

libximc

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# Chapter 1

## libximc library

Documentation for libximc library.

Libximc is 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 hardware using ready-made software or using libraries for programming languages: C / C ++, C #, JAVA, Visual Basic, Python 2/3, .NET, Delphi, integration with MS Visual Studio programming environments, gcc, Xcode.
- Works with scientific development environments by integrating LabVIEW and MATLAB;

### 1.2 What can do libximc library

- Libximc manages hardware 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 Mac OS 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.

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 suggestions, errors and ideas. We appreciate your suggestions and try to make our product better. Please post your questions [here](#). Your ideas and comments send a e-mail: [8smc4@standa.lt](mailto:8smc4@standa.lt)



# 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 7, Windows, Vista, Windows XP, Windows Server 2003, Windows 2000, Linux, Mac OS X. 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.

### 2.2 System requirements

#### 2.2.1 For rebuilding library

On Windows:

- Windows 2000 or later, 64-bit system (if compiling both architectures) or 32-bit system.
- Microsoft Visual C++ 2013 or later
- cygwin with tar, bison, flex, curl installed
- 7z

On Linux:

- 64-bit or/and 32-bit system system
- gcc 4 or later
- common autotools: autoconf, autoheader, aclocal, automake, autoreconf, libtool
- gmake
- doxygen - for building docs
- LaTeX distribution (teTeX or texlive) - for building docs
- flex 2.5.30+
- bison
- mercurial (for building developer version from hg)

On Mac OS X:

- XCode 4
- doxygen
- mactex
- autotools
- mercurial (for building developer version from hg)

If mercurial is used, please enable 'purge' extension by adding to `~/.hgrc` following lines:

```
[extensions]
hgext.purge=
```

### 2.2.2 For using library

Supported operating systems (32 or 64 bit) and environment requirements:

- Mac OS X 10.6
- Windows 2000 or later
- Autotools-compatible unix. Package is installed from sources.
- Linux debian-based 32 and 64 bit. 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
- Java 7 64-bit or 32-bit
- .NET 2.0 (32-bit only)
- Delphi (32-bit only)

Build requirements:

- Windows: Microsoft Visual C++ 2013 or mingw (currently not supported)
- UNIX: gcc 4, gmake
- Mac OS X: XCode 4
- JDK 7

# Chapter 3

## How to rebuild library

### 3.1 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.

### 3.2 Building on debian-based linux systems

Requirement: 64-bit and 32-bit debian system, ubuntu Typical set of packages: gcc, autotools, autoconf, libtool, dpkg-dev, flex, bison, doxygen, texlive, mercurial Full set of packages: apt-get install ruby1.9.1 debhelper vim sudo g++ mercurial git curl make cmake autotools-dev automake autoconf libtool default-jre-headless default-jdk openjdk-6-jdk dpkg-dev lintian texlive texlive-latex-extra texlive-lang-cyrillic dh-autoreconf hardening-wrapper bison flex doxygen lsb-release pkg-config check For ARM cross-compiling install gcc-arm-linux-gnueabi from your ARM toolchain.

It's required to match library and host architecture: 64-bit library can be built only at 64-bit host, 32-bit library - only at 32-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 redhat-based linux systems

Requirement: 64-bit redhat-based system (Fedora, Red Hat, SUSE) Typical set of packages: gcc, autotools, autoconf, libtool, flex, bison, doxygen, texlive, mercurial Full set of packages: autoconf automake bison doxygen flex gcc gcc-32bit gcc-c++ gcc-c++-32bit java-1.7.0-openjdk java-1.7.0-openjdk-devel libtool lsb-release make mercurial rpm-build rpm-devel rpmlint texlive texlive-fonts-extra texlive-latex

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`.

## 3.4 Building on Mac OS 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`.

## 3.5 Building on Windows

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

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.

## 3.6 Source code access

XIMC source codes are given under special request.

# Chapter 4

## How to use with...

Library usage can be examined from test application testapp. Non-C languages are supported because library supports stdcall calling convention and so can be used with a variety of languages.

C test project is located at 'examples/testapp' directory, C# test project - at 'examples/testcs', VB.NET - 'examples/testvbnet', Delphi 6 - 'examples/testdelphi', sample bindings for MATLAB - 'examples/testmatlab', for Java - 'examples/testjava', for Python - 'examples/testpython'. Development kit also contains precompiled examples: testapp and testappeasy as 32 and 64-bit applications for Windows and 64-bit application for osx, testcs, testvbnet, testdelphi - 32-bit only, testjava is architecture-independent, testmatlab and testpython are runtime-interpreted.

NOTE: SDK requires Microsoft Visual C++ Redistributable Package (provided with SDK - vcredist\_x86 or vcredist\_x64)

NOTE: On Linux both the libximc7\_x.x.x and libximc7-dev\_x.x.x need to be installed. 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).

### 4.1 Usage with C

#### 4.1.1 Visual C++

Testapp can be built using testapp.sln. Library must be compiled with MS Visual C++ too, mingw-library isn't supported. 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).

#### 4.1.2 CodeBlocks

Testapp can be built using testcodeblocks.cbp. Library must be compiled with MS Visual C++ too, mingw-library isn't supported. Make sure that Microsoft Visual C++ Redistributable Package is installed. \*

Open solution examples/testcodeblocks/testcodeblocks.cbp, build and run from the IDE.

#### 4.1.3 MinGW

MinGW is a port of GCC to win32 platform. It's required to install MinGW package. Currently not supported

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 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).

#### 4.1.4 C++ Builder

First of all you should create C++ Builder-style import library. Visual C++ library is not compatible with BCB. Invoke:

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

Then compile test application:

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

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).

#### 4.1.5 XCode

Test app should be built with XCode project testapp.xcodeproj. Library is a Mac OS 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 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).

#### 4.1.6 GCC

Make sure that libximc (rpm, deb, freebsd package or tarball) is installed at your system. Installation of package should be performed with a package manager of operating system. On OS 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).

Copy file /usr/share/libximc/keyfile.sqlite project directory:

```
$ cp /usr/share/libximc/keyfile.sqlite .
```

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 OS 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 OS 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).

## 4.2 .NET

Wrapper assembly for libximc.dll is wrappers/csharp/ximcnet.dll. It is provided with two different architectures and depends on .NET 2.0.

Test .NET applications for Visual Studio 2013 is located at testcs (for C#) and testvbnet (for VB.NET) respectively. Open solutions and build.

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).

## 4.3 Delphi

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

Console test application for is located at testdelphi. Tested with Delphi 6 and only 32-bit version.

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

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

## 4.4 Java

How to run example on Linux. Navigate to ximc-2.x.x./examples/testjava/compiled/ and run:

```
$ cp /usr/share/libximc/keyfile.sqlite .
$ java -cp /usr/share/java/libjximc.jar:testjava.jar ru.ximc.TestJava
```

How to run example on Windows or Mac. Navigate to ximc-2.x.x./examples/testjava/compiled/. Copy contents of ximc-2.x.x/ximc/win64 or ximc-2.x.x/ximc/macosx accordingly to the current directory. Then run:

```
$ java -classpath libjximc.jar -classpath testjava.jar ru.ximc.TestJava
```

How to modify and recompile an example. Navigate to examples/testjava/compiled. Sources are embedded in a testjava.jar. Extract them:

```
$ jar xvf testjava.jar ru META-INF
```

Then rebuild sources:

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

or for windows or mac

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

Then build a jar:

```
$ jar cmf META-INF/MANIFEST.MF testjava.jar ru
```

In case of the 8SMC4-USB-Eth1 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).

## 4.5 Python

Change current directory to the examples/testpython. For correct usage of the library libximc, the example uses the file wrapper, `crossplatform\wrappers\python\pyximc.py` with a description of the structures of the library.

Before launch:

On OS X: copy library `ximc/macosx/libximc.framework` to the current directory.

On Linux: you may need to set `LD_LIBRARY_PATH` so Python can locate libraries with `RPATH`. For example, you may need:

```
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:`pwd`
```

On Windows before the start nothing needs to be done. All necessary communication and dependencies are registered in the example code. Libraries used: `bindy.dll` `libximc.dll` `xiwrapper.dll`. Located in the folder for the respective versions of Windows.

Launch Python 2 or Python 3:

```
python testpython.py
```

In case of the 8SMC4-USB-Eth1 Ethernet adapter usage it is necessary to set correct IP address of the Ethernet adapter in `testpython.py` file before launch (see `enum_hints` variable).

## 4.6 MATLAB

Sample MATLAB program `testximc.m` is provided at the directory `examples/testmatlab`. 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 OS X: copy `ximc/macosx/libximc.framework`, `ximc/macosx/wrappers/ximcm.h`, `ximc/ximc.h` \* to the directory `examples/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 compability check document <https://www.mathworks.com/content/dam/mathworks/matlab/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/matlab`. Then launch in MATLAB prompt:

```
testximc
```

In case of the 8SMC4-USB-Eth1 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).

## 4.7 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.



## 4.8 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.

## 4.9 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 "testcprofile" example directory.

# Chapter 5

## Working with custom units

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

- The structure of the conversion units [calibration\\_t](#)
- The functions of which have doubles for working with custom 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 custom units.

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

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

Structures and functions for working with custom 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 custom 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

Additional accessories information.

#### 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 (B).*
- 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

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 (B).

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 TSMMax

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](#)  
*"Voltage on the top of MOSFET full bridge" 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, from ADC.*
- unsigned int [H5\\_ADC](#)  
*Power supply USB 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](#)  
*"Voltage on the top of MOSFET full bridge" 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 Celcius).*

- 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](#)  
*Power supply USB (in tens of mV).*
- unsigned int **deprecated**
- int [R](#)  
*Motor winding resistance in mOhms(is only used with stepper motor).*
- int [L](#)  
*Motor winding pseudo inductance in uHn(is only used with stepper motor).*

### 6.2.1 Detailed Description

Analog data.

This structure contains raw analog data from ADC embedded on board. These data used for device testing and deep recalibraton by 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

Power supply USB (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 uHn(is only used with stepper motor).



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, 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 motor).

6.2.2.23 int SupVoltage

"Voltage on the top of MOSFET full bridge" calibrated data (in tens of mV).

6.2.2.24 unsigned int SupVoltage\_ADC

"Voltage on the top of MOSFET full bridge" raw data from ADC.

6.2.2.25 int Temp

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

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

### 6.3.1 Detailed Description

Brake settings.

This structure contains parameters of brake control.

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 turn on motor power and turn off brake.

#### 6.3.2.3 unsigned int t2

Time in ms between turn off brake 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 turn on brake.

#### 6.3.2.5 unsigned int t4

Time in ms between turn on brake and turn off motor power.

## 6.4 calibration\_settings\_t Struct Reference

Calibration settings.

### Data Fields

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

- float [FullCurrent\\_B](#)  
*Shift factor for the analogue measurements of the full current.*

### 6.4.1 Detailed Description

Calibration settings.

This structure contains calibration settings.

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 analogue measurements of the winding A current.

#### 6.4.2.2 float CSS1\_B

Shift factor for the analogue measurements of the winding A current.

#### 6.4.2.3 float CSS2\_A

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

#### 6.4.2.4 float CSS2\_B

Shift factor for the analogue measurements of the winding B current.

#### 6.4.2.5 float FullCurrent\_A

Scaling factor for the analogue measurements of the full current.

#### 6.4.2.6 float FullCurrent\_B

Shift factor for the analogue measurements of the full current.

## 6.5 calibration\_t Struct Reference

Calibration companion structure.

### Data Fields

- double [A](#)  
*Multiplier.*
- unsigned int [MicrostepMode](#)  
*Microstep mode.*

### 6.5.1 Detailed Description

Calibration companion structure.

## 6.6 chart\_data\_t Struct Reference

Additional device state.

### Data Fields

- int [WindingVoltageA](#)  
*In the case step motor, the voltage across the winding A (in tens of mV); in the case of a brushless, the voltage on the first coil, in the case of the only DC.*
- int [WindingVoltageB](#)  
*In the case step motor, the voltage across the winding B (in tens of mV); in case of a brushless, the voltage on the second winding, and in the case of DC is not used.*
- int [WindingVoltageC](#)  
*In the case of a brushless, the voltage on the third winding (in tens of mV), in the case step motor and DC is not used.*
- int [WindingCurrentA](#)  
*In the case step motor, the current in the coil A (in mA); brushless if the current in the first coil, and in the case of a single DC.*
- int [WindingCurrentB](#)  
*In the case step motor, the current in the coil B (in mA); brushless if the current in the second coil, and in the case of DC is not used.*
- int [WindingCurrentC](#)  
*In the case of a brushless, the current in the third winding (in mA), in the case step motor and DC is not used.*
- unsigned int [Pot](#)  
*Analog input value in ten-thousandths.*
- unsigned int [Joy](#)  
*The joystick position in the ten-thousandths.*
- int [DutyCycle](#)  
*Duty cycle of PWM.*

### 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

Duty cycle of PWM.

#### 6.6.2.2 unsigned int Joy

The joystick position in the ten-thousandths.

Range: 0..10000

#### 6.6.2.3 unsigned int Pot

Analog input value in ten-thousandths.

Range: 0..10000

#### 6.6.2.4 int WindingCurrentA

In the case step motor, the current in the coil A (in mA); brushless if the current in the first coil, and in the case of a single DC.

#### 6.6.2.5 int WindingCurrentB

In the case step motor, the current in the coil B (in mA); brushless if the current in the second coil, and in the case of DC is not used.

#### 6.6.2.6 int WindingCurrentC

In the case of a brushless, the current in the third winding (in mA), in the case step motor and DC is not used.

#### 6.6.2.7 int WindingVoltageA

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

#### 6.6.2.8 int WindingVoltageB

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

#### 6.6.2.9 int WindingVoltageC

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

## 6.7 command\_add\_sync\_in\_action\_calb\_t Struct Reference

This command adds one element of the FIFO commands which use user units.

### Data Fields

- float [Position](#)  
*Desired position or shift.*
- unsigned int [Time](#)  
*Time for which you want to achieve the desired position in microseconds.*

### 6.7.1 Detailed Description

This command adds one element of the FIFO commands which use user units.

See Also

[command\\_add\\_sync\\_in\\_action](#)

### 6.7.2 Field Documentation

#### 6.7.2.1 float Position

Desired position or shift.

#### 6.7.2.2 unsigned int Time

Time for which you want to achieve the desired position in microseconds.

## 6.8 `command_add_sync_in_action_t` Struct Reference

This command adds one element of the FIFO commands.

### Data Fields

- int [Position](#)  
*Desired position or shift (full steps)*
- int [uPosition](#)  
*The fractional part of a position or shift in microsteps.*
- unsigned int [Time](#)  
*Time for which you want to achieve the desired position in microseconds.*

### 6.8.1 Detailed Description

This command adds one element of the FIFO commands.

See Also

[command\\_add\\_sync\\_in\\_action](#)

### 6.8.2 Field Documentation

#### 6.8.2.1 unsigned int Time

Time for which you want to achieve the desired position in microseconds.

#### 6.8.2.2 int uPosition

The fractional part of a position or shift 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`).

## 6.9 command\_change\_motor\_t Struct Reference

Change motor - command for switching output relay.

### Data Fields

- unsigned int [Motor](#)  
*Motor number which it should be switch relay on [0..1].*

### 6.9.1 Detailed Description

Change motor - command for switching output relay.

See Also

[command\\_change\\_motor](#)

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

Control settings which use user units.

### Data Fields

- float [MaxSpeed](#) [10]  
*Array of speeds using with joystick and button control.*
- unsigned int [Timeout](#) [9]  
*timeout[i] is time in ms, after that max\_speed[i+1] is applying.*
- unsigned int [MaxClickTime](#)  
*Maximum click time (in ms).*
- unsigned int [Flags](#)  
*Control flags.*
- float [DeltaPosition](#)  
*Shift (delta) of position.*

### 6.10.1 Detailed Description

Control settings which use user units.

This structure contains control parameters. When choosing CTL.MODE=1 switches motor control with the joystick. In this mode, the joystick to the maximum engine tends Move at MaxSpeed [i], where i=0 if the previous use This mode is not selected another i. Buttons switch the room rate i. When CTL.MODE=2 is switched on motor control using the Left / right. When you click on the button motor starts to move in the appropriate direction at a speed MaxSpeed [0], at the end of time Timeout[i] motor move at a speed MaxSpeed [i+1]. at Transition from MaxSpeed [i] on MaxSpeed [i+1] to acceleration, as usual. The figure above shows the sensitivity of the joystick feature on its position.

See Also

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

## 6.10.2 Field Documentation

### 6.10.2.1 unsigned int Flags

[Control flags.](#)

### 6.10.2.2 unsigned int MaxClickTime

Maximum click time (in ms).

Prior to the expiration of this time the first speed isn't enabled.

### 6.10.2.3 float MaxSpeed[10]

Array of speeds using with joystick and button control.

### 6.10.2.4 unsigned int Timeout[9]

timeout[i] is time in ms, after that max\_speed[i+1] is applying.

It is using with buttons control only.

## 6.11 control\_settings\_t Struct Reference

Control settings.

### Data Fields

- unsigned int [MaxSpeed](#) [10]  
*Array of speeds (full step) using with joystick and button control.*
- unsigned int [uMaxSpeed](#) [10]  
*Array of speeds (in microsteps) using with joystick and button control.*
- unsigned int [Timeout](#) [9]  
*timeout[i] is time in ms, after that max\_speed[i+1] is applying.*
- unsigned int [MaxClickTime](#)  
*Maximum click time (in ms).*
- unsigned int [Flags](#)  
*Control flags.*
- int [DeltaPosition](#)  
*Shift (delta) of position (full step)*
- int [uDeltaPosition](#)  
*Fractional part of the shift in micro steps.*

### 6.11.1 Detailed Description

Control settings.

This structure contains control parameters. When choosing CTL\_MODE=1 switches motor control with the joystick. In this mode, the joystick to the maximum engine tends Move at MaxSpeed [i], where i=0 if the previous use This mode is not selected another i. Buttons switch the room rate i. When CTL\_MODE=2 is switched on motor control using the Left / right. When you click on the button motor starts to move in the appropriate direction at a speed MaxSpeed [0], at the end of time Timeout[i] motor move at a speed MaxSpeed [i+1]. at Transition from MaxSpeed



[i] on MaxSpeed [i+1] to acceleration, as usual. The figure above shows the sensitivity of the joystick feature on its position.

See Also

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

## 6.11.2 Field Documentation

### 6.11.2.1 unsigned int Flags

[Control flags](#).

### 6.11.2.2 unsigned int MaxClickTime

Maximum click time (in ms).

Prior to the expiration of this time the first speed isn't enabled.

### 6.11.2.3 unsigned int MaxSpeed[10]

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

Range: 0..100000.

### 6.11.2.4 unsigned int Timeout[9]

timeout[i] is time in ms, after that max\_speed[i+1] is applying.

It is using with buttons control only.

### 6.11.2.5 int uDeltaPosition

Fractional part of the shift in micro steps.

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).

### 6.11.2.6 unsigned int uMaxSpeed[10]

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

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

## 6.12 controller\_name\_t Struct Reference

Controller user name and flags of setting.

## Data Fields

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

### 6.12.1 Detailed Description

Controller user name and flags of setting.

See Also

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

### 6.12.2 Field Documentation

#### 6.12.2.1 char ControllerName[17]

User controller name.

Can be set by user for his/her convenience. Max string length: 16 chars.

#### 6.12.2.2 unsigned int CtrlFlags

[Flags of internal controller settings.](#)

## 6.13 ctp\_settings\_t Struct Reference

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

## Data Fields

- unsigned int [CTPMinError](#)  
*Minimum contrast steps from step motor encoder position, wich set STATE\_CTP\_ERROR flag.*
- unsigned int [CTPFlags](#)  
*Position control flags.*

### 6.13.1 Detailed Description

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

When controlling the step motor with 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 (flag CTP\_ENABLED), the controller stores the current position in the footsteps of SM and the current position of the encoder. Further, at each step of the position encoder is converted into steps and if the difference is greater CTPMinError, a flag STATE\_CTP\_ERROR and set ALARM state. When controlling the step motor with speed sensor (CTP\_BASE 1), the position is controlled by him. The active edge of input clock controller stores the current value of steps. Further, at each turn checks how many steps shifted. When a mismatch CTPMinError a flag STATE\_CTP\_ERROR and set ALARM state.

See Also

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

### 6.13.2 Field Documentation

#### 6.13.2.1 unsigned int CTPFlags

[Position control flags.](#)

#### 6.13.2.2 unsigned int CTPMinError

Minimum contrast steps from step motor encoder position, wich set STATE\_CTP\_ERROR flag.

Measured in steps step motor.

## 6.14 debug\_read\_t Struct Reference

Debug data.

### Data Fields

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

### 6.14.1 Detailed Description

Debug data.

These data are used for device debugging by manufacturer only.

See Also

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

### 6.14.2 Field Documentation

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

Arbitrary debug data.

## 6.15 debug\_write\_t Struct Reference

Debug data.

### Data Fields

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

### 6.15.1 Detailed Description

Debug data.

These data are used for device debugging by manufacturer only.

See Also

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

### 6.15.2 Field Documentation

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

Arbitrary debug data.

## 6.16 device\_information\_t Struct Reference

Read command controller information.

### 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](#)  
*Minor number of the hardware version.*
- unsigned int [Release](#)  
*Number of edits this release of hardware.*

### 6.16.1 Detailed Description

Read command controller information.

The controller responds to this command in any state. Manufacturer field for all XI\*\* devices should contain the string "XIMC" (validation is performed on it) The remaining fields contain information about the device.

See Also

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

### 6.16.2 Field Documentation

#### 6.16.2.1 unsigned int Major

The major number of the hardware version.

6.16.2.2 unsigned int Minor

Minor number of the hardware version.

6.16.2.3 unsigned int Release

Number of edits this release of hardware.

## 6.17 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)*

### 6.17.1 Detailed Description

Device network information structure.

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

Edges settings which use user units.

### 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.*

### 6.18.1 Detailed Description

Edges settings which use user units.

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

See Also

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

### 6.18.2 Field Documentation

#### 6.18.2.1 unsigned int BorderFlags

[Border flags.](#)

#### 6.18.2.2 unsigned int EnderFlags

[Limit switches flags.](#)

#### 6.18.2.3 float LeftBorder

Left border position, used if BORDER.IS.ENCODER flag is set.

Corrected by the table.

#### 6.18.2.4 float RightBorder

Right border position, used if BORDER.IS.ENCODER flag is set.

Corrected by the table.

## 6.19 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.*

### 6.19.1 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 lead to device malfunction, can lead to irreversible damage of board.

See Also

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

### 6.19.2 Field Documentation

#### 6.19.2.1 unsigned int BorderFlags

[Border flags.](#)

#### 6.19.2.2 unsigned int EnderFlags

[Limit switches flags.](#)

#### 6.19.2.3 int LeftBorder

Left border position, used if BORDER.IS.ENCODER flag is set.

#### 6.19.2.4 int RightBorder

Right border position, used if BORDER.IS.ENCODER flag is set.

#### 6.19.2.5 int uLeftBorder

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

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

#### 6.19.2.6 int uRightBorder

Right border position in microsteps.

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

## 6.20 emf\_settings\_t Struct Reference

EMF settings.

## Data Fields

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

### 6.20.1 Detailed Description

EMF settings.

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

See Also

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

### 6.20.2 Field Documentation

#### 6.20.2.1 unsigned int BackEMFFlags

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

#### 6.20.2.2 float Km

Electromechanical ratio of the motor.

#### 6.20.2.3 float L

The inductance of the windings of the motor.

#### 6.20.2.4 float R

The resistance of the windings of the motor.

## 6.21 encoder\_information\_t Struct Reference

Encoder information.



## Data Fields

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

### 6.21.1 Detailed Description

Encoder information.

See Also

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

### 6.21.2 Field Documentation

#### 6.21.2.1 char Manufacturer[17]

Manufacturer.

Max string length: 16 chars.

#### 6.21.2.2 char PartNumber[25]

Series and PartNumber.

Max string length: 24 chars.

## 6.22 encoder\_settings\_t Struct Reference

Encoder settings.

## Data Fields

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

### 6.22.1 Detailed Description

Encoder settings.

See Also

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

### 6.22.2 Field Documentation

#### 6.22.2.1 unsigned int EncoderSettings

[Encoder settings flags](#).

#### 6.22.2.2 float MaxCurrentConsumption

Max current consumption (mA).

Data type: float.

#### 6.22.2.3 float MaxOperatingFrequency

Max operation frequency (kHz).

Data type: float.

#### 6.22.2.4 float SupplyVoltageMax

Maximum supply voltage (V).

Data type: float.

#### 6.22.2.5 float SupplyVoltageMin

Minimum supply voltage (V).

Data type: float.

## 6.23 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.*

### 6.23.1 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](#)

### 6.23.2 Field Documentation

#### 6.23.2.1 unsigned int stepcloseloop\_Kp\_high

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

#### 6.23.2.2 unsigned int stepcloseloop\_Kp\_low

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

#### 6.23.2.3 unsigned int stepcloseloop\_Kw

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

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

Movement limitations and settings, related to the motor, which use user units.

### Data Fields

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

### 6.24.1 Detailed Description

Movement limitations and settings, related to the motor, which use user units.

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

See Also

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

### 6.24.2 Field Documentation

#### 6.24.2.1 float Antiplay

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

Used if ENGINE\_ANTIPLAY flag is set.

#### 6.24.2.2 unsigned int EngineFlags

[Flags of engine settings.](#)

#### 6.24.2.3 unsigned int MicrostepMode

[Flags of microstep mode.](#)

#### 6.24.2.4 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

#### 6.24.2.5 float NomSpeed

Nominal speed.

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

#### 6.24.2.6 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).

#### 6.24.2.7 unsigned int StepsPerRev

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

Range: 1..65535.

## 6.25 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).*

### 6.25.1 Detailed Description

Movement limitations and settings, related to the motor.

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

See Also

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

### 6.25.2 Field Documentation

#### 6.25.2.1 int Antiplay

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

Used if ENGINE\_ANTIPLAY flag is set.

#### 6.25.2.2 unsigned int EngineFlags

[Flags of engine settings.](#)

#### 6.25.2.3 unsigned int MicrostepMode

[Flags of microstep mode.](#)

6.25.2.4 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

6.25.2.5 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.

6.25.2.6 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).

6.25.2.7 unsigned int StepsPerRev

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

Range: 1..65535.

6.25.2.8 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).

## 6.26 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.*

### 6.26.1 Detailed Description

Engine type and driver type settings.

#### Parameters

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

See Also

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

### 6.26.2 Field Documentation

#### 6.26.2.1 unsigned int DriverType

[Flags of driver type.](#)

#### 6.26.2.2 unsigned int EngineType

[Flags of engine type.](#)

## 6.27 `extended_settings_t` Struct Reference

EST settings.

Data Fields

- unsigned int **Param1**

### 6.27.1 Detailed Description

EST settings.

This structure EST.

See Also

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

## 6.28 `extio_settings_t` Struct Reference

EXTIO settings.

Data Fields

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

### 6.28.1 Detailed Description

EXTIO settings.

This structure contains all EXTIO settings. By default input event are signalled through rising front and output states are signalled by high logic state.

See Also

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

## 6.28.2 Field Documentation

6.28.2.1 unsigned int EXTIOModeFlags

[External IO mode flags.](#)

6.28.2.2 unsigned int EXTIOSetupFlags

[External IO setup flags.](#)

## 6.29 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.*

## 6.29.1 Detailed Description

Feedback settings.

This structure contains feedback settings.

See Also

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

## 6.29.2 Field Documentation

6.29.2.1 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.

6.29.2.2 unsigned int FeedbackFlags

[Describes feedback flags.](#)



6.29.2.3 unsigned int FeedbackType

[Feedback type.](#)

6.29.2.4 unsigned int IPS

The number of encoder counts per shaft revolution.

Range: 1..655535. 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.

## 6.30 gear\_information\_t Struct Reference

Gear information.

### Data Fields

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

### 6.30.1 Detailed Description

Gear information.

See Also

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

### 6.30.2 Field Documentation

6.30.2.1 char Manufacturer[17]

Manufacturer.

Max string length: 16 chars.

6.30.2.2 char PartNumber[25]

Series and PartNumber.

Max string length: 24 chars.

## 6.31 gear\_settings\_t Struct Reference

Gear settings.

## Data Fields

- float [ReductionIn](#)  
*Input reduction coefficient.*
- float [ReductionOut](#)  
*Output reduction coefficient.*
- float [RatedInputTorque](#)  
*Max continuous torque (N m).*
- float [RatedInputSpeed](#)  
*Max speed on the input shaft (rpm).*
- float [MaxOutputBacklash](#)  
*Output backlash of the reduction gear(degree).*
- float [InputInertia](#)  
*Equivalent input gear inertia (g cm2).*
- float [Efficiency](#)  
*Reduction gear efficiency (%).*

### 6.31.1 Detailed Description

Gear settings.

See Also

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

### 6.31.2 Field Documentation

#### 6.31.2.1 float Efficiency

Reduction gear efficiency (%).

Data type: float.

#### 6.31.2.2 float InputInertia

Equivalent input gear inertia (g cm2).

Data type: float.

#### 6.31.2.3 float MaxOutputBacklash

Output backlash of the reduction gear(degree).

Data type: float.

#### 6.31.2.4 float RatedInputSpeed

Max speed on the input shaft (rpm).

Data type: float.

6.31.2.5 float RatedInputTorque

Max continuous torque (N m).

Data type: float.

6.31.2.6 float ReductionIn

Input reduction coefficient.

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

6.31.2.7 float ReductionOut

Output reduction coefficient.

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

## 6.32 `get_position_calb_t` Struct Reference

Position information.

### Data Fields

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

### 6.32.1 Detailed Description

Position information.

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

See Also

[get\\_position](#)

### 6.32.2 Field Documentation

6.32.2.1 long\_t EncPosition

Encoder position.

6.32.2.2 float Position

The position in the engine.

Corrected by the table.

## 6.33 `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.*

### 6.33.1 Detailed Description

Position information.

Useful structure that contains position value in steps and micro for stepper motor and encoder steps of all engines.

See Also

[get\\_position](#)

### 6.33.2 Field Documentation

#### 6.33.2.1 long\_t EncPosition

Encoder position.

#### 6.33.2.2 int uPosition

Microstep position is only used with stepper motors.

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

## 6.34 `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.*

### 6.34.1 Detailed Description

Globally unique identifier.

See Also

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

### 6.34.2 Field Documentation

#### 6.34.2.1 unsigned int UniqueID0

Unique ID 0.

#### 6.34.2.2 unsigned int UniqueID1

Unique ID 1.

#### 6.34.2.3 unsigned int UniqueID2

Unique ID 2.

#### 6.34.2.4 unsigned int UniqueID3

Unique ID 3.

## 6.35 hallsensor\_information\_t Struct Reference

Hall sensor information.

### Data Fields

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

### 6.35.1 Detailed Description

Hall sensor information.

See Also

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

### 6.35.2 Field Documentation

#### 6.35.2.1 char Manufacturer[17]

Manufacturer.

Max string length: 16 chars.

#### 6.35.2.2 char PartNumber[25]

Series and PartNumber.

Max string length: 24 chars.

## 6.36 hallsensor\_settings\_t Struct Reference

Hall sensor settings.

### Data Fields

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

### 6.36.1 Detailed Description

Hall sensor settings.

See Also

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

### 6.36.2 Field Documentation

#### 6.36.2.1 float MaxCurrentConsumption

Max current consumption (mA).

Data type: float.

#### 6.36.2.2 float MaxOperatingFrequency

Max operation frequency (kHz).

Data type: float.

6.36.2.3 float SupplyVoltageMax

Maximum supply voltage (V).

Data type: float.

6.36.2.4 float SupplyVoltageMin

Minimum supply voltage (V).

Data type: float.

## 6.37 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.*

### 6.37.1 Detailed Description

Position calibration settings which use user units.

This structure contains settings used in position calibrating. It specify behaviour of calibrating position.

See Also

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

### 6.37.2 Field Documentation

6.37.2.1 float FastHome

Speed used for first motion.

6.37.2.2 float HomeDelta

Distance from break point.

6.37.2.3 unsigned int HomeFlags

[Home settings flags.](#)

6.37.2.4 float SlowHome

Speed used for second motion.

## 6.38 home\_settings\_t Struct Reference

Position calibration settings.

### Data Fields

- unsigned int [FastHome](#)  
*Speed used for first motion (full steps).*
- unsigned int [uFastHome](#)  
*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](#)  
*Part of the delta distance, microsteps.*
- unsigned int [HomeFlags](#)  
*Home settings flags.*

### 6.38.1 Detailed Description

Position calibration settings.

This structure contains settings used in position calibrating. It specify behaviour of calibrating position.

See Also

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

### 6.38.2 Field Documentation

6.38.2.1 unsigned int FastHome

Speed used for first motion (full steps).

Range: 0..100000.

6.38.2.2 int HomeDelta

Distance from break point (full steps).

6.38.2.3 unsigned int HomeFlags

[Home settings flags.](#)



6.38.2.4 `unsigned int SlowHome`

Speed used for second motion (full steps).

Range: 0..100000.

6.38.2.5 `unsigned int uFastHome`

Part of the speed for first motion, microsteps.

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

6.38.2.6 `int uHomeDelta`

Part of the delta distance, microsteps.

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

6.38.2.7 `unsigned int uSlowHome`

Part of the speed for second motion, microsteps.

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

## 6.39 `init_random_t` Struct Reference

Random key.

### Data Fields

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

### 6.39.1 Detailed Description

Random key.

Structure that contains random key used in encryption of WKEY and SSER command contents.

See Also

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

### 6.39.2 Field Documentation

6.39.2.1 `uint8_t key`[16]

Random key.

## 6.40 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 higher end position.*
- unsigned int [ExpFactor](#)  
*Exponential nonlinearity factor.*
- unsigned int [DeadZone](#)  
*Joystick dead zone.*
- unsigned int [JoyFlags](#)  
*Joystick flags.*

### 6.40.1 Detailed Description

Joystick settings.

This structure contains joystick parameters. If joystick position is outside DeadZone limits from the central position a movement with speed, defined by the joystick DeadZone edge to 100% deviation, begins. Joystick positions inside DeadZone limits correspond to zero speed (soft stop of motion) and positions beyond Low and High limits correspond 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 next speed in list is zero (both integer and microstep parts), the button press is ignored. First speed in list shouldn't be zero. The relationship between the deviation and the rate is exponential, allowing no switching speed combine high mobility and accuracy.

See Also

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

### 6.40.2 Field Documentation

#### 6.40.2.1 unsigned int DeadZone

Joystick dead zone.

#### 6.40.2.2 unsigned int ExpFactor

Exponential nonlinearity factor.

#### 6.40.2.3 unsigned int JoyCenter

Joystick center position.

Range: 0..10000.

6.40.2.4 unsigned int JoyFlags

[Joystick flags.](#)

6.40.2.5 unsigned int JoyHighEnd

Joystick higher end position.

Range: 0..10000.

6.40.2.6 unsigned int JoyLowEnd

Joystick lower end position.

Range: 0..10000.

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

### 6.41.1 Detailed Description

The buffer holds no more than 25 points.

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

See Also

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

### 6.41.2 Field Documentation

6.41.2.1 int Error[25]

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

6.41.2.2 unsigned int Length

Length of actual data in buffer.

### 6.41.2.3 int Speed[25]

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

## 6.42 motor\_information\_t Struct Reference

motor information.

### Data Fields

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

### 6.42.1 Detailed Description

motor information.

See Also

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

### 6.42.2 Field Documentation

#### 6.42.2.1 char Manufacturer[17]

Manufacturer.

Max string length: 16 chars.

#### 6.42.2.2 char PartNumber[25]

Series and PartNumber.

Max string length: 24 chars.

## 6.43 motor\_settings\_t Struct Reference

Physical characteristics and limitations of the motor.

### 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 motor.*

  - 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 motor (A).*
- float [NominalSpeed](#)
- Not used.*
- float [NominalTorque](#)
- Nominal torque(mN m).*
- float [NominalPower](#)
- Nominal power(W).*
- float [WindingResistance](#)
- Resistance of windings for DC engine, each of two windings for stepper motor or each of there windings for BLDC engine(Ohm).*
- float [WindingInductance](#)
- Inductance of windings for DC engine, each of two windings for stepper motor or each of there windings for BLDC engine(mH).*
- float [RotorInertia](#)
- Rotor inertia(g cm<sup>2</sup>).*
- 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 un-powered coils (mN m).*
- float [TorqueConstant](#)
- Torque constant, which determines the aspect ratio of maximum moment of force from the rotor current flowing in the coil (mN m / A).*
- float [SpeedConstant](#)
- Velocity constant, which determines the value or amplitude of the induced voltage on the motion of DC or BLDC motor (rpm / V) or stepper motor (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 (rmp).*
- 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).*

### 6.43.1 Detailed Description

Physical characteristics and limitations of the motor.

See Also

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

## 6.43.2 Field Documentation

### 6.43.2.1 float DetentTorque

Holding torque position with un-powered coils (mN m).

Data type: float.

### 6.43.2.2 float MaxCurrent

The maximum current in the winding (A).

Data type: float.

### 6.43.2.3 float MaxCurrentTime

Safe duration of overcurrent in the winding (ms).

Data type: float.

### 6.43.2.4 float MaxSpeed

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

Data type: float.

### 6.43.2.5 float MechanicalTimeConstant

Mechanical time constant (ms).

Data type: float.

### 6.43.2.6 unsigned int MotorType

[Motor Type flags](#).

### 6.43.2.7 float NoLoadCurrent

The current consumption in idle mode (A).

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

### 6.43.2.8 float NoLoadSpeed

Idle speed (rpm).

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

### 6.43.2.9 float NominalCurrent

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

Data type: float.

6.43.2.10 float NominalPower

Nominal power(W).

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

6.43.2.11 float NominalSpeed

Not used.

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

6.43.2.12 float NominalTorque

Nominal torque(mN m).

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

6.43.2.13 float NominalVoltage

Nominal voltage on winding (B).

Data type: float

6.43.2.14 unsigned int Phases

Number of phases for BLDC motors.

6.43.2.15 unsigned int Poles

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

6.43.2.16 float RotorInertia

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

Data type: float.

6.43.2.17 float SpeedConstant

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

Data type: float.

6.43.2.18 float SpeedTorqueGradient

Speed torque gradient (rpm / mN m).

Data type: float.

6.43.2.19 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.

## 6.43.2.20 float TorqueConstant

Torque constant, which determines the aspect ratio of maximum moment of force from the rotor current flowing in the coil (mN m / A).

Used mainly for DC motors. Data type: float.

## 6.43.2.21 float WindingInductance

Inductance of windings for DC engine, each of two windings for stepper motor or each of these windings for BLDC engine(mH).

Data type: float.

## 6.43.2.22 float WindingResistance

Resistance of windings for DC engine, each of two windings for stepper motor or each of these windings for BLDC engine(Ohm).

Data type: float.

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

Move settings which use user units.

### 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.*

### 6.44.1 Detailed Description

Move settings which use user units.

See Also

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

### 6.44.2 Field Documentation

## 6.44.2.1 float Accel

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



6.44.2.2 float `AntiplaySpeed`

Speed in antiplay mode.

6.44.2.3 float `Decel`

Motor shaft deceleration,  $\text{steps/s}^2$ (stepper motor) or RPM/s(DC).

6.44.2.4 float `Speed`

Target speed.

## 6.45 `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](#)  
*Motor shaft acceleration,  $\text{steps/s}^2$ (stepper motor) or RPM/s(DC).*
- unsigned int [Decel](#)  
*Motor shaft deceleration,  $\text{steps/s}^2$ (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.*

### 6.45.1 Detailed Description

Move settings.

See Also

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

### 6.45.2 Field Documentation

6.45.2.1 unsigned int `Accel`

Motor shaft acceleration,  $\text{steps/s}^2$ (stepper motor) or RPM/s(DC).

Range: 1..65535.

6.45.2.2 unsigned int AntiplaySpeed

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

Range: 0..100000.

6.45.2.3 unsigned int Decel

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

Range: 1..65535.

6.45.2.4 unsigned int Speed

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

Range: 0..100000.

6.45.2.5 unsigned int uAntiplaySpeed

Speed in antiplay mode, microsteps/s.

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

6.45.2.6 unsigned int uSpeed

Target speed in microstep fractions/s.

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

## 6.46 nonvolatile\_memory\_t Struct Reference

Userdata for save into FRAM.

### Data Fields

- unsigned int [UserData](#) [7]

*User data.*

### 6.46.1 Detailed Description

Userdata for save into FRAM.

See Also

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

### 6.46.2 Field Documentation

6.46.2.1 unsigned int UserData[7]

User data.

Can be set by user for his/her convenience. 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 that all amd64 systems.

## 6.47 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.*

### 6.47.1 Detailed Description

PID settings.

This structure contains factors for PID routine. It specifies behaviour of PID routine for voltage. These factors are slightly different for different positioners. All boards are supplied with standard set of PID settings on 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](#)

## 6.48 power\_settings\_t Struct Reference

Step motor power settings.

### Data Fields

- unsigned int [HoldCurrent](#)  
*Current in holding regime, percent of nominal.*
- unsigned int [CurrReductDelay](#)  
*Time in ms from going to STOP state to reducing current.*
- unsigned int [PowerOffDelay](#)  
*Time in s from going to STOP state to turning power off.*
- unsigned int [CurrentSetTime](#)

*Time in ms to reach nominal current.*

- unsigned int [PowerFlags](#)

*Flags of power settings of stepper motor.*

### 6.48.1 Detailed Description

Step motor power settings.

See Also

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

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

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

### 6.48.2 Field Documentation

#### 6.48.2.1 unsigned int CurrentSetTime

Time in ms to reach nominal current.

#### 6.48.2.2 unsigned int CurrReductDelay

Time in ms from going to STOP state to reducing current.

#### 6.48.2.3 unsigned int HoldCurrent

Current in holding regime, percent of nominal.

Range: 0..100.

#### 6.48.2.4 unsigned int PowerFlags

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

#### 6.48.2.5 unsigned int PowerOffDelay

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

## 6.49 `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, 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, tens of mV.*

- unsigned int [CriticalT](#)  
*Maximum temperature, which triggers ALARM state, in tenths of degrees Celcius.*
- unsigned int [CriticalIusb](#)  
*Maximum USB current which triggers ALARM state, in mA.*
- unsigned int [CriticalUusb](#)  
*Maximum USB voltage which triggers ALARM state, tens of mV.*
- unsigned int [MinimumUusb](#)  
*Minimum USB voltage which triggers ALARM state, tens of mV.*
- unsigned int [Flags](#)  
*Flags of secure settings.*

### 6.49.1 Detailed Description

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

These data used for device testing and deep recalibraton by manufacturer only.

See Also

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

### 6.49.2 Field Documentation

#### 6.49.2.1 unsigned int `CriticalIpwr`

Maximum motor current which triggers ALARM state, in mA.

#### 6.49.2.2 unsigned int `CriticalIusb`

Maximum USB current which triggers ALARM state, in mA.

#### 6.49.2.3 unsigned int `CriticalT`

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

#### 6.49.2.4 unsigned int `CriticalUpwr`

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

#### 6.49.2.5 unsigned int `CriticalUusb`

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

#### 6.49.2.6 unsigned int `Flags`

[Flags of secure settings.](#)

#### 6.49.2.7 unsigned int `LowUpwrOff`

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

6.49.2.8 unsigned int MinimumUusb

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

## 6.50 serial\_number\_t Struct Reference

Serial number structure and hardware version.

### 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](#)  
*Minor number of the hardware version.*
- unsigned int [Release](#)  
*Number of edits this release of hardware.*

### 6.50.1 Detailed Description

Serial number structure and hardware version.

The structure keep new serial number, hardware version and valid key. The SN and hardware version are changed and saved when transmitted key matches stored key. Can be used by manufacturer only.

See Also

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

### 6.50.2 Field Documentation

#### 6.50.2.1 uint8\_t Key[32]

Protection key (256 bit).

#### 6.50.2.2 unsigned int Major

The major number of the hardware version.

#### 6.50.2.3 unsigned int Minor

Minor number of the hardware version.

#### 6.50.2.4 unsigned int Release

Number of edits this release of hardware.

6.50.2.5 unsigned int SN

New board serial number.

## 6.51 `set_position_calb_t` Struct Reference

Position information which use user units.

### Data Fields

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

### 6.51.1 Detailed Description

Position information which use user units.

Useful structure that contains position value in steps and micro for stepper motor and encoder steps of 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 float Position

The position in the engine.

## 6.52 `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.*

### 6.52.1 Detailed Description

Position information.

Useful structure that contains position value in steps and micro for stepper motor and encoder steps of all engines.

See Also

[set\\_position](#)

### 6.52.2 Field Documentation

#### 6.52.2.1 long\_t EncPosition

Encoder position.

#### 6.52.2.2 unsigned int PosFlags

[Position setting flags.](#)

#### 6.52.2.3 int uPosition

Microstep position is only used with stepper motors.

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

## 6.53 stage\_information\_t Struct Reference

Stage information.

### Data Fields

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

### 6.53.1 Detailed Description

Stage information.



See Also

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

### 6.53.2 Field Documentation

#### 6.53.2.1 `char Manufacturer[17]`

Manufacturer.

Max string length: 16 chars.

#### 6.53.2.2 `char PartNumber[25]`

Series and PartNumber.

Max string length: 24 chars.

## 6.54 `stage_name_t` Struct Reference

Stage user name.

Data Fields

- `char PositionerName [17]`  
*User positioner name.*

### 6.54.1 Detailed Description

Stage user name.

See Also

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

### 6.54.2 Field Documentation

#### 6.54.2.1 `char PositionerName[17]`

User positioner name.

Can be set by user for his/her convenience. Max string length: 16 chars.

## 6.55 `stage_settings_t` Struct Reference

Stage settings.

## 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](#)  
*Max speed (Units/c).*
- float [TravelRange](#)  
*Travel range (Units).*
- float [SupplyVoltageMin](#)  
*Supply voltage minimum (V).*
- float [SupplyVoltageMax](#)  
*Supply voltage maximum (V).*
- float [MaxCurrentConsumption](#)  
*Max current consumption (A).*
- float [HorizontalLoadCapacity](#)  
*Horizontal load capacity (kg).*
- float [VerticalLoadCapacity](#)  
*Vertical load capacity (kg).*

### 6.55.1 Detailed Description

Stage settings.

See Also

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

### 6.55.2 Field Documentation

#### 6.55.2.1 float HorizontalLoadCapacity

Horizontal load capacity (kg).

Data type: float.

#### 6.55.2.2 float LeadScrewPitch

Lead screw pitch (mm).

Data type: float.

#### 6.55.2.3 float MaxCurrentConsumption

Max current consumption (A).

Data type: float.

6.55.2.4 float MaxSpeed

Max speed (Units/c).

Data type: float.

6.55.2.5 float SupplyVoltageMax

Supply voltage maximum (V).

Data type: float.

6.55.2.6 float SupplyVoltageMin

Supply voltage minimum (V).

Data type: float.

6.55.2.7 float TravelRange

Travel range (Units).

Data type: float.

6.55.2.8 char Units[9]

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

Max string length: 8 chars.

6.55.2.9 float VerticalLoadCapacity

Vertical load capacity (kg).

Data type: float.

## 6.56 status\_calb\_t Struct Reference

Device state which use user units.

### 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 [lpwr](#)
  - Engine current, mA.*
- int [Upwr](#)
  - Power supply voltage, tens of mV.*
- int [lusb](#)
  - USB current, mA.*
- int [Uusb](#)
  - USB voltage, tens of mV.*
- int [CurT](#)
  - Temperature in tenths of degrees C.*
- unsigned int [Flags](#)
  - Status flags.*
- unsigned int [GPIOFlags](#)
  - Status flags of the GPIO outputs.*
- unsigned int [CmdBufFreeSpace](#)
  - This field shows the amount of free cells buffer synchronization chain.*

### 6.56.1 Detailed Description

Device state which use user units.

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 shows the amount of free cells buffer synchronization chain.

#### 6.56.2.2 float CurPosition

Current position.

Corrected by the table.

#### 6.56.2.3 float CurSpeed

Motor shaft speed.

#### 6.56.2.4 int CurT

Temperature in tenths of degrees C.

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 Upwr

Power supply voltage, tens of mV.

6.56.2.15 int Uusb

USB voltage, tens of mV.

6.56.2.16 unsigned int WindSts

[Winding state.](#)

## 6.57 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](#)  
*Part of motor shaft speed in microsteps.*
- int [lpwr](#)  
*Engine current, mA.*
- int [Upwr](#)  
*Power supply voltage, tens of mV.*
- int [lusb](#)  
*USB current, mA.*
- int [Uusb](#)  
*USB voltage, tens of mV.*
- int [CurT](#)  
*Temperature in tenths of degrees C.*
- unsigned int [Flags](#)  
*Status flags.*
- unsigned int [GPIOFlags](#)  
*Status flags of the GPIO outputs.*
- unsigned int [CmdBufFreeSpace](#)  
*This field shows the amount of free cells buffer synchronization chain.*

### 6.57.1 Detailed Description

Device state.

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

See Also

`get_status_impl`

## 6.57.2 Field Documentation

### 6.57.2.1 unsigned int CmdBufFreeSpace

This field shows the amount of free cells buffer synchronization chain.

### 6.57.2.2 int CurPosition

Current position.

### 6.57.2.3 int CurSpeed

Motor shaft speed in steps/s or rpm.

### 6.57.2.4 int CurT

Temperature in tenths of degrees C.

### 6.57.2.5 long\_t EncPosition

Current encoder position.

### 6.57.2.6 unsigned int EncSts

[Encoder state.](#)

### 6.57.2.7 unsigned int Flags

[Status flags.](#)

### 6.57.2.8 unsigned int GPIOFlags

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

### 6.57.2.9 int Ipwr

Engine current, mA.

### 6.57.2.10 int Iusb

USB current, mA.

### 6.57.2.11 unsigned int MoveSts

[Flags of move state.](#)

### 6.57.2.12 unsigned int MvCmdSts

[Move command state.](#)

6.57.2.13 unsigned int PWRSts

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

6.57.2.14 int uCurPosition

Step motor shaft position in microsteps.

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

6.57.2.15 int uCurSpeed

Part of motor shaft speed in microsteps.

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

6.57.2.16 int Upwr

Power supply voltage, tens of mV.

6.57.2.17 int Uusb

USB voltage, tens of mV.

6.57.2.18 unsigned int WindSts

[Winding state.](#)

## 6.58 sync\_in\_settings\_calb\_t Struct Reference

Synchronization settings which use user units.

### Data Fields

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

### 6.58.1 Detailed Description

Synchronization settings which use user units.

This structure contains all synchronization settings, modes, periods and flags. It specifies behaviour of input synchronization. All boards are supplied with 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](#)

## 6.58.2 Field Documentation

### 6.58.2.1 unsigned int ClutterTime

Input synchronization pulse dead time (mks).

### 6.58.2.2 float Position

Desired position or shift.

### 6.58.2.3 float Speed

Target speed.

### 6.58.2.4 unsigned int SyncInFlags

[Flags for synchronization input setup.](#)

## 6.59 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 (mks).*
- 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.*

### 6.59.1 Detailed Description

Synchronization settings.

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

See Also

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

## 6.59.2 Field Documentation

### 6.59.2.1 unsigned int ClutterTime

Input synchronization pulse dead time (mks).

### 6.59.2.2 unsigned int Speed

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

Range: 0..100000.

### 6.59.2.3 unsigned int SyncInFlags

[Flags for synchronization input setup.](#)

### 6.59.2.4 int uPosition

The fractional part of a position or shift in microsteps.

Is 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`).

### 6.59.2.5 unsigned int uSpeed

Target speed in microsteps/s.

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

## 6.60 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 duration of output pulse.*
- unsigned int [SyncOutPeriod](#)  
*This value specifies number of encoder pulses or steps between two output synchronization pulses when `SYNCOU-T_ONPERIOD` is set.*
- float [Accuracy](#)  
*This is the neighborhood around the target coordinates (in encoder pulses or motor steps), which is getting hit in the target position and the momentum generated by the stop.*

### 6.60.1 Detailed Description

Synchronization settings which use user units.

This structure contains all synchronization settings, modes, periods and flags. It specifies behaviour of output synchronization. All boards are supplied with 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](#)

### 6.60.2 Field Documentation

#### 6.60.2.1 float Accuracy

This is the neighborhood around the target coordinates (in encoder pulses or motor steps), which is getting hit in the target position and the momentum generated by the stop.

#### 6.60.2.2 unsigned int SyncOutFlags

[Flags of synchronization output.](#)

#### 6.60.2.3 unsigned int SyncOutPeriod

This value specifies 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 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.

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

Synchronization settings.

### Data Fields

- unsigned int [SyncOutFlags](#)  
*Flags of synchronization output.*
- unsigned int [SyncOutPulseSteps](#)  
*This value specifies duration of output pulse.*
- unsigned int [SyncOutPeriod](#)  
*This value specifies 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, which is getting hit in the target position and the momentum generated by the stop.*
- unsigned int [uAccuracy](#)  
*This is the neighborhood around the target coordinates in microsteps (only used with stepper motor).*

### 6.61.1 Detailed Description

Synchronization settings.

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

See Also

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

### 6.61.2 Field Documentation

#### 6.61.2.1 unsigