

libximc

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# Chapter 1

## libximc library

Documentation for libximc library.

Libximc is **thread safe**, cross-platform library for working with 8SMC4-USB and 8SMC5-USB controllers.

Full documentation about controllers is [there](#)

Full documentation about libximc API is available on the page [ximc.h](#).

### 1.1 What the controller does

- Supports input and output synchronization signals to ensure the joint operation of multiple devices within a complex system ;.
- Works with all compact stepper motors with a winding current of up to 3 A, without feedback, as well as with stepper motors equipped with an encoder in the feedback circuit, including a linear encoder on the positioner.
- Manages controller using ready-made [xilab software](#) or using examples which allow rapid development using C++, C#, .NET, Delphi, Visual Basic, Xcode, Python, Matlab, Java, LabWindows and LabVIEW.

### 1.2 What can do libximc library

- Libximc manages controller using interfaces: USB 2.0, RS232 and Ethernet, also uses a common and proven virtual serial port interface, so you can work with motor control modules through this library under almost all operating systems, including Windows, Linux and MacOS X
- Libximc library supports plug/unplug on the fly. Each device can be controlled only by one program at once. **Multiple processes (programs) that control one device simultaneously are not allowed!**

#### Warning

Libximc library opens the controller in exclusive access mode. Any controller opened with libximc (XiLab also uses this library) needs to be closed before it may be used by another process. So at first check that you have closed XiLab or other software dealing with the controller before trying to reopen the controller.

Please read the [Introduction](#) to start work with library.

To use libximc in your project please consult with [How to use with...](#)

## 1.3 Assistance

Many thanks to everyone who sends us **errors** and **suggestions**. We appreciate your suggestions and try to make our product better!

# Chapter 2

## Introduction

### 2.1 About library

This document contains all information about libximc library. It utilizes well known virtual COM-port interface, so you can use it on Windows, Linux, MacOS X for Intel and Apple Silicon (via Rosetta 2) including 64-bit versions. Multi-platform programming library supports plug/unplug on the fly.

**Each device can be controlled only by one program at once. Multiple processes (programs) that control one device simultaneously are not allowed.**

#### 2.1.1 Supported OS and environment requirements:

- MacOS X 10.6 or newer
- Windows 2000 or newer
- Linux debian-based. DEB package is built against Debian Squeeze 7
- Linux debian-based ARM. DEB package is built on Ubuntu 14.04
- Linux rpm-based. RPM is built against OpenSUSE 12

Build requirements:

- Windows: Microsoft Visual C++ 2013 or newer, MATLAB, Code::Blocks, Delphi, Java, Python, cygwin with tar, bison, flex, curl, 7z mingw
- UNIX: gcc 4 or newer, gmake, doxygen, LaTeX, flex 2.5.30+, bison 2.3+, autotools (autoconf, autoheader, aclocal, automake, autoreconf, libtool)
- MacOS X: XCode 4 or newer, doxygen, mactex, autotools (autoconf, autoheader, aclocal, automake, autoreconf, libtool)

## Chapter 3

# How to rebuild library

### 3.1 Building on Windows

Requirements: 64-bit windows (build script builds both architectures), cygwin (must be installed to a default path).

Invoke a script:

```
./build.bat
```

Grab packages from ./deb/win32 and ./deb/win64

To build debug version of the library set environment variable "DEBUG" to "true" before running the build script.

### 3.2 Building on debian-based linux systems

Requirement: 64-bit and 32-bit debian system, ubuntu Typical set of packages:

```
sudo apt-get install build-essential make cmake curl git ruby1.9.1 autotools-  
dev automake autoconf libtool doxygen bison flex debhelper lintian texlive texlive-  
-latex-extra texlive-latex texlive-fonts-extra texlive-lang-cyrillic java-1.7.0-  
openjdk java-1.7.0-openjdk-devel default-jre-headless default-jdk openjdk-6-jdk  
rpm-build rpm-devel rpmlint pkg-config check dh-autoreconf hardening-wrapper  
libfl-dev lsb-release
```

For ARM cross-compiling install gcc-arm-linux-gnueabi from your ARM toolchain.

It's required to match library and host architecture: 32-bit library can be built only at 32-bit host, 64-bit library - only at 64-bit host. ARM library is built with armhf cross-compiler gcc-arm-linux-gnueabi.

To build library and package invoke a script:

```
./build.sh libdeb
```

For ARM library replace 'libdeb' with 'libdebarm'.

Grab packages from ./ximc/deb and locally installed binaries from ./dist/local.

### 3.3 Building on MacOS X

To build and package a script invoke a script:

```
./build.sh libosx
```

Built library (classical and framework), examples (classical and .app), documentation are located at `./ximc/macosex`, locally installed binaries from `./dist/local`.

## 3.4 Building on generic UNIX

Generic version could be built with standard autotools.

```
./build.sh lib
```

Built files (library, headers, documentation) are installed to `./dist/local` directory. It is a generic developer build. Sometimes you need to specify additional parameters to command line for your machine. Please look to following OS sections.

## 3.5 Building on redhat-based linux systems

Requirement: 64-bit redhat-based system (Fedora, Red Hat, SUSE) Typical set of packages:

```
sudo apt-get install build-essential make cmake curl git ruby1.9.1 autotools-  
dev automake autoconf libtool doxygen bison flex debhelper lintian texlive texlive  
-latex-extra texlive-latex texlive-fonts-extra texlive-lang-cyrillic java-1.7.0-  
openjdk java-1.7.0-openjdk-devel default-jre-headless default-jdk openjdk-6-jdk  
rpm-build rpm-devel rpmlint pkg-config check dh-autoreconf hardening-wrapper  
libf1-dev lsb-release
```

It's possible to build both 32- and 64-bit libraries on 64-bit host system. 64-bit library can't be built on 32-bit system.

To build library and package invoke a script:

```
./build.sh librpm
```

Grab packages from `./ximc/rpm` and locally installed binaries from `./dist/local`.

## 3.6 Source code access

The source codes of the libximc library can be found on [github](#).

## Chapter 4

# How to use with...

To acquire the first skills of using the library, a simple `testappeasy_C` test application has been created. Languages other than C are supported using calls with conversion of arguments of the `stdcall` type. A simple C test application is located in the `'examples/test_C'` directory, a C# project is located in `'examples/test_CSharp'`, on VB.NET - in `'examples/test_VBNET'`, for delphi 6 - in `'example/test_Delphi'`, for matlab - `'examples/test_MATLAB'`, for Java - `'examples/test_Java'`, for Python - `'examples/test_Python'`, for LabWindows - `'examples/test_LabWindows'`. Libraries, header files and other necessary files are located in the directories `'ximc/win32'`, `'ximc/win64'`, `'ximc/macosx'` and the like. The developer kit also includes already compiled examples: `testapp` and `testappeasy` x32 and x64 bits for windows and only x64 bits for macOS X, `test_CSharp`, `test_VBNET`, `test_Delphi` - only x32 bits, `test_Java` - cross-platform, `test_MATLAB` and `test_Python` do not require compilation, `test_LabWindows` - 64-bit build is installed by default.

### Note

SDK requires Microsoft Visual C++ Redistributable Package (provided with SDK - `vcredist_x86` or `vcredist_x64`)

On Linux both the `libximc7_x.x.x` and `libximc7-dev_x.x.x` target architecture in the specified order. For install packages, you can use the `.deb` command: `dpkg -i filename.deb`, where `filename.deb` is the name of the package (packages in Debian have the extension `.deb`). You must run `dpkg` with superuser privileges (`root`).

`Testapp` can be built using `testapp.sln`. Library must be compiled with MS Visual C++ too, `mingw-library`. Make sure that Microsoft Visual C++ Redistributable Package is installed.

Open solution `examples/testapp/testapp.sln`, build and run from the IDE.

In case of the 8SMC4-USB-Eth1 Ethernet adapter usage it is necessary to set correct IP address of the Ethernet adapter in `testapp.c` file before build (see `enumerate_hints` variable).

`Testappeasy_C` and `testapp_C` can be built using `testappeasy_C.cbp` and `testapp_C.cbp` respectively. Library must be compiled with MS Visual C++ too, `mingw-library`. Make sure that Microsoft Visual C++ Redistributable Package is installed. \*

Open solution `examples/test_C/testappeasy_C/testappeasy_C/testappeasy_C.cbp` or `examples/test_C/testapp_C/testapp_C.cbp`, build and run from the IDE.

MinGW is a port of GCC to win32 platform. It's required to install MinGW package.

MinGW-compiled `testapp` can be built with MS Visual C++ or `mingw` library.

```
mingw32-make -f Makefile.mingw all
```

Then copy library `libximc.dll` to current directory and launch `testapp.exe`.

In case of the 8Eth1 Ethernet adapter usage it is necessary to set correct IP address of the Ethernet adapter in `testapp.c` file before build (see `enumerate_hints` variable).

First of all, you should create a library suitable for C++ Builder. **Visual C++ and Builder libraries are not compatible** Invoke:

```
implib libximc.lib libximc.def
```

Then compile test application:

```
bcc32 -I..\..\ximc\win32 -L..\..\ximc\win32 -DWIN32 -DNDEBUG -DWINDOWS testapp
.c libximc.lib
```

In case of the 8Eth1 Ethernet adapter usage it is necessary to set correct IP address of the Ethernet adapter in testapp.c file before build (see enumerate\_hints variable).

There is also an **unsupported example** of using libximc in a C++ Builder project

testapp should be built with XCode project testapp.xcodeproj. Library is a MacOS X framework, and at example application it's bundled inside testapp.app

Then launch application testapp.app and check activity output in Console.app.

In case of the 8Eth1 Ethernet adapter usage it is necessary to set correct IP address of the Ethernet adapter in testapp.c file before build (see enumerate\_hints variable). There is also **an example of using the libximc library** in a C++ Builder project, **but it is not supported**.

Make sure that libximc (rpm or deb) is installed at your system. Installation of package should be performed with a package manager of operating system. On MacOS X a framework is provided.

Note that user should belong to system group which allows access to a serial port (dip or serial, for example).

Test application can be built with the installed library with the following script:

```
make
```

In case of cross-compilation (target architecture differs from the current system architecture) feed -m64 or -m32 flag to compiler. On MacOS X it's needed to use -arch flag instead to build an universal binary. Please consult a compiler documentation.

Then launch the application as:

```
make run
```

Note: make run on MacOS X copies a library to the current directory. If you want to use library from the custom directory please be sure to specify LD\_LIBRARY\_PATH or DYLD\_LIBRARY\_PATH to the directory with the library.

In case of the 8SMC4-USB-Eth1 Ethernet adapter usage it is necessary to set correct IP address of the Ethernet adapter in testapp.c file before build (see enumerate\_hints variable).

Wrapper assembly for libximc.dll is ximc/winX/wrappers/csharp/ximcnet.dll. It is provided with two different architectures. Tested on platforms .NET from 2.0 to 4.5.1

Test .NET applications for Visual Studio 2013 is located at test\_CSharp (for C#) and test\_VBNET (for VB.NET) respectively. Open solutions and build it.

In case of the 8SMC4-USB-Eth1 Ethernet adapter usage it is necessary to set correct IP address of the Ethernet adapter in testapp.cs or testapp.vb file (depending on programming language) before build (see enumerate\_hints variable for C# or enum\_hints variable for VB).

Wrapper for libximc.dll is a unit ximc/winX/wrappers/delphi/ximc.pas

Console test application for is located at test\_Delphi. Tested on Delphi 6 and only 32-bit version.

Just compile, place .dll near the executable and run program.

In case of the 8Eth1 Ethernet adapter usage it is necessary to set correct IP address of the Ethernet adapter in test\_Delphi.dpr file before build (see enum\_hints variable).

How to run example on Linux. Go to to examples/test\_Java/compiled-winX/ and run:

---

```
java -cp /usr/share/java/libximc.jar:test_Java.jar ru.ximc.TestJava
```

How to run example on Windows. Go to to examples/test\_Java/compiled-winX/. Then run:

```
java -classpath libximc.jar -classpath test_Java.jar ru.ximc.TestJava
```

How to modify and recompile an example. Go to to examples/test\_Java/compiled. Sources are embedded in a test\_Java.jar. Extract them:

```
jar xvf test_Java.jar ru META-INF
```

Then rebuild sources:

```
javac -classpath /usr/share/java/libximc.jar -Xlint ru/ximc/TestJava.java
```

or for Windows or MacOS X

```
javac -classpath libximc.jar -Xlint ru/ximc/TestJava.java
```

Then build a jar:

```
jar cmf META-INF/MANIFEST.MF test_Java.jar ru
```

In case of the 8Eth1 Ethernet adapter usage it is necessary to set correct IP address of the Ethernet adapter in TestJava.java file before build (see ENUM\_HINTS variable).

Change current directory to the examples/test\_Python/xxxctest. NB: For libximc usage, the example uses the wrapper module ximc/crossplatform/wrappers/python/libximc.

To run:

```
python xxxx.py
```

In case of the 8Eth1 Ethernet adapter usage, it's necessary to set correct IP address of the Ethernet adapter in test\_Python.py file before launch (see enum\_hints variable).

Sample MATLAB program testximc.m is provided at the directory examples/test\_MATLAB. On windows copy [ximc.h](#), libximc.dll, bindy.dll, xiwrapper.dll and contents of ximc/(win32,win64)/wrappers/matlab/ directory to the current directory.

Before launch:

On MacOS X: copy ximc/macosx/libximc.framework, ximc/macosx/wrappers/ximcm.h, ximc/ximc.h to the directory examples/test\_MATLAB. Install XCode compatible with Matlab.

On Linux: install libximc\*deb and libximc-dev\*dev of target architecture. Then copy ximc/macosx/wrappers/ximcm.h to the directory examples/matlab. Install gcc compatible with Matlab.

For XCode and gcc version compatibility check document <https://www.mathworks.com/content/dam/mathworks/mathworks/SystemRequirements-Release2014a-SupportedCompilers.pdf> or similar.

On Windows before the start nothing needs to be done

Change current directory in the MATLAB to the examples/test\_MATLAB. Then launch in MATLAB prompt:

```
testximc
```

In case of the 8Eth1 Ethernet adapter usage it is necessary to set correct IP address of the Ethernet adapter in testximc.m file before launch (see enum\_hints variable).

## 4.1 Generic logging facility

If you want to turn on file logging, you should run the program that uses libximc library with the "XILog" environment variable set to desired file name. This file will be opened for writing on the first log event and will be closed when the program which uses libximc terminates. Data which is sent to/received from the controller is logged along with port open and close events.

## 4.2 Required permissions

libximc generally does not require special permissions to work, it only needs read/write access to USB-serial ports on the system. An exception to this rule is a Windows-only "fix\_usbser\_sys()" function - it needs elevation and will produce null result if run as a regular user.

## 4.3 C-profiles

C-profiles are header files distributed with the libximc library. They enable one to set all controller settings for any of the supported stages with a single function call in a C/C++ program.

You may see how to use C-profiles in the example directory "examples/test\_C/testprofile\_C".

## 4.4 Python-profiles

Python-profiles are sets of configuration functions distributed with the libximc library. They allow to load the controller with settings of one of the supported stages using a single function call in a Python program.

You may see how to use Python-profiles in the example "examples/test\_Python/profiletest/testpythonprofile.py".

## Chapter 5

# Working with user units

In addition to working in basic units(steps, encoder value), the library allows you to work with user units. For this purpose are used:

- The structure of the conversion units [calibration\\_t](#)
- The functions of which have doubles for working with user units, data structures for these functions
- Coordinate correction table for more accurate positioning

### 5.1 The structure of the conversion units `calibration_t`

To specify conversion of the basic units in the user and back, [calibration\\_t](#) structure is used. With the help of coefficients A and MicrostepMode, specified in this structure, steps and microsteps which are integers are converted into the user value of the real type and back.

Conversion formulas:

- The conversion to user units.

```
user_value = A*(step + mstep/pow(2, MicrostepMode-1))
```

- Conversion from user units.

```
step = (int)(user_value/A)
mstep = (user_value/A - step)*pow(2, MicrostepMode-1)
```

### 5.2 Alternative functions for working with user units and data structures for them

Structures and functions for working with user units have the `_calb` postfix. The user using these functions can perform all actions in their own units without worrying about the computations of the controller. The data format of `_calb` structures is described in detail. For `_calb` functions particular descriptions are not used. They perform the same actions as the basic functions do. The difference between them and the basic functions is in the position, velocity, and acceleration of the data types defined as user-defined. If clarification for `_calb` functions is necessary, they are provided as notes in the description of the basic functions.

## 5.3 Coordinate correction table for more accurate positioning

Some functions for working with user units support coordinate transformation using a correction table. To load a table from a file, the `load_correction_table()` function is used. Its description contains the functions and their data supporting correction.

### Note

For data fields which are corrected in case of loading of the table in the description of the field is written - corrected by the table.

### File format:

- two columns separated by tabs;
- column headers are string;
- real type data, point is a separator;
- the first column is the coordinate, the second is the deviation caused by a mechanical error;
- the deviation between coordinates is calculated linearly;
- constant is equal to the deviation at the boundary beyond the range;
- maximum length of the table is 100 lines.

### Sample file:

```
X dX
0 0
5.0 0.005
10.0 -0.01
```

# Chapter 6

## Data Structure Documentation

### 6.1 accessories\_settings\_t Struct Reference

Deprecated.

#### Data Fields

- char [MagneticBrakeInfo](#) [25]  
*The manufacturer and the part number of magnetic brake, the maximum string length is 24 characters.*
- float [MBRatedVoltage](#)  
*Rated voltage for controlling the magnetic brake (V).*
- float [MBRatedCurrent](#)  
*Rated current for controlling the magnetic brake (A).*
- float [MBTorque](#)  
*Retention moment (mN \* m).*
- unsigned int [MBSettings](#)  
*Magnetic brake settings flags.*
- char [TemperatureSensorInfo](#) [25]  
*The manufacturer and the part number of the temperature sensor, the maximum string length: 24 characters.*
- float [TSMIn](#)  
*The minimum measured temperature (degrees Celsius) Data type: float.*
- float [TSMaX](#)  
*The maximum measured temperature (degrees Celsius) Data type: float.*
- float [TSGraD](#)  
*The temperature gradient (V/degrees Celsius).*
- unsigned int [TSSettings](#)  
*Temperature sensor settings flags.*
- unsigned int [LimitSwitchesSettings](#)  
*Temperature sensor settings flags.*

#### 6.1.1 Detailed Description

Deprecated.

Additional accessories' information.

See Also

[set\\_accessories\\_settings](#)  
[get\\_accessories\\_settings](#)  
[get\\_accessories\\_settings](#), [set\\_accessories\\_settings](#)

## 6.1.2 Field Documentation

### 6.1.2.1 unsigned int LimitSwitchesSettings

[Temperature sensor settings flags.](#)

### 6.1.2.2 char MagneticBrakeInfo[25]

The manufacturer and the part number of magnetic brake, the maximum string length is 24 characters.

### 6.1.2.3 float MBRatedCurrent

Rated current for controlling the magnetic brake (A).

Data type: float.

### 6.1.2.4 float MBRatedVoltage

Rated voltage for controlling the magnetic brake (V).

Data type: float.

### 6.1.2.5 unsigned int MBSettings

[Magnetic brake settings flags.](#)

### 6.1.2.6 float MBTorque

Retention moment (mN \* m).

Data type: float.

### 6.1.2.7 char TemperatureSensorInfo[25]

The manufacturer and the part number of the temperature sensor, the maximum string length: 24 characters.

### 6.1.2.8 float TSGrad

The temperature gradient (V/degrees Celsius).

Data type: float.

### 6.1.2.9 float TSMax

The maximum measured temperature (degrees Celsius) Data type: float.

## 6.1.2.10 float TSMIn

The minimum measured temperature (degrees Celsius) Data type: float.

## 6.1.2.11 unsigned int TSSettings

[Temperature sensor settings flags.](#)

## 6.2 analog\_data\_t Struct Reference

Analog data.

## Data Fields

- unsigned int [A1Voltage\\_ADC](#)  
*"Voltage on pin 1 winding A" raw data from ADC.*
- unsigned int [A2Voltage\\_ADC](#)  
*"Voltage on pin 2 winding A" raw data from ADC.*
- unsigned int [B1Voltage\\_ADC](#)  
*"Voltage on pin 1 winding B" raw data from ADC.*
- unsigned int [B2Voltage\\_ADC](#)  
*"Voltage on pin 2 winding B" raw data from ADC.*
- unsigned int [SupVoltage\\_ADC](#)  
*"Supply voltage of H-bridge's MOSFETs" raw data from ADC.*
- unsigned int [ACurrent\\_ADC](#)  
*"Winding A current" raw data from ADC.*
- unsigned int [BCurrent\\_ADC](#)  
*"Winding B current" raw data from ADC.*
- unsigned int [FullCurrent\\_ADC](#)  
*"Full current" raw data from ADC.*
- unsigned int [Temp\\_ADC](#)  
*Voltage from temperature sensor, raw data from ADC.*
- unsigned int [Joy\\_ADC](#)  
*Joystick raw data from ADC.*
- unsigned int [Pot\\_ADC](#)  
*Voltage on analog input, raw data from ADC.*
- unsigned int [L5\\_ADC](#)  
*USB supply voltage after the current sense resistor, raw data from ADC.*
- unsigned int [H5\\_ADC](#)  
*USB Power supply from ADC.*
- int [A1Voltage](#)  
*"Voltage on pin 1 winding A" calibrated data (in tens of mV).*
- int [A2Voltage](#)  
*"Voltage on pin 2 winding A" calibrated data (in tens of mV).*
- int [B1Voltage](#)  
*"Voltage on pin 1 winding B" calibrated data (in tens of mV).*
- int [B2Voltage](#)  
*"Voltage on pin 2 winding B" calibrated data (in tens of mV).*

- int [SupVoltage](#)  
*"Supply voltage on the top of H-bridge's MOSFETs" calibrated data (in tens of mV).*
- int [ACurrent](#)  
*"Winding A current" calibrated data (in mA).*
- int [BCurrent](#)  
*"Winding B current" calibrated data (in mA).*
- int [FullCurrent](#)  
*"Full current" calibrated data (in mA).*
- int [Temp](#)  
*Temperature, calibrated data (in tenths of degrees Celsius).*
- int [Joy](#)  
*Joystick, calibrated data.*
- int [Pot](#)  
*Analog input, calibrated data.*
- int [L5](#)  
*USB supply voltage after the current sense resistor (in tens of mV).*
- int [H5](#)  
*USB power supply (in tens of mV).*
- unsigned int **deprecated**
- int [R](#)  
*Motor winding resistance in mOhms (is only used with stepper motors).*
- int [L](#)  
*Motor winding pseudo inductance in uH (is only used with stepper motors).*

### 6.2.1 Detailed Description

Analog data.

This structure contains raw analog data from the embedded ADC. These data are used for device testing and deep recalibration by the manufacturer only.

See Also

[get\\_analog\\_data](#)  
[get\\_analog\\_data](#)

### 6.2.2 Field Documentation

#### 6.2.2.1 int A1Voltage

"Voltage on pin 1 winding A" calibrated data (in tens of mV).

#### 6.2.2.2 unsigned int A1Voltage\_ADC

"Voltage on pin 1 winding A" raw data from ADC.

#### 6.2.2.3 int A2Voltage

"Voltage on pin 2 winding A" calibrated data (in tens of mV).

6.2.2.4 unsigned int A2Voltage\_ADC

"Voltage on pin 2 winding A" raw data from ADC.

6.2.2.5 int ACurrent

"Winding A current" calibrated data (in mA).

6.2.2.6 unsigned int ACurrent\_ADC

"Winding A current" raw data from ADC.

6.2.2.7 int B1Voltage

"Voltage on pin 1 winding B" calibrated data (in tens of mV).

6.2.2.8 unsigned int B1Voltage\_ADC

"Voltage on pin 1 winding B" raw data from ADC.

6.2.2.9 int B2Voltage

"Voltage on pin 2 winding B" calibrated data (in tens of mV).

6.2.2.10 unsigned int B2Voltage\_ADC

"Voltage on pin 2 winding B" raw data from ADC.

6.2.2.11 int BCurrent

"Winding B current" calibrated data (in mA).

6.2.2.12 unsigned int BCurrent\_ADC

"Winding B current" raw data from ADC.

6.2.2.13 int FullCurrent

"Full current" calibrated data (in mA).

6.2.2.14 unsigned int FullCurrent\_ADC

"Full current" raw data from ADC.

6.2.2.15 int H5

USB power supply (in tens of mV).

6.2.2.16 int Joy

Joystick, calibrated data.

Range: 0..10000

6.2.2.17 unsigned int Joy\_ADC

Joystick raw data from ADC.

6.2.2.18 int L

Motor winding pseudo inductance in uH (is only used with stepper motors).

6.2.2.19 int L5

USB supply voltage after the current sense resistor (in tens of mV).

6.2.2.20 unsigned int L5\_ADC

USB supply voltage after the current sense resistor, raw data from ADC.

6.2.2.21 int Pot

Analog input, calibrated data.

Range: 0..10000

6.2.2.22 int R

Motor winding resistance in mOhms (is only used with stepper motors).

6.2.2.23 int SupVoltage

"Supply voltage on the top of H-bridge's MOSFETs" calibrated data (in tens of mV).

6.2.2.24 unsigned int SupVoltage\_ADC

"Supply voltage of H-bridge's MOSFETs" raw data from ADC.

6.2.2.25 int Temp

Temperature, calibrated data (in tenths of degrees Celsius).

6.2.2.26 unsigned int Temp\_ADC

Voltage from temperature sensor, raw data from ADC.

## 6.3 brake\_settings\_t Struct Reference

Brake settings.

### Data Fields

- unsigned int [t1](#)  
*Time in ms between turning on motor power and turning off the brake.*
- unsigned int [t2](#)  
*Time in ms between the brake turning off and moving readiness.*
- unsigned int [t3](#)  
*Time in ms between motor stop and the brake turning on.*
- unsigned int [t4](#)  
*Time in ms between turning on the brake and turning off motor power.*
- unsigned int [BrakeFlags](#)  
*Brake settings flags.*

### 6.3.1 Detailed Description

Brake settings.

This structure contains brake control parameters.

See Also

[set\\_brake\\_settings](#)  
[get\\_brake\\_settings](#)  
[get\\_brake\\_settings](#), [set\\_brake\\_settings](#)

### 6.3.2 Field Documentation

#### 6.3.2.1 unsigned int BrakeFlags

[Brake settings flags.](#)

#### 6.3.2.2 unsigned int t1

Time in ms between turning on motor power and turning off the brake.

#### 6.3.2.3 unsigned int t2

Time in ms between the brake turning off and moving readiness.

All moving commands will execute after this interval.

#### 6.3.2.4 unsigned int t3

Time in ms between motor stop and the brake turning on.

#### 6.3.2.5 unsigned int t4

Time in ms between turning on the brake and turning off motor power.

## 6.4 calibration\_settings\_t Struct Reference

Calibration settings.

### Data Fields

- float [CSS1\\_A](#)  
*Scaling factor for the analog measurements of the A winding current.*
- float [CSS1\\_B](#)  
*Offset for the analog measurements of the A winding current.*
- float [CSS2\\_A](#)  
*Scaling factor for the analog measurements of the B winding current.*
- float [CSS2\\_B](#)  
*Offset for the analog measurements of the B winding current.*
- float [FullCurrent\\_A](#)  
*Scaling factor for the analog measurements of the full current.*
- float [FullCurrent\\_B](#)  
*Offset for the analog measurements of the full current.*

### 6.4.1 Detailed Description

Calibration settings.

This structure contains calibration settings. These settings are used to convert bare ADC values to winding currents in mA and the full current in mA. Parameters are grouped into pairs, XXX\_A and XXX\_B, representing linear equation coefficients. The first one is the slope, the second one is the constant term. Thus,  $XXX\_Current[mA] = XXX\_A[mA/ADC]*XXX\_ADC\_CODE[ADC] + XXX\_B[mA]$ .

See Also

[get\\_calibration\\_settings](#)  
[set\\_calibration\\_settings](#)  
[get\\_calibration\\_settings, set\\_calibration\\_settings](#)

### 6.4.2 Field Documentation

#### 6.4.2.1 float CSS1\_A

Scaling factor for the analog measurements of the A winding current.

#### 6.4.2.2 float CSS1\_B

Offset for the analog measurements of the A winding current.

#### 6.4.2.3 float CSS2\_A

Scaling factor for the analog measurements of the B winding current.

#### 6.4.2.4 float CSS2\_B

Offset for the analog measurements of the B winding current.

6.4.2.5 float FullCurrent\_A

Scaling factor for the analog measurements of the full current.

6.4.2.6 float FullCurrent\_B

Offset for the analog measurements of the full current.

## 6.5 calibration\_t Struct Reference

Calibration structure.

### Data Fields

- double [A](#)  
*is a conversion factor which is equal number of millimeters (or other units) per one step*
- unsigned int [MicrostepMode](#)  
*is a controller setting which is determine a step division mode*

### 6.5.1 Detailed Description

Calibration structure.

## 6.6 chart\_data\_t Struct Reference

Additional device state.

### Data Fields

- int [WindingVoltageA](#)  
*In case of a step motor, it contains the voltage across the winding A (in tens of mV); in case of a brushless motor, it contains the voltage on the first coil; in case of a DC motor, it contains the only winding current.*
- int [WindingVoltageB](#)  
*In case of a step motor, it contains the voltage across the winding B (in tens of mV); in case of a brushless motor, it contains the voltage on the second winding; and in case of a DC motor, this field is not used.*
- int [WindingVoltageC](#)  
*In case of a brushless motor, it contains the voltage on the third winding (in tens of mV); in the case of a step motor and a DC motor, the field is not used.*
- int [WindingCurrentA](#)  
*In case of a step motor, it contains the current in the winding A (in mA); in case of a brushless motor, it contains the current in the winding A; and in case of a DC motor, it contains the only winding current.*
- int [WindingCurrentB](#)  
*In case of a step motor, it contains the current in the winding B (in mA); in case of a brushless motor, it contains the current in the winding B; and in case of a DC motor, the field is not used.*
- int [WindingCurrentC](#)  
*In case of a brushless motor, it contains the current in the winding C (in mA); in case of a step motor and a DC motor, the field is not used.*
- unsigned int [Pot](#)

- *Analog input value, dimensionless.*  
• unsigned int `Joy`  
*The joystick position, dimensionless.*
- int `DutyCycle`  
*PWM duty cycle.*

### 6.6.1 Detailed Description

Additional device state.

This structure contains additional values such as winding's voltages, currents, and temperature.

See Also

[get\\_chart\\_data](#)  
[get\\_chart\\_data](#)

### 6.6.2 Field Documentation

#### 6.6.2.1 int `DutyCycle`

PWM duty cycle.

#### 6.6.2.2 unsigned int `Joy`

The joystick position, dimensionless.

Range: 0..10000

#### 6.6.2.3 unsigned int `Pot`

Analog input value, dimensionless.

Range: 0..10000

#### 6.6.2.4 int `WindingCurrentA`

In case of a step motor, it contains the current in the winding A (in mA); in case of a brushless motor, it contains the current in the winding A; and in case of a DC motor, it contains the only winding current.

#### 6.6.2.5 int `WindingCurrentB`

In case of a step motor, it contains the current in the winding B (in mA); in case of a brushless motor, it contains the current in the winding B; and in case of a DC motor, the field is not used.

#### 6.6.2.6 int `WindingCurrentC`

In case of a brushless motor, it contains the current in the winding C (in mA); in case of a step motor and a DC motor, the field is not used.

#### 6.6.2.7 int WindingVoltageA

In case of a step motor, it contains the voltage across the winding A (in tens of mV); in case of a brushless motor, it contains the voltage on the first coil; in case of a DC motor, it contains the only winding current.

#### 6.6.2.8 int WindingVoltageB

In case of a step motor, it contains the voltage across the winding B (in tens of mV); in case of a brushless motor, it contains the voltage on the second winding; and in case of a DC motor, this field is not used.

#### 6.6.2.9 int WindingVoltageC

In case of a brushless motor, it contains the voltage on the third winding (in tens of mV); in the case of a step motor and a DC motor, the field is not used.

## 6.7 control\_settings\_calb\_t Struct Reference

User unit control settings.

### Data Fields

- float [MaxSpeed](#) [10]  
*Array of speeds used with the joystick and the button control.*
- unsigned int [Timeout](#) [9]  
*Timeout[i] is timeout in ms.*
- unsigned int [MaxClickTime](#)  
*Maximum click time (in ms).*
- unsigned int [Flags](#)  
*Control flags.*
- float [DeltaPosition](#)  
*Position shift (delta)*

### 6.7.1 Detailed Description

User unit control settings.

This structure contains control parameters.

In case of CTL\_MODE=1, the joystick motor control is enabled. In this mode, while the joystick is maximally displaced, the engine tends to move at MaxSpeed[i]. i=0 if another value hasn't been set at the previous usage. To change the speed index "i", use the buttons.

In case of CTL\_MODE=2, the motor is controlled by the left/right buttons. When you click on the button, the motor starts moving in the appropriate direction at a speed MaxSpeed[0]. After Timeout[i], the motor moves at speed MaxSpeed[i+1]. At the transition between MaxSpeed[i] and MaxSpeed[i+1] the motor just accelerates/decelerates as usual.

See Also

[set\\_control\\_settings\\_calb](#)  
[get\\_control\\_settings\\_calb](#)  
[get\\_control\\_settings](#), [set\\_control\\_settings](#)

## 6.7.2 Field Documentation

### 6.7.2.1 unsigned int Flags

Control flags.

### 6.7.2.2 unsigned int MaxClickTime

Maximum click time (in ms).

Until the expiration of this time, the first speed isn't applied.

### 6.7.2.3 float MaxSpeed[10]

Array of speeds used with the joystick and the button control.

### 6.7.2.4 unsigned int Timeout[9]

Timeout[i] is timeout in ms.

After that, max\_speed[i+1] is applied. It's used with the button control only.

## 6.8 control\_settings\_t Struct Reference

Control settings.

### Data Fields

- unsigned int [MaxSpeed](#) [10]  
*Array of speeds (full step) used with the joystick and the button control.*
- unsigned int [uMaxSpeed](#) [10]  
*Array of speeds (in microsteps) used with the joystick and the button control.*
- unsigned int [Timeout](#) [9]  
*Timeout[i] is timeout in ms.*
- unsigned int [MaxClickTime](#)  
*Maximum click time (in ms).*
- unsigned int [Flags](#)  
*Control flags.*
- int [DeltaPosition](#)  
*Position Shift (delta) (full step)*
- int [uDeltaPosition](#)  
*Fractional part of the shift in micro steps.*

### 6.8.1 Detailed Description

Control settings.

This structure contains control parameters.

In case of CTL\_MODE=1, the joystick motor control is enabled. In this mode, while the joystick is maximally displaced, the engine tends to move at MaxSpeed[i]. i=0 if another value hasn't been set at the previous usage. To change the speed index "i", use the buttons.

In case of CTL\_MODE=2, the motor is controlled by the left/right buttons. When you click on the button, the motor starts moving in the appropriate direction at a speed MaxSpeed[0]. After Timeout[i], motor moves at speed MaxSpeed[i+1]. At the transition between MaxSpeed[i] and MaxSpeed[i+1] the motor just accelerates/decelerates as usual.

See Also

[set\\_control\\_settings](#)  
[get\\_control\\_settings](#)  
[get\\_control\\_settings](#), [set\\_control\\_settings](#)

## 6.8.2 Field Documentation

### 6.8.2.1 unsigned int Flags

[Control flags](#).

### 6.8.2.2 unsigned int MaxClickTime

Maximum click time (in ms).

Until the expiration of this time, the first speed isn't applied.

### 6.8.2.3 unsigned int MaxSpeed[10]

Array of speeds (full step) used with the joystick and the button control.

Range: 0..100000.

### 6.8.2.4 unsigned int Timeout[9]

Timeout[i] is timeout in ms.

After that, max\_speed[i+1] is applied. It's used with the button control only.

### 6.8.2.5 int uDeltaPosition

Fractional part of the shift in micro steps.

It's used with a stepper motor only. The microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine\_settings).

### 6.8.2.6 unsigned int uMaxSpeed[10]

Array of speeds (in microsteps) used with the joystick and the button control.

The microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine\_settings).

## 6.9 controller\_name\_t Struct Reference

Controller name and settings flags.

### Data Fields

- char [ControllerName](#) [17]  
*User controller name.*
- unsigned int [CtrlFlags](#)  
*Flags of internal controller settings.*

### 6.9.1 Detailed Description

Controller name and settings flags.

See Also

[get\\_controller\\_name](#), [set\\_controller\\_name](#)

### 6.9.2 Field Documentation

#### 6.9.2.1 char ControllerName[17]

User controller name.

It may be set by the user. Max string length: 16 characters.

#### 6.9.2.2 unsigned int CtrlFlags

[Flags of internal controller settings.](#)

## 6.10 ctp\_settings\_t Struct Reference

Control position settings (used with stepper motor only)

### Data Fields

- unsigned int [CTPMinError](#)  
*The minimum difference between the SM position in steps and the encoder position that causes the setting of the STATE\_CTP\_ERROR flag.*
- unsigned int [CTPFlags](#)  
*Position control flags.*

### 6.10.1 Detailed Description

Control position settings (used with stepper motor only)

When controlling the step motor with the encoder (CTP\_BASE=0), it is possible to detect the loss of steps. The controller knows the number of steps per revolution (GENG::StepsPerRev) and the encoder resolution (GFBS::IPT). When the control is enabled (CTP\_ENABLED is set), the controller stores the

current position in the steps of SM and the current position of the encoder. Next, the encoder position is converted into steps at each step, and if the difference between the current position in steps and the encoder position is greater than CTPMinError, the flag STATE\_CTP\_ERROR is set.

Alternatively, the stepper motor may be controlled with the speed sensor (CTP\_BASE 1). In this mode, at the active edges of the input clock, the controller stores the current value of steps. Then, at each revolution, the controller checks how many steps have been passed. When the difference is over the CTPMinError, the STATE\_CTP\_ERROR flag is set.

See Also

[set\\_ctp\\_settings](#)  
[get\\_ctp\\_settings](#)  
[get\\_ctp\\_settings](#), [set\\_ctp\\_settings](#)

## 6.10.2 Field Documentation

### 6.10.2.1 unsigned int CTPFlags

[Position control flags.](#)

### 6.10.2.2 unsigned int CTPMinError

The minimum difference between the SM position in steps and the encoder position that causes the setting of the STATE\_CTP\_ERROR flag.

Measured in steps.

## 6.11 debug\_read\_t Struct Reference

Debug data.

### Data Fields

- `uint8_t DebugData [128]`  
*Arbitrary debug data.*

### 6.11.1 Detailed Description

Debug data.

These data are used for device debugging by the manufacturer.

See Also

[get\\_debug\\_read](#)

## 6.11.2 Field Documentation

### 6.11.2.1 uint8\_t DebugData[128]

Arbitrary debug data.

## 6.12 debug\_write\_t Struct Reference

Debug data.

### Data Fields

- uint8\_t [DebugData](#) [128]  
*Arbitrary debug data.*

### 6.12.1 Detailed Description

Debug data.

These data are used for device debugging by the manufacturer.

See Also

[set\\_debug\\_write](#)

### 6.12.2 Field Documentation

#### 6.12.2.1 uint8\_t DebugData[128]

Arbitrary debug data.

## 6.13 device\_information\_t Struct Reference

Controller information structure.

### Data Fields

- char [Manufacturer](#) [5]  
*Manufacturer.*
- char [ManufacturerId](#) [3]  
*Manufacturer id.*
- char [ProductDescription](#) [9]  
*Product description.*
- unsigned int [Major](#)  
*The major number of the hardware version.*
- unsigned int [Minor](#)  
*The minor number of the hardware version.*
- unsigned int [Release](#)  
*Release version.*

### 6.13.1 Detailed Description

Controller information structure.

See Also

[get\\_device\\_information](#)  
[get\\_device\\_information\\_impl](#)

### 6.13.2 Field Documentation

#### 6.13.2.1 unsigned int Major

The major number of the hardware version.

#### 6.13.2.2 unsigned int Minor

The minor number of the hardware version.

#### 6.13.2.3 unsigned int Release

Release version.

## 6.14 device\_network\_information\_t Struct Reference

Device network information structure.

### Data Fields

- uint32\_t [ipv4](#)  
*IPv4 address, passed in network byte order (big-endian byte order)*
- char [nodename](#) [16]  
*name of the Bindy node which hosts the device*
- uint32\_t [axis\\_state](#)  
*flags representing device state*
- char [locker\\_username](#) [16]  
*name of the user who locked the device (if any)*
- char [locker\\_nodename](#) [16]  
*Bindy node name, which was used to lock the device (if any)*
- time\_t [locked\\_time](#)  
*time the lock was acquired at (UTC, microseconds since the epoch)*

### 6.14.1 Detailed Description

Device network information structure.

## 6.15 edges\_settings\_calb\_t Struct Reference

User unit edges settings.

### Data Fields

- unsigned int [BorderFlags](#)  
*Border flags.*
- unsigned int [EnderFlags](#)  
*Limit switches flags.*

- float [LeftBorder](#)  
*Left border position, used if BORDER\_IS\_ENCODER flag is set.*
- float [RightBorder](#)  
*Right border position, used if BORDER\_IS\_ENCODER flag is set.*

### 6.15.1 Detailed Description

User unit edges settings.

This structure contains border and limit switches settings. Please load new engine settings when you change positioner, etc. Please note that wrong engine settings may lead to device malfunction, which can cause irreversible damage to the board.

See Also

[set\\_edges\\_settings\\_calb](#)  
[get\\_edges\\_settings\\_calb](#)  
[get\\_edges\\_settings](#), [set\\_edges\\_settings](#)

### 6.15.2 Field Documentation

#### 6.15.2.1 unsigned int BorderFlags

[Border flags.](#)

#### 6.15.2.2 unsigned int EnderFlags

[Limit switches flags.](#)

#### 6.15.2.3 float LeftBorder

Left border position, used if BORDER\_IS\_ENCODER flag is set.

Corrected by the table.

#### 6.15.2.4 float RightBorder

Right border position, used if BORDER\_IS\_ENCODER flag is set.

Corrected by the table.

## 6.16 edges\_settings\_t Struct Reference

Edges settings.

### Data Fields

- unsigned int [BorderFlags](#)  
*Border flags.*
- unsigned int [EnderFlags](#)  
*Limit switches flags.*

- int [LeftBorder](#)  
*Left border position, used if BORDER\_IS\_ENCODER flag is set.*
- int [uLeftBorder](#)  
*Left border position in microsteps (used with stepper motor only).*
- int [RightBorder](#)  
*Right border position, used if BORDER\_IS\_ENCODER flag is set.*
- int [uRightBorder](#)  
*Right border position in microsteps.*

### 6.16.1 Detailed Description

Edges settings.

This structure contains border and limit switches settings. Please load new engine settings when you change positioner, etc. Please note that wrong engine settings may lead to device malfunction, which can cause irreversible damage to the board.

See Also

[set\\_edges\\_settings](#)  
[get\\_edges\\_settings](#)  
[get\\_edges\\_settings](#), [set\\_edges\\_settings](#)

### 6.16.2 Field Documentation

#### 6.16.2.1 unsigned int BorderFlags

[Border flags](#).

#### 6.16.2.2 unsigned int EnderFlags

[Limit switches flags](#).

#### 6.16.2.3 int LeftBorder

Left border position, used if BORDER\_IS\_ENCODER flag is set.

#### 6.16.2.4 int RightBorder

Right border position, used if BORDER\_IS\_ENCODER flag is set.

#### 6.16.2.5 int uLeftBorder

Left border position in microsteps (used with stepper motor only).

The microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine\_settings).

### 6.16.2.6 int uRightBorder

Right border position in microsteps.

Used with a stepper motor only. The microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine\_settings).

## 6.17 emf\_settings\_t Struct Reference

EMF settings.

### Data Fields

- float [L](#)  
*Motor winding inductance.*
- float [R](#)  
*Motor winding resistance.*
- float [Km](#)  
*Electromechanical ratio of the motor.*
- unsigned int [BackEMFFlags](#)  
*Flags of auto-detection of characteristics of windings of the engine.*

### 6.17.1 Detailed Description

EMF settings.

This structure contains the data for Electromechanical characteristics (EMF) of the motor. It determines the inductance, resistance, and Electromechanical coefficient of the motor. This data is stored in the flash memory of the controller. Please set new settings when you change the motor. Remember that improper EMF settings may damage the equipment.

See Also

[set\\_emf\\_settings](#)  
[get\\_emf\\_settings](#)  
[get\\_emf\\_settings](#), [set\\_emf\\_settings](#)

### 6.17.2 Field Documentation

#### 6.17.2.1 unsigned int BackEMFFlags

[Flags of auto-detection of characteristics of windings of the engine.](#)

#### 6.17.2.2 float Km

Electromechanical ratio of the motor.

#### 6.17.2.3 float L

Motor winding inductance.

6.17.2.4 float R

Motor winding resistance.

## 6.18 encoder\_information\_t Struct Reference

Deprecated.

### Data Fields

- char [Manufacturer](#) [17]  
*Manufacturer.*
- char [PartNumber](#) [25]  
*Series and PartNumber.*

### 6.18.1 Detailed Description

Deprecated.

Encoder information.

See Also

[set\\_encoder\\_information](#)  
[get\\_encoder\\_information](#)  
[get\\_encoder\\_information](#), [set\\_encoder\\_information](#)

### 6.18.2 Field Documentation

#### 6.18.2.1 char Manufacturer[17]

Manufacturer.

Max string length: 16 chars.

#### 6.18.2.2 char PartNumber[25]

Series and PartNumber.

Max string length: 24 chars.

## 6.19 encoder\_settings\_t Struct Reference

Deprecated.

### Data Fields

- float [MaxOperatingFrequency](#)  
*Maximum operation frequency (kHz).*
- float [SupplyVoltageMin](#)

- float [SupplyVoltageMax](#)  
*Minimum supply voltage (V).*
- float [MaxCurrentConsumption](#)  
*Maximum supply voltage (V).*
- unsigned int [PPR](#)  
*Max current consumption (mA).*
- unsigned int [EncoderSettings](#)  
*The number of counts per revolution.*
- [Encoder settings flags](#).

### 6.19.1 Detailed Description

Deprecated.

Encoder settings.

See Also

[set\\_encoder\\_settings](#)  
[get\\_encoder\\_settings](#)  
[get\\_encoder\\_settings](#), [set\\_encoder\\_settings](#)

### 6.19.2 Field Documentation

#### 6.19.2.1 unsigned int EncoderSettings

[Encoder settings flags](#).

#### 6.19.2.2 float MaxCurrentConsumption

Max current consumption (mA).

Data type: float.

#### 6.19.2.3 float MaxOperatingFrequency

Maximum operation frequency (kHz).

Data type: float.

#### 6.19.2.4 float SupplyVoltageMax

Maximum supply voltage (V).

Data type: float.

#### 6.19.2.5 float SupplyVoltageMin

Minimum supply voltage (V).

Data type: float.

## 6.20 engine\_advanced\_setup\_t Struct Reference

EAS settings.

### Data Fields

- unsigned int [stepcloseloop\\_Kw](#)  
*Mixing ratio of the actual and set speed, range [0, 100], default value 50.*
- unsigned int [stepcloseloop\\_Kp\\_low](#)  
*Position feedback in the low-speed zone, range [0, 65535], default value 1000.*
- unsigned int [stepcloseloop\\_Kp\\_high](#)  
*Position feedback in the high-speed zone, range [0, 65535], default value 33.*

### 6.20.1 Detailed Description

EAS settings.

This structure is intended for setting parameters of algorithms that cannot be attributed to standard Kp, Ki, Kd, and L, R, Km.

See Also

[set\\_engine\\_advanced\\_setup](#)  
[get\\_engine\\_advanced\\_setup](#)  
[get\\_engine\\_advanced\\_setup](#), [set\\_engine\\_advanced\\_setup](#)

### 6.20.2 Field Documentation

#### 6.20.2.1 unsigned int stepcloseloop\_Kp\_high

Position feedback in the high-speed zone, range [0, 65535], default value 33.

#### 6.20.2.2 unsigned int stepcloseloop\_Kp\_low

Position feedback in the low-speed zone, range [0, 65535], default value 1000.

#### 6.20.2.3 unsigned int stepcloseloop\_Kw

Mixing ratio of the actual and set speed, range [0, 100], default value 50.

## 6.21 engine\_settings\_calb\_t Struct Reference

Movement limitations and settings, related to the motor.

### Data Fields

- unsigned int [NomVoltage](#)  
*Rated voltage in tens of mV.*
- unsigned int [NomCurrent](#)

- float [NomSpeed](#)  
*Nominal speed.*
- unsigned int [EngineFlags](#)  
*Flags of engine settings.*
- float [Antiplay](#)  
*Number of pulses or steps for backlash (play) compensation procedure.*
- unsigned int [MicrostepMode](#)  
*Flags of microstep mode.*
- unsigned int [StepsPerRev](#)  
*Number of full steps per revolution (Used with stepper motor only).*

### 6.21.1 Detailed Description

Movement limitations and settings, related to the motor.

In user units.

This structure contains useful motor settings. These settings specify the motor shaft movement algorithm, list of limitations and rated characteristics. All boards are supplied with the standard set of engine settings on the controller's flash memory. Please load new engine settings when you change the motor, encoder, positioner, etc. Please note that wrong engine settings may lead to the device malfunction, that may cause irreversible damage to the board.

See Also

[set\\_engine\\_settings\\_calb](#)  
[get\\_engine\\_settings\\_calb](#)  
[get\\_engine\\_settings](#), [set\\_engine\\_settings](#)

### 6.21.2 Field Documentation

#### 6.21.2.1 float Antiplay

Number of pulses or steps for backlash (play) compensation procedure.

Used if ENGINE\_ANTIPLAY flag is set.

#### 6.21.2.2 unsigned int EngineFlags

[Flags of engine settings.](#)

#### 6.21.2.3 unsigned int MicrostepMode

[Flags of microstep mode.](#)

#### 6.21.2.4 unsigned int NomCurrent

Rated current (in mA).

Controller will keep current consumed by motor below this value if ENGINE\_LIMIT\_CURR flag is set. Range: 15..8000

## 6.21.2.5 float NomSpeed

Nominal speed.

Controller will keep motor speed below this value if ENGINE\_LIMIT\_RPM flag is set.

## 6.21.2.6 unsigned int NomVoltage

Rated voltage in tens of mV.

Controller will keep the voltage drop on motor below this value if ENGINE\_LIMIT\_VOLT flag is set (used with DC only).

## 6.21.2.7 unsigned int StepsPerRev

Number of full steps per revolution (Used with stepper motor only).

Range: 1..65535.

## 6.22 engine\_settings\_t Struct Reference

Movement limitations and settings related to the motor.

### Data Fields

- unsigned int [NomVoltage](#)  
*Rated voltage in tens of mV.*
- unsigned int [NomCurrent](#)  
*Rated current (in mA).*
- unsigned int [NomSpeed](#)  
*Nominal (maximum) speed (in whole steps/s or rpm for DC and stepper motor as a master encoder).*
- unsigned int [uNomSpeed](#)  
*The fractional part of a nominal speed in microsteps (is only used with stepper motor).*
- unsigned int [EngineFlags](#)  
*Flags of engine settings.*
- int [Antiplay](#)  
*Number of pulses or steps for backlash (play) compensation procedure.*
- unsigned int [MicrostepMode](#)  
*Flags of microstep mode.*
- unsigned int [StepsPerRev](#)  
*Number of full steps per revolution (Used with stepper motor only).*

### 6.22.1 Detailed Description

Movement limitations and settings related to the motor.

This structure contains useful motor settings. These settings specify the motor shaft movement algorithm, list of limitations and rated characteristics. All boards are supplied with the standard set of engine settings on the controller's flash memory. Please load new engine settings when you change the motor, encoder, positioner, etc. Please note that wrong engine settings may lead to device malfunction, which can lead to irreversible damage to the board.

See Also

[set\\_engine\\_settings](#)  
[get\\_engine\\_settings](#)  
[get\\_engine\\_settings](#), [set\\_engine\\_settings](#)

## 6.22.2 Field Documentation

### 6.22.2.1 int Antiplay

Number of pulses or steps for backlash (play) compensation procedure.

Used if ENGINE\_ANTIPLAY flag is set.

### 6.22.2.2 unsigned int EngineFlags

[Flags of engine settings.](#)

### 6.22.2.3 unsigned int MicrostepMode

[Flags of microstep mode.](#)

### 6.22.2.4 unsigned int NomCurrent

Rated current (in mA).

Controller will keep current consumed by motor below this value if ENGINE\_LIMIT\_CURR flag is set. Range: 15..8000

### 6.22.2.5 unsigned int NomSpeed

Nominal (maximum) speed (in whole steps/s or rpm for DC and stepper motor as a master encoder).

Controller will keep motor shaft RPM below this value if ENGINE\_LIMIT\_RPM flag is set. Range: 1..100000.

### 6.22.2.6 unsigned int NomVoltage

Rated voltage in tens of mV.

Controller will keep the voltage drop on motor below this value if ENGINE\_LIMIT\_VOLT flag is set (used with DC only).

### 6.22.2.7 unsigned int StepsPerRev

Number of full steps per revolution (Used with stepper motor only).

Range: 1..65535.

### 6.22.2.8 unsigned int uNomSpeed

The fractional part of a nominal speed in microsteps (is only used with stepper motor).

Microstep size and the range of valid values for this field depend on selected step division mode (see MicrostepMode field in engine\_settings).

## 6.23 `entype_settings_t` Struct Reference

Engine type and driver type settings.

### Data Fields

- unsigned int `EngineType`  
*Flags of engine type.*
- unsigned int `DriverType`  
*Flags of driver type.*

### 6.23.1 Detailed Description

Engine type and driver type settings.

#### Parameters

<i>id</i>	An identifier of a device
<i>EngineType</i>	engine type
<i>DriverType</i>	driver type

#### See Also

[get\\_entype\\_settings](#), [set\\_entype\\_settings](#)

### 6.23.2 Field Documentation

#### 6.23.2.1 unsigned int `DriverType`

[Flags of driver type.](#)

#### 6.23.2.2 unsigned int `EngineType`

[Flags of engine type.](#)

## 6.24 `extended_settings_t` Struct Reference

EST settings This data is stored in the controller's flash memory.

### Data Fields

- unsigned int **Param1**

### 6.24.1 Detailed Description

EST settings This data is stored in the controller's flash memory.

This structure is designed for the future. Currently, it is not in use.

See Also

[set\\_extended\\_settings](#)  
[get\\_extended\\_settings](#)  
[get\\_extended\\_settings](#), [set\\_extended\\_settings](#)

## 6.25 extio\_settings\_t Struct Reference

EXTIO settings.

Data Fields

- unsigned int [EXTIOSetupFlags](#)  
*External IO setup flags.*
- unsigned int [EXTIOModeFlags](#)  
*External IO mode flags.*

### 6.25.1 Detailed Description

EXTIO settings.

This structure contains all EXTIO settings. By default, input events are signaled through a rising front, and output states are signaled by a high logic state.

See Also

[get\\_extio\\_settings](#)  
[set\\_extio\\_settings](#)  
[get\\_extio\\_settings](#), [set\\_extio\\_settings](#)

### 6.25.2 Field Documentation

6.25.2.1 unsigned int [EXTIOModeFlags](#)

[External IO mode flags.](#)

6.25.2.2 unsigned int [EXTIOSetupFlags](#)

[External IO setup flags.](#)

## 6.26 feedback\_settings\_t Struct Reference

Feedback settings.

Data Fields

- unsigned int [IPS](#)  
*The number of encoder counts per shaft revolution.*
- unsigned int [FeedbackType](#)  
*Feedback type.*

- unsigned int [FeedbackFlags](#)  
*Describes feedback flags.*
- unsigned int [CountsPerTurn](#)  
*The number of encoder counts per shaft revolution.*

### 6.26.1 Detailed Description

Feedback settings.

This structure contains feedback settings.

See Also

[get\\_feedback\\_settings](#), [set\\_feedback\\_settings](#)

### 6.26.2 Field Documentation

#### 6.26.2.1 unsigned int CountsPerTurn

The number of encoder counts per shaft revolution.

Range: 1..4294967295. To use the CountsPerTurn field, write 0 in the IPS field, otherwise the value from the IPS field will be used.

#### 6.26.2.2 unsigned int FeedbackFlags

[Describes feedback flags.](#)

#### 6.26.2.3 unsigned int FeedbackType

[Feedback type.](#)

#### 6.26.2.4 unsigned int IPS

The number of encoder counts per shaft revolution.

Range: 1..65535. The field is obsolete, it is recommended to write 0 to IPS and use the extended CountsPerTurn field. You may need to update the controller firmware to the latest version.

## 6.27 gear\_information\_t Struct Reference

Deprecated.

### Data Fields

- char [Manufacturer](#) [17]  
*Manufacturer.*
- char [PartNumber](#) [25]  
*Series and PartNumber.*

### 6.27.1 Detailed Description

Deprecated.

Gear information.

See Also

[set\\_gear\\_information](#)  
[get\\_gear\\_information](#)  
[get\\_gear\\_information](#), [set\\_gear\\_information](#)

### 6.27.2 Field Documentation

#### 6.27.2.1 char Manufacturer[17]

Manufacturer.

Max string length: 16 chars.

#### 6.27.2.2 char PartNumber[25]

Series and PartNumber.

Max string length: 24 chars.

## 6.28 gear\_settings\_t Struct Reference

Deprecated.

### Data Fields

- float [ReductionIn](#)  
*Input reduction coefficient.*
- float [ReductionOut](#)  
*Output reduction coefficient.*
- float [RatedInputTorque](#)  
*Maximum continuous torque ( $N * m$ ).*
- float [RatedInputSpeed](#)  
*Maximum speed on the input shaft (rpm).*
- float [MaxOutputBacklash](#)  
*Output backlash of the reduction gear (degree).*
- float [InputInertia](#)  
*Equivalent input gear inertia ( $g * cm^2$ ).*
- float [Efficiency](#)  
*Reduction gear efficiency (%).*

### 6.28.1 Detailed Description

Deprecated.

Gear settings.

See Also

[set\\_gear\\_settings](#)

[get\\_gear\\_settings](#)

[get\\_gear\\_settings](#), [set\\_gear\\_settings](#)

## 6.28.2 Field Documentation

### 6.28.2.1 float Efficiency

Reduction gear efficiency (%).

Data type: float.

### 6.28.2.2 float InputInertia

Equivalent input gear inertia ( $\text{g} * \text{cm}^2$ ).

Data type: float.

### 6.28.2.3 float MaxOutputBacklash

Output backlash of the reduction gear (degree).

Data type: float.

### 6.28.2.4 float RatedInputSpeed

Maximum speed on the input shaft (rpm).

Data type: float.

### 6.28.2.5 float RatedInputTorque

Maximum continuous torque ( $\text{N} * \text{m}$ ).

Data type: float.

### 6.28.2.6 float ReductionIn

Input reduction coefficient.

(Output = (ReductionOut / ReductionIn) \* Input) Data type: float.

### 6.28.2.7 float ReductionOut

Output reduction coefficient.

(Output = (ReductionOut / ReductionIn) \* Input) Data type: float.

## 6.29 `get_position_calb_t` Struct Reference

Position information.

## Data Fields

- float [Position](#)  
*The position in the engine.*
- long\_t [EncPosition](#)  
*Encoder position.*

### 6.29.1 Detailed Description

Position information.

A useful structure that contains position value in user units for stepper motor and encoder steps for all engines.

See Also

[get\\_position](#)

### 6.29.2 Field Documentation

#### 6.29.2.1 long\_t EncPosition

Encoder position.

#### 6.29.2.2 float Position

The position in the engine.

Corrected by the table.

## 6.30 `get_position_t` Struct Reference

Position information.

## Data Fields

- int [Position](#)  
*The position of the whole steps in the engine.*
- int [uPosition](#)  
*Microstep position is only used with stepper motors.*
- long\_t [EncPosition](#)  
*Encoder position.*

### 6.30.1 Detailed Description

Position information.

A useful structure that contains position value in steps and microsteps for stepper motor and encoder steps for all engines.

See Also

[get\\_position](#)

### 6.30.2 Field Documentation

#### 6.30.2.1 long\_t EncPosition

Encoder position.

#### 6.30.2.2 int uPosition

Microstep position is only used with stepper motors.

Microstep size and the range of valid values for this field depend on the selected step division mode (see MicrostepMode field in engine\_settings).

## 6.31 globally\_unique\_identifier\_t Struct Reference

Globally unique identifier.

### Data Fields

- unsigned int [UniqueID0](#)  
*Unique ID 0.*
- unsigned int [UniqueID1](#)  
*Unique ID 1.*
- unsigned int [UniqueID2](#)  
*Unique ID 2.*
- unsigned int [UniqueID3](#)  
*Unique ID 3.*

### 6.31.1 Detailed Description

Globally unique identifier.

Manufacturer only.

See Also

[get\\_globally\\_unique\\_identifier](#)

### 6.31.2 Field Documentation

#### 6.31.2.1 unsigned int UniqueID0

Unique ID 0.

#### 6.31.2.2 unsigned int UniqueID1

Unique ID 1.

#### 6.31.2.3 unsigned int UniqueID2

Unique ID 2.

6.31.2.4 unsigned int UniqueID3

Unique ID 3.

## 6.32 hallsensor\_information\_t Struct Reference

Deprecated.

### Data Fields

- char [Manufacturer](#) [17]  
*Manufacturer.*
- char [PartNumber](#) [25]  
*Series and PartNumber.*

### 6.32.1 Detailed Description

Deprecated.

Hall sensor information.

See Also

[set\\_hallsensor\\_information](#)  
[get\\_hallsensor\\_information](#)  
[get\\_hallsensor\\_information](#), [set\\_hallsensor\\_information](#)

### 6.32.2 Field Documentation

#### 6.32.2.1 char Manufacturer[17]

Manufacturer.

Max string length: 16 chars.

#### 6.32.2.2 char PartNumber[25]

Series and PartNumber.

Max string length: 24 chars.

## 6.33 hallsensor\_settings\_t Struct Reference

Deprecated.

### Data Fields

- float [MaxOperatingFrequency](#)  
*Maximum operation frequency (kHz).*
- float [SupplyVoltageMin](#)

- *Minimum supply voltage (V).*  
float [SupplyVoltageMax](#)
  - *Maximum supply voltage (V).*  
float [MaxCurrentConsumption](#)
  - *Maximum current consumption (mA).*  
unsigned int [PPR](#)
- The number of counts per revolution.*

### 6.33.1 Detailed Description

Deprecated.

Hall sensor settings.

See Also

[set\\_hallsensor\\_settings](#)  
[get\\_hallsensor\\_settings](#)  
[get\\_hallsensor\\_settings](#), [set\\_hallsensor\\_settings](#)

### 6.33.2 Field Documentation

#### 6.33.2.1 float MaxCurrentConsumption

Maximum current consumption (mA).

Data type: float.

#### 6.33.2.2 float MaxOperatingFrequency

Maximum operation frequency (kHz).

Data type: float.

#### 6.33.2.3 float SupplyVoltageMax

Maximum supply voltage (V).

Data type: float.

#### 6.33.2.4 float SupplyVoltageMin

Minimum supply voltage (V).

Data type: float.

## 6.34 home\_settings\_calb\_t Struct Reference

Position calibration settings which use user units.

## Data Fields

- float [FastHome](#)  
*Speed used for first motion.*
- float [SlowHome](#)  
*Speed used for second motion.*
- float [HomeDelta](#)  
*Distance from break point.*
- unsigned int [HomeFlags](#)  
*Home settings flags.*

### 6.34.1 Detailed Description

Position calibration settings which use user units.

This structure contains settings used in position calibrating. It specifies behavior of calibrating position.

See Also

[get\\_home\\_settings\\_calb](#)  
[set\\_home\\_settings\\_calb](#)  
[command\\_home](#)  
[get\\_home\\_settings](#), [set\\_home\\_settings](#)

### 6.34.2 Field Documentation

#### 6.34.2.1 float FastHome

Speed used for first motion.

#### 6.34.2.2 float HomeDelta

Distance from break point.

#### 6.34.2.3 unsigned int HomeFlags

[Home settings flags.](#)

#### 6.34.2.4 float SlowHome

Speed used for second motion.

## 6.35 `home_settings_t` Struct Reference

Position calibration settings.

## Data Fields

- unsigned int [FastHome](#)  
*Speed used for first motion (full steps).*
- unsigned int [uFastHome](#)  
*Fractional part of the speed for first motion, microsteps.*
- unsigned int [SlowHome](#)  
*Speed used for second motion (full steps).*
- unsigned int [uSlowHome](#)  
*Part of the speed for second motion, microsteps.*
- int [HomeDelta](#)  
*Distance from break point (full steps).*
- int [uHomeDelta](#)  
*Fractional part of the delta distance, microsteps.*
- unsigned int [HomeFlags](#)  
*Home settings flags.*

### 6.35.1 Detailed Description

Position calibration settings.

This structure contains settings used in position calibration. It specify behavior of calibration procedure.

See Also

[get\\_home\\_settings](#)  
[set\\_home\\_settings](#)  
[command\\_home](#)  
[get\\_home\\_settings](#), [set\\_home\\_settings](#)

### 6.35.2 Field Documentation

#### 6.35.2.1 unsigned int FastHome

Speed used for first motion (full steps).

Range: 0..100000.

#### 6.35.2.2 int HomeDelta

Distance from break point (full steps).

#### 6.35.2.3 unsigned int HomeFlags

[Home settings flags](#).

#### 6.35.2.4 unsigned int SlowHome

Speed used for second motion (full steps).

Range: 0..100000.

6.35.2.5 unsigned int `uFastHome`

Fractional part of the speed for first motion, microsteps.

The microstep size and the range of valid values for this field depend on the selected step division mode (see the `MicrostepMode` field in `engine_settings`).

6.35.2.6 int `uHomeDelta`

Fractional part of the delta distance, microsteps.

The microstep size and the range of valid values for this field depend on the selected step division mode (see the `MicrostepMode` field in `engine_settings`).

6.35.2.7 unsigned int `uSlowHome`

Part of the speed for second motion, microsteps.

The microstep size and the range of valid values for this field depend on the selected step division mode (see the `MicrostepMode` field in `engine_settings`).

## 6.36 `init_random_t` Struct Reference

Random key.

### Data Fields

- `uint8_t key` [16]  
*Random key.*

### 6.36.1 Detailed Description

Random key.

Manufacturer only.

Structure that contains a random key. It is used in the encryption of `WKEY` and `SSER` command contents.

See Also

[get\\_init\\_random](#)

### 6.36.2 Field Documentation

6.36.2.1 `uint8_t key`[16]

Random key.

## 6.37 `joystick_settings_t` Struct Reference

Joystick settings.

## Data Fields

- unsigned int [JoyLowEnd](#)  
*Joystick lower end position.*
- unsigned int [JoyCenter](#)  
*Joystick center position.*
- unsigned int [JoyHighEnd](#)  
*Joystick upper end position.*
- unsigned int [ExpFactor](#)  
*Exponential nonlinearity factor.*
- unsigned int [DeadZone](#)  
*Joystick dead zone.*
- unsigned int [JoyFlags](#)  
*Joystick flags.*

### 6.37.1 Detailed Description

Joystick settings.

This structure contains joystick parameters. If joystick position falls outside the DeadZone limits, a movement begins. Speed is defined by the joystick position in the range of the DeadZone limit to the maximum deviation. Joystick positions inside the DeadZone limits correspond to zero speed (a soft stop of the motion), and positions beyond the Low and High limits correspond to MaxSpeed[i] or -MaxSpeed[i] (see command SCTL), where  $i = 0$  by default and can be changed with left/right buttons (see command SCTL). If the next speed in the list is zero (both integer and microstep parts), the button press is ignored. The first speed in the list shouldn't be zero.

The relationship between the deviation and the rate is exponential, which allows for high mobility and accuracy without speed mode switching.

See Also

[set\\_joystick\\_settings](#)  
[get\\_joystick\\_settings](#)  
[get\\_joystick\\_settings](#), [set\\_joystick\\_settings](#)

### 6.37.2 Field Documentation

#### 6.37.2.1 unsigned int DeadZone

Joystick dead zone.

#### 6.37.2.2 unsigned int ExpFactor

Exponential nonlinearity factor.

#### 6.37.2.3 unsigned int JoyCenter

Joystick center position.

Range: 0..10000.

6.37.2.4 unsigned int JoyFlags

[Joystick flags.](#)

6.37.2.5 unsigned int JoyHighEnd

Joystick upper end position.

Range: 0..10000.

6.37.2.6 unsigned int JoyLowEnd

Joystick lower end position.

Range: 0..10000.

## 6.38 measurements\_t Struct Reference

The buffer holds no more than 25 points.

### Data Fields

- int [Speed](#) [25]  
*Current speed in microsteps per second (whole steps are recalculated considering the current step division mode) or encoder counts per second.*
- int [Error](#) [25]  
*Current error in microsteps per second (whole steps are recalculated considering the current step division mode) or encoder counts per second.*
- unsigned int [Length](#)  
*Length of actual data in buffer.*

### 6.38.1 Detailed Description

The buffer holds no more than 25 points.

The exact length of the received buffer is stored in the Length field.

See Also

[measurements](#)  
[get\\_measurements](#)

### 6.38.2 Field Documentation

6.38.2.1 int Error[25]

Current error in microsteps per second (whole steps are recalculated considering the current step division mode) or encoder counts per second.

6.38.2.2 unsigned int Length

Length of actual data in buffer.

### 6.38.2.3 int Speed[25]

Current speed in microsteps per second (whole steps are recalculated considering the current step division mode) or encoder counts per second.

## 6.39 motor\_information\_t Struct Reference

Deprecated.

### Data Fields

- char [Manufacturer](#) [17]  
*Manufacturer.*
- char [PartNumber](#) [25]  
*Series and PartNumber.*

### 6.39.1 Detailed Description

Deprecated.

motor information.

See Also

[set\\_motor\\_information](#)  
[get\\_motor\\_information](#)  
[get\\_motor\\_information](#), [set\\_motor\\_information](#)

### 6.39.2 Field Documentation

#### 6.39.2.1 char Manufacturer[17]

Manufacturer.

Max string length: 16 chars.

#### 6.39.2.2 char PartNumber[25]

Series and PartNumber.

Max string length: 24 chars.

## 6.40 motor\_settings\_t Struct Reference

Deprecated.

### Data Fields

- unsigned int [MotorType](#)  
*Motor Type flags.*

- unsigned int [ReservedField](#)  
*Reserved.*
- unsigned int [Poles](#)  
*Number of pole pairs for DC or BLDC motors or number of steps per rotation for stepper motors.*
- unsigned int [Phases](#)  
*Number of phases for BLDC motors.*
- float [NominalVoltage](#)  
*Nominal voltage on winding (B).*
- float [NominalCurrent](#)  
*Maximum direct current in winding for DC and BLDC engines, nominal current in windings for stepper motors (A).*
- float [NominalSpeed](#)  
*Not used.*
- float [NominalTorque](#)  
*Nominal torque ( $mN * m$ ).*
- float [NominalPower](#)  
*Nominal power (W).*
- float [WindingResistance](#)  
*Resistance of windings for DC engines, of each of two windings for stepper motors, or of each of three windings for BLDC engines (Ohm).*
- float [WindingInductance](#)  
*Inductance of windings for DC engines, inductance of each of two windings for stepper motors, or inductance of each of three windings for BLDC engines (mH).*
- float [RotorInertia](#)  
*Rotor inertia ( $g * cm^2$ ).*
- float [StallTorque](#)  
*Torque hold position for a stepper motor or torque at a motionless rotor for other types of engines ( $mN * m$ ).*
- float [DetentTorque](#)  
*Holding torque position with unpowered windings ( $mN * m$ ).*
- float [TorqueConstant](#)  
*Torque constant that determines the proportionality constant between the maximum rotor torque and current flowing in the winding ( $mN * m / A$ ).*
- float [SpeedConstant](#)  
*Velocity constant, which determines the value or the amplitude of the induced voltage on the motion of DC or BLDC motors ( $rpm / V$ ) or stepper motors ( $steps/s / V$ ).*
- float [SpeedTorqueGradient](#)  
*Speed torque gradient ( $rpm / mN * m$ ).*
- float [MechanicalTimeConstant](#)  
*Mechanical time constant (ms).*
- float [MaxSpeed](#)  
*The maximum speed for stepper motors ( $steps/s$ ) or DC and BLDC motors (rpm).*
- float [MaxCurrent](#)  
*The maximum current in the winding (A).*
- float [MaxCurrentTime](#)  
*Safe duration of overcurrent in the winding (ms).*
- float [NoLoadCurrent](#)  
*The current consumption in idle mode (A).*
- float [NoLoadSpeed](#)  
*Idle speed (rpm).*

### 6.40.1 Detailed Description

Deprecated.

Physical characteristics and limitations of the motor.

See Also

[set\\_motor\\_settings](#)

[get\\_motor\\_settings](#)

[get\\_motor\\_settings](#), [set\\_motor\\_settings](#)

### 6.40.2 Field Documentation

#### 6.40.2.1 float DetentTorque

Holding torque position with unpowered windings (mN \* m).

Data type: float.

#### 6.40.2.2 float MaxCurrent

The maximum current in the winding (A).

Data type: float.

#### 6.40.2.3 float MaxCurrentTime

Safe duration of overcurrent in the winding (ms).

Data type: float.

#### 6.40.2.4 float MaxSpeed

The maximum speed for stepper motors (steps/s) or DC and BLDC motors (rpm).

Data type: float.

#### 6.40.2.5 float MechanicalTimeConstant

Mechanical time constant (ms).

Data type: float.

#### 6.40.2.6 unsigned int MotorType

[Motor Type flags](#).

#### 6.40.2.7 float NoLoadCurrent

The current consumption in idle mode (A).

Used for DC and BLDC motors. Data type: float.

## 6.40.2.8 float NoLoadSpeed

Idle speed (rpm).

Used for DC and BLDC motors. Data type: float.

## 6.40.2.9 float NominalCurrent

Maximum direct current in winding for DC and BLDC engines, nominal current in windings for stepper motors (A).

Data type: float.

## 6.40.2.10 float NominalPower

Nominal power (W).

Used for DC and BLDC engines. Data type: float.

## 6.40.2.11 float NominalSpeed

Not used.

Nominal speed (rpm). Used for DC and BLDC engines. Data type: float.

## 6.40.2.12 float NominalTorque

Nominal torque (mN \* m).

Used for DC and BLDC engines. Data type: float.

## 6.40.2.13 float NominalVoltage

Nominal voltage on winding (B).

Data type: float

## 6.40.2.14 unsigned int Phases

Number of phases for BLDC motors.

## 6.40.2.15 unsigned int Poles

Number of pole pairs for DC or BLDC motors or number of steps per rotation for stepper motors.

## 6.40.2.16 float RotorInertia

Rotor inertia (g \* cm<sup>2</sup>).

Data type: float.

## 6.40.2.17 float SpeedConstant

Velocity constant, which determines the value or the amplitude of the induced voltage on the motion of DC or BLDC motors (rpm / V) or stepper motors (steps/s / V).

Data type: float.

## 6.40.2.18 float SpeedTorqueGradient

Speed torque gradient (rpm / mN \* m).

Data type: float.

## 6.40.2.19 float StallTorque

Torque hold position for a stepper motor or torque at a motionless rotor for other types of engines (mN \* m).

Data type: float.

## 6.40.2.20 float TorqueConstant

Torque constant that determines the proportionality constant between the maximum rotor torque and current flowing in the winding (mN \* m / A).

Used mainly for DC motors. Data type: float.

## 6.40.2.21 float WindingInductance

Inductance of windings for DC engines, inductance of each of two windings for stepper motors, or inductance of each of three windings for BLDC engines (mH).

Data type: float.

## 6.40.2.22 float WindingResistance

Resistance of windings for DC engines, of each of two windings for stepper motors, or of each of three windings for BLDC engines (Ohm).

Data type: float.

## 6.41 move\_settings\_calb\_t Struct Reference

User units move settings.

### Data Fields

- float [Speed](#)  
*Target speed.*
- float [Accel](#)  
*Motor shaft acceleration, steps/s<sup>2</sup> (stepper motor) or RPM/s (DC).*
- float [Decel](#)  
*Motor shaft deceleration, steps/s<sup>2</sup> (stepper motor) or RPM/s (DC).*

- float [AntiplaySpeed](#)  
*Speed in antiplay mode.*
- unsigned int [MoveFlags](#)  
*Flags of the motion parameters.*

### 6.41.1 Detailed Description

User units move settings.

See Also

[set\\_move\\_settings\\_calb](#)  
[get\\_move\\_settings\\_calb](#)  
[get\\_move\\_settings](#), [set\\_move\\_settings](#)

### 6.41.2 Field Documentation

#### 6.41.2.1 float Accel

Motor shaft acceleration, steps/s<sup>2</sup> (stepper motor) or RPM/s (DC).

#### 6.41.2.2 float AntiplaySpeed

Speed in antiplay mode.

#### 6.41.2.3 float Decel

Motor shaft deceleration, steps/s<sup>2</sup> (stepper motor) or RPM/s (DC).

#### 6.41.2.4 unsigned int MoveFlags

[Flags of the motion parameters.](#)

#### 6.41.2.5 float Speed

Target speed.

## 6.42 `move_settings_t` Struct Reference

Move settings.

### Data Fields

- unsigned int [Speed](#)  
*Target speed (for stepper motor: steps/s, for DC: rpm).*
- unsigned int [uSpeed](#)  
*Target speed in microstep fractions/s.*
- unsigned int [Accel](#)

- unsigned int `Decel`  
*Motor shaft deceleration, steps/s<sup>2</sup> (stepper motor) or RPM/s (DC).*
- unsigned int `AntiplaySpeed`  
*Speed in antiplay mode, full steps/s (stepper motor) or RPM (DC).*
- unsigned int `uAntiplaySpeed`  
*Speed in antiplay mode, microsteps/s.*
- unsigned int `MoveFlags`  
*Flags of the motion parameters.*

### 6.42.1 Detailed Description

Move settings.

See Also

[set\\_move\\_settings](#)  
[get\\_move\\_settings](#)  
[get\\_move\\_settings](#), [set\\_move\\_settings](#)

### 6.42.2 Field Documentation

#### 6.42.2.1 unsigned int `Accel`

Motor shaft acceleration, steps/s<sup>2</sup> (stepper motor) or RPM/s (DC).

Range: 1..65535.

#### 6.42.2.2 unsigned int `AntiplaySpeed`

Speed in antiplay mode, full steps/s (stepper motor) or RPM (DC).

Range: 0..100000.

#### 6.42.2.3 unsigned int `Decel`

Motor shaft deceleration, steps/s<sup>2</sup> (stepper motor) or RPM/s (DC).

Range: 1..65535.

#### 6.42.2.4 unsigned int `MoveFlags`

[Flags of the motion parameters.](#)

#### 6.42.2.5 unsigned int `Speed`

Target speed (for stepper motor: steps/s, for DC: rpm).

Range: 0..100000.

6.42.2.6 unsigned int uAntiplaySpeed

Speed in antiplay mode, microsteps/s.

The microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine\_settings). Used with a stepper motor only.

6.42.2.7 unsigned int uSpeed

Target speed in microstep fractions/s.

The microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine\_settings). Used with a stepper motor only.

## 6.43 network\_settings\_t Struct Reference

Network settings.

### Data Fields

- unsigned int [DHCPEnabled](#)  
*Indicates the method to get the IP-address.*
- unsigned int [IPv4Address](#) [4]  
*IP-address of the device in format x.x.x.x.*
- unsigned int [SubnetMask](#) [4]  
*The mask of the subnet in format x.x.x.x.*
- unsigned int [DefaultGateway](#) [4]  
*Default value of the gateway in format x.x.x.x.*

### 6.43.1 Detailed Description

Network settings.

Manufacturer only. This structure contains network settings.

See Also

[get\\_network\\_settings](#)  
[set\\_network\\_settings](#)  
[get\\_network\\_settings](#), [set\\_network\\_settings](#)

### 6.43.2 Field Documentation

6.43.2.1 unsigned int DefaultGateway[4]

Default value of the gateway in format x.x.x.x.

6.43.2.2 unsigned int DHCPEnabled

Indicates the method to get the IP-address.

It can be either 0 (static) or 1 (DHCP).

6.43.2.3 unsigned int IPv4Address[4]

IP-address of the device in format x.x.x.x.

6.43.2.4 unsigned int SubnetMask[4]

The mask of the subnet in format x.x.x.x.

## 6.44 `nonvolatile_memory_t` Struct Reference

Structure contains user data to save into the FRAM.

### Data Fields

- unsigned int [UserData](#) [7]  
*User data.*

### 6.44.1 Detailed Description

Structure contains user data to save into the FRAM.

See Also

[get\\_nonvolatile\\_memory](#), [set\\_nonvolatile\\_memory](#)

### 6.44.2 Field Documentation

6.44.2.1 unsigned int UserData[7]

User data.

It may be set by the user. Each element of the array stores only 32 bits of user data. This is important on systems where an int type contains more than 4 bytes. For example, on all amd64 systems.

## 6.45 `password_settings_t` Struct Reference

The web-page user password.

### Data Fields

- char [UserPassword](#) [21]  
*Password for the web-page that the user can change with a USB command or via web-page.*

### 6.45.1 Detailed Description

The web-page user password.

Manufacturer only. This structure contains the user password.

See Also

[get\\_password\\_settings](#)  
[set\\_password\\_settings](#)  
[get\\_password\\_settings](#), [set\\_password\\_settings](#)

## 6.45.2 Field Documentation

### 6.45.2.1 char UserPassword[21]

Password for the web-page that the user can change with a USB command or via web-page.

## 6.46 pid\_settings\_t Struct Reference

PID settings.

### Data Fields

- unsigned int [KpU](#)  
*Proportional gain for voltage PID routine.*
- unsigned int [KiU](#)  
*Integral gain for voltage PID routine.*
- unsigned int [KdU](#)  
*Differential gain for voltage PID routine.*
- float [Kpf](#)  
*Proportional gain for BLDC position PID routine.*
- float [Kif](#)  
*Integral gain for BLDC position PID routine.*
- float [Kdf](#)  
*Differential gain for BLDC position PID routine.*

### 6.46.1 Detailed Description

PID settings.

This structure contains factors for PID routine. It specifies the behavior of the voltage PID routine. These factors are slightly different for different positioners. All boards are supplied with the standard set of PID settings in the controller's flash memory. Please load new PID settings when you change positioner. Please note that wrong PID settings lead to device malfunction.

See Also

[set\\_pid\\_settings](#)  
[get\\_pid\\_settings](#)  
[get\\_pid\\_settings](#), [set\\_pid\\_settings](#)

## 6.47 power\_settings\_t Struct Reference

Step motor power settings.

## Data Fields

- unsigned int [HoldCurrent](#)  
*Holding current, as percent of the nominal current.*
- unsigned int [CurrReductDelay](#)  
*Time in ms from going to STOP state to the end of current reduction.*
- unsigned int [PowerOffDelay](#)  
*Time in s from going to STOP state to turning power off.*
- unsigned int [CurrentSetTime](#)  
*Time in ms to reach the nominal current.*
- unsigned int [PowerFlags](#)  
*Flags of power settings of stepper motor.*

### 6.47.1 Detailed Description

Step motor power settings.

See Also

[set\\_move\\_settings](#)  
[get\\_move\\_settings](#)  
[get\\_power\\_settings](#), [set\\_power\\_settings](#)

### 6.47.2 Field Documentation

#### 6.47.2.1 unsigned int CurrentSetTime

Time in ms to reach the nominal current.

#### 6.47.2.2 unsigned int CurrReductDelay

Time in ms from going to STOP state to the end of current reduction.

#### 6.47.2.3 unsigned int HoldCurrent

Holding current, as percent of the nominal current.

Range: 0..100.

#### 6.47.2.4 unsigned int PowerFlags

[Flags of power settings of stepper motor.](#)

#### 6.47.2.5 unsigned int PowerOffDelay

Time in s from going to STOP state to turning power off.

## 6.48 `secure_settings_t` Struct Reference

This structure contains raw analog data from ADC embedded on board.

## Data Fields

- unsigned int [LowUpwrOff](#)  
*Lower voltage limit to turn off the motor, in tens of mV.*
- unsigned int [Criticalpwr](#)  
*Maximum motor current which triggers ALARM state, in mA.*
- unsigned int [CriticalUpwr](#)  
*Maximum motor voltage which triggers ALARM state, in tens of mV.*
- unsigned int [CriticalT](#)  
*Maximum temperature, which triggers ALARM state, in tenths of degrees Celsius.*
- unsigned int [Criticalusb](#)  
*Maximum USB current which triggers ALARM state, in mA.*
- unsigned int [CriticalUusb](#)  
*Maximum USB voltage which triggers ALARM state, in tens of mV.*
- unsigned int [MinimumUusb](#)  
*Minimum USB voltage which triggers ALARM state, in tens of mV.*
- unsigned int [Flags](#)  
*Flags of secure settings.*

### 6.48.1 Detailed Description

This structure contains raw analog data from ADC embedded on board.

These data are used for device testing and deep recalibration by the manufacturer only.

See Also

[get\\_secure\\_settings](#)  
[set\\_secure\\_settings](#)  
[get\\_secure\\_settings](#), [set\\_secure\\_settings](#)

### 6.48.2 Field Documentation

#### 6.48.2.1 unsigned int `Criticalpwr`

Maximum motor current which triggers ALARM state, in mA.

#### 6.48.2.2 unsigned int `Criticalusb`

Maximum USB current which triggers ALARM state, in mA.

#### 6.48.2.3 unsigned int `CriticalT`

Maximum temperature, which triggers ALARM state, in tenths of degrees Celsius.

#### 6.48.2.4 unsigned int `CriticalUpwr`

Maximum motor voltage which triggers ALARM state, in tens of mV.

6.48.2.5 unsigned int CriticalUusb

Maximum USB voltage which triggers ALARM state, in tens of mV.

6.48.2.6 unsigned int Flags

[Flags of secure settings.](#)

6.48.2.7 unsigned int LowUpwrOff

Lower voltage limit to turn off the motor, in tens of mV.

6.48.2.8 unsigned int MinimumUusb

Minimum USB voltage which triggers ALARM state, in tens of mV.

## 6.49 serial\_number\_t Struct Reference

The structure contains a new serial number, hardware version, and valid key.

### Data Fields

- unsigned int [SN](#)  
*New board serial number.*
- uint8\_t [Key](#) [32]  
*Protection key (256 bit).*
- unsigned int [Major](#)  
*The major number of the hardware version.*
- unsigned int [Minor](#)  
*The minor number of the hardware version.*
- unsigned int [Release](#)  
*Number of edits this release of hardware.*

### 6.49.1 Detailed Description

The structure contains a new serial number, hardware version, and valid key.

The SN and hardware version are changed and saved when the transmitted key matches the stored key. It can be used by the manufacturer only.

See Also

[set\\_serial\\_number](#)

### 6.49.2 Field Documentation

6.49.2.1 uint8\_t [Key](#)[32]

Protection key (256 bit).

6.49.2.2 unsigned int Major

The major number of the hardware version.

6.49.2.3 unsigned int Minor

The minor number of the hardware version.

6.49.2.4 unsigned int Release

Number of edits this release of hardware.

6.49.2.5 unsigned int SN

New board serial number.

## 6.50 `set_position_calb_t` Struct Reference

User unit position information.

### Data Fields

- float [Position](#)  
*The position in the engine.*
- long\_t [EncPosition](#)  
*Encoder position.*
- unsigned int [PosFlags](#)  
*Position setting flags.*

### 6.50.1 Detailed Description

User unit position information.

A useful structure that contains position value in steps and microsteps for stepper motor and encoder steps of all engines.

See Also

[set\\_position](#)

### 6.50.2 Field Documentation

6.50.2.1 long\_t `EncPosition`

Encoder position.

6.50.2.2 unsigned int `PosFlags`

[Position setting flags.](#)

### 6.50.2.3 float Position

The position in the engine.

## 6.51 `set_position_t` Struct Reference

Position information.

### Data Fields

- int [Position](#)  
*The position of the whole steps in the engine.*
- int [uPosition](#)  
*Microstep position is only used with stepper motors.*
- long\_t [EncPosition](#)  
*Encoder position.*
- unsigned int [PosFlags](#)  
*Position setting flags.*

### 6.51.1 Detailed Description

Position information.

A useful structure that contains position value in steps and microsteps for stepper motor and encoder steps for all engines.

See Also

[set\\_position](#)

### 6.51.2 Field Documentation

#### 6.51.2.1 long\_t EncPosition

Encoder position.

#### 6.51.2.2 unsigned int PosFlags

[Position setting flags.](#)

#### 6.51.2.3 int uPosition

Microstep position is only used with stepper motors.

Microstep size and the range of valid values for this field depend on the selected step division mode (see the `MicrostepMode` field in `engine_settings`).

## 6.52 `stage_information_t` Struct Reference

Deprecated.

## Data Fields

- char [Manufacturer](#) [17]  
*Manufacturer.*
- char [PartNumber](#) [25]  
*Series and PartNumber.*

### 6.52.1 Detailed Description

Deprecated.

Stage information. Deprecated.

See Also

[set\\_stage\\_information](#)  
[get\\_stage\\_information](#)  
[get\\_stage\\_information](#), [set\\_stage\\_information](#)

### 6.52.2 Field Documentation

#### 6.52.2.1 char Manufacturer[17]

Manufacturer.

Max string length: 16 chars.

#### 6.52.2.2 char PartNumber[25]

Series and PartNumber.

Max string length: 24 chars.

## 6.53 stage\_name\_t Struct Reference

Stage username.

## Data Fields

- char [PositionerName](#) [17]  
*User's positioner name.*

### 6.53.1 Detailed Description

Stage username.

See Also

[get\\_stage\\_name](#), [set\\_stage\\_name](#)

### 6.53.2 Field Documentation

#### 6.53.2.1 char PositionerName[17]

User's positioner name.

It can be set by a user. Max string length: 16 characters.

## 6.54 stage\_settings\_t Struct Reference

Deprecated.

### Data Fields

- float [LeadScrewPitch](#)  
*Lead screw pitch (mm).*
- char [Units](#) [9]  
*Units for MaxSpeed and TravelRange fields of the structure (steps, degrees, mm, ...).*
- float [MaxSpeed](#)  
*Maximum speed (Units/c).*
- float [TravelRange](#)  
*Travel range (Units).*
- float [SupplyVoltageMin](#)  
*Minimum supply voltage (V).*
- float [SupplyVoltageMax](#)  
*Maximum supply voltage (V).*
- float [MaxCurrentConsumption](#)  
*Maximum current consumption (A).*
- float [HorizontalLoadCapacity](#)  
*Horizontal load capacity (kg).*
- float [VerticalLoadCapacity](#)  
*Vertical load capacity (kg).*

### 6.54.1 Detailed Description

Deprecated.

Stage settings.

See Also

[set\\_stage\\_settings](#)  
[get\\_stage\\_settings](#)  
[get\\_stage\\_settings](#), [set\\_stage\\_settings](#)

### 6.54.2 Field Documentation

#### 6.54.2.1 float HorizontalLoadCapacity

Horizontal load capacity (kg).

Data type: float.

6.54.2.2 float LeadScrewPitch

Lead screw pitch (mm).

Data type: float.

6.54.2.3 float MaxCurrentConsumption

Maximum current consumption (A).

Data type: float.

6.54.2.4 float MaxSpeed

Maximum speed (Units/c).

Data type: float.

6.54.2.5 float SupplyVoltageMax

Maximum supply voltage (V).

Data type: float.

6.54.2.6 float SupplyVoltageMin

Minimum supply voltage (V).

Data type: float.

6.54.2.7 float TravelRange

Travel range (Units).

Data type: float.

6.54.2.8 char Units[9]

Units for MaxSpeed and TravelRange fields of the structure (steps, degrees, mm, ...).

Max string length: 8 chars.

6.54.2.9 float VerticalLoadCapacity

Vertical load capacity (kg).

Data type: float.

## 6.55 status\_calb\_t Struct Reference

User unit device's state.

## Data Fields

- unsigned int [MoveSts](#)  
*Flags of move state.*
- unsigned int [MvCmdSts](#)  
*Move command state.*
- unsigned int [PWRSts](#)  
*Flags of power state of stepper motor.*
- unsigned int [EncSts](#)  
*Encoder state.*
- unsigned int [WindSts](#)  
*Winding state.*
- float [CurPosition](#)  
*Current position.*
- long\_t [EncPosition](#)  
*Current encoder position.*
- float [CurSpeed](#)  
*Motor shaft speed.*
- int [Ipwr](#)  
*Engine current, mA.*
- int [Upwr](#)  
*Power supply voltage, tens of mV.*
- int [Iusb](#)  
*USB current, mA.*
- int [Uusb](#)  
*USB voltage, tens of mV.*
- int [CurT](#)  
*Temperature, tenths of degrees Celsius.*
- unsigned int [Flags](#)  
*Status flags.*
- unsigned int [GPIOFlags](#)  
*Status flags of the GPIO outputs.*
- unsigned int [CmdBufFreeSpace](#)  
*This field is a service field.*

### 6.55.1 Detailed Description

User unit device's state.

A useful structure that contains current controller state, including speed, position, and boolean flags.

See Also

`get_status_impl`

### 6.55.2 Field Documentation

#### 6.55.2.1 unsigned int CmdBufFreeSpace

This field is a service field.

It shows the number of free synchronization chain buffer cells.

## 6.55.2.2 float CurPosition

Current position.

Corrected by the table.

## 6.55.2.3 float CurSpeed

Motor shaft speed.

## 6.55.2.4 int CurT

Temperature, tenths of degrees Celsius.

## 6.55.2.5 long\_t EncPosition

Current encoder position.

## 6.55.2.6 unsigned int EncSts

[Encoder state.](#)

## 6.55.2.7 unsigned int Flags

[Status flags.](#)

## 6.55.2.8 unsigned int GPIOFlags

[Status flags of the GPIO outputs.](#)

## 6.55.2.9 int Ipwr

Engine current, mA.

## 6.55.2.10 int Iusb

USB current, mA.

## 6.55.2.11 unsigned int MoveSts

[Flags of move state.](#)

## 6.55.2.12 unsigned int MvCmdSts

[Move command state.](#)

## 6.55.2.13 unsigned int PWRSts

[Flags of power state of stepper motor.](#)

6.55.2.14 int Upwr

Power supply voltage, tens of mV.

6.55.2.15 int Uusb

USB voltage, tens of mV.

6.55.2.16 unsigned int WindSts

[Winding state.](#)

## 6.56 status\_t Struct Reference

Device state.

### Data Fields

- unsigned int [MoveSts](#)  
*Flags of move state.*
- unsigned int [MvCmdSts](#)  
*Move command state.*
- unsigned int [PWRSts](#)  
*Flags of power state of stepper motor.*
- unsigned int [EncSts](#)  
*Encoder state.*
- unsigned int [WindSts](#)  
*Winding state.*
- int [CurPosition](#)  
*Current position.*
- int [uCurPosition](#)  
*Step motor shaft position in microsteps.*
- long\_t [EncPosition](#)  
*Current encoder position.*
- int [CurSpeed](#)  
*Motor shaft speed in steps/s or rpm.*
- int [uCurSpeed](#)  
*Fractional part of motor shaft speed in microsteps.*
- int [Ipwr](#)  
*Engine current, mA.*
- int [Upwr](#)  
*Power supply voltage, tens of mV.*
- int [Iusb](#)  
*USB current, mA.*
- int [Uusb](#)  
*USB voltage, tens of mV.*
- int [CurT](#)  
*Temperature, tenths of degrees Celsius.*

- unsigned int [Flags](#)  
*Status flags.*
- unsigned int [GPIOFlags](#)  
*Status flags of the GPIO outputs.*
- unsigned int [CmdBufFreeSpace](#)  
*This field is a service field.*

### 6.56.1 Detailed Description

Device state.

A useful structure that contains current controller state, including speed, position, and boolean flags.

See Also

`get_status_impl`

### 6.56.2 Field Documentation

#### 6.56.2.1 unsigned int CmdBufFreeSpace

This field is a service field.

It shows the number of free synchronization chain buffer cells.

#### 6.56.2.2 int CurPosition

Current position.

#### 6.56.2.3 int CurSpeed

Motor shaft speed in steps/s or rpm.

#### 6.56.2.4 int CurT

Temperature, tenths of degrees Celsius.

#### 6.56.2.5 long\_t EncPosition

Current encoder position.

#### 6.56.2.6 unsigned int EncSts

[Encoder state.](#)

#### 6.56.2.7 unsigned int Flags

[Status flags.](#)

6.56.2.8 unsigned int GPIOFlags

[Status flags of the GPIO outputs.](#)

6.56.2.9 int Ipwr

Engine current, mA.

6.56.2.10 int Iusb

USB current, mA.

6.56.2.11 unsigned int MoveSts

[Flags of move state.](#)

6.56.2.12 unsigned int MvCmdSts

[Move command state.](#)

6.56.2.13 unsigned int PWRSts

[Flags of power state of stepper motor.](#)

6.56.2.14 int uCurPosition

Step motor shaft position in microsteps.

The microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine\_settings). Used with stepper motors only.

6.56.2.15 int uCurSpeed

Fractional part of motor shaft speed in microsteps.

The microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine\_settings). Used with stepper motors only.

6.56.2.16 int Upwr

Power supply voltage, tens of mV.

6.56.2.17 int Uusb

USB voltage, tens of mV.

6.56.2.18 unsigned int WindSts

[Winding state.](#)

## 6.57 `sync_in_settings_calb_t` Struct Reference

User unit synchronization settings.

### Data Fields

- unsigned int [SynclnFlags](#)  
*Flags for synchronization input setup.*
- unsigned int [ClutterTime](#)  
*Input synchronization pulse dead time (us).*
- float [Position](#)  
*Desired position or shift.*
- float [Speed](#)  
*Target speed.*

### 6.57.1 Detailed Description

User unit synchronization settings.

This structure contains all synchronization settings, modes, periods and flags. It specifies behavior of input synchronization. All boards are supplied with the standard set of these settings.

See Also

[get\\_sync\\_in\\_settings\\_calb](#)  
[set\\_sync\\_in\\_settings\\_calb](#)  
[get\\_sync\\_in\\_settings](#), [set\\_sync\\_in\\_settings](#)

### 6.57.2 Field Documentation

#### 6.57.2.1 unsigned int `ClutterTime`

Input synchronization pulse dead time (us).

#### 6.57.2.2 float `Position`

Desired position or shift.

#### 6.57.2.3 float `Speed`

Target speed.

#### 6.57.2.4 unsigned int `SynclnFlags`

[Flags for synchronization input setup.](#)

## 6.58 `sync_in_settings_t` Struct Reference

Synchronization settings.

## Data Fields

- unsigned int `SyncInFlags`  
*Flags for synchronization input setup.*
- unsigned int `ClutterTime`  
*Input synchronization pulse dead time (us).*
- int `Position`  
*Desired position or shift (full steps)*
- int `uPosition`  
*The fractional part of a position or shift in microsteps.*
- unsigned int `Speed`  
*Target speed (for stepper motor: steps/s, for DC: rpm).*
- unsigned int `uSpeed`  
*Target speed in microsteps/s.*

### 6.58.1 Detailed Description

Synchronization settings.

This structure contains all synchronization settings, modes, periods and flags. It specifies the behavior of the input synchronization. All boards are supplied with the standard set of these settings.

See Also

[get\\_sync\\_in\\_settings](#)  
[set\\_sync\\_in\\_settings](#)  
[get\\_sync\\_in\\_settings](#), [set\\_sync\\_in\\_settings](#)

### 6.58.2 Field Documentation

#### 6.58.2.1 unsigned int `ClutterTime`

Input synchronization pulse dead time (us).

#### 6.58.2.2 unsigned int `Speed`

Target speed (for stepper motor: steps/s, for DC: rpm).

Range: 0..100000.

#### 6.58.2.3 unsigned int `SyncInFlags`

[Flags for synchronization input setup.](#)

#### 6.58.2.4 int `uPosition`

The fractional part of a position or shift in microsteps.

It is used with a stepper motor. The microstep size and the range of valid values for this field depend on the selected step division mode (see the `MicrostepMode` field in `engine_settings`).

6.58.2.5 unsigned int uSpeed

Target speed in microsteps/s.

Microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine\_settings). Used a stepper motor only.

## 6.59 sync\_out\_settings\_calb\_t Struct Reference

Synchronization settings which use user units.

### Data Fields

- unsigned int [SyncOutFlags](#)  
*Flags of synchronization output.*
- unsigned int [SyncOutPulseSteps](#)  
*This value specifies the duration of output pulse.*
- unsigned int [SyncOutPeriod](#)  
*This value specifies the number of encoder pulses or steps between two output synchronization pulses when SYNCOUT\_ONPERIOD is set.*
- float [Accuracy](#)  
*This is the neighborhood around the target coordinates, every point in which is treated as the target position.*

### 6.59.1 Detailed Description

Synchronization settings which use user units.

This structure contains all synchronization settings, modes, periods and flags. It specifies the behavior of the output synchronization. All boards are supplied with the standard set of these settings.

See Also

[get\\_sync\\_out\\_settings\\_calb](#)  
[set\\_sync\\_out\\_settings\\_calb](#)  
[get\\_sync\\_out\\_settings](#), [set\\_sync\\_out\\_settings](#)

### 6.59.2 Field Documentation

6.59.2.1 float Accuracy

This is the neighborhood around the target coordinates, every point in which is treated as the target position. Getting in these points cause the stop impulse.

6.59.2.2 unsigned int SyncOutFlags

[Flags of synchronization output.](#)

6.59.2.3 unsigned int SyncOutPeriod

This value specifies the number of encoder pulses or steps between two output synchronization pulses when SYNCOUT\_ONPERIOD is set.

6.59.2.4 unsigned int SyncOutPulseSteps

This value specifies the duration of output pulse.

It is measured microseconds when SYNCOUT\_IN\_STEPS flag is cleared or in encoder pulses or motor steps when SYNCOUT\_IN\_STEPS is set.

## 6.60 sync\_out\_settings\_t Struct Reference

Synchronization settings.

### Data Fields

- unsigned int [SyncOutFlags](#)  
*Flags of synchronization output.*
- unsigned int [SyncOutPulseSteps](#)  
*This value specifies the duration of output pulse.*
- unsigned int [SyncOutPeriod](#)  
*This value specifies the number of encoder pulses or steps between two output synchronization pulses when SYNCOUT\_ONPERIOD is set.*
- unsigned int [Accuracy](#)  
*This is the neighborhood around the target coordinates, every point in which is treated as the target position.*
- unsigned int [uAccuracy](#)  
*This is the neighborhood around the target coordinates in microsteps (used with a stepper motor only).*

### 6.60.1 Detailed Description

Synchronization settings.

This structure contains all synchronization settings, modes, periods and flags. It specifies the behavior of the output synchronization. All boards are supplied with the standard set of these settings.

See Also

[get\\_sync\\_out\\_settings](#)  
[set\\_sync\\_out\\_settings](#)  
[get\\_sync\\_out\\_settings](#), [set\\_sync\\_out\\_settings](#)

### 6.60.2 Field Documentation

6.60.2.1 unsigned int Accuracy

This is the neighborhood around the target coordinates, every point in which is treated as the target position. Getting in these points cause the stop impulse.

6.60.2.2 unsigned int SyncOutFlags

[Flags of synchronization output.](#)

6.60.2.3 unsigned int `SyncOutPeriod`

This value specifies the number of encoder pulses or steps between two output synchronization pulses when `SYNCOUT_ONPERIOD` is set.

6.60.2.4 unsigned int `SyncOutPulseSteps`

This value specifies the duration of output pulse.

It is measured microseconds when `SYNCOUT_IN_STEPS` flag is cleared or in encoder pulses or motor steps when `SYNCOUT_IN_STEPS` is set.

6.60.2.5 unsigned int `uAccuracy`

This is the neighborhood around the target coordinates in microsteps (used with a stepper motor only).

The microstep size and the range of valid values for this field depend on the selected step division mode (see the `MicrostepMode` field in `engine_settings`).

## 6.61 `uart_settings_t` Struct Reference

UART settings.

### Data Fields

- unsigned int [Speed](#)  
*UART baudrate (in bauds)*
- unsigned int [UARTSetupFlags](#)  
*UART parity flags.*

### 6.61.1 Detailed Description

UART settings.

This structure contains UART settings.

See Also

[get\\_uart\\_settings](#)  
[set\\_uart\\_settings](#)  
[get\\_uart\\_settings](#), [set\\_uart\\_settings](#)

### 6.61.2 Field Documentation

6.61.2.1 unsigned int `UARTSetupFlags`

[UART parity flags.](#)

# Chapter 7

## File Documentation

### 7.1 ximc.h File Reference

Header file for libximc library.

#### Data Structures

- struct [calibration\\_t](#)  
*Calibration structure.*
- struct [device\\_network\\_information\\_t](#)  
*Device network information structure.*
- struct [feedback\\_settings\\_t](#)  
*Feedback settings.*
- struct [home\\_settings\\_t](#)  
*Position calibration settings.*
- struct [home\\_settings\\_calb\\_t](#)  
*Position calibration settings which use user units.*
- struct [move\\_settings\\_t](#)  
*Move settings.*
- struct [move\\_settings\\_calb\\_t](#)  
*User units move settings.*
- struct [engine\\_settings\\_t](#)  
*Movement limitations and settings related to the motor.*
- struct [engine\\_settings\\_calb\\_t](#)  
*Movement limitations and settings, related to the motor.*
- struct [entype\\_settings\\_t](#)  
*Engine type and driver type settings.*
- struct [power\\_settings\\_t](#)  
*Step motor power settings.*
- struct [secure\\_settings\\_t](#)  
*This structure contains raw analog data from ADC embedded on board.*
- struct [edges\\_settings\\_t](#)  
*Edges settings.*
- struct [edges\\_settings\\_calb\\_t](#)  
*User unit edges settings.*
- struct [pid\\_settings\\_t](#)

- *PID settings.*
- struct [sync\\_in\\_settings\\_t](#)
  - *Synchronization settings.*
- struct [sync\\_in\\_settings\\_calb\\_t](#)
  - *User unit synchronization settings.*
- struct [sync\\_out\\_settings\\_t](#)
  - *Synchronization settings.*
- struct [sync\\_out\\_settings\\_calb\\_t](#)
  - *Synchronization settings which use user units.*
- struct [extio\\_settings\\_t](#)
  - *EXTIO settings.*
- struct [brake\\_settings\\_t](#)
  - *Brake settings.*
- struct [control\\_settings\\_t](#)
  - *Control settings.*
- struct [control\\_settings\\_calb\\_t](#)
  - *User unit control settings.*
- struct [joystick\\_settings\\_t](#)
  - *Joystick settings.*
- struct [ctp\\_settings\\_t](#)
  - *Control position settings (used with stepper motor only)*
- struct [uart\\_settings\\_t](#)
  - *UART settings.*
- struct [network\\_settings\\_t](#)
  - *Network settings.*
- struct [password\\_settings\\_t](#)
  - *The web-page user password.*
- struct [calibration\\_settings\\_t](#)
  - *Calibration settings.*
- struct [controller\\_name\\_t](#)
  - *Controller name and settings flags.*
- struct [nonvolatile\\_memory\\_t](#)
  - *Structure contains user data to save into the FRAM.*
- struct [emf\\_settings\\_t](#)
  - *EMF settings.*
- struct [engine\\_advanced\\_setup\\_t](#)
  - *EAS settings.*
- struct [extended\\_settings\\_t](#)
  - *EST settings This data is stored in the controller's flash memory.*
- struct [get\\_position\\_t](#)
  - *Position information.*
- struct [get\\_position\\_calb\\_t](#)
  - *Position information.*
- struct [set\\_position\\_t](#)
  - *Position information.*
- struct [set\\_position\\_calb\\_t](#)
  - *User unit position information.*
- struct [status\\_t](#)
  - *Device state.*

- struct [status\\_calb\\_t](#)  
*User unit device's state.*
- struct [measurements\\_t](#)  
*The buffer holds no more than 25 points.*
- struct [chart\\_data\\_t](#)  
*Additional device state.*
- struct [device\\_information\\_t](#)  
*Controller information structure.*
- struct [serial\\_number\\_t](#)  
*The structure contains a new serial number, hardware version, and valid key.*
- struct [analog\\_data\\_t](#)  
*Analog data.*
- struct [debug\\_read\\_t](#)  
*Debug data.*
- struct [debug\\_write\\_t](#)  
*Debug data.*
- struct [stage\\_name\\_t](#)  
*Stage username.*
- struct [stage\\_information\\_t](#)  
*Deprecated.*
- struct [stage\\_settings\\_t](#)  
*Deprecated.*
- struct [motor\\_information\\_t](#)  
*Deprecated.*
- struct [motor\\_settings\\_t](#)  
*Deprecated.*
- struct [encoder\\_information\\_t](#)  
*Deprecated.*
- struct [encoder\\_settings\\_t](#)  
*Deprecated.*
- struct [hallsensor\\_information\\_t](#)  
*Deprecated.*
- struct [hallsensor\\_settings\\_t](#)  
*Deprecated.*
- struct [gear\\_information\\_t](#)  
*Deprecated.*
- struct [gear\\_settings\\_t](#)  
*Deprecated.*
- struct [accessories\\_settings\\_t](#)  
*Deprecated.*
- struct [init\\_random\\_t](#)  
*Random key.*
- struct [globally\\_unique\\_identifier\\_t](#)  
*Globally unique identifier.*

## Macros

- #define `XIMC_API`  
*Library import macro.*
- #define `XIMC_CALLCONV`  
*Library calling convention macros.*
- #define `XIMC_RETTYPE` `void*`  
*Thread return type.*
- #define `device_undefined` `-1`  
*Handle specified undefined device.*

## Result statuses

- #define `result_ok` `0`  
*success*
- #define `result_error` `-1`  
*generic error*
- #define `result_not_implemented` `-2`  
*function is not implemented*
- #define `result_value_error` `-3`  
*value error*
- #define `result_nodvice` `-4`  
*device is lost*

## Logging level

- #define `LOGLEVEL_ERROR` `0x01`  
*Logging level - error.*
- #define `LOGLEVEL_WARNING` `0x02`  
*Logging level - warning.*
- #define `LOGLEVEL_INFO` `0x03`  
*Logging level - info.*
- #define `LOGLEVEL_DEBUG` `0x04`  
*Logging level - debug.*

## Enumerate devices flags

*This is a bit mask for bitwise operations.*

- #define `ENUMERATE_PROBE` `0x01`  
*Check if a device with an OS name is a XIMC device.*
- #define `ENUMERATE_ALL_COM` `0x02`  
*Check all COM devices.*
- #define `ENUMERATE_NETWORK` `0x04`  
*Check network devices.*

## Flags of move state

*This is a bit mask for bitwise operations. Specify move states.*

See Also

[get\\_status](#)  
[status.t::MoveSts](#), [get\\_status\\_impl](#)

- #define [MOVE\\_STATE\\_MOVING](#) 0x01  
*This flag indicates that the controller is trying to move the motor.*
- #define [MOVE\\_STATE\\_TARGET\\_SPEED](#) 0x02  
*Target speed is reached, if flag set.*
- #define [MOVE\\_STATE\\_ANTIPLAY](#) 0x04  
*Motor is playing compensation, if flag set.*

### Flags of internal controller settings

*This is a bit mask for bitwise operations.*

See Also

[set\\_controller\\_name](#)  
[get\\_controller\\_name](#)  
[controller\\_name.t::CtrlFlags](#), [get\\_controller\\_name](#), [set\\_controller\\_name](#)

- #define [EEPROM\\_PRECEDENCE](#) 0x01  
*If the flag is set, settings from external EEPROM override controller settings.*

### Flags of power state of stepper motor

*This is a bit mask for bitwise operations. Specify power states.*

See Also

[get\\_status](#)  
[status.t::PWRSts](#), [get\\_status\\_impl](#)

- #define [PWR\\_STATE\\_UNKNOWN](#) 0x00  
*Unknown state, should never happen.*
- #define [PWR\\_STATE\\_OFF](#) 0x01  
*Motor windings are disconnected from the driver.*
- #define [PWR\\_STATE\\_NORM](#) 0x03  
*Motor windings are powered by nominal current.*
- #define [PWR\\_STATE\\_REDUCT](#) 0x04  
*Motor windings are powered by reduced current to lower power consumption.*
- #define [PWR\\_STATE\\_MAX](#) 0x05  
*Motor windings are powered by the maximum current driver can provide at this voltage.*

### Status flags

*This is a bit mask for bitwise operations. Controller flags returned by device query. Contains boolean part of controller state. May be combined with bitwise OR.*

See Also

[get\\_status](#)  
[status.t::Flags](#), [get\\_status\\_impl](#)

- #define [STATE\\_CONTR](#) 0x000003F  
*Flags of controller states.*
- #define [STATE\\_ERRC](#) 0x0000001  
*Command error encountered.*
- #define [STATE\\_ERRD](#) 0x0000002  
*Data integrity error encountered.*
- #define [STATE\\_ERRV](#) 0x0000004

- *Value error encountered.*
- #define [STATE\\_EEPROM\\_CONNECTED](#) 0x0000010  
*EEPROM with settings is connected.*
- #define [STATE\\_IS\\_HOMED](#) 0x0000020  
*Calibration performed.*
- #define [STATE\\_SECUR](#) 0x1B3FFC0  
*Security flags.*
- #define [STATE\\_ALARM](#) 0x0000040  
*The controller is in an alarm state, indicating that something dangerous has happened.*
- #define [STATE\\_CTP\\_ERROR](#) 0x0000080  
*Control position error (is only used with stepper motor).*
- #define [STATE\\_POWER\\_OVERHEAT](#) 0x0000100  
*Power driver overheat.*
- #define [STATE\\_CONTROLLER\\_OVERHEAT](#) 0x0000200  
*Controller overheat.*
- #define [STATE\\_OVERLOAD\\_POWER\\_VOLTAGE](#) 0x0000400  
*Power voltage exceeds safe limit.*
- #define [STATE\\_OVERLOAD\\_POWER\\_CURRENT](#) 0x0000800  
*Power current exceeds safe limit.*
- #define [STATE\\_OVERLOAD\\_USB\\_VOLTAGE](#) 0x0001000  
*USB voltage exceeds safe limit.*
- #define [STATE\\_LOW\\_USB\\_VOLTAGE](#) 0x0002000  
*USB voltage is insufficient for normal operation.*
- #define [STATE\\_OVERLOAD\\_USB\\_CURRENT](#) 0x0004000  
*USB current exceeds safe limit.*
- #define [STATE\\_BORDERS\\_SWAP\\_MISSET](#) 0x0008000  
*Engine stuck at the wrong edge.*
- #define [STATE\\_LOW\\_POWER\\_VOLTAGE](#) 0x0010000  
*Power voltage is lower than Low Voltage Protection limit.*
- #define [STATE\\_H\\_BRIDGE\\_FAULT](#) 0x0020000  
*Signal from the driver that fault happened.*
- #define [STATE\\_WINDING\\_RES\\_MISMATCH](#) 0x0100000  
*The difference between winding resistances is too large.*
- #define [STATE\\_ENCODER\\_FAULT](#) 0x0200000  
*Signal from the encoder that fault happened.*
- #define [STATE\\_ENGINE\\_RESPONSE\\_ERROR](#) 0x0800000  
*Error response of the engine control action.*
- #define [STATE\\_EXTIO\\_ALARM](#) 0x1000000  
*The error is caused by the external EXTIO input signal.*

### Status flags of the GPIO outputs

This is a bit mask for bitwise operations. GPIO state flags returned by device query. Contains boolean part of controller state. May be combined with bitwise OR.

See Also

[get\\_status](#)  
[status\\_t::GPIOFlags](#), [get\\_status\\_impl](#)

- #define [STATE\\_DIG\\_SIGNAL](#) 0xFFFF  
*Flags of digital signals.*
- #define [STATE\\_RIGHT\\_EDGE](#) 0x0001  
*Engine stuck at the right edge.*
- #define [STATE\\_LEFT\\_EDGE](#) 0x0002  
*Engine stuck at the left edge.*
- #define [STATE\\_BUTTON\\_RIGHT](#) 0x0004  
*Button "right" state (1 if pressed).*

- #define [STATE.BUTTON\\_LEFT](#) 0x0008  
*Button "left" state (1 if pressed).*
- #define [STATE.GPIO\\_PINOUT](#) 0x0010  
*External GPIO works as out if the flag is set; otherwise, it works as in.*
- #define [STATE.GPIO\\_LEVEL](#) 0x0020  
*State of external GPIO pin.*
- #define [STATE.BRAKE](#) 0x0200  
*State of Brake pin.*
- #define [STATE.REV.SENSOR](#) 0x0400  
*State of Revolution sensor pin.*
- #define [STATE.SYNC.INPUT](#) 0x0800  
*State of Sync input pin.*
- #define [STATE.SYNC.OUTPUT](#) 0x1000  
*State of Sync output pin.*
- #define [STATE.ENC.A](#) 0x2000  
*State of encoder A pin.*
- #define [STATE.ENC.B](#) 0x4000  
*State of encoder B pin.*

### Encoder state

This is a bit mask for bitwise operations. Encoder state returned by device query.

See Also

[get\\_status](#)  
[status.t::EncSts](#), [get\\_status\\_impl](#)

- #define [ENC.STATE.ABSENT](#) 0x00  
*Encoder is absent.*
- #define [ENC.STATE.UNKNOWN](#) 0x01  
*Encoder state is unknown.*
- #define [ENC.STATE.MALFUNC](#) 0x02  
*Encoder is connected and malfunctioning.*
- #define [ENC.STATE.REVERS](#) 0x03  
*Encoder is connected and operational but counts in other direction.*
- #define [ENC.STATE.OK](#) 0x04  
*Encoder is connected and working properly.*

### Winding state

This is a bit mask for bitwise operations. Motor winding state returned by device query.

See Also

[get\\_status](#)  
[status.t::WindSts](#), [get\\_status\\_impl](#)

- #define [WIND.A.STATE.ABSENT](#) 0x00  
*Winding A is disconnected.*
- #define [WIND.A.STATE.UNKNOWN](#) 0x01  
*Winding A state is unknown.*
- #define [WIND.A.STATE.MALFUNC](#) 0x02  
*Winding A is short-circuited.*
- #define [WIND.A.STATE.OK](#) 0x03  
*Winding A is connected and working properly.*
- #define [WIND.B.STATE.ABSENT](#) 0x00  
*Winding B is disconnected.*
- #define [WIND.B.STATE.UNKNOWN](#) 0x10  
*Winding B state is unknown.*

- #define [WIND\\_B\\_STATE\\_MALFUNC](#) 0x20  
*Winding B is short-circuited.*
- #define [WIND\\_B\\_STATE\\_OK](#) 0x30  
*Winding B is connected and working properly.*

### Move command state

This is a bit mask for bitwise operations. Move command (*command\_move*, *command\_movr*, *command\_left*, *command\_right*, *command\_stop*, *command\_home*, *command\_loft*, *command\_sstp*) and its state (*run*, *finished*, *error*).

See Also

[get\\_status](#)  
[status\\_t::MvCmdSts](#), [get\\_status\\_impl](#)

- #define [MVCMD\\_NAME\\_BITS](#) 0x3F  
*Move command bit mask.*
- #define [MVCMD\\_UKNWN](#) 0x00  
*Unknown command.*
- #define [MVCMD\\_MOVE](#) 0x01  
*Command move.*
- #define [MVCMD\\_MOVR](#) 0x02  
*Command movr.*
- #define [MVCMD\\_LEFT](#) 0x03  
*Command left.*
- #define [MVCMD\\_RIGHT](#) 0x04  
*Command rigt.*
- #define [MVCMD\\_STOP](#) 0x05  
*Command stop.*
- #define [MVCMD\\_HOME](#) 0x06  
*Command home.*
- #define [MVCMD\\_LOFT](#) 0x07  
*Command loft.*
- #define [MVCMD\\_SSTP](#) 0x08  
*Command soft stop.*
- #define [MVCMD\\_ERROR](#) 0x40  
*Finish state (1 - move command has finished with an error, 0 - move command has finished correctly).*
- #define [MVCMD\\_RUNNING](#) 0x80  
*Move command state (0 - move command has finished, 1 - move command is being executed).*

### Flags of the motion parameters

This is a bit mask for bitwise operations. Specify the motor shaft movement algorithm and list of limitations. Flags returned by the query of *get\_move\_settings*.

See Also

[set\\_move\\_settings](#)  
[get\\_move\\_settings](#)  
[move\\_settings\\_t::MoveFlags](#), [get\\_move\\_settings](#), [set\\_move\\_settings](#)

- #define [RPM\\_DIV\\_1000](#) 0x01  
*This flag indicates that the operating speed specified in the command is set in milliRPM.*

### Flags of engine settings

This is a bit mask for bitwise operations. Specify the motor shaft movement algorithm and list of limitations. Flags returned by query of engine settings. May be combined with bitwise OR.

See Also

[set\\_engine\\_settings](#)  
[get\\_engine\\_settings](#)  
[engine\\_settings\\_t::EngineFlags](#), [get\\_engine\\_settings](#), [set\\_engine\\_settings](#)

- #define [ENGINE\\_REVERSE](#) 0x01  
Reverse flag.
- #define [ENGINE\\_CURRENT\\_AS\\_RMS](#) 0x02  
Engine current meaning flag.
- #define [ENGINE\\_MAX\\_SPEED](#) 0x04  
Max speed flag.
- #define [ENGINE\\_ANTIPLAY](#) 0x08  
Play compensation flag.
- #define [ENGINE\\_ACCEL\\_ON](#) 0x10  
Acceleration enable flag.
- #define [ENGINE\\_LIMIT\\_VOLT](#) 0x20  
Maximum motor voltage limit enable flag (is only used with DC motor).
- #define [ENGINE\\_LIMIT\\_CURR](#) 0x40  
Maximum motor current limit enable flag (is only used with DC motor).
- #define [ENGINE\\_LIMIT\\_RPM](#) 0x80  
Maximum motor speed limit enable flag.

### Flags of microstep mode

This is a bit mask for bitwise operations. Specify settings for microstep mode. Used with step motors. Flags returned by query of engine settings. May be combined with bitwise OR

See Also

[engine\\_settings\\_t::flags](#)  
[set\\_engine\\_settings](#)  
[get\\_engine\\_settings](#)  
[engine\\_settings\\_t::MicrostepMode](#), [get\\_engine\\_settings](#), [set\\_engine\\_settings](#)

- #define [MICROSTEP\\_MODE\\_FULL](#) 0x01  
Full step mode.
- #define [MICROSTEP\\_MODE\\_FRAC\\_2](#) 0x02  
1/2-step mode.
- #define [MICROSTEP\\_MODE\\_FRAC\\_4](#) 0x03  
1/4-step mode.
- #define [MICROSTEP\\_MODE\\_FRAC\\_8](#) 0x04  
1/8-step mode.
- #define [MICROSTEP\\_MODE\\_FRAC\\_16](#) 0x05  
1/16-step mode.
- #define [MICROSTEP\\_MODE\\_FRAC\\_32](#) 0x06  
1/32-step mode.
- #define [MICROSTEP\\_MODE\\_FRAC\\_64](#) 0x07  
1/64-step mode.
- #define [MICROSTEP\\_MODE\\_FRAC\\_128](#) 0x08  
1/128-step mode.
- #define [MICROSTEP\\_MODE\\_FRAC\\_256](#) 0x09  
1/256-step mode.

### Flags of engine type

This is a bit mask for bitwise operations. Specify motor type. Flags returned by query of engine settings.

See Also

[engine\\_settings\\_t::flags](#)  
[set\\_entype\\_settings](#)  
[get\\_entype\\_settings](#)  
[entype\\_settings\\_t::EngineType](#), [get\\_entype\\_settings](#), [set\\_entype\\_settings](#)

- #define [ENGINE\\_TYPE\\_NONE](#) 0x00  
*A value that shouldn't be used.*
- #define [ENGINE\\_TYPE\\_DC](#) 0x01  
*DC motor.*
- #define [ENGINE\\_TYPE\\_2DC](#) 0x02  
*2 DC motors.*
- #define [ENGINE\\_TYPE\\_STEP](#) 0x03  
*Step motor.*
- #define [ENGINE\\_TYPE\\_TEST](#) 0x04  
*Duty cycle are fixed.*
- #define [ENGINE\\_TYPE\\_BRUSHLESS](#) 0x05  
*Brushless motor.*

### Flags of driver type

*This is a bit mask for bitwise operations. Specify driver type. Flags returned by query of engine settings.*

See Also

[engine\\_settings\\_t::flags](#)  
[set\\_entype\\_settings](#)  
[get\\_entype\\_settings](#)  
[entype\\_settings\\_t::DriverType](#), [get\\_entype\\_settings](#), [set\\_entype\\_settings](#)

- #define [DRIVER\\_TYPE\\_DISCRETE\\_FET](#) 0x01  
*Driver with discrete FET keys.*
- #define [DRIVER\\_TYPE\\_INTEGRATE](#) 0x02  
*Driver with integrated IC.*
- #define [DRIVER\\_TYPE\\_EXTERNAL](#) 0x03  
*External driver.*

### Flags of power settings of stepper motor

*This is a bit mask for bitwise operations. Flags returned by query of engine settings. Specify power settings. Flags returned by query of power settings.*

See Also

[get\\_power\\_settings](#)  
[set\\_power\\_settings](#)  
[power\\_settings\\_t::PowerFlags](#), [get\\_power\\_settings](#), [set\\_power\\_settings](#)

- #define [POWER\\_REDUCT\\_ENABLED](#) 0x01  
*Current reduction is enabled after CurrReductDelay if this flag is set.*
- #define [POWER\\_OFF\\_ENABLED](#) 0x02  
*Power off is enabled after PowerOffDelay if this flag is set.*
- #define [POWER\\_SMOOTH\\_CURRENT](#) 0x04  
*Current ramp-up/down are performed smoothly during current\_set\_time if this flag is set.*

### Flags of secure settings

*This is a bit mask for bitwise operations. Flags returned by query of engine settings. Specify secure settings. Flags returned by query of secure settings.*

See Also

[get\\_secure\\_settings](#)  
[set\\_secure\\_settings](#)  
[secure\\_settings\\_t::Flags](#), [get\\_secure\\_settings](#), [set\\_secure\\_settings](#)

- #define [ALARM\\_ON\\_DRIVER\\_OVERHEATING](#) 0x01  
*If this flag is set, enter the alarm state on the driver overheat signal.*
- #define [LOW\\_UPWR\\_PROTECTION](#) 0x02  
*If this flag is set, turn off the motor when the voltage is lower than LowUpwrOff.*
- #define [H\\_BRIDGE\\_ALERT](#) 0x04  
*If this flag is set then turn off the power unit with a signal problem in one of the transistor bridge.*
- #define [ALARM\\_ON\\_BORDERS\\_SWAP\\_MISSET](#) 0x08  
*If this flag is set, enter Alarm state on borders swap misset.*
- #define [ALARM\\_FLAGS\\_STICKING](#) 0x10  
*If this flag is set, only a STOP command can turn all alarms to 0.*
- #define [USB\\_BREAK\\_RECONNECT](#) 0x20  
*If this flag is set, the USB brake reconnect module will be enabled.*
- #define [ALARM\\_WINDING\\_MISMATCH](#) 0x40  
*If this flag is set, enter Alarm state when windings mismatch.*
- #define [ALARM\\_ENGINE\\_RESPONSE](#) 0x80  
*If this flag is set, enter the Alarm state on response of the engine control action.*

### Position setting flags

*This is a bit mask for bitwise operations. Flags used in setting position.*

See Also

[get\\_position](#)  
[set\\_position](#)  
[set\\_position\\_t::PosFlags](#), [set\\_position](#)

- #define [SETPOS\\_IGNORE\\_POSITION](#) 0x01  
*Will not reload position in steps/microsteps if this flag is set.*
- #define [SETPOS\\_IGNORE\\_ENCODER](#) 0x02  
*Will not reload encoder state if this flag is set.*

### Feedback type.

*This is a bit mask for bitwise operations.*

See Also

[set\\_feedback\\_settings](#)  
[get\\_feedback\\_settings](#)  
[feedback\\_settings\\_t::FeedbackType](#), [get\\_feedback\\_settings](#), [set\\_feedback\\_settings](#)

- #define [FEEDBACK\\_ENCODER](#) 0x01  
*Feedback by encoder.*
- #define [FEEDBACK\\_EMF](#) 0x04  
*Feedback by EMF.*
- #define [FEEDBACK\\_NONE](#) 0x05  
*Feedback is absent.*
- #define [FEEDBACK\\_ENCODER\\_MEDIATED](#) 0x06  
*Feedback by encoder mediated by mechanical transmission (for example leadscrew).*

### Describes feedback flags.

*This is a bit mask for bitwise operations.*

See Also

[set\\_feedback\\_settings](#)  
[get\\_feedback\\_settings](#)  
[feedback\\_settings.t::FeedbackFlags](#), [get\\_feedback\\_settings](#), [set\\_feedback\\_settings](#)

- #define [FEEDBACK\\_ENC\\_REVERSE](#) 0x01  
*Reverse count of encoder.*
- #define [FEEDBACK\\_ENC\\_TYPE\\_BITS](#) 0xC0  
*Bits of the encoder type.*
- #define [FEEDBACK\\_ENC\\_TYPE\\_AUTO](#) 0x00  
*Auto detect encoder type.*
- #define [FEEDBACK\\_ENC\\_TYPE\\_SINGLE\\_ENDED](#) 0x40  
*Single-ended encoder.*
- #define [FEEDBACK\\_ENC\\_TYPE\\_DIFFERENTIAL](#) 0x80  
*Differential encoder.*

### Flags for synchronization input setup

*This is a bit mask for bitwise operations.*

See Also

[sync\\_in\\_settings.t::SyncInFlags](#), [get\\_sync\\_in\\_settings](#), [set\\_sync\\_in\\_settings](#)

- #define [SYNCIN\\_ENABLED](#) 0x01  
*Synchronization in mode is enabled if this flag is set.*
- #define [SYNCIN\\_INVERT](#) 0x02  
*Trigger on falling edge if flag is set, on rising edge otherwise.*
- #define [SYNCIN\\_GOTOPOSITION](#) 0x04  
*The engine is going to the position specified in Position and uPosition if this flag is set.*

### Flags of synchronization output

*This is a bit mask for bitwise operations.*

See Also

[sync\\_out\\_settings.t::SyncOutFlags](#), [get\\_sync\\_out\\_settings](#), [set\\_sync\\_out\\_settings](#)

- #define [SYNCOUT\\_ENABLED](#) 0x01  
*The synchronization out pin follows the synchronization logic if the flag is set.*
- #define [SYNCOUT\\_STATE](#) 0x02  
*When the output state is fixed by the negative SYNCOUT\_ENABLED flag, the pin state is in accordance with this flag state.*
- #define [SYNCOUT\\_INVERT](#) 0x04  
*The low level is active if the flag is set.*
- #define [SYNCOUT\\_IN\\_STEPS](#) 0x08  
*Use motor steps or encoder pulses instead of milliseconds for output pulse generation if the flag is set.*
- #define [SYNCOUT\\_ONSTART](#) 0x10  
*Generate a synchronization pulse when movement starts.*
- #define [SYNCOUT\\_ONSTOP](#) 0x20  
*Generate a synchronization pulse when movement stops.*
- #define [SYNCOUT\\_ONPERIOD](#) 0x40  
*Generate a synchronization pulse every SyncOutPeriod encoder pulses.*

### External IO setup flags

*This is a bit mask for bitwise operations.*

See Also

[get\\_extio\\_settings](#)  
[set\\_extio\\_settings](#)  
[extio\\_settings\\_t::EXTIOSetupFlags](#), [get\\_extio\\_settings](#), [set\\_extio\\_settings](#)

- #define [EXTIO\\_SETUP\\_OUTPUT](#) 0x01  
*EXTIO works as output if the flag is set, works as input otherwise.*
- #define [EXTIO\\_SETUP\\_INVERT](#) 0x02  
*Interpret EXTIO state inverted if the flag is set.*

### External IO mode flags

*This is a bit mask for bitwise operations.*

See Also

[extio\\_settings\\_t::extio\\_mode\\_flags](#)  
[get\\_extio\\_settings](#)  
[set\\_extio\\_settings](#)  
[extio\\_settings\\_t::EXTIOModeFlags](#), [get\\_extio\\_settings](#), [set\\_extio\\_settings](#)

- #define [EXTIO\\_SETUP\\_MODE\\_IN\\_BITS](#) 0x0F  
*Bits of the behavior selector when the signal on input goes to the active state.*
- #define [EXTIO\\_SETUP\\_MODE\\_IN\\_NOP](#) 0x00  
*Do nothing.*
- #define [EXTIO\\_SETUP\\_MODE\\_IN\\_STOP](#) 0x01  
*Issue STOP command, ceasing the engine movement.*
- #define [EXTIO\\_SETUP\\_MODE\\_IN\\_PWOF](#) 0x02  
*Issue PWOF command, powering off all engine windings.*
- #define [EXTIO\\_SETUP\\_MODE\\_IN\\_MOVR](#) 0x03  
*Issue MOVR command with last used settings.*
- #define [EXTIO\\_SETUP\\_MODE\\_IN\\_HOME](#) 0x04  
*Issue HOME command.*
- #define [EXTIO\\_SETUP\\_MODE\\_IN\\_ALARM](#) 0x05  
*Set Alarm when the signal goes to the active state.*
- #define [EXTIO\\_SETUP\\_MODE\\_OUT\\_BITS](#) 0xF0  
*Bits of the output behavior selection.*
- #define [EXTIO\\_SETUP\\_MODE\\_OUT\\_OFF](#) 0x00  
*EXTIO pin always set in inactive state.*
- #define [EXTIO\\_SETUP\\_MODE\\_OUT\\_ON](#) 0x10  
*EXTIO pin always set in active state.*
- #define [EXTIO\\_SETUP\\_MODE\\_OUT\\_MOVING](#) 0x20  
*EXTIO pin stays active during moving state.*
- #define [EXTIO\\_SETUP\\_MODE\\_OUT\\_ALARM](#) 0x30  
*EXTIO pin stays active during the alarm state.*
- #define [EXTIO\\_SETUP\\_MODE\\_OUT\\_MOTOR\\_ON](#) 0x40  
*EXTIO pin stays active when windings are powered.*

### Border flags

*This is a bit mask for bitwise operations. Specify types of borders and motor behavior on borders. May be combined with bitwise OR.*

See Also

[get\\_edges\\_settings](#)

[set\\_edges\\_settings](#)

[edges\\_settings.t::BorderFlags](#), [get\\_edges\\_settings](#), [set\\_edges\\_settings](#)

- #define [BORDER\\_IS\\_ENCODER](#) 0x01  
*Borders are fixed by predetermined encoder values, if set; borders are placed on limit switches, if not set.*
- #define [BORDER\\_STOP\\_LEFT](#) 0x02  
*The motor should stop on the left border.*
- #define [BORDER\\_STOP\\_RIGHT](#) 0x04  
*Motor should stop on right border.*
- #define [BORDERS\\_SWAP\\_MISSET\\_DETECTION](#) 0x08  
*Motor should stop on both borders.*

### Limit switches flags

This is a bit mask for bitwise operations. Specify electrical behavior of limit switches like order and pulled positions. May be combined with bitwise OR.

See Also

[get\\_edges\\_settings](#)

[set\\_edges\\_settings](#)

[edges\\_settings.t::EnderFlags](#), [get\\_edges\\_settings](#), [set\\_edges\\_settings](#)

- #define [ENDER\\_SWAP](#) 0x01  
*First limit switch on the right side, if set; otherwise on the left side.*
- #define [ENDER\\_SW1\\_ACTIVE\\_LOW](#) 0x02  
*1 - Limit switch connected to pin SW1 is triggered by a low level on pin.*
- #define [ENDER\\_SW2\\_ACTIVE\\_LOW](#) 0x04  
*1 - Limit switch connected to pin SW2 is triggered by a low level on pin.*

### Brake settings flags

This is a bit mask for bitwise operations. Specify behavior of brake. May be combined with bitwise OR.

See Also

[get\\_brake\\_settings](#)

[set\\_brake\\_settings](#)

[brake\\_settings.t::BrakeFlags](#), [get\\_brake\\_settings](#), [set\\_brake\\_settings](#)

- #define [BRAKE\\_ENABLED](#) 0x01  
*Brake control is enabled if this flag is set.*
- #define [BRAKE\\_ENG\\_PWROFF](#) 0x02  
*Brake turns the stepper motor power off if this flag is set.*

### Control flags

This is a bit mask for bitwise operations. Specify motor control settings by joystick or buttons. May be combined with bitwise OR.

See Also

[get\\_control\\_settings](#)

[set\\_control\\_settings](#)

[control\\_settings.t::Flags](#), [get\\_control\\_settings](#), [set\\_control\\_settings](#)

- #define [CONTROL\\_MODE\\_BITS](#) 0x03  
*Bits to control the engine by joystick or buttons.*

- #define [CONTROL\\_MODE\\_OFF](#) 0x00  
*Control is disabled.*
- #define [CONTROL\\_MODE\\_JOY](#) 0x01  
*Control by joystick.*
- #define [CONTROL\\_MODE\\_LR](#) 0x02  
*Control by left/right buttons.*
- #define [CONTROL\\_BTN\\_LEFT\\_PUSHED\\_OPEN](#) 0x04  
*Pushed left button corresponds to the open contact if this flag is set.*
- #define [CONTROL\\_BTN\\_RIGHT\\_PUSHED\\_OPEN](#) 0x08  
*Pushed right button corresponds to open contact if this flag is set.*

### Joystick flags

*This is a bit mask for bitwise operations. Control joystick states.*

See Also

[set\\_joystick\\_settings](#)  
[get\\_joystick\\_settings](#)  
[joystick\\_settings\\_t::JoyFlags](#), [get\\_joystick\\_settings](#), [set\\_joystick\\_settings](#)

- #define [JOY\\_REVERSE](#) 0x01  
*Joystick action is reversed.*

### Position control flags

*This is a bit mask for bitwise operations. Specify control position settings. May be combined with bitwise OR.*

See Also

[get\\_ctp\\_settings](#)  
[set\\_ctp\\_settings](#)  
[ctp\\_settings\\_t::CTPFlags](#), [get\\_ctp\\_settings](#), [set\\_ctp\\_settings](#)

- #define [CTP\\_ENABLED](#) 0x01  
*The position control is enabled if the flag is set.*
- #define [CTP\\_BASE](#) 0x02  
*The position control is based on the revolution sensor if this flag is set; otherwise, it is based on the encoder.*
- #define [CTP\\_ALARM\\_ON\\_ERROR](#) 0x04  
*Set ALARM on mismatch if the flag is set.*
- #define [REV\\_SENS\\_INV](#) 0x08  
*Typically, the sensor is active when it is at 0, and inversion makes active at 1.*
- #define [CTP\\_ERROR\\_CORRECTION](#) 0x10  
*Correct errors that appear when slippage occurs if the flag is set.*

### Home settings flags

*This is a bit mask for bitwise operations. Specify home command behavior. May be combined with bitwise OR.*

See Also

[get\\_home\\_settings](#)  
[set\\_home\\_settings](#)  
[command\\_home](#)  
[home\\_settings\\_t::HomeFlags](#), [get\\_home\\_settings](#), [set\\_home\\_settings](#)

- #define [HOME\\_DIR\\_FIRST](#) 0x001  
*The flag defines the direction of the 1st motion after execution of the home command.*
- #define [HOME\\_DIR\\_SECOND](#) 0x002

- The flag defines the direction of the 2nd motion.*

  - #define [HOME\\_MV\\_SEC\\_EN](#) 0x004

*Use the second phase of calibration to the home position, if set; otherwise the second phase is skipped.*
- #define [HOME\\_HALF\\_MV](#) 0x008

*If the flag is set, the stop signals are ignored during the first half-turn of the second movement.*
- #define [HOME\\_STOP\\_FIRST\\_BITS](#) 0x030

*Bits of the first stop selector.*
- #define [HOME\\_STOP\\_FIRST\\_REV](#) 0x010

*First motion stops by revolution sensor.*
- #define [HOME\\_STOP\\_FIRST\\_SYN](#) 0x020

*First motion stops by synchronization input.*
- #define [HOME\\_STOP\\_FIRST\\_LIM](#) 0x030

*First motion stops by limit switch.*
- #define [HOME\\_STOP\\_SECOND\\_BITS](#) 0x0C0

*Bits of the second stop selector.*
- #define [HOME\\_STOP\\_SECOND\\_REV](#) 0x040

*Second motion stops by revolution sensor.*
- #define [HOME\\_STOP\\_SECOND\\_SYN](#) 0x080

*Second motion stops by synchronization input.*
- #define [HOME\\_STOP\\_SECOND\\_LIM](#) 0x0C0

*Second motion stops by limit switch.*
- #define [HOME\\_USE\\_FAST](#) 0x100

*Use the fast algorithm of calibration to the home position, if set; otherwise the traditional algorithm.*

### UART parity flags

*This is a bit mask for bitwise operations.*

See Also

[uart\\_settings\\_t::UARTSetupFlags](#), [get\\_uart\\_settings](#), [set\\_uart\\_settings](#)

- #define [UART\\_PARITY\\_BITS](#) 0x03
- Bits of the parity.*

  - #define [UART\\_PARITY\\_BIT\\_EVEN](#) 0x00

*Parity bit 1, if even.*
- #define [UART\\_PARITY\\_BIT\\_ODD](#) 0x01

*Parity bit 1, if odd.*
- #define [UART\\_PARITY\\_BIT\\_SPACE](#) 0x02

*Parity bit always 0.*
- #define [UART\\_PARITY\\_BIT\\_MARK](#) 0x03

*Parity bit always 1.*
- #define [UART\\_PARITY\\_BIT\\_USE](#) 0x04

*None parity.*
- #define [UART\\_STOP\\_BIT](#) 0x08

*If set - one stop bit, else two stop bit.*

### Motor Type flags

*This is a bit mask for bitwise operations.*

See Also

[motor\\_settings\\_t::MotorType](#), [get\\_motor\\_settings](#), [set\\_motor\\_settings](#)

- #define [MOTOR\\_TYPE\\_UNKNOWN](#) 0x00
- Unknown type of engine.*

  - #define [MOTOR\\_TYPE\\_STEP](#) 0x01

*Step engine.*

- #define [MOTOR\\_TYPE\\_DC](#) 0x02  
*DC engine.*
- #define [MOTOR\\_TYPE\\_BLDC](#) 0x03  
*BLDC engine.*

### Encoder settings flags

*This is a bit mask for bitwise operations.*

See Also

[encoder\\_settings\\_t::EncoderSettings](#), [get\\_encoder\\_settings](#), [set\\_encoder\\_settings](#)

- #define [ENCSET\\_DIFFERENTIAL\\_OUTPUT](#) 0x001  
*If the flag is set, the encoder has differential output, otherwise single-ended output.*
- #define [ENCSET\\_PUSHPULL\\_OUTPUT](#) 0x004  
*If the flag is set the encoder has push-pull output, otherwise open drain output.*
- #define [ENCSET\\_INDEXCHANNEL\\_PRESENT](#) 0x010  
*If the flag is set, the encoder has an extra indexed channel.*
- #define [ENCSET\\_REVOLUTIONSENSOR\\_PRESENT](#) 0x040  
*If the flag is set, the encoder has the revolution sensor.*
- #define [ENCSET\\_REVOLUTIONSENSOR\\_ACTIVE\\_HIGH](#) 0x100  
*If the flag is set, the revolution sensor's active state is high logic state; otherwise, the active state is low logic state.*

### Magnetic brake settings flags

*This is a bit mask for bitwise operations.*

See Also

[accessories\\_settings\\_t::MBSettings](#), [get\\_accessories\\_settings](#), [set\\_accessories\\_settings](#)

- #define [MB\\_AVAILABLE](#) 0x01  
*If the flag is set, the magnetic brake is available.*
- #define [MB\\_POWERED\\_HOLD](#) 0x02  
*If this flag is set, the magnetic brake is on when powered.*

### Temperature sensor settings flags

*This is a bit mask for bitwise operations.*

See Also

[accessories\\_settings\\_t::LimitSwitchesSettings](#), [get\\_accessories\\_settings](#), [set\\_accessories\\_settings](#)

- #define [TS\\_TYPE\\_BITS](#) 0x07  
*Bits of the temperature sensor type.*
- #define [TS\\_TYPE\\_UNKNOWN](#) 0x00  
*Unknown type of sensor.*
- #define [TS\\_TYPE\\_THERMOCOUPLE](#) 0x01  
*Thermocouple.*
- #define [TS\\_TYPE\\_SEMICONDUCTOR](#) 0x02  
*The semiconductor temperature sensor.*
- #define [TS\\_AVAILABLE](#) 0x08  
*If the flag is set, the temperature sensor is available.*
- #define [LS\\_ON\\_SW1\\_AVAILABLE](#) 0x01  
*If the flag is set, the limit switch connected to pin SW1 is available.*
- #define [LS\\_ON\\_SW2\\_AVAILABLE](#) 0x02  
*If the flag is set, the limit switch connected to pin SW2 is available.*

- #define [LS\\_SW1\\_ACTIVE\\_LOW](#) 0x04  
*If the flag is set, the limit switch connected to pin SW1 is triggered by a low level on the pin.*
- #define [LS\\_SW2\\_ACTIVE\\_LOW](#) 0x08  
*If the flag is set, the limit switch connected to pin SW2 is triggered by a low level on pin.*
- #define [LS\\_SHORTED](#) 0x10  
*If the flag is set, the limit switches are shorted.*

### Flags of auto-detection of characteristics of windings of the engine.

*This is a bit mask for bitwise operations.*

See Also

[set\\_emf\\_settings](#)  
[get\\_emf\\_settings](#)  
[emf\\_settings\\_t::BackEMFFlags](#), [get\\_emf\\_settings](#), [set\\_emf\\_settings](#)

- #define [BACK\\_EMF\\_INDUCTANCE\\_AUTO](#) 0x01  
*Flag of auto-detection of inductance of windings of the engine.*
- #define [BACK\\_EMF\\_RESISTANCE\\_AUTO](#) 0x02  
*Flag of auto-detection of resistance of windings of the engine.*
- #define [BACK\\_EMF\\_KM\\_AUTO](#) 0x04  
*Flag of auto-detection of electromechanical coefficient of the engine.*

### Typedefs

- typedef unsigned long long [ulong\\_t](#)
- typedef long long [long\\_t](#)
- typedef int [device\\_t](#)  
*Type describes device identifier.*
- typedef int [result\\_t](#)  
*Type specifies result of any operation.*
- typedef uint32\_t [device\\_enumeration\\_t](#)  
*Type describes device enumeration structure.*
- typedef struct [calibration\\_t](#) [calibration\\_t](#)  
*Calibration structure.*
- typedef struct [device\\_network\\_information\\_t](#) [device\\_network\\_information\\_t](#)  
*Device network information structure.*

### Functions

#### Controller settings setup

*Read and write functions for almost all controller settings.*

- [result\\_t](#) [XIMC\\_API](#) [set\\_feedback\\_settings](#) ([device\\_t](#) id, const [feedback\\_settings\\_t](#) \*feedback\_settings)  
*Feedback settings.*
- [result\\_t](#) [XIMC\\_API](#) [get\\_feedback\\_settings](#) ([device\\_t](#) id, [feedback\\_settings\\_t](#) \*feedback\_settings)  
*Feedback settings.*
- [result\\_t](#) [XIMC\\_API](#) [set\\_home\\_settings](#) ([device\\_t](#) id, const [home\\_settings\\_t](#) \*home\_settings)  
*Set home settings.*
- [result\\_t](#) [XIMC\\_API](#) [set\\_home\\_settings\\_calb](#) ([device\\_t](#) id, const [home\\_settings\\_calb\\_t](#) \*home\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Set user unit home settings.*

- [result\\_t XIMC\\_API get\\_home\\_settings](#) ([device\\_t](#) id, [home\\_settings\\_t](#) \*home\_settings)  
*Read home settings.*
- [result\\_t XIMC\\_API get\\_home\\_settings\\_calb](#) ([device\\_t](#) id, [home\\_settings\\_calb\\_t](#) \*home\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Read user unit home settings.*
- [result\\_t XIMC\\_API set\\_move\\_settings](#) ([device\\_t](#) id, const [move\\_settings\\_t](#) \*move\_settings)  
*Movement settings set command (speed, acceleration, threshold, etc.).*
- [result\\_t XIMC\\_API set\\_move\\_settings\\_calb](#) ([device\\_t](#) id, const [move\\_settings\\_calb\\_t](#) \*move\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*User unit movement settings set command (speed, acceleration, threshold, etc.).*
- [result\\_t XIMC\\_API get\\_move\\_settings](#) ([device\\_t](#) id, [move\\_settings\\_t](#) \*move\_settings)  
*Movement settings read command (speed, acceleration, threshold, etc.).*
- [result\\_t XIMC\\_API get\\_move\\_settings\\_calb](#) ([device\\_t](#) id, [move\\_settings\\_calb\\_t](#) \*move\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*User unit movement settings read command (speed, acceleration, threshold, etc.).*
- [result\\_t XIMC\\_API set\\_engine\\_settings](#) ([device\\_t](#) id, const [engine\\_settings\\_t](#) \*engine\_settings)  
*Set engine settings.*
- [result\\_t XIMC\\_API set\\_engine\\_settings\\_calb](#) ([device\\_t](#) id, const [engine\\_settings\\_calb\\_t](#) \*engine\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Set user unit engine settings.*
- [result\\_t XIMC\\_API get\\_engine\\_settings](#) ([device\\_t](#) id, [engine\\_settings\\_t](#) \*engine\_settings)  
*Read engine settings.*
- [result\\_t XIMC\\_API get\\_engine\\_settings\\_calb](#) ([device\\_t](#) id, [engine\\_settings\\_calb\\_t](#) \*engine\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Read user unit engine settings.*
- [result\\_t XIMC\\_API set\\_entype\\_settings](#) ([device\\_t](#) id, const [entype\\_settings\\_t](#) \*entype\_settings)  
*Set engine type and driver type.*
- [result\\_t XIMC\\_API get\\_entype\\_settings](#) ([device\\_t](#) id, [entype\\_settings\\_t](#) \*entype\_settings)  
*Return engine type and driver type.*
- [result\\_t XIMC\\_API set\\_power\\_settings](#) ([device\\_t](#) id, const [power\\_settings\\_t](#) \*power\_settings)  
*Set settings of step motor power control.*
- [result\\_t XIMC\\_API get\\_power\\_settings](#) ([device\\_t](#) id, [power\\_settings\\_t](#) \*power\_settings)  
*Read settings of step motor power control.*
- [result\\_t XIMC\\_API set\\_secure\\_settings](#) ([device\\_t](#) id, const [secure\\_settings\\_t](#) \*secure\_settings)  
*Set protection settings.*
- [result\\_t XIMC\\_API get\\_secure\\_settings](#) ([device\\_t](#) id, [secure\\_settings\\_t](#) \*secure\_settings)  
*Read protection settings.*
- [result\\_t XIMC\\_API set\\_edges\\_settings](#) ([device\\_t](#) id, const [edges\\_settings\\_t](#) \*edges\_settings)  
*Set border and limit switches settings.*
- [result\\_t XIMC\\_API set\\_edges\\_settings\\_calb](#) ([device\\_t](#) id, const [edges\\_settings\\_calb\\_t](#) \*edges\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Set border and limit switches settings in user units.*
- [result\\_t XIMC\\_API get\\_edges\\_settings](#) ([device\\_t](#) id, [edges\\_settings\\_t](#) \*edges\_settings)  
*Read border and limit switches settings.*
- [result\\_t XIMC\\_API get\\_edges\\_settings\\_calb](#) ([device\\_t](#) id, [edges\\_settings\\_calb\\_t](#) \*edges\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Read border and limit switches settings in user units.*
- [result\\_t XIMC\\_API set\\_pid\\_settings](#) ([device\\_t](#) id, const [pid\\_settings\\_t](#) \*pid\_settings)  
*Set PID settings.*
- [result\\_t XIMC\\_API get\\_pid\\_settings](#) ([device\\_t](#) id, [pid\\_settings\\_t](#) \*pid\_settings)  
*Read PID settings.*
- [result\\_t XIMC\\_API set\\_sync\\_in\\_settings](#) ([device\\_t](#) id, const [sync\\_in\\_settings\\_t](#) \*sync\_in\_settings)  
*Set input synchronization settings.*
- [result\\_t XIMC\\_API set\\_sync\\_in\\_settings\\_calb](#) ([device\\_t](#) id, const [sync\\_in\\_settings\\_calb\\_t](#) \*sync\_in\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Set input user unit synchronization settings.*
- [result\\_t XIMC\\_API get\\_sync\\_in\\_settings](#) ([device\\_t](#) id, [sync\\_in\\_settings\\_t](#) \*sync\_in\_settings)

- Read input synchronization settings.*

  - [result\\_t XIMC\\_API get\\_sync\\_in\\_settings\\_calb](#) ([device\\_t](#) id, [sync\\_in\\_settings\\_calb\\_t](#) \*sync\_in\_settings\_calb, const [calibration\\_t](#) \*calibration)
- Read input user unit synchronization settings.*

  - [result\\_t XIMC\\_API set\\_sync\\_out\\_settings](#) ([device\\_t](#) id, const [sync\\_out\\_settings\\_t](#) \*sync\_out\_settings)
- Set output synchronization settings.*

  - [result\\_t XIMC\\_API set\\_sync\\_out\\_settings\\_calb](#) ([device\\_t](#) id, const [sync\\_out\\_settings\\_calb\\_t](#) \*sync\_out\_settings\_calb, const [calibration\\_t](#) \*calibration)
- Set output user unit synchronization settings.*

  - [result\\_t XIMC\\_API get\\_sync\\_out\\_settings](#) ([device\\_t](#) id, [sync\\_out\\_settings\\_t](#) \*sync\_out\_settings)
- Read output synchronization settings.*

  - [result\\_t XIMC\\_API get\\_sync\\_out\\_settings\\_calb](#) ([device\\_t](#) id, [sync\\_out\\_settings\\_calb\\_t](#) \*sync\_out\_settings\_calb, const [calibration\\_t](#) \*calibration)
- Read output user unit synchronization settings.*

  - [result\\_t XIMC\\_API set\\_extio\\_settings](#) ([device\\_t](#) id, const [extio\\_settings\\_t](#) \*extio\_settings)
- Set EXTIO settings.*

  - [result\\_t XIMC\\_API get\\_extio\\_settings](#) ([device\\_t](#) id, [extio\\_settings\\_t](#) \*extio\_settings)
- Read EXTIO settings.*

  - [result\\_t XIMC\\_API set\\_brake\\_settings](#) ([device\\_t](#) id, const [brake\\_settings\\_t](#) \*brake\_settings)
- Set brake control settings.*

  - [result\\_t XIMC\\_API get\\_brake\\_settings](#) ([device\\_t](#) id, [brake\\_settings\\_t](#) \*brake\_settings)
- Read break control settings.*

  - [result\\_t XIMC\\_API set\\_control\\_settings](#) ([device\\_t](#) id, const [control\\_settings\\_t](#) \*control\_settings)
- Read motor control settings.*

  - [result\\_t XIMC\\_API set\\_control\\_settings\\_calb](#) ([device\\_t](#) id, const [control\\_settings\\_calb\\_t](#) \*control\_settings\_calb, const [calibration\\_t](#) \*calibration)
- Set motor control settings.*

  - [result\\_t XIMC\\_API get\\_control\\_settings](#) ([device\\_t](#) id, [control\\_settings\\_t](#) \*control\_settings)
- Read motor control settings.*

  - [result\\_t XIMC\\_API get\\_control\\_settings\\_calb](#) ([device\\_t](#) id, [control\\_settings\\_calb\\_t](#) \*control\_settings\_calb, const [calibration\\_t](#) \*calibration)
- Set calibrated motor control settings.*

  - [result\\_t XIMC\\_API set\\_joystick\\_settings](#) ([device\\_t](#) id, const [joystick\\_settings\\_t](#) \*joystick\_settings)
- Set joystick position.*

  - [result\\_t XIMC\\_API get\\_joystick\\_settings](#) ([device\\_t](#) id, [joystick\\_settings\\_t](#) \*joystick\_settings)
- Read joystick settings.*

  - [result\\_t XIMC\\_API set\\_ctp\\_settings](#) ([device\\_t](#) id, const [ctp\\_settings\\_t](#) \*ctp\_settings)
- Set control position settings (used with stepper motor only).*

  - [result\\_t XIMC\\_API get\\_ctp\\_settings](#) ([device\\_t](#) id, [ctp\\_settings\\_t](#) \*ctp\_settings)
- Read control position settings (used with stepper motor only).*

  - [result\\_t XIMC\\_API set\\_uart\\_settings](#) ([device\\_t](#) id, const [uart\\_settings\\_t](#) \*uart\_settings)
- Set UART settings.*

  - [result\\_t XIMC\\_API get\\_uart\\_settings](#) ([device\\_t](#) id, [uart\\_settings\\_t](#) \*uart\_settings)
- Read UART settings.*

  - [result\\_t XIMC\\_API set\\_network\\_settings](#) ([device\\_t](#) id, const [network\\_settings\\_t](#) \*network\_settings)
- Set network settings.*

  - [result\\_t XIMC\\_API get\\_network\\_settings](#) ([device\\_t](#) id, [network\\_settings\\_t](#) \*network\_settings)
- Read network settings.*

  - [result\\_t XIMC\\_API set\\_password\\_settings](#) ([device\\_t](#) id, const [password\\_settings\\_t](#) \*password\_settings)
- Sets the password.*

  - [result\\_t XIMC\\_API get\\_password\\_settings](#) ([device\\_t](#) id, [password\\_settings\\_t](#) \*password\_settings)
- Read the password.*

  - [result\\_t XIMC\\_API set\\_calibration\\_settings](#) ([device\\_t](#) id, const [calibration\\_settings\\_t](#) \*calibration\_settings)
- Set calibration settings.*

- [result\\_t XIMC\\_API get\\_calibration\\_settings](#) ([device\\_t](#) id, [calibration\\_settings\\_t](#) \*calibration\_settings)  
*Read calibration settings.*
- [result\\_t XIMC\\_API set\\_controller\\_name](#) ([device\\_t](#) id, const [controller\\_name\\_t](#) \*controller\_name)  
*Write user's controller name and internal settings to the FRAM.*
- [result\\_t XIMC\\_API get\\_controller\\_name](#) ([device\\_t](#) id, [controller\\_name\\_t](#) \*controller\_name)  
*Read user's controller name and internal settings from the FRAM.*
- [result\\_t XIMC\\_API set\\_nonvolatile\\_memory](#) ([device\\_t](#) id, const [nonvolatile\\_memory\\_t](#) \*nonvolatile\_memory)  
*Write user data into the FRAM.*
- [result\\_t XIMC\\_API get\\_nonvolatile\\_memory](#) ([device\\_t](#) id, [nonvolatile\\_memory\\_t](#) \*nonvolatile\_memory)  
*Read user data from FRAM.*
- [result\\_t XIMC\\_API set\\_emf\\_settings](#) ([device\\_t](#) id, const [emf\\_settings\\_t](#) \*emf\_settings)  
*Set electromechanical coefficients.*
- [result\\_t XIMC\\_API get\\_emf\\_settings](#) ([device\\_t](#) id, [emf\\_settings\\_t](#) \*emf\_settings)  
*Read electromechanical settings.*
- [result\\_t XIMC\\_API set\\_engine\\_advanced\\_setup](#) ([device\\_t](#) id, const [engine\\_advanced\\_setup\\_t](#) \*engine\_advanced\_setup)  
*Set engine advanced settings.*
- [result\\_t XIMC\\_API get\\_engine\\_advanced\\_setup](#) ([device\\_t](#) id, [engine\\_advanced\\_setup\\_t](#) \*engine\_advanced\_setup)  
*Read engine advanced settings.*
- [result\\_t XIMC\\_API set\\_extended\\_settings](#) ([device\\_t](#) id, const [extended\\_settings\\_t](#) \*extended\_settings)  
*Set extended settings.*
- [result\\_t XIMC\\_API get\\_extended\\_settings](#) ([device\\_t](#) id, [extended\\_settings\\_t](#) \*extended\_settings)  
*Read extended settings.*

### Group of commands movement control

- [result\\_t XIMC\\_API command\\_stop](#) ([device\\_t](#) id)  
*Immediately stops the engine, moves it to the STOP state, and sets switches to BREAK mode (windings are short-circuited).*
- [result\\_t XIMC\\_API command\\_power\\_off](#) ([device\\_t](#) id)  
*Immediately power off the motor regardless its state.*
- [result\\_t XIMC\\_API command\\_move](#) ([device\\_t](#) id, int Position, int uPosition)  
*Move to position.*
- [result\\_t XIMC\\_API command\\_move\\_calb](#) ([device\\_t](#) id, float Position, const [calibration\\_t](#) \*calibration)  
*Move to position using user units.*
- [result\\_t XIMC\\_API command\\_movr](#) ([device\\_t](#) id, int DeltaPosition, int uDeltaPosition)  
*Shift by a set offset.*
- [result\\_t XIMC\\_API command\\_movr\\_calb](#) ([device\\_t](#) id, float DeltaPosition, const [calibration\\_t](#) \*calibration)  
*Shift by a set offset using user units.*
- [result\\_t XIMC\\_API command\\_home](#) ([device\\_t](#) id)  
*Moving to home position.*
- [result\\_t XIMC\\_API command\\_left](#) ([device\\_t](#) id)  
*Start continuous moving to the left.*
- [result\\_t XIMC\\_API command\\_right](#) ([device\\_t](#) id)  
*Start continuous moving to the right.*
- [result\\_t XIMC\\_API command\\_loft](#) ([device\\_t](#) id)  
*Upon receiving the command "loft", the engine is shifted from the current position to a distance Antiplay defined in engine settings.*
- [result\\_t XIMC\\_API command\\_sstp](#) ([device\\_t](#) id)  
*Soft stop the engine.*

- `result_t XIMC_API get_position` (`device_t id`, `get_position_t *the_get_position`)  
*Reads the value position in steps and microsteps for stepper motor and encoder steps for all engines.*
- `result_t XIMC_API get_position_calb` (`device_t id`, `get_position_calb_t *the_get_position_calb`, `const calibration_t *calibration`)  
*Reads position value in user units for stepper motor and encoder steps for all engines.*
- `result_t XIMC_API set_position` (`device_t id`, `const set_position_t *the_set_position`)  
*Sets position in steps and microsteps for stepper motor.*
- `result_t XIMC_API set_position_calb` (`device_t id`, `const set_position_calb_t *the_set_position_calb`, `const calibration_t *calibration`)  
*Sets any position value and encoder value of all engines.*
- `result_t XIMC_API command_zero` (`device_t id`)  
*Sets the current position to 0.*

### Group of save settings and load settings commands

- `result_t XIMC_API command_save_settings` (`device_t id`)  
*Save all settings from the controller's RAM to the controller's flash memory, replacing previous data in the flash memory.*
- `result_t XIMC_API command_read_settings` (`device_t id`)  
*Read all settings from the controller's flash memory to the controller's RAM, replacing previous data in the RAM.*
- `result_t XIMC_API command_save_robust_settings` (`device_t id`)  
*Save important settings (calibration coefficients, etc.) from the controller's RAM to the controller's flash memory, replacing previous data in the flash memory.*
- `result_t XIMC_API command_read_robust_settings` (`device_t id`)  
*Read important settings (calibration coefficients, etc.) from the controller's flash memory to the controller's RAM, replacing previous data in the RAM.*
- `result_t XIMC_API command_eesave_settings` (`device_t id`)  
*Save settings from the controller's RAM to the stage's EEPROM.*
- `result_t XIMC_API command_eeread_settings` (`device_t id`)  
*Read settings from the stage's EEPROM to the controller's RAM.*
- `result_t XIMC_API command_start_measurements` (`device_t id`)  
*Start measurements and buffering of speed and the speed error (target speed minus real speed).*
- `result_t XIMC_API get_measurements` (`device_t id`, `measurements_t *measurements`)  
*A command to read the data buffer to build a speed graph and a speed error graph.*
- `result_t XIMC_API get_chart_data` (`device_t id`, `chart_data_t *chart_data`)  
*Return device electrical parameters, useful for charts.*
- `result_t XIMC_API get_serial_number` (`device_t id`, `unsigned int *SerialNumber`)  
*Read device serial number.*
- `result_t XIMC_API get_firmware_version` (`device_t id`, `unsigned int *Major`, `unsigned int *Minor`, `unsigned int *Release`)  
*Read the controller's firmware version.*
- `result_t XIMC_API service_command_updf` (`device_t id`)  
*The command switches the controller to update the firmware state.*

### Service commands

- `result_t XIMC_API set_serial_number` (`device_t id`, `const serial_number_t *serial_number`)  
*Write device serial number and hardware version to the controller's flash memory.*
- `result_t XIMC_API get_analog_data` (`device_t id`, `analog_data_t *analog_data`)  
*Read the analog data structure that contains raw analog data from the embedded ADC.*
- `result_t XIMC_API get_debug_read` (`device_t id`, `debug_read_t *debug_read`)  
*Read data from firmware for debug purpose.*
- `result_t XIMC_API set_debug_write` (`device_t id`, `const debug_write_t *debug_write`)  
*Write data to firmware for debug purpose.*

### A group of EEPROM commands

- [result\\_t XIMC\\_API set\\_stage\\_name](#) ([device\\_t](#) id, const [stage\\_name\\_t](#) \*stage\_name)  
*Write the user's stage name to EEPROM.*
- [result\\_t XIMC\\_API get\\_stage\\_name](#) ([device\\_t](#) id, [stage\\_name\\_t](#) \*stage\_name)  
*Read the user's stage name from the EEPROM.*
- [result\\_t XIMC\\_API set\\_stage\\_information](#) ([device\\_t](#) id, const [stage\\_information\\_t](#) \*stage\_information)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_stage\\_information](#) ([device\\_t](#) id, [stage\\_information\\_t](#) \*stage\_information)  
*Deprecated.*
- [result\\_t XIMC\\_API set\\_stage\\_settings](#) ([device\\_t](#) id, const [stage\\_settings\\_t](#) \*stage\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_stage\\_settings](#) ([device\\_t](#) id, [stage\\_settings\\_t](#) \*stage\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API set\\_motor\\_information](#) ([device\\_t](#) id, const [motor\\_information\\_t](#) \*motor\_information)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_motor\\_information](#) ([device\\_t](#) id, [motor\\_information\\_t](#) \*motor\_information)  
*Deprecated.*
- [result\\_t XIMC\\_API set\\_motor\\_settings](#) ([device\\_t](#) id, const [motor\\_settings\\_t](#) \*motor\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_motor\\_settings](#) ([device\\_t](#) id, [motor\\_settings\\_t](#) \*motor\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API set\\_encoder\\_information](#) ([device\\_t](#) id, const [encoder\\_information\\_t](#) \*encoder\_information)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_encoder\\_information](#) ([device\\_t](#) id, [encoder\\_information\\_t](#) \*encoder\_information)  
*Deprecated.*
- [result\\_t XIMC\\_API set\\_encoder\\_settings](#) ([device\\_t](#) id, const [encoder\\_settings\\_t](#) \*encoder\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_encoder\\_settings](#) ([device\\_t](#) id, [encoder\\_settings\\_t](#) \*encoder\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API set\\_hallsensor\\_information](#) ([device\\_t](#) id, const [hallsensor\\_information\\_t](#) \*hallsensor\_information)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_hallsensor\\_information](#) ([device\\_t](#) id, [hallsensor\\_information\\_t](#) \*hallsensor\_information)  
*Deprecated.*
- [result\\_t XIMC\\_API set\\_hallsensor\\_settings](#) ([device\\_t](#) id, const [hallsensor\\_settings\\_t](#) \*hallsensor\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_hallsensor\\_settings](#) ([device\\_t](#) id, [hallsensor\\_settings\\_t](#) \*hallsensor\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API set\\_gear\\_information](#) ([device\\_t](#) id, const [gear\\_information\\_t](#) \*gear\_information)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_gear\\_information](#) ([device\\_t](#) id, [gear\\_information\\_t](#) \*gear\_information)  
*Deprecated.*
- [result\\_t XIMC\\_API set\\_gear\\_settings](#) ([device\\_t](#) id, const [gear\\_settings\\_t](#) \*gear\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_gear\\_settings](#) ([device\\_t](#) id, [gear\\_settings\\_t](#) \*gear\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API set\\_accessories\\_settings](#) ([device\\_t](#) id, const [accessories\\_settings\\_t](#) \*accessories\_settings)  
*Deprecated.*
- [result\\_t XIMC\\_API get\\_accessories\\_settings](#) ([device\\_t](#) id, [accessories\\_settings\\_t](#) \*accessories\_settings)  
*Deprecated.*

- [result\\_t XIMC\\_API get\\_bootloader\\_version](#) ([device\\_t](#) id, unsigned int \*Major, unsigned int \*Minor, unsigned int \*Release)  
*Read the controller's bootloader version.*
- [result\\_t XIMC\\_API get\\_init\\_random](#) ([device\\_t](#) id, [init\\_random\\_t](#) \*init\_random)  
*Read a random number from the controller.*
- [result\\_t XIMC\\_API get\\_globally\\_unique\\_identifier](#) ([device\\_t](#) id, [globally\\_unique\\_identifier\\_t](#) \*globally\_unique\_identifier)  
*This value is unique to each individual device, but is not a random value.*
- [result\\_t XIMC\\_API goto\\_firmware](#) ([device\\_t](#) id, [uint8\\_t](#) \*ret)  
*Reboot to firmware.*
- [result\\_t XIMC\\_API has\\_firmware](#) (const char \*uri, [uint8\\_t](#) \*ret)  
*Check for firmware on device.*
- [result\\_t XIMC\\_API command\\_update\\_firmware](#) (const char \*uri, const [uint8\\_t](#) \*data, [uint32\\_t](#) data\_size)  
*Update firmware.*
- [result\\_t XIMC\\_API write\\_key](#) (const char \*uri, [uint8\\_t](#) \*key)  
*Write controller key.*
- [result\\_t XIMC\\_API command\\_reset](#) ([device\\_t](#) id)  
*Reset controller.*
- [result\\_t XIMC\\_API command\\_clear\\_fram](#) ([device\\_t](#) id)  
*Clear controller FRAM.*

## Boards and drivers control

Functions for searching and opening/closing devices

- typedef char \* [pchar](#)  
*Nevermind.*
- typedef void([XIMC\\_CALLCONV](#) \* [logging\\_callback\\_t](#) )(int loglevel, const [wchar\\_t](#) \*message, void \*user\_data)  
*Logging callback prototype.*
- [device\\_t](#) [XIMC\\_API open\\_device](#) (const char \*uri)  
*Open a device with OS uri and return identifier of the device which can be used in calls.*
- [result\\_t](#) [XIMC\\_API close\\_device](#) ([device\\_t](#) \*id)  
*Close specified device.*
- [result\\_t](#) [XIMC\\_API load\\_correction\\_table](#) ([device\\_t](#) \*id, const char \*namefile)  
*Command of loading a correction table from a text file (this function is deprecated).*
- [result\\_t](#) [XIMC\\_API set\\_correction\\_table](#) ([device\\_t](#) id, const char \*namefile)  
*Command of loading a correction table from a text file.*
- [result\\_t](#) [XIMC\\_API probe\\_device](#) (const char \*uri)  
*Check if a device with OS uri uri is XIMC device.*
- [result\\_t](#) [XIMC\\_API set\\_bindy\\_key](#) (const char \*keyfilepath)  
*Set network encryption layer (bindy) key.*
- [device\\_enumeration\\_t](#) [XIMC\\_API enumerate\\_devices](#) (int enumerate\_flags, const char \*hints)  
*Enumerate all devices that looks like valid.*
- [result\\_t](#) [XIMC\\_API free\\_enumerate\\_devices](#) ([device\\_enumeration\\_t](#) device\_enumeration)  
*Free memory returned by enumerate\_devices.*
- int [XIMC\\_API get\\_device\\_count](#) ([device\\_enumeration\\_t](#) device\_enumeration)  
*Get device count.*
- [pchar](#) [XIMC\\_API get\\_device\\_name](#) ([device\\_enumeration\\_t](#) device\_enumeration, int device\_index)  
*Get device name from the device enumeration.*

- [result\\_t XIMC\\_API get\\_enumerate\\_device\\_serial](#) ([device\\_enumeration\\_t](#) device\_enumeration, int device\_index, [uint32\\_t](#) \*serial)  
*Get device serial number from the device enumeration.*
- [result\\_t XIMC\\_API get\\_enumerate\\_device\\_information](#) ([device\\_enumeration\\_t](#) device\_enumeration, int device\_index, [device\\_information\\_t](#) \*device\_information)  
*Get device information from the device enumeration.*
- [result\\_t XIMC\\_API get\\_enumerate\\_device\\_controller\\_name](#) ([device\\_enumeration\\_t](#) device\_enumeration, int device\_index, [controller\\_name\\_t](#) \*controller\_name)  
*Get controller name from the device enumeration.*
- [result\\_t XIMC\\_API get\\_enumerate\\_device\\_stage\\_name](#) ([device\\_enumeration\\_t](#) device\_enumeration, int device\_index, [stage\\_name\\_t](#) \*stage\_name)  
*Get stage name from the device enumeration.*
- [result\\_t XIMC\\_API get\\_enumerate\\_device\\_network\\_information](#) ([device\\_enumeration\\_t](#) device\_enumeration, int device\_index, [device\\_network\\_information\\_t](#) \*device\_network\_information)  
*Get device network information from the device enumeration.*
- [result\\_t XIMC\\_API reset\\_locks](#) ()  
*Resets the error of incorrect data transmission.*
- [result\\_t XIMC\\_API ximc\\_fix\\_usbser\\_sys](#) (const char \*device\_uri)  
*Fixing a USB driver error in Windows.*
- void [XIMC\\_API msec\\_sleep](#) (unsigned int msec)  
*Sleeps for a specified amount of time.*
- void [XIMC\\_API ximc\\_version](#) (char \*version)  
*Returns a library version.*
- void [XIMC\\_API logging\\_callback\\_stderr\\_wide](#) (int loglevel, const [wchar\\_t](#) \*message, void \*user\_data)  
*Simple callback for logging to stderr in wide chars.*
- void [XIMC\\_API logging\\_callback\\_stderr\\_narrow](#) (int loglevel, const [wchar\\_t](#) \*message, void \*user\_data)  
*Simple callback for logging to stderr in narrow (single byte) chars.*
- void [XIMC\\_API set\\_logging\\_callback](#) ([logging\\_callback\\_t](#) logging\_callback, void \*user\_data)  
*Sets a logging callback.*
- [result\\_t XIMC\\_API get\\_status](#) ([device\\_t](#) id, [status\\_t](#) \*status)  
*Return device state.*
- [result\\_t XIMC\\_API get\\_status\\_calb](#) ([device\\_t](#) id, [status\\_calb\\_t](#) \*status, const [calibration\\_t](#) \*calibration)  
*Return device state.*
- [result\\_t XIMC\\_API get\\_device\\_information](#) ([device\\_t](#) id, [device\\_information\\_t](#) \*device\_information)  
*Return device information.*
- [result\\_t XIMC\\_API command\\_wait\\_for\\_stop](#) ([device\\_t](#) id, [uint32\\_t](#) refresh\_interval\_ms)  
*Wait for stop.*
- [result\\_t XIMC\\_API command\\_homezero](#) ([device\\_t](#) id)  
*Make home command, wait until it is finished and make zero command.*

### 7.1.1 Detailed Description

Header file for libximc library.

### 7.1.2 Macro Definition Documentation

#### 7.1.2.1 #define ALARM\_ON\_DRIVER\_OVERHEATING 0x01

If this flag is set, enter the alarm state on the driver overheat signal.

7.1.2.2 `#define BACK_EMF_INDUCTANCE_AUTO 0x01`

Flag of auto-detection of inductance of windings of the engine.

7.1.2.3 `#define BACK_EMF_KM_AUTO 0x04`

Flag of auto-detection of electromechanical coefficient of the engine.

7.1.2.4 `#define BACK_EMF_RESISTANCE_AUTO 0x02`

Flag of auto-detection of resistance of windings of the engine.

7.1.2.5 `#define BORDER_IS_ENCODER 0x01`

Borders are fixed by predetermined encoder values, if set; borders are placed on limit switches, if not set.

7.1.2.6 `#define BORDER_STOP_LEFT 0x02`

The motor should stop on the left border.

7.1.2.7 `#define BORDER_STOP_RIGHT 0x04`

Motor should stop on right border.

7.1.2.8 `#define BORDERS_SWAP_MISSET_DETECTION 0x08`

Motor should stop on both borders.

Need to save motor then wrong border settings is set

7.1.2.9 `#define BRAKE_ENABLED 0x01`

Brake control is enabled if this flag is set.

7.1.2.10 `#define BRAKE_ENG_PWROFF 0x02`

Brake turns the stepper motor power off if this flag is set.

7.1.2.11 `#define CONTROL_BTN_LEFT_PUSHED_OPEN 0x04`

Pushed left button corresponds to the open contact if this flag is set.

7.1.2.12 `#define CONTROL_BTN_RIGHT_PUSHED_OPEN 0x08`

Pushed right button corresponds to open contact if this flag is set.

7.1.2.13 `#define CONTROL_MODE_BITS 0x03`

Bits to control the engine by joystick or buttons.

7.1.2.14 `#define CONTROL_MODE_JOY 0x01`

Control by joystick.

7.1.2.15 `#define CONTROL_MODE_LR 0x02`

Control by left/right buttons.

7.1.2.16 `#define CONTROL_MODE_OFF 0x00`

Control is disabled.

7.1.2.17 `#define CTP_ALARM_ON_ERROR 0x04`

Set ALARM on mismatch if the flag is set.

7.1.2.18 `#define CTP_BASE 0x02`

The position control is based on the revolution sensor if this flag is set; otherwise, it is based on the encoder.

7.1.2.19 `#define CTP_ENABLED 0x01`

The position control is enabled if the flag is set.

7.1.2.20 `#define CTP_ERROR_CORRECTION 0x10`

Correct errors that appear when slippage occurs if the flag is set.

It works only with the encoder. Incompatible with the flag `CTP_ALARM_ON_ERROR`.

7.1.2.21 `#define DRIVER_TYPE_DISCRETE_FET 0x01`

Driver with discrete FET keys.

Default option.

7.1.2.22 `#define DRIVER_TYPE_EXTERNAL 0x03`

External driver.

7.1.2.23 `#define DRIVER_TYPE_INTEGRATE 0x02`

Driver with integrated IC.

7.1.2.24 `#define EEPROM_PRECEDENCE 0x01`

If the flag is set, settings from external EEPROM override controller settings.

7.1.2.25 `#define ENC_STATE_ABSENT 0x00`

Encoder is absent.

7.1.2.26 `#define ENC_STATE_MALFUNC 0x02`

Encoder is connected and malfunctioning.

7.1.2.27 `#define ENC_STATE_OK 0x04`

Encoder is connected and working properly.

7.1.2.28 `#define ENC_STATE_REVERS 0x03`

Encoder is connected and operational but counts in other direction.

7.1.2.29 `#define ENC_STATE_UNKNOWN 0x01`

Encoder state is unknown.

7.1.2.30 `#define ENDER_SW1_ACTIVE_LOW 0x02`

1 - Limit switch connected to pin SW1 is triggered by a low level on pin.

7.1.2.31 `#define ENDER_SW2_ACTIVE_LOW 0x04`

1 - Limit switch connected to pin SW2 is triggered by a low level on pin.

7.1.2.32 `#define ENDER_SWAP 0x01`

First limit switch on the right side, if set; otherwise on the left side.

7.1.2.33 `#define ENGINE_ACCEL_ON 0x10`

Acceleration enable flag.

If it set, motion begins with acceleration and ends with deceleration.

7.1.2.34 `#define ENGINE_ANTIPLAY 0x08`

Play compensation flag.

If it is set, the engine makes backlash (play) compensation and reaches the predetermined position accurately at low speed.

7.1.2.35 `#define ENGINE_CURRENT_AS_RMS 0x02`

Engine current meaning flag.

If the flag is unset, then the engine's current value is interpreted as the maximum amplitude value. If the flag is set, then the engine current value is interpreted as the root-mean-square current value (for stepper) or as the current value calculated from the maximum heat dissipation (BLDC).

7.1.2.36 `#define ENGINE_LIMIT_CURR 0x40`

Maximum motor current limit enable flag (is only used with DC motor).

7.1.2.37 `#define ENGINE_LIMIT_RPM 0x80`

Maximum motor speed limit enable flag.

7.1.2.38 `#define ENGINE_LIMIT_VOLT 0x20`

Maximum motor voltage limit enable flag (is only used with DC motor).

7.1.2.39 `#define ENGINE_MAX_SPEED 0x04`

Max speed flag.

If it is set, the engine uses the maximum speed achievable with the present engine settings as its nominal speed.

7.1.2.40 `#define ENGINE_REVERSE 0x01`

Reverse flag.

It determines motor shaft rotation direction that corresponds to feedback counts increasing. If not set (default), motor shaft rotation direction under positive voltage corresponds to feedback counts increasing and vice versa. Change it if you see that positive directions on motor and feedback are opposite.

7.1.2.41 `#define ENGINE_TYPE_2DC 0x02`

2 DC motors.

7.1.2.42 `#define ENGINE_TYPE_BRUSHLESS 0x05`

Brushless motor.

7.1.2.43 `#define ENGINE_TYPE_DC 0x01`

DC motor.

7.1.2.44 `#define ENGINE_TYPE_NONE 0x00`

A value that shouldn't be used.

7.1.2.45 `#define ENGINE_TYPE_STEP 0x03`

Step motor.

7.1.2.46 `#define ENGINE_TYPE_TEST 0x04`

Duty cycle are fixed.

Used only manufacturer.

7.1.2.47 `#define ENUMERATE_PROBE 0x01`

Check if a device with an OS name is a XIMC device.

Be careful with this flag because it sends some data to the device.

7.1.2.48 `#define EXTIO_SETUP_INVERT 0x02`

Interpret EXTIO state inverted if the flag is set.

A falling front is treated as an input event and a low logic level as an active state.

7.1.2.49 `#define EXTIO_SETUP_MODE_IN_ALARM 0x05`

Set Alarm when the signal goes to the active state.

7.1.2.50 `#define EXTIO_SETUP_MODE_IN_BITS 0x0F`

Bits of the behavior selector when the signal on input goes to the active state.

7.1.2.51 `#define EXTIO_SETUP_MODE_IN_HOME 0x04`

Issue HOME command.

7.1.2.52 `#define EXTIO_SETUP_MODE_IN_MOVR 0x03`

Issue MOVR command with last used settings.

7.1.2.53 `#define EXTIO_SETUP_MODE_IN_NOP 0x00`

Do nothing.

7.1.2.54 `#define EXTIO_SETUP_MODE_IN_PWOF 0x02`

Issue PWOF command, powering off all engine windings.

7.1.2.55 `#define EXTIO_SETUP_MODE_IN_STOP 0x01`

Issue STOP command, ceasing the engine movement.

7.1.2.56 `#define EXTIO_SETUP_MODE_OUT_ALARM 0x30`

EXTIO pin stays active during the alarm state.

7.1.2.57 `#define EXTIO_SETUP_MODE_OUT_BITS 0xF0`

Bits of the output behavior selection.

7.1.2.58 `#define EXTIO_SETUP_MODE_OUT_MOTOR_ON 0x40`

EXTIO pin stays active when windings are powered.

7.1.2.59 `#define EXTIO_SETUP_MODE_OUT_MOVING 0x20`

EXTIO pin stays active during moving state.

7.1.2.60 `#define EXTIO_SETUP_MODE_OUT_OFF 0x00`

EXTIO pin always set in inactive state.

7.1.2.61 `#define EXTIO_SETUP_MODE_OUT_ON 0x10`

EXTIO pin always set in active state.

7.1.2.62 `#define EXTIO_SETUP_OUTPUT 0x01`

EXTIO works as output if the flag is set, works as input otherwise.

7.1.2.63 `#define FEEDBACK_EMF 0x04`

Feedback by EMF.

7.1.2.64 `#define FEEDBACK_ENC_REVERSE 0x01`

Reverse count of encoder.

7.1.2.65 `#define FEEDBACK_ENC_TYPE_AUTO 0x00`

Auto detect encoder type.

7.1.2.66 `#define FEEDBACK_ENC_TYPE_BITS 0xC0`

Bits of the encoder type.

7.1.2.67 `#define FEEDBACK_ENC_TYPE_DIFFERENTIAL 0x80`

Differential encoder.

7.1.2.68 `#define FEEDBACK_ENC_TYPE_SINGLE_ENDED 0x40`

Single-ended encoder.

7.1.2.69 `#define FEEDBACK_ENCODER 0x01`

Feedback by encoder.

7.1.2.70 `#define FEEDBACK_ENCODER_MEDIATED 0x06`

Feedback by encoder mediated by mechanical transmission (for example leadscrew).

7.1.2.71 `#define FEEDBACK_NONE 0x05`

Feedback is absent.

7.1.2.72 `#define H_BRIDGE_ALERT 0x04`

If this flag is set then turn off the power unit with a signal problem in one of the transistor bridge.

7.1.2.73 `#define HOME_DIR_FIRST 0x001`

The flag defines the direction of the 1st motion after execution of the home command.

The direction is to the right if the flag is set, and to the left otherwise.

7.1.2.74 `#define HOME_DIR_SECOND 0x002`

The flag defines the direction of the 2nd motion.

The direction is to the right if the flag is set, and to the left otherwise.

7.1.2.75 `#define HOME_HALF_MV 0x008`

If the flag is set, the stop signals are ignored during the first half-turn of the second movement.

7.1.2.76 `#define HOME_MV_SEC_EN 0x004`

Use the second phase of calibration to the home position, if set; otherwise the second phase is skipped.

7.1.2.77 `#define HOME_STOP_FIRST_BITS 0x030`

Bits of the first stop selector.

7.1.2.78 `#define HOME_STOP_FIRST_LIM 0x030`

First motion stops by limit switch.

7.1.2.79 `#define HOME_STOP_FIRST_REV 0x010`

First motion stops by revolution sensor.

7.1.2.80 `#define HOME_STOP_FIRST_SYN 0x020`

First motion stops by synchronization input.

7.1.2.81 `#define HOME_STOP_SECOND_BITS 0x0C0`

Bits of the second stop selector.

7.1.2.82 `#define HOME_STOP_SECOND_LIM 0x0C0`

Second motion stops by limit switch.

7.1.2.83 `#define HOME_STOP_SECOND_REV 0x040`

Second motion stops by revolution sensor.

7.1.2.84 `#define HOME_STOP_SECOND_SYN 0x080`

Second motion stops by synchronization input.

7.1.2.85 `#define HOME_USE_FAST 0x100`

Use the fast algorithm of calibration to the home position, if set; otherwise the traditional algorithm.

7.1.2.86 `#define JOY_REVERSE 0x01`

Joystick action is reversed.

The joystick deviation to the upper values corresponds to negative speed and vice versa.

7.1.2.87 `#define LOW_UPWR_PROTECTION 0x02`

If this flag is set, turn off the motor when the voltage is lower than LowUpwrOff.

7.1.2.88 `#define MICROSTEP_MODE_FRAC_128 0x08`

1/128-step mode.

7.1.2.89 `#define MICROSTEP_MODE_FRAC_16 0x05`

1/16-step mode.

7.1.2.90 `#define MICROSTEP_MODE_FRAC_2 0x02`

1/2-step mode.

7.1.2.91 `#define MICROSTEP_MODE_FRAC_256 0x09`

1/256-step mode.

7.1.2.92 `#define MICROSTEP_MODE_FRAC_32 0x06`

1/32-step mode.

7.1.2.93 `#define MICROSTEP_MODE_FRAC_4 0x03`

1/4-step mode.

7.1.2.94 `#define MICROSTEP_MODE_FRAC_64 0x07`

1/64-step mode.

7.1.2.95 `#define MICROSTEP_MODE_FRAC_8 0x04`

1/8-step mode.

7.1.2.96 `#define MICROSTEP_MODE_FULL 0x01`

Full step mode.

7.1.2.97 `#define MOVE_STATE_ANTIPLAY 0x04`

Motor is playing compensation, if flag set.

7.1.2.98 `#define MOVE_STATE_MOVING 0x01`

This flag indicates that the controller is trying to move the motor.

Don't use this flag to wait for the completion of the movement command. Use the `MVCMD_RUNNING` flag from the `MvCmdSts` field instead.

7.1.2.99 `#define MOVE_STATE_TARGET_SPEED 0x02`

Target speed is reached, if flag set.

7.1.2.100 `#define MVCMD_ERROR 0x40`

Finish state (1 - move command has finished with an error, 0 - move command has finished correctly).

This flag makes sense when `MVCMD_RUNNING` signals movement completion.

7.1.2.101 `#define MVCMD_HOME 0x06`

Command home.

7.1.2.102 `#define MVCMD_LEFT 0x03`

Command left.

7.1.2.103 #define MVCMD\_LOFT 0x07

Command loft.

7.1.2.104 #define MVCMD\_MOVE 0x01

Command move.

7.1.2.105 #define MVCMD\_MOVR 0x02

Command movr.

7.1.2.106 #define MVCMD\_NAME\_BITS 0x3F

Move command bit mask.

7.1.2.107 #define MVCMD\_RIGHT 0x04

Command rigt.

7.1.2.108 #define MVCMD\_RUNNING 0x80

Move command state (0 - move command has finished, 1 - move command is being executed).

7.1.2.109 #define MVCMD\_SSTP 0x08

Command soft stop.

7.1.2.110 #define MVCMD\_STOP 0x05

Command stop.

7.1.2.111 #define MVCMD\_UKNWN 0x00

Unknown command.

7.1.2.112 #define POWER\_OFF\_ENABLED 0x02

Power off is enabled after PowerOffDelay if this flag is set.

7.1.2.113 #define POWER\_REDUCT\_ENABLED 0x01

Current reduction is enabled after CurrReductDelay if this flag is set.

7.1.2.114 #define POWER\_SMOOTH\_CURRENT 0x04

Current ramp-up/down are performed smoothly during current\_set\_time if this flag is set.

7.1.2.115 `#define PWR_STATE_MAX 0x05`

Motor windings are powered by the maximum current driver can provide at this voltage.

7.1.2.116 `#define PWR_STATE_NORM 0x03`

Motor windings are powered by nominal current.

7.1.2.117 `#define PWR_STATE_OFF 0x01`

Motor windings are disconnected from the driver.

7.1.2.118 `#define PWR_STATE_REDUCT 0x04`

Motor windings are powered by reduced current to lower power consumption.

7.1.2.119 `#define PWR_STATE_UNKNOWN 0x00`

Unknown state, should never happen.

7.1.2.120 `#define REV_SENS_INV 0x08`

Typically, the sensor is active when it is at 0, and inversion makes active at 1.

That is, if you do not invert, it is normal logic - 0 is the activation.

7.1.2.121 `#define RPM_DIV_1000 0x01`

This flag indicates that the operating speed specified in the command is set in milliRPM.

Applicable only for ENCODER feedback mode and only for BLDC motors.

7.1.2.122 `#define SETPOS_IGNORE_ENCODER 0x02`

Will not reload encoder state if this flag is set.

7.1.2.123 `#define SETPOS_IGNORE_POSITION 0x01`

Will not reload position in steps/microsteps if this flag is set.

7.1.2.124 `#define STATE_ALARM 0x0000040`

The controller is in an alarm state, indicating that something dangerous has happened.

Most commands are ignored in this state. To reset the flag, a STOP command must be issued.

7.1.2.125 `#define STATE_BORDERS_SWAP_MISSET 0x0008000`

Engine stuck at the wrong edge.

7.1.2.126 `#define STATE_BRAKE 0x0200`

State of Brake pin.

Flag "1" - if the pin state brake is not powered (brake is clamped), "0" - if the pin state brake is powered (brake is unclamped).

7.1.2.127 `#define STATE_BUTTON_LEFT 0x0008`

Button "left" state (1 if pressed).

7.1.2.128 `#define STATE_BUTTON_RIGHT 0x0004`

Button "right" state (1 if pressed).

7.1.2.129 `#define STATE_CONTR 0x000003F`

Flags of controller states.

7.1.2.130 `#define STATE_CONTROLLER_OVERHEAT 0x0000200`

Controller overheat.

7.1.2.131 `#define STATE_CTP_ERROR 0x0000080`

Control position error (is only used with stepper motor).

The flag is set when the encoder position and step position are too far apart.

7.1.2.132 `#define STATE_DIG_SIGNAL 0xFFFF`

Flags of digital signals.

7.1.2.133 `#define STATE_EEPROM_CONNECTED 0x0000010`

EEPROM with settings is connected.

The built-in stage profile is uploaded from the EEPROM memory chip if the EEPROM\_PRECEDENCE flag is set, allowing you to connect various stages to the controller with automatic setup.

7.1.2.134 `#define STATE_ENC_A 0x2000`

State of encoder A pin.

7.1.2.135 `#define STATE_ENC_B 0x4000`

State of encoder B pin.

7.1.2.136 `#define STATE_ENGINE_RESPONSE_ERROR 0x0800000`

Error response of the engine control action.

Motor control algorithm failure means that it can't make the correct decisions with the feedback data it receives. A single failure may be caused by a mechanical problem. A repeating failure can be caused by incorrect motor settings.

7.1.2.137 `#define STATE_ERRC 0x0000001`

Command error encountered.

The command received is not in the list of controller known commands. The most possible reason is the outdated firmware.

7.1.2.138 `#define STATE_ERRD 0x0000002`

Data integrity error encountered.

The data inside the command and its CRC code do not correspond. Therefore, the data can't be considered valid. This error may be caused by EMI in the UART/RS232 interface.

7.1.2.139 `#define STATE_ERRV 0x0000004`

Value error encountered.

The values in the command can't be applied without correction because they fall outside the valid range. Corrected values were used instead of the original ones.

7.1.2.140 `#define STATE_EXTIO_ALARM 0x1000000`

The error is caused by the external EXTIO input signal.

7.1.2.141 `#define STATE_GPIO_LEVEL 0x0020`

State of external GPIO pin.

7.1.2.142 `#define STATE_GPIO_PINOUT 0x0010`

External GPIO works as out if the flag is set; otherwise, it works as in.

7.1.2.143 `#define STATE_IS_HOMED 0x0000020`

Calibration performed.

This means that the relative position scale is calibrated against a hardware absolute position sensor, like a limit switch. Drops after loss of calibration, like harsh stops and possibly skipped steps.

7.1.2.144 `#define STATE_LEFT_EDGE 0x0002`

Engine stuck at the left edge.

7.1.2.145 `#define STATE_LOW_USB_VOLTAGE 0x0002000`

USB voltage is insufficient for normal operation.

7.1.2.146 `#define STATE_OVERLOAD_POWER_CURRENT 0x0000800`

Power current exceeds safe limit.

7.1.2.147 `#define STATE_OVERLOAD_POWER_VOLTAGE 0x0000400`

Power voltage exceeds safe limit.

7.1.2.148 `#define STATE_OVERLOAD_USB_CURRENT 0x0004000`

USB current exceeds safe limit.

7.1.2.149 `#define STATE_OVERLOAD_USB_VOLTAGE 0x0001000`

USB voltage exceeds safe limit.

7.1.2.150 `#define STATE_POWER_OVERHEAT 0x0000100`

Power driver overheat.

Motor control is disabled until some cooldown occurs. This should not happen with boxed versions of the controller. This may happen with the bare-board version of the controller with a custom radiator. Redesign your radiator.

7.1.2.151 `#define STATE_REV_SENSOR 0x0400`

State of Revolution sensor pin.

7.1.2.152 `#define STATE_RIGHT_EDGE 0x0001`

Engine stuck at the right edge.

7.1.2.153 `#define STATE_SECUR 0x1B3FFC0`

Security flags.

7.1.2.154 `#define STATE_SYNC_INPUT 0x0800`

State of Sync input pin.

7.1.2.155 `#define STATE_SYNC_OUTPUT 0x1000`

State of Sync output pin.

7.1.2.156 `#define STATE_WINDING_RES_MISMATCH 0x0100000`

The difference between winding resistances is too large.

This usually happens with a damaged stepper motor with partially short-circuited windings.

7.1.2.157 `#define SYNCIN_ENABLED 0x01`

Synchronization in mode is enabled if this flag is set.

7.1.2.158 `#define SYNCIN_GOTOPOSITION 0x04`

The engine is going to the position specified in Position and uPosition if this flag is set.

And it is shifting on the Position and uPosition if this flag is unset

7.1.2.159 `#define SYNCIN_INVERT 0x02`

Trigger on falling edge if flag is set, on rising edge otherwise.

7.1.2.160 `#define SYNCOUT_ENABLED 0x01`

The synchronization out pin follows the synchronization logic if the flag is set.

Otherwise, it is governed by the SYNCOUT\_STATE flag.

7.1.2.161 `#define SYNCOUT_IN_STEPS 0x08`

Use motor steps or encoder pulses instead of milliseconds for output pulse generation if the flag is set.

7.1.2.162 `#define SYNCOUT_INVERT 0x04`

The low level is active if the flag is set.

Otherwise, the high level is active.

7.1.2.163 `#define SYNCOUT_ONPERIOD 0x40`

Generate a synchronization pulse every SyncOutPeriod encoder pulses.

7.1.2.164 `#define SYNCOUT_ONSTART 0x10`

Generate a synchronization pulse when movement starts.

7.1.2.165 `#define SYNCOUT_ONSTOP 0x20`

Generate a synchronization pulse when movement stops.

7.1.2.166 `#define SYNCOUT_STATE 0x02`

When the output state is fixed by the negative SYNCOUT\_ENABLED flag, the pin state is in accordance with this flag state.

7.1.2.167 `#define UART_PARITY_BITS 0x03`

Bits of the parity.

7.1.2.168 `#define WIND_A_STATE_ABSENT 0x00`

Winding A is disconnected.

7.1.2.169 `#define WIND_A_STATE_MALFUNC 0x02`

Winding A is short-circuited.

7.1.2.170 `#define WIND_A_STATE_OK 0x03`

Winding A is connected and working properly.

7.1.2.171 `#define WIND_A_STATE_UNKNOWN 0x01`

Winding A state is unknown.

7.1.2.172 `#define WIND_B_STATE_ABSENT 0x00`

Winding B is disconnected.

7.1.2.173 `#define WIND_B_STATE_MALFUNC 0x20`

Winding B is short-circuited.

7.1.2.174 `#define WIND_B_STATE_OK 0x30`

Winding B is connected and working properly.

7.1.2.175 `#define WIND_B_STATE_UNKNOWN 0x10`

Winding B state is unknown.

7.1.2.176 `#define XIMC_API`

Library import macro.

Macros allows to automatically import function from shared library. It automatically expands to `dllimport` on `msvc` when including header file.

### 7.1.3 Typedef Documentation

7.1.3.1 `typedef void(XIMC_CALLCONV * logging_callback_t)(int loglevel, const wchar_t *message, void *user_data)`

Logging callback prototype.

Parameters

<i>loglevel</i>	a loglevel
<i>message</i>	a message

### 7.1.4 Function Documentation

#### 7.1.4.1 **result\_t XIMC\_API** close\_device ( **device\_t** \* id )

Close specified device.

Parameters

<i>id</i>	an identifier of device
-----------	-------------------------

Note

The id parameter in this function is a C pointer, unlike most library functions that use this parameter

#### 7.1.4.2 **result\_t XIMC\_API** command\_clear\_fram ( **device\_t** id )

Clear controller FRAM.

Can be used by manufacturer only

Parameters

<i>id</i>	an identifier of device
-----------	-------------------------

#### 7.1.4.3 **result\_t XIMC\_API** command\_eeread\_settings ( **device\_t** id )

Read settings from the stage's EEPROM to the controller's RAM.

This operation is performed automatically at the connection of the stage with an EEPROM to the controller.  
Can be used by the manufacturer only.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

#### 7.1.4.4 **result\_t XIMC\_API** command\_eesave\_settings ( **device\_t** id )

Save settings from the controller's RAM to the stage's EEPROM.

Can be used by the manufacturer only.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

#### 7.1.4.5 **result\_t XIMC\_API** command\_home ( **device\_t** id )

Moving to home position.

Moving algorithm:

- 1) Moves the motor according to the speed FastHome, uFastHome and flag HOME\_DIR\_FAST until the limit switch if the HOME\_STOP\_ENDS flag is set. Or moves the motor until the input synchronization signal occurs if the flag HOME\_STOP\_SYNC is set. Or moves until the revolution sensor signal occurs if the flag HOME\_STOP\_REV\_SN is set.
- 2) Then moves according to the speed SlowHome, uSlowHome and flag HOME\_DIR\_SLOW until the input clock signal occurs if the flag HOME\_MV\_SEC is set. If the flag HOME\_MV\_SEC is reset, skip this step.
- 3) Then shifts the motor according to the speed FastHome, uFastHome and the flag HOME\_DIR\_SLOW by HomeDelta distance, uHomeDelta.

See GHOM/SHOM commands' description for details on home flags.

Moving settings can be set by set\_home\_settings/set\_home\_settings\_calb.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

See Also

[home\\_settings\\_t](#)  
[get\\_home\\_settings](#)  
[set\\_home\\_settings](#)

#### 7.1.4.6 **result\_t XIMC\_API** command\_homezero ( **device\_t id** )

Make home command, wait until it is finished and make zero command.

This is a convenient way to calibrate zero position.

Parameters

	<i>id</i>	an identifier of device
<b>out</b>	<i>ret</i>	RESULT_OK if controller has finished home & zero correctly or result of first controller query that returned anything other than RESULT_OK.

#### 7.1.4.7 **result\_t XIMC\_API** command\_left ( **device\_t id** )

Start continuous moving to the left.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

#### 7.1.4.8 **result\_t XIMC\_API** command\_loft ( **device\_t id** )

Upon receiving the command "loft", the engine is shifted from the current position to a distance Antiplay defined in engine settings.

Then moves to the initial position.

## Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

7.1.4.9 **result\_t XIMC\_API** command\_move ( **device\_t** id, int Position, int uPosition )

Move to position.

Upon receiving the command "move" the engine starts to move with pre-set parameters (speed, acceleration, retention), to the point specified by Position and uPosition. uPosition sets the microstep position of a stepper motor. In the case of DC motor, this field is ignored.

## Parameters

<i>id</i>	An identifier of a device
<i>Position</i>	position to move.
<i>uPosition</i>	the fractional part of the position to move, in microsteps. The microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine_settings).

7.1.4.10 **result\_t XIMC\_API** command\_move\_calb ( **device\_t** id, float Position, const **calibration\_t** \* calibration )

Move to position using user units.

Upon receiving the command "move" the engine starts to move with preset parameters (speed, acceleration, retention), to the point specified by Position.

## Parameters

<i>id</i>	An identifier of a device
<i>Position</i>	position to move.
<i>calibration</i>	user unit settings

## Note

The parameter Position is adjusted by the correction table.

7.1.4.11 **result\_t XIMC\_API** command\_movr ( **device\_t** id, int DeltaPosition, int uDeltaPosition )

Shift by a set offset.

Upon receiving the command "movr", the engine starts to move with preset parameters (speed, acceleration, hold) left or right (depending on the sign of DeltaPosition). It moves by the number of steps specified in the fields DeltaPosition and uDeltaPosition. uDeltaPosition sets the microstep offset for a stepper motor. In the case of a DC motor, this field is ignored.

## Parameters

<i>DeltaPosition</i>	shift from initial position.
<i>uDeltaPosition</i>	the fractional part of the offset shift, in microsteps. The microstep size and the range of valid values for this field depend on the selected step division mode (see the MicrostepMode field in engine_settings).
<i>id</i>	An identifier of a device

7.1.4.12 **result\_t XIMC\_API** `command_movr_calb ( device_t id, float DeltaPosition, const calibration_t * calibration )`

Shift by a set offset using user units.

Upon receiving the command "movr", the engine starts to move with preset parameters (speed, acceleration, hold) left or right (depending on the sign of DeltaPosition). It moves by the distance specified in the field DeltaPosition.

Parameters

<i>DeltaPosition</i>	shift from initial position.
<i>id</i>	An identifier of a device
<i>user</i>	unit calibration settings

Note

The final coordinate is calculated using DeltaPosition and adjusted by the correction table. However, the correction cannot be done if the motor moves. `movr` sets the target position equal to the current target position, shifted by delta. But the library can't determine the current target position while moving. So there is no possibility of calculating the final position and correcting it with the correction table.

7.1.4.13 **result\_t XIMC\_API** `command_power_off ( device_t id )`

Immediately power off the motor regardless its state.

Shouldn't be used during motion as the motor could be powered on again automatically to continue movement. The command is designed to manually power off the motor. When automatic power off after stop is required, use the power management system.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

See Also

[get\\_power\\_settings](#)  
[set\\_power\\_settings](#)

7.1.4.14 **result\_t XIMC\_API** `command_read_robust_settings ( device_t id )`

Read important settings (calibration coefficients, etc.) from the controller's flash memory to the controller's RAM, replacing previous data in the RAM.

Manufacturer only.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

7.1.4.15 **result\_t XIMC\_API** `command_read_settings ( device_t id )`

Read all settings from the controller's flash memory to the controller's RAM, replacing previous data in the RAM.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

7.1.4.16 **result\_t XIMC\_API** command\_reset ( **device\_t** id )

Reset controller.

Can be used by manufacturer only

Parameters

<i>id</i>	an identifier of device
-----------	-------------------------

7.1.4.17 **result\_t XIMC\_API** command\_right ( **device\_t** id )

Start continuous moving to the right.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

7.1.4.18 **result\_t XIMC\_API** command\_save\_robust\_settings ( **device\_t** id )

Save important settings (calibration coefficients, etc.) from the controller's RAM to the controller's flash memory, replacing previous data in the flash memory.

Manufacturer only.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

7.1.4.19 **result\_t XIMC\_API** command\_save\_settings ( **device\_t** id )

Save all settings from the controller's RAM to the controller's flash memory, replacing previous data in the flash memory.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

7.1.4.20 **result\_t XIMC\_API** command\_sstp ( **device\_t** id )

Soft stop the engine.

The motor is slowing down with the deceleration specified in move\_settings.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

7.1.4.21 **result\_t XIMC\_API** command\_start\_measurements ( **device\_t** id )

Start measurements and buffering of speed and the speed error (target speed minus real speed).

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

7.1.4.22 **result\_t XIMC\_API** command\_stop ( **device\_t** id )

Immediately stops the engine, moves it to the STOP state, and sets switches to BREAK mode (windings are short-circuited).

The holding regime is deactivated for DC motors, keeping current in the windings for stepper motors (to control it, see Power management settings).

When this command is called, the ALARM flag is reset.

Parameters

<i>id</i>	An identifier of a device
-----------	---------------------------

7.1.4.23 **result\_t XIMC\_API** command\_update\_firmware ( const char \* uri, const uint8\_t \* data, uint32\_t data\_size )

Update firmware.

Manufacturer only. Service command

Parameters

<i>uri</i>	a uri of device
<i>data</i>	firmware byte stream
<i>data_size</i>	size of byte stream

7.1.4.24 **result\_t XIMC\_API** command\_wait\_for\_stop ( **device\_t** id, uint32\_t refresh\_interval\_ms )

Wait for stop.

Parameters

	<i>id</i>	an identifier of device
	<i>refresh_interval_ms</i>	Status refresh interval. The function waits this number of milliseconds between get_status requests to the controller. Recommended value of this parameter is 10 ms. Use values of less than 3 ms only when necessary - small refresh interval values do not significantly increase response time of the function, but they create substantially more traffic in controller-computer data channel.
<i>out</i>	<i>ret</i>	RESULT_OK if controller has stopped and result of the first get_status command which returned anything other than RESULT_OK otherwise.

7.1.4.25 **result\_t XIMC\_API** `command_zero ( device_t id )`

Sets the current position to 0.

Sets the target position of the move command and the movr command to zero for all cases except for movement to the target position. In the latter case, the target position is calculated so that the absolute position of the destination stays the same. For example, if we were at 400 and moved to 500, then the command Zero makes the current position 0 and the position of the destination 100. It does not change the mode of movement. If the motion is carried, it continues, and if the engine is in the "hold", the type of retention remains.

Parameters

	<i>id</i>	An identifier of a device
--	-----------	---------------------------

7.1.4.26 **device\_enumeration\_t XIMC\_API** `enumerate_devices ( int enumerate_flags, const char * hints )`

Enumerate all devices that looks like valid.

Parameters

<i>in</i>	<i>enumerate_flags</i>	enumerate devices flags
<i>in</i>	<i>hints</i>	extended information

*hints* is a string of form "key=value \n key2=value2". *Unrecognized key-value pairs are ignored.* Key list: *addr* - used together with `ENUMERATE_NETWORK` flag. Non-null value is a remote host name or a comma-separated list of host names which contain the devices to be found, absent value means broadcast discovery. *adapter\_addr* - used together with `ENUMERATE_NETWORK` flag. Non-null value is a IP address of network adapter. Remote ximc device must be on the same local network as the adapter. When using the *adapter\_addr* key, you **must set** the *addr* key. Example: "addr= \n adapter\_addr=192.168.0.100".

7.1.4.27 **result\_t XIMC\_API** `free_enumerate_devices ( device_enumeration_t device_enumeration )`

Free memory returned by *enumerate\_devices*.

Parameters

<i>in</i>	<i>device_enumeration</i>	opaque pointer to an enumeration device data
-----------	---------------------------	--

7.1.4.28 **result\_t XIMC\_API** `get_accessories_settings ( device_t id, accessories_settings_t * accessories_settings )`

Deprecated.

Read additional accessory information from the EEPROM.

Parameters

	<i>id</i>	An identifier of a device
<i>out</i>	<i>accessories_settings</i>	structure contains information about additional accessories

7.1.4.29 **result\_t XIMC\_API** get\_analog\_data ( **device\_t** id, **analog\_data\_t** \* analog\_data )

Read the analog data structure that contains raw analog data from the embedded ADC.

This function is used for device testing and deep recalibration by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
out	<i>analog_data</i>	analog data coefficients

7.1.4.30 **result\_t XIMC\_API** get\_bootloader\_version ( **device\_t** id, unsigned int \* Major, unsigned int \* Minor, unsigned int \* Release )

Read the controller's bootloader version.

Parameters

	<i>id</i>	An identifier of a device
out	<i>Major</i>	major version
out	<i>Minor</i>	minor version
out	<i>Release</i>	release version

7.1.4.31 **result\_t XIMC\_API** get\_brake\_settings ( **device\_t** id, **brake\_settings\_t** \* brake\_settings )

Read break control settings.

Parameters

	<i>id</i>	An identifier of a device
out	<i>brake_settings</i>	structure contains settings of brake control

7.1.4.32 **result\_t XIMC\_API** get\_calibration\_settings ( **device\_t** id, **calibration\_settings\_t** \* calibration\_settings )

Read calibration settings.

Manufacturer only. This function reads the structure with calibration settings. These settings are used to convert bare ADC values to winding currents in mA and the full current in mA. Parameters are grouped into pairs, XXX\_A and XXX\_B, representing linear equation coefficients. The first one is the slope, the second one is the constant term. Thus,  $XXX\_Current[mA] = XXX\_A[mA/ADC] * XXX\_ADC\_CODE[ADC] + XXX\_B[mA]$ .

See Also

[calibration\\_settings\\_t](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>calibration_settings</i>	calibration settings

7.1.4.33 **result\_t XIMC\_API** `get_chart_data ( device_t id, chart_data_t * chart_data )`

Return device electrical parameters, useful for charts.

A useful function that fills the structure with a snapshot of the controller voltages and currents.

See Also

[chart\\_data\\_t](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>chart_data</i>	structure with a snapshot of controller parameters.

7.1.4.34 **result\_t XIMC\_API** `get_control_settings ( device_t id, control_settings_t * control_settings )`

Read motor control settings.

In case of CTL\_MODE=1, joystick motor control is enabled. In this mode, while the joystick is maximally displaced, the engine tends to move at MaxSpeed[i]. i=0 if another value hasn't been set at the previous usage. To change the speed index "i", use the buttons.

In case of CTL\_MODE=2, the motor is controlled by the left/right buttons. When you click on the button, the motor starts moving in the appropriate direction at a speed MaxSpeed[0]. After Timeout[i], motor moves at speed MaxSpeed[i+1]. At the transition between MaxSpeed[i] and MaxSpeed[i+1] the motor just accelerates/decelerates as usual.

Parameters

	<i>id</i>	An identifier of a device
out	<i>control_settings</i>	structure contains settings motor control by joystick or buttons left/right.

7.1.4.35 **result\_t XIMC\_API** `get_control_settings_calb ( device_t id, control_settings_calb_t * control_settings_calb, const calibration_t * calibration )`

Set calibrated motor control settings.

In case of CTL\_MODE=1, the joystick motor control is enabled. In this mode, while the joystick is maximally displaced, the engine tends to move at MaxSpeed[i]. i=0 if another value hasn't been set at the previous usage. To change the speed index "i", use the buttons.

In case of CTL\_MODE=2, the motor is controlled by the left/right buttons. When you click on the button, the motor starts moving in the appropriate direction at a speed MaxSpeed[0]. After Timeout[i], motor moves at speed MaxSpeed[i+1]. At the transition between MaxSpeed[i] and MaxSpeed[i+1] the motor just accelerates/decelerates as usual.

Parameters

	<i>id</i>	An identifier of a device
out	<i>control_settings_calb</i>	structure contains user unit motor control settings.
	<i>calibration</i>	user unit settings

7.1.4.36 **result\_t XIMC\_API** get\_controller\_name ( **device\_t** id, **controller\_name\_t** \* controller\_name )

Read user's controller name and internal settings from the FRAM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>controller_name</i>	structure contains previously set user controller name

7.1.4.37 **result\_t XIMC\_API** get\_ctp\_settings ( **device\_t** id, **ctp\_settings\_t** \* ctp\_settings )

Read control position settings (used with stepper motor only).

When controlling the step motor with an encoder (CTP\_BASE=0), it is possible to detect the loss of steps. The controller knows

Alternatively, the stepper motor may be controlled with the speed sensor (CTP\_BASE 1). In this mode, at the active edges of the input clock, the controller stores the current value of steps. Then, at each revolution, the controller checks how many steps have been passed. When the difference is over the CTPMinError, the STATE\_CTP\_ERROR flag is set.

Parameters

	<i>id</i>	An identifier of a device
out	<i>ctp_settings</i>	structure contains position control settings.

7.1.4.38 **result\_t XIMC\_API** get\_debug\_read ( **device\_t** id, **debug\_read\_t** \* debug\_read )

Read data from firmware for debug purpose.

Manufacturer only. Its use depends on context, firmware version and previous history.

Parameters

	<i>id</i>	An identifier of a device
out	<i>debug_read</i>	Debug data.

7.1.4.39 **int XIMC\_API** get\_device\_count ( **device\_enumeration\_t** device\_enumeration )

Get device count.

Parameters

in	<i>device_enumeration</i>	opaque pointer to an enumeration device data
----	---------------------------	--

7.1.4.40 **result\_t XIMC\_API** get\_device\_information ( **device\_t** id, **device\_information\_t** \* device\_information )

Return device information.

All fields must point to allocated string buffers with at least 10 bytes. Works with both raw or initialized device.

## Parameters

	<i>id</i>	an identifier of device
out	<i>device-information</i>	device information Device information.

## See Also

[get\\_device\\_information](#)

7.1.4.41 **pchar XIMC\_API** `get_device_name ( device_enumeration_t device_enumeration, int device_index )`

Get device name from the device enumeration.

Returns *device\_index* device name.

## Parameters

in	<i>device-enumeration</i>	opaque pointer to an enumeration device data
in	<i>device_index</i>	device index

7.1.4.42 **result\_t XIMC\_API** `get_edges_settings ( device_t id, edges_settings_t * edges_settings )`

Read border and limit switches settings.

## See Also

[set\\_edges\\_settings](#)

## Parameters

	<i>id</i>	An identifier of a device
out	<i>edges_settings</i>	edges settings, types of borders, motor behavior and electrical behavior of limit switches

7.1.4.43 **result\_t XIMC\_API** `get_edges_settings_calb ( device_t id, edges_settings_calb_t * edges_settings_calb, const calibration_t * calibration )`

Read border and limit switches settings in user units.

## See Also

[set\\_edges\\_settings\\_calb](#)

## Parameters

	<i>id</i>	An identifier of a device
out	<i>edges_settings-calb</i>	edges settings, types of borders, motor behavior and electrical behavior of limit switches
	<i>calibration</i>	user unit settings

## Note

Attention! Some parameters of the `edges_settings_calb` structure are corrected by the coordinate correction table.

7.1.4.44 **result\_t XIMC\_API** `get_emf_settings ( device_t id, emf_settings_t * emf_settings )`

Read electromechanical settings.

The settings are different for different stepper motors.

See Also

[set\\_emf\\_settings](#)

## Parameters

	<i>id</i>	An identifier of a device
out	<i>emf_settings</i>	EMF settings

7.1.4.45 **result\_t XIMC\_API** `get_encoder_information ( device_t id, encoder_information_t * encoder_information )`

Deprecated.

Read encoder information from the EEPROM.

## Parameters

	<i>id</i>	An identifier of a device
out	<i>encoder_information</i>	structure contains information about encoder

7.1.4.46 **result\_t XIMC\_API** `get_encoder_settings ( device_t id, encoder_settings_t * encoder_settings )`

Deprecated.

Read encoder settings from the EEPROM.

## Parameters

	<i>id</i>	An identifier of a device
out	<i>encoder_settings</i>	structure contains encoder settings

7.1.4.47 **result\_t XIMC\_API** `get_engine_advanced_setup ( device_t id, engine_advanced_setup_t * engine_advanced_setup )`

Read engine advanced settings.

See Also

[set\\_engine\\_advanced\\_setup](#)

## Parameters

	<i>id</i>	An identifier of a device
out	<i>engine_-- advansed_setup</i>	EAS settings

7.1.4.48 **result\_t XIMC\_API** `get_engine_settings ( device_t id, engine_settings_t * engine_settings )`

Read engine settings.

This function reads the structure containing a set of useful motor settings stored in the controller's memory. These settings specify motor shaft movement algorithm, list of limitations and rated characteristics.

See Also

[set\\_engine\\_settings](#)

## Parameters

	<i>id</i>	An identifier of a device
out	<i>engine_settings</i>	engine settings

7.1.4.49 **result\_t XIMC\_API** `get_engine_settings_calb ( device_t id, engine_settings_calb_t * engine_settings_calb, const calibration_t * calibration )`

Read user unit engine settings.

This function reads the structure containing a set of useful motor settings stored in the controller's memory. These settings specify the motor shaft movement algorithm, list of limitations and rated characteristics.

See Also

[set\\_engine\\_settings](#)

## Parameters

	<i>id</i>	An identifier of a device
out	<i>engine_settings- _calb</i>	engine settings
	<i>calibration</i>	user unit settings

7.1.4.50 **result\_t XIMC\_API** `get_entype_settings ( device_t id, entype_settings_t * entype_settings )`

Return engine type and driver type.

## Parameters

	<i>id</i>	An identifier of a device
out	<i>entype_settings</i>	structure contains motor type and power driver type settings

7.1.4.51 **result\_t XIMC\_API** `get_enumerate_device_controller_name ( device_enumeration_t device_enumeration, int device_index, controller_name_t * controller_name )`

Get controller name from the device enumeration.

Returns *device\_index* device controller name.

Parameters

in	<i>device_enumeration</i>	opaque pointer to an enumeration device data
in	<i>device_index</i>	device index
out	<i>controller_name</i>	controller name

7.1.4.52 **result\_t XIMC\_API** `get_enumerate_device_information ( device_enumeration_t device_enumeration, int device_index, device_information_t * device_information )`

Get device information from the device enumeration.

Returns *device\_index* device information.

Parameters

in	<i>device_enumeration</i>	opaque pointer to an enumeration device data
in	<i>device_index</i>	device index
out	<i>device_information</i>	device information data

7.1.4.53 **result\_t XIMC\_API** `get_enumerate_device_network_information ( device_enumeration_t device_enumeration, int device_index, device_network_information_t * device_network_information )`

Get device network information from the device enumeration.

Returns *device\_index* device network information.

Parameters

in	<i>device_enumeration</i>	opaque pointer to an enumeration device data
in	<i>device_index</i>	device index
out	<i>device_network_information</i>	device network information data

7.1.4.54 **result\_t XIMC\_API** `get_enumerate_device_serial ( device_enumeration_t device_enumeration, int device_index, uint32_t * serial )`

Get device serial number from the device enumeration.

Returns *device\_index* device serial number.

Parameters

in	<i>device_enumeration</i>	opaque pointer to an enumeration device data
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in	<i>device_index</i>	device index
out	<i>serial</i>	device serial number

7.1.4.55 **result\_t XIMC\_API** `get_enumerate_device_stage_name ( device_enumeration_t device_enumeration, int device_index, stage_name_t * stage_name )`

Get stage name from the device enumeration.

Returns *device\_index* device stage name.

Parameters

in	<i>device- enumeration</i>	opaque pointer to an enumeration device data
in	<i>device_index</i>	device index
out	<i>stage_name</i>	stage name

7.1.4.56 **result\_t XIMC\_API** `get_extended_settings ( device_t id, extended_settings_t * extended_settings )`

Read extended settings.

Currently, it is not in use.

See Also

[set\\_extended\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>extended- settings</i>	EST settings

7.1.4.57 **result\_t XIMC\_API** `get_extio_settings ( device_t id, extio_settings_t * extio_settings )`

Read EXTIO settings.

This function reads a structure with a set of EXTIO settings from the controller's memory.

See Also

[set\\_extio\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>extio_settings</i>	EXTIO settings

7.1.4.58 **result\_t XIMC\_API** get\_feedback\_settings ( **device\_t** id, **feedback\_settings\_t** \* feedback\_settings )

Feedback settings.

Parameters

	<i>id</i>	An identifier of a device
out	<i>IPS</i>	number of encoder counts per shaft revolution. Range: 1..65535. The field is obsolete, it is recommended to write 0 to IPS and use the extended CountsPerTurn field. You may need to update the controller firmware to the latest version.
out	<i>FeedbackType</i>	type of feedback
out	<i>FeedbackFlags</i>	flags of feedback
out	<i>CountsPerTurn</i>	number of encoder counts per shaft revolution. Range: 1..4294967295. To use the CountsPerTurn field, write 0 in the IPS field, otherwise the value from the IPS field will be used.

7.1.4.59 **result\_t XIMC\_API** get\_firmware\_version ( **device\_t** id, unsigned int \* Major, unsigned int \* Minor, unsigned int \* Release )

Read the controller's firmware version.

Parameters

	<i>id</i>	An identifier of a device
out	<i>Major</i>	major version
out	<i>Minor</i>	minor version
out	<i>Release</i>	release version

7.1.4.60 **result\_t XIMC\_API** get\_gear\_information ( **device\_t** id, **gear\_information\_t** \* gear\_information )

Deprecated.

Read gear information from the EEPROM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>gear_information</i>	structure contains information about step gearhead

7.1.4.61 **result\_t XIMC\_API** get\_gear\_settings ( **device\_t** id, **gear\_settings\_t** \* gear\_settings )

Deprecated.

Read gear settings from the EEPROM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>gear_settings</i>	structure contains step gearhead settings

7.1.4.62 **result\_t XIMC\_API** `get_globally_unique_identifier ( device_t id, globally_unique_identifier_t * globally_unique_identifier )`

This value is unique to each individual device, but is not a random value.

Manufacturer only. This unique device identifier can be used to initiate secure boot processes or as a serial number for USB or other end applications.

Parameters

	<i>id</i>	An identifier of a device
out	<i>globally_unique_identifier</i>	the result of fields 0-3 concatenated defines the unique 128-bit device identifier.

7.1.4.63 **result\_t XIMC\_API** `get_hallsensor_information ( device_t id, hallsensor_information_t * hallsensor_information )`

Deprecated.

Read hall sensor information from the EEPROM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>hallsensor_information</i>	structure contains information about hall sensor

7.1.4.64 **result\_t XIMC\_API** `get_hallsensor_settings ( device_t id, hallsensor_settings_t * hallsensor_settings )`

Deprecated.

Read hall sensor settings from the EEPROM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>hallsensor_settings</i>	structure contains hall sensor settings

7.1.4.65 **result\_t XIMC\_API** `get_home_settings ( device_t id, home_settings_t * home_settings )`

Read home settings.

This function reads the structure with home position settings.

See Also

[home\\_settings\\_t](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>home_settings</i>	calibrating position settings

7.1.4.66 **result\_t XIMC\_API** get\_home\_settings\_calb ( **device\_t** id, **home\_settings\_calb\_t** \* home\_settings\_calb, const **calibration\_t** \* calibration )

Read user unit home settings.

This function reads the structure with home position settings.

See Also

[home\\_settings\\_calb\\_t](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>home_settings_calb</i>	calibrating position settings
	<i>calibration</i>	user unit settings

7.1.4.67 **result\_t XIMC\_API** get\_init\_random ( **device\_t** id, **init\_random\_t** \* init\_random )

Read a random number from the controller.

Manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
out	<i>init_random</i>	random sequence generated by the controller

7.1.4.68 **result\_t XIMC\_API** get\_joystick\_settings ( **device\_t** id, **joystick\_settings\_t** \* joystick\_settings )

Read joystick settings.

If joystick position falls outside DeadZone limits, a movement begins. The speed is defined by the joystick's position in the range of the DeadZone limit to the maximum deviation. Joystick positions inside DeadZone limits correspond to zero speed (a soft stop of the motion), and positions beyond Low and High limits correspond to MaxSpeed[i] or -MaxSpeed[i] (see command SCTL), where  $i = 0$  by default and can be changed with the left/right buttons (see command SCTL). If the next speed in the list is zero (both integer and microstep parts), the button press is ignored. The first speed in the list shouldn't be zero. See the Joystick control section on <https://doc.xisupport.com> for more information.

Parameters

	<i>id</i>	An identifier of a device
out	<i>joystick_settings</i>	structure contains joystick settings

7.1.4.69 **result\_t XIMC\_API** get\_measurements ( **device\_t** id, **measurements\_t** \* measurements )

A command to read the data buffer to build a speed graph and a speed error graph.

Filling the buffer starts with the command "start\_measurements". The buffer holds 25 points; the points are taken with a period of 1 ms. To create a robust system, read data every 20 ms. If the buffer is full, it is recommended to repeat the readings every 5 ms until the buffer again becomes filled with 20 points.

To stop measurements just stop reading data. After buffer overflow measurements will stop automatically.

See Also

[measurements\\_t](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>measurements</i>	structure with buffer and its length.

7.1.4.70 **result\_t XIMC\_API** `get_motor_information ( device_t id, motor_information_t * motor_information )`

Deprecated.

Read motor information from the EEPROM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>motor_information</i>	structure contains motor information

7.1.4.71 **result\_t XIMC\_API** `get_motor_settings ( device_t id, motor_settings_t * motor_settings )`

Deprecated.

Read motor settings from the EEPROM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>motor_settings</i>	structure contains motor settings

7.1.4.72 **result\_t XIMC\_API** `get_move_settings ( device_t id, move_settings_t * move_settings )`

Movement settings read command (speed, acceleration, threshold, etc.).

Parameters

	<i>id</i>	An identifier of a device
out	<i>move_settings</i>	structure contains move settings: speed, acceleration, deceleration etc.

7.1.4.73 **result\_t XIMC\_API** `get_move_settings_calb ( device_t id, move_settings_calb_t * move_settings_calb, const calibration_t * calibration )`

User unit movement settings read command (speed, acceleration, threshold, etc.).

Parameters

	<i>id</i>	An identifier of a device
out	<i>move_settings_calb</i>	structure contains move settings: speed, acceleration, deceleration etc.

	<i>calibration</i>	user unit settings
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7.1.4.74 **result\_t XIMC\_API** get\_network\_settings ( **device\_t** id, **network\_settings\_t** \* network\_settings )

Read network settings.

Manufacturer only. This function returns the current network settings.

See Also

net\_settings\_t

Parameters

<i>DHCPEnabled</i>	DHCP enabled (1) or not (0)
<i>IPv4Address[4]</i>	Array[4] with an IP address
<i>SubnetMask[4]</i>	Array[4] with a subnet mask address
<i>Default-Gateway[4]</i>	Array[4] with a default gateway address

7.1.4.75 **result\_t XIMC\_API** get\_nonvolatile\_memory ( **device\_t** id, **nonvolatile\_memory\_t** \* nonvolatile\_memory )

Read user data from FRAM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>nonvolatile-memory</i>	structure contains previously set user data.

7.1.4.76 **result\_t XIMC\_API** get\_password\_settings ( **device\_t** id, **password\_settings\_t** \* password\_settings )

Read the password.

Manufacturer only. This function reads the user password for the device's web-page.

See Also

pwd\_settings\_t

Parameters

<i>User-Password[20]</i>	Password for web-page
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7.1.4.77 **result\_t XIMC\_API** get\_pid\_settings ( **device\_t** id, **pid\_settings\_t** \* pid\_settings )

Read PID settings.

This function reads the structure containing a set of motor PID settings stored in the controller's memory. These settings specify the behavior of the PID routine for the positioner. These factors are slightly different for different positioners. All boards are supplied with the standard set of PID settings in the controller's flash memory.

See Also

[set\\_pid\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>pid_settings</i>	PID settings

7.1.4.78 **result\_t XIMC\_API** `get_position ( device_t id, get_position_t * the_get_position )`

Reads the value position in steps and microsteps for stepper motor and encoder steps for all engines.

Parameters

	<i>id</i>	An identifier of a device
out	<i>the_get_position</i>	structure contains motor position.

7.1.4.79 **result\_t XIMC\_API** `get_position_calb ( device_t id, get_position_calb_t * the_get_position_calb, const calibration_t * calibration )`

Reads position value in user units for stepper motor and encoder steps for all engines.

Parameters

	<i>id</i>	An identifier of a device
out	<i>the_get_position_calb</i>	structure contains motor position.
	<i>calibration</i>	user unit settings

Note

Attention! Some parameters of the `get_position_calb` structure are corrected by the coordinate correction table.

7.1.4.80 **result\_t XIMC\_API** `get_power_settings ( device_t id, power_settings_t * power_settings )`

Read settings of step motor power control.

Used with a stepper motor only.

Parameters

	<i>id</i>	An identifier of a device
out	<i>power_settings</i>	structure contains settings of step motor power control

7.1.4.81 **result\_t XIMC\_API** `get_secure_settings ( device_t id, secure_settings_t * secure_settings )`

Read protection settings.

Parameters

	<i>id</i>	An identifier of a device
out	<i>secure_settings</i>	critical parameter settings to protect the hardware

See Also

`status_t::flags`

7.1.4.82 **result\_t XIMC\_API** `get_serial_number ( device_t id, unsigned int * SerialNumber )`

Read device serial number.

Parameters

	<i>id</i>	An identifier of a device
out	<i>SerialNumber</i>	serial number

7.1.4.83 **result\_t XIMC\_API** `get_stage_information ( device_t id, stage_information_t * stage_information )`

Deprecated.

Read stage information from the EEPROM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>stage-information</i>	structure contains stage information

7.1.4.84 **result\_t XIMC\_API** `get_stage_name ( device_t id, stage_name_t * stage_name )`

Read the user's stage name from the EEPROM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>stage_name</i>	structure contains the previously set user's stage name.

7.1.4.85 **result\_t XIMC\_API** `get_stage_settings ( device_t id, stage_settings_t * stage_settings )`

Deprecated.

Read stage settings from the EEPROM.

Parameters

	<i>id</i>	An identifier of a device
out	<i>stage_settings</i>	structure contains stage settings

7.1.4.86 **result\_t XIMC\_API** `get_status ( device_t id, status_t * status )`

Return device state.

Parameters

	<i>id</i>	an identifier of device
out	<i>status</i>	structure with snapshot of controller status Device state. Useful structure that contains current controller status, including speed, position and boolean flags.

See Also

[get\\_status](#)

7.1.4.87 **result\_t XIMC\_API** `get_status_calb ( device_t id, status_calb_t * status, const calibration_t * calibration )`

Return device state.

Parameters

	<i>id</i>	an identifier of device
out	<i>status</i>	structure with snapshot of controller status
	<i>calibration</i>	user unit settings Calibrated device state. Useful structure that contains current controller status, including speed, position and boolean flags.

See Also

[get\\_status](#)

7.1.4.88 **result\_t XIMC\_API** `get_sync_in_settings ( device_t id, sync_in_settings_t * sync_in_settings )`

Read input synchronization settings.

This function reads the structure with a set of input synchronization settings, modes, periods and flags that specify the behavior of input synchronization. All boards are supplied with the standard set of these settings.

See Also

[set\\_sync\\_in\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>sync_in_settings</i>	synchronization settings

7.1.4.89 **result\_t XIMC\_API** `get_sync_in_settings_calb ( device_t id, sync_in_settings_calb_t * sync_in_settings_calb, const calibration_t * calibration )`

Read input user unit synchronization settings.

This function reads the structure with a set of input synchronization settings, modes, periods and flags that specify the behavior of input synchronization. All boards are supplied with the standard set of these settings.

See Also

[set\\_sync\\_in\\_settings\\_calb](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>sync_in_settings_calb</i>	synchronization settings
	<i>calibration</i>	user unit settings

7.1.4.90 **result\_t XIMC\_API** `get_sync_out_settings ( device_t id, sync_out_settings_t * sync_out_settings )`

Read output synchronization settings.

This function reads the structure containing a set of output synchronization settings, modes, periods and flags that specify the behavior of output synchronization. All boards are supplied with the standard set of these settings.

See Also

[set\\_sync\\_out\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>sync_out_settings</i>	synchronization settings

7.1.4.91 **result\_t XIMC\_API** `get_sync_out_settings_calb ( device_t id, sync_out_settings_calb_t * sync_out_settings_calb, const calibration_t * calibration )`

Read output user unit synchronization settings.

This function reads the structure containing a set of output synchronization settings, modes, periods and flags that specify the behavior of output synchronization. All boards are supplied with the standard set of these settings.

See Also

[set\\_sync\\_in\\_settings\\_calb](#)

Parameters

	<i>id</i>	An identifier of a device
out	<i>sync_out_settings_calb</i>	synchronization settings
	<i>calibration</i>	user unit settings

7.1.4.92 **result\_t XIMC\_API** `get_uart_settings ( device_t id, uart_settings_t * uart_settings )`

Read UART settings.

This function reads the structure containing UART settings.

See Also

[uart\\_settings\\_t](#)

Parameters

	<i>Speed</i>	UART speed
out	<i>uart_settings</i>	UART settings

7.1.4.93 **result\_t XIMC\_API** `goto_firmware ( device_t id, uint8_t * ret )`

Reboot to firmware.

Parameters

	<i>id</i>	an identifier of device
out	<i>ret</i>	RESULT_OK, if reboot to firmware is possible. Reboot is done after reply to this command. RESULT_NO_FIRMWARE, if firmware is not found. RESULT_ALREADY_IN_FIRMWARE, if this command was sent when controller is already in firmware.

7.1.4.94 **result\_t XIMC\_API** `has_firmware ( const char * uri, uint8_t * ret )`

Check for firmware on device.

Parameters

	<i>uri</i>	a uri of device
out	<i>ret</i>	non-zero if firmware existed

7.1.4.95 **result\_t XIMC\_API** `load_correction_table ( device_t * id, const char * namefile )`

Command of loading a correction table from a text file (this function is deprecated).

Use the function [set\\_correction\\_table\(device\\_t id, const char\\* namefile\)](#). The correction table is used for position correction in case of mechanical inaccuracies. It works for some parameters in `_calb` commands.

Parameters

	<i>id</i>	an identifier the device
in	<i>namefile</i>	- the file name must be fully qualified. If the short name is used, the file must be located in the application directory. If the file name is set to NULL, the correction table will be cleared. File format: two tab-separated columns. Column headers are string. Data is real, the point is a determiner. The first column is a coordinate. The second one is the deviation caused by a mechanical error. The maximum length of a table is 100 rows.

## Note

The `id` parameter in this function is a C pointer, unlike most library functions that use this parameter

## See Also

[command\\_move](#)  
[get\\_position\\_calb](#)  
[get\\_position\\_calb\\_t](#)  
[get\\_status\\_calb](#)  
[status\\_calb\\_t](#)  
[get\\_edges\\_settings\\_calb](#)  
[set\\_edges\\_settings\\_calb](#)  
[edges\\_settings\\_calb\\_t](#)

7.1.4.96 void **XIMC\_API** `logging_callback_stderr_narrow` ( int `loglevel`, const wchar\_t \* `message`, void \* `user_data` )

Simple callback for logging to stderr in narrow (single byte) chars.

## Parameters

<i>loglevel</i>	a loglevel
<i>message</i>	a message

7.1.4.97 void **XIMC\_API** `logging_callback_stderr_wide` ( int `loglevel`, const wchar\_t \* `message`, void \* `user_data` )

Simple callback for logging to stderr in wide chars.

## Parameters

<i>loglevel</i>	a loglevel
<i>message</i>	a message

7.1.4.98 void **XIMC\_API** `msec_sleep` ( unsigned int `msec` )

Sleeps for a specified amount of time.

## Parameters

<i>msec</i>	time in milliseconds
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7.1.4.99 **device\_t** **XIMC\_API** `open_device` ( const char \* `uri` )

Open a device with OS `uri` and return identifier of the device which can be used in calls.

## Parameters

<code>in</code>	<code>uri</code>	- a device URI. Device URI has a form of "xi-com:port" or "xi-net://host/serial" or "xi-emu:///abs_path_to_file". For POSIX systems one can ommit root-slash in <code>abs_path_to_file</code> ; for example, "xi-emu:///home/user/virt_controller.bin". In case of USB-COM port, the "port" is the OS device URI. For example, "xi-com:\\\\.\\COM3" in Windows (note that double-backslash will be transformed to single-backslash) or "xi-com:///dev/ttyACM0" in Linux/Mac. In case of network device, the "host" is an IPv4 address or fully qualified domain URI (FQDN), "serial" is the device serial number in hexadecimal system. For example, "xi-net://192.168.0.1/00001234" or "xi-net://hostname.com/89ABCDEF". In case of UDP protocol, use "xi-udp://<ip/host>:<port>". For example, "xi-udp://192.168.0.1:1818". In case of virtual device, the "abs_file.to_file" is the full path to the virtual device's file. If it doesn't exist, then it is created and initialized with default values. For example, "xi-emu:///-C:/dir/file.bin" in Windows or "xi-emu:///home/user/file.bin" in Linux/Mac.
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7.1.4.100 **result\_t XIMC\_API** probe\_device ( const char \* uri )

Check if a device with OS uri `uri` is XIMC device.

Be carefully with this call because it sends some data to the device.

## Parameters

<code>in</code>	<code>uri</code>	- a device uri
-----------------	------------------	----------------

7.1.4.101 **result\_t XIMC\_API** service\_command\_updf ( **device\_t** id )

The command switches the controller to update the firmware state.

Manufacturer only. After receiving this command, the firmware board sets a flag (for loader), sends an echo reply, and restarts the controller.

7.1.4.102 **result\_t XIMC\_API** set\_accessories\_settings ( **device\_t** id, const **accessories\_settings\_t** \* accessories\_settings )

Deprecated.

Set additional accessories' information to the EEPROM. Can be used by the manufacturer only.

## Parameters

	<code>id</code>	An identifier of a device
<code>in</code>	<code>accessories_settings</code>	structure contains information about additional accessories

7.1.4.103 **result\_t XIMC\_API** set\_bindy\_key ( const char \* keyfilepath )

Set network encryption layer (bindy) key.

## Parameters

<code>in</code>	<code>keyfilepath</code>	full path to the bindy keyfile When using network-attached devices this function must be called before <a href="#">enumerate_devices</a> and <a href="#">open_device</a> functions.
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7.1.4.104 **result\_t XIMC\_API** `set_brake_settings ( device_t id, const brake_settings_t * brake_settings )`

Set brake control settings.

## Parameters

	<code>id</code>	An identifier of a device
<code>in</code>	<code>brake_settings</code>	structure contains brake control settings

7.1.4.105 **result\_t XIMC\_API** `set_calibration_settings ( device_t id, const calibration_settings_t * calibration_settings )`

Set calibration settings.

Manufacturer only. This function sends the structure with calibration settings to the controller's memory. These settings are used to convert bare ADC values to winding currents in mA and the full current in mA. Parameters are grouped into pairs, XXX\_A and XXX\_B, representing linear equation coefficients. The first one is the slope, the second one is the constant term. Thus,  $XXX\_Current[mA] = XXX\_A[mA/ADC] * XXX\_ADC\_CODE[ADC] + XXX\_B[mA]$ .

See Also

[calibration\\_settings\\_t](#)

## Parameters

	<code>id</code>	An identifier of a device
<code>in</code>	<code>calibration_settings</code>	calibration settings

7.1.4.106 **result\_t XIMC\_API** `set_control_settings ( device_t id, const control_settings_t * control_settings )`

Read motor control settings.

In case of CTL\_MODE=1, joystick motor control is enabled. In this mode, the joystick is maximally displaced, the engine tends to move at MaxSpeed[i]. i=0 if another value hasn't been set at the previous usage. To change the speed index "i", use the buttons.

In case of CTL\_MODE=2, the motor is controlled by the left/right buttons. When you click on the button, the motor starts moving in the appropriate direction at a speed MaxSpeed[0]. After Timeout[i], motor moves at speed MaxSpeed[i+1]. At the transition between MaxSpeed[i] and MaxSpeed[i+1] the motor just accelerates/decelerates as usual.

## Parameters

	<code>id</code>	An identifier of a device
<code>in</code>	<code>control_settings</code>	structure contains motor control settings.

7.1.4.107 **result\_t XIMC\_API** set\_control\_settings\_calb ( **device\_t** id, const **control\_settings\_calb\_t** \* control\_settings\_calb, const **calibration\_t** \* calibration )

Set motor control settings.

In case of CTL\_MODE=1, joystick motor control is enabled. In this mode, while the joystick is maximally displaced, the engine tends to move at MaxSpeed[i]. i=0 if another value hasn't been set at the previous usage. To change the speed index "i", use the buttons.

In case of CTL\_MODE=2, the motor is controlled by the left/right buttons. When you click on the button, the motor starts moving in the appropriate direction at a speed MaxSpeed[0]. After Timeout[i], motor moves at speed MaxSpeed[i+1]. At the transition between MaxSpeed[i] and MaxSpeed[i+1] the motor just accelerates/decelerates as usual.

Parameters

	<i>id</i>	An identifier of a device
<i>in</i>	<i>control_settings_calb</i>	structure contains motor control settings.
	<i>calibration</i>	user unit settings

7.1.4.108 **result\_t XIMC\_API** set\_controller\_name ( **device\_t** id, const **controller\_name\_t** \* controller\_name )

Write user's controller name and internal settings to the FRAM.

Parameters

	<i>id</i>	An identifier of a device
<i>in</i>	<i>controller_name</i>	structure contains the previously set user's controller name

7.1.4.109 **result\_t XIMC\_API** set\_correction\_table ( **device\_t** id, const char \* namefile )

Command of loading a correction table from a text file.

The correction table is used for position correction in case of mechanical inaccuracies. It works for some parameters in \_calb commands.

Parameters

	<i>id</i>	an identifier the device
<i>in</i>	<i>namefile</i>	- the file name must be either a full path or a relative path. If the file name is set to NULL, the correction table will be cleared. File format: two tab-separated columns. Column headers are strings. Data is real, the dot is a delimiter. The first column is a coordinate. The second one is the deviation caused by a mechanical error. The maximum length of a table is 100 rows. Coordinate column must be sorted in ascending order.

See Also

[command\\_move](#)  
[get\\_position\\_calb](#)  
[get\\_position\\_calb\\_t](#)  
[get\\_status\\_calb](#)  
[status\\_calb\\_t](#)  
[get\\_edges\\_settings\\_calb](#)

[set\\_edges\\_settings\\_calb](#)  
[edges\\_settings\\_calb\\_t](#)

7.1.4.110 **result\_t XIMC\_API** set\_ctp\_settings ( **device\_t** id, const **ctp\_settings\_t** \* ctp\_settings )

Set control position settings (used with stepper motor only).

When controlling the step motor with the encoder (CTP\_BASE=0), it is possible to detect the loss of steps. The controller knows the number of steps per revolution (GENG::StepsPerRev) and the encoder resolution (GFBS::IPT). When the control is enabled (CTP\_ENABLED is set), the controller stores the current position in the steps of SM and the current position of the encoder. Next, the encoder position is converted into steps at each step, and if the difference between the current position in steps and the encoder position is greater than CTPMinError, the flag STATE\_CTP\_ERROR is set.

Alternatively, the stepper motor may be controlled with the speed sensor (CTP\_BASE 1). In this mode, at the active edges of the input clock, the controller stores the current value of steps. Then, at each revolution, the controller checks how many steps have been passed. When the difference is over the CTPMinError, the STATE\_CTP\_ERROR flag is set.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>ctp_settings</i>	structure contains position control settings.

7.1.4.111 **result\_t XIMC\_API** set\_debug\_write ( **device\_t** id, const **debug\_write\_t** \* debug\_write )

Write data to firmware for debug purpose.

Manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>debug_write</i>	Debug data.

7.1.4.112 **result\_t XIMC\_API** set\_edges\_settings ( **device\_t** id, const **edges\_settings\_t** \* edges\_settings )

Set border and limit switches settings.

See Also

[get\\_edges\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>edges_settings</i>	edges settings, specify types of borders, motor behavior and electrical behavior of limit switches

7.1.4.113 **result\_t XIMC\_API** set\_edges\_settings\_calb ( **device\_t** id, const **edges\_settings\_calb\_t** \* edges\_settings\_calb, const **calibration\_t** \* calibration )

Set border and limit switches settings in user units.

See Also

[get\\_edges\\_settings\\_calb](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>edges_settings_calb</i>	edges settings, specify types of borders, motor behavior and electrical behavior of limit switches
	<i>calibration</i>	user unit settings

Note

Attention! Some parameters of the edges\_settings\_calb structure are corrected by the coordinate correction table.

7.1.4.114 **result\_t XIMC\_API** set\_emf\_settings ( **device\_t** id, const **emf\_settings\_t** \* emf\_settings )

Set electromechanical coefficients.

The settings are different for different stepper motors. Please set new settings when you change the motor.

See Also

[get\\_emf\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>emf_settings</i>	EMF settings

7.1.4.115 **result\_t XIMC\_API** set\_encoder\_information ( **device\_t** id, const **encoder\_information\_t** \* encoder\_information )

Deprecated.

Set encoder information to the EEPROM. Can be used by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>encoder_information</i>	structure contains information about encoder

7.1.4.116 **result\_t XIMC\_API** set\_encoder\_settings ( **device\_t** id, const **encoder\_settings\_t** \* encoder\_settings )

Deprecated.

Set encoder settings to the EEPROM. Can be used by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>encoder_settings</i>	structure contains encoder settings

7.1.4.117 **result\_t XIMC\_API** `set_engine_advanced_setup ( device_t id, const engine_advanced_setup_t * engine_advanced_setup )`

Set engine advanced settings.

See Also

[get\\_engine\\_advanced\\_setup](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>engine_advanced_setup</i>	EAS settings

7.1.4.118 **result\_t XIMC\_API** `set_engine_settings ( device_t id, const engine_settings_t * engine_settings )`

Set engine settings.

This function sends a structure with a set of engine settings to the controller's memory. These settings specify the motor shaft movement algorithm, list of limitations and rated characteristics. Use it when you change the motor, encoder, positioner, etc. Please note that wrong engine settings may lead to device malfunction, which can cause irreversible damage to the board.

See Also

[get\\_engine\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>engine_settings</i>	engine settings

7.1.4.119 **result\_t XIMC\_API** `set_engine_settings_calb ( device_t id, const engine_settings_calb_t * engine_settings_calb, const calibration_t * calibration )`

Set user unit engine settings.

This function sends a structure with a set of engine settings to the controller's memory. These settings specify the motor shaft movement algorithm, list of limitations and rated characteristics. Use it when you change the motor, encoder, positioner etc. Please note that wrong engine settings may lead to device malfunction, which can cause irreversible damage to the board.

See Also

[get\\_engine\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>engine_settings- _calb</i>	engine settings
	<i>calibration</i>	user unit settings

7.1.4.120 **result\_t XIMC\_API** set\_entype\_settings ( **device\_t** id, const **entype\_settings\_t** \* entype\_settings )

Set engine type and driver type.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>entype_settings</i>	structure contains motor type and power driver type settings

7.1.4.121 **result\_t XIMC\_API** set\_extended\_settings ( **device\_t** id, const **extended\_settings\_t** \* extended\_settings )

Set extended settings.

Currently, it is not in use.

See Also

[get\\_extended\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>extended- settings</i>	EST settings

7.1.4.122 **result\_t XIMC\_API** set\_extio\_settings ( **device\_t** id, const **extio\_settings\_t** \* extio\_settings )

Set EXTIO settings.

This function sends the structure with a set of EXTIO settings to the controller's memory. By default, input events are signaled through a rising front, and output states are signaled by a high logic state.

See Also

[get\\_extio\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>extio_settings</i>	EXTIO settings

7.1.4.123 **result\_t XIMC\_API** set\_feedback\_settings ( **device\_t** id, const **feedback\_settings\_t** \* feedback\_settings )

Feedback settings.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>IPS</i>	number of encoder counts per shaft revolution. Range: 1..65535. The field is obsolete, it is recommended to write 0 to IPS and use the extended CountsPerTurn field. You may need to update the controller firmware to the latest version.
<b>in</b>	<i>FeedbackType</i>	type of feedback
<b>in</b>	<i>FeedbackFlags</i>	flags of feedback
<b>in</b>	<i>CountsPerTurn</i>	number of encoder counts per shaft revolution. Range: 1..4294967295. To use the CountsPerTurn field, write 0 in the IPS field, otherwise the value from the IPS field will be used.

7.1.4.124 **result\_t XIMC\_API** set\_gear\_information ( **device\_t** id, const **gear\_information\_t** \* gear\_information )

Deprecated.

Set gear information to the EEPROM. Can be used by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>gear-information</i>	structure contains information about step gearhead

7.1.4.125 **result\_t XIMC\_API** set\_gear\_settings ( **device\_t** id, const **gear\_settings\_t** \* gear\_settings )

Deprecated.

Set gear settings to the EEPROM. Can be used by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>gear_settings</i>	structure contains step gearhead settings

7.1.4.126 **result\_t XIMC\_API** set\_hallsensor\_information ( **device\_t** id, const **hallsensor\_information\_t** \* hallsensor\_information )

Deprecated.

Set hall sensor information to the EEPROM. Can be used by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>hallsensor-information</i>	structure contains information about hall sensor

7.1.4.127 **result\_t XIMC\_API** set\_hallsensor\_settings ( **device\_t** id, const **hallsensor\_settings\_t** \* hallsensor\_settings )

Deprecated.

Set hall sensor settings to the EEPROM. Can be used by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>hallsensor_settings</i>	structure contains hall sensor settings

7.1.4.128 **result\_t XIMC\_API** set\_home\_settings ( **device\_t** id, const **home\_settings\_t** \* home\_settings )

Set home settings.

This function sends home position structure to the controller's memory.

See Also

[home\\_settings\\_t](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>home_settings</i>	calibrating position settings

7.1.4.129 **result\_t XIMC\_API** set\_home\_settings\_calb ( **device\_t** id, const **home\_settings\_calb\_t** \* home\_settings\_calb, const **calibration\_t** \* calibration )

Set user unit home settings.

This function sends home position structure to the controller's memory.

See Also

[home\\_settings\\_calb\\_t](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>home_settings_calb</i>	calibrating position settings
	<i>calibration</i>	user unit settings

7.1.4.130 **result\_t XIMC\_API** set\_joystick\_settings ( **device\_t** id, const **joystick\_settings\_t** \* joystick\_settings )

Set joystick position.

If joystick position falls outside DeadZone limits, a movement begins. The speed is defined by the joystick's position in the range of the DeadZone limit to the maximum deviation. Joystick positions inside DeadZone limits correspond to zero speed (a soft stop of motion), and positions beyond Low and High limits correspond

to MaxSpeed[i] or -MaxSpeed[i] (see command SCTL), where  $i = 0$  by default and can be changed with the left/right buttons (see command SCTL). If the next speed in the list is zero (both integer and microstep parts), the button press is ignored. The first speed in the list shouldn't be zero. See the Joystick control section on <https://doc.xisupport.com> for more information.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>joystick_settings</i>	structure contains joystick settings

7.1.4.131 void **XIMC\_API** set\_logging\_callback ( **logging\_callback\_t** logging\_callback, void \* user\_data )

Sets a logging callback.

Call resets a callback to default (stderr, syslog) if NULL passed.

Parameters

<i>logging_callback</i>	a callback for log messages
-------------------------	-----------------------------

7.1.4.132 **result\_t XIMC\_API** set\_motor\_information ( **device\_t** id, const **motor\_information\_t** \* motor\_information )

Deprecated.

Set motor information to the EEPROM. Can be used by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>motor_information</i>	structure contains motor information

7.1.4.133 **result\_t XIMC\_API** set\_motor\_settings ( **device\_t** id, const **motor\_settings\_t** \* motor\_settings )

Deprecated.

Set motor settings to the EEPROM. Can be used by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>motor_settings</i>	structure contains motor information

7.1.4.134 **result\_t XIMC\_API** set\_move\_settings ( **device\_t** id, const **move\_settings\_t** \* move\_settings )

Movement settings set command (speed, acceleration, threshold, etc.).

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>move_settings</i>	structure contains move settings: speed, acceleration, deceleration etc.

7.1.4.135 **result\_t XIMC\_API** set\_move\_settings\_calb ( **device\_t** id, const **move\_settings\_calb\_t** \* move\_settings\_calb, const **calibration\_t** \* calibration )

User unit movement settings set command (speed, acceleration, threshold, etc.).

Parameters

	<i>id</i>	An identifier of a device
<i>in</i>	<i>move_settings_calb</i>	structure contains move settings: speed, acceleration, deceleration etc.
	<i>calibration</i>	user unit settings

7.1.4.136 **result\_t XIMC\_API** set\_network\_settings ( **device\_t** id, const **network\_settings\_t** \* network\_settings )

Set network settings.

Manufacturer only. This function sets the desired network settings.

See Also

net\_settings\_t

Parameters

<i>DHCPEnabled</i>	DHCP enabled (1) or not (0)
<i>IPv4Address[4]</i>	Array[4] with an IP address
<i>SubnetMask[4]</i>	Array[4] with a subnet mask address
<i>Default-Gateway[4]</i>	Array[4] with a default gateway address

7.1.4.137 **result\_t XIMC\_API** set\_nonvolatile\_memory ( **device\_t** id, const **nonvolatile\_memory\_t** \* nonvolatile\_memory )

Write user data into the FRAM.

Parameters

	<i>id</i>	An identifier of a device
<i>in</i>	<i>nonvolatile_memory</i>	user data.

7.1.4.138 **result\_t XIMC\_API** set\_password\_settings ( **device\_t** id, const **password\_settings\_t** \* password\_settings )

Sets the password.

Manufacturer only. This function sets the user password for the device's web-page.

See Also

pwd\_settings\_t

## Parameters

<i>User-Password[20]</i>	Password for web-page
--------------------------	-----------------------

7.1.4.139 **result\_t XIMC\_API** set\_pid\_settings ( **device\_t** id, const **pid\_settings\_t** \* pid\_settings )

Set PID settings.

This function sends the structure with a set of PID factors to the controller's memory. These settings specify the behavior of the PID routine for the positioner. These factors are slightly different for different positioners. All boards are supplied with the standard set of PID settings in the controller's flash memory. Please use it for loading new PID settings when you change positioner. Please note that wrong PID settings lead to device malfunction.

See Also

[get\\_pid\\_settings](#)

## Parameters

	<i>id</i>	An identifier of a device
<i>in</i>	<i>pid_settings</i>	PID settings

7.1.4.140 **result\_t XIMC\_API** set\_position ( **device\_t** id, const **set\_position\_t** \* the\_set\_position )

Sets position in steps and microsteps for stepper motor.

Sets encoder position for all engines.

## Parameters

	<i>id</i>	An identifier of a device
<i>out</i>	<i>the_set_position</i>	structure contains motor position.

7.1.4.141 **result\_t XIMC\_API** set\_position\_calb ( **device\_t** id, const **set\_position\_calb\_t** \* the\_set\_position\_calb, const **calibration\_t** \* calibration )

Sets any position value and encoder value of all engines.

In user units.

## Parameters

	<i>id</i>	An identifier of a device
<i>out</i>	<i>the_set_position_calb</i>	structure contains motor position.
	<i>calibration</i>	user unit settings

7.1.4.142 **result\_t XIMC\_API** set\_power\_settings ( **device\_t** id, const **power\_settings\_t** \* power\_settings )

Set settings of step motor power control.

Used with a stepper motor only.

Parameters

	<i>id</i>	An identifier of a device
<i>in</i>	<i>power_settings</i>	structure contains settings of step motor power control

7.1.4.143 **result\_t XIMC\_API** set\_secure\_settings ( **device\_t** id, const **secure\_settings\_t** \* secure\_settings )

Set protection settings.

Parameters

	<i>id</i>	An identifier of a device
	<i>secure_settings</i>	structure with secure data

See Also

status\_t::flags

7.1.4.144 **result\_t XIMC\_API** set\_serial\_number ( **device\_t** id, const **serial\_number\_t** \* serial\_number )

Write device serial number and hardware version to the controller's flash memory.

Along with the new serial number and hardware version, a "Key" is transmitted. The SN and hardware version are changed and saved when keys match. Can be used by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<i>in</i>	<i>serial_number</i>	structure contains new serial number and secret key.

7.1.4.145 **result\_t XIMC\_API** set\_stage\_information ( **device\_t** id, const **stage\_information\_t** \* stage\_information )

Deprecated.

Set stage information to the EEPROM. Can be used by the manufacturer only.

Parameters

	<i>id</i>	An identifier of a device
<i>in</i>	<i>stage-information</i>	structure contains stage information

7.1.4.146 **result\_t XIMC\_API** set\_stage\_name ( **device\_t** id, const **stage\_name\_t** \* stage\_name )

Write the user's stage name to EEPROM.

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>stage_name</i>	structure contains the previously set user's stage name.

7.1.4.147 **result\_t XIMC\_API** set\_stage\_settings ( **device\_t** id, const **stage\_settings\_t** \* stage\_settings )

Deprecated.

Set stage settings to the EEPROM. Can be used by the manufacturer only

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>stage_settings</i>	structure contains stage settings

7.1.4.148 **result\_t XIMC\_API** set\_sync\_in\_settings ( **device\_t** id, const **sync\_in\_settings\_t** \* sync\_in\_settings )

Set input synchronization settings.

This function sends the structure with a set of input synchronization settings that specify the behavior of input synchronization to the controller's memory. All boards are supplied with the standard set of these settings.

See Also

[get\\_sync\\_in\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>sync_in_settings</i>	synchronization settings

7.1.4.149 **result\_t XIMC\_API** set\_sync\_in\_settings\_calb ( **device\_t** id, const **sync\_in\_settings\_calb\_t** \* sync\_in\_settings\_calb, const **calibration\_t** \* calibration )

Set input user unit synchronization settings.

This function sends the structure with a set of input synchronization settings that specify the behavior of input synchronization to the controller's memory. All boards are supplied with the standard set of these settings.

See Also

[get\\_sync\\_in\\_settings\\_calb](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>sync_in_settings_calb</i>	synchronization settings
	<i>calibration</i>	user unit settings

7.1.4.150 **result\_t XIMC\_API** `set_sync_out_settings ( device_t id, const sync_out_settings_t * sync_out_settings )`

Set output synchronization settings.

This function sends the structure with a set of output synchronization settings that specify the behavior of output synchronization to the controller's memory. All boards are supplied with the standard set of these settings.

See Also

[get\\_sync\\_out\\_settings](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>sync_out_settings</i>	synchronization settings

7.1.4.151 **result\_t XIMC\_API** `set_sync_out_settings_calb ( device_t id, const sync_out_settings_calb_t * sync_out_settings_calb, const calibration_t * calibration )`

Set output user unit synchronization settings.

This function sends the structure with a set of output synchronization settings that specify the behavior of output synchronization to the controller's memory. All boards are supplied with the standard set of these settings.

See Also

[get\\_sync\\_in\\_settings\\_calb](#)

Parameters

	<i>id</i>	An identifier of a device
<b>in</b>	<i>sync_out_settings_calb</i>	synchronization settings
	<i>calibration</i>	user unit settings

7.1.4.152 **result\_t XIMC\_API** `set_uart_settings ( device_t id, const uart_settings_t * uart_settings )`

Set UART settings.

This function sends the structure with UART settings to the controller's memory.

See Also

[uart\\_settings\\_t](#)

Parameters

	<i>Speed</i>	UART speed
<b>in</b>	<i>uart_settings</i>	UART settings

7.1.4.153 **result\_t XIMC\_API** write\_key ( const char \* uri, uint8\_t \* key )

Write controller key.

Can be used by manufacturer only

Parameters

	<i>uri</i>	a uri of device
<i>in</i>	<i>key</i>	protection key. Range: 0..4294967295

7.1.4.154 **result\_t XIMC\_API** ximc\_fix\_usbser\_sys ( const char \* device\_uri )

Fixing a USB driver error in Windows.

The USB-COM subsystem in the Windows OS does not always work correctly. During operation, the following malfunctions are possible: All attempts to open the device fail. The device can be opened and data can be sent to it, but the response data is not received. These problems are fixed by reconnecting the device or reinitializing it in the Device Manager. The [ximc\\_fix\\_usbser\\_sys\(\)](#) function automates the deletion detection process.

7.1.4.155 **void XIMC\_API** ximc\_version ( char \* version )

Returns a library version.

Parameters

<i>version</i>	a buffer to hold a version string, 32 bytes is enough
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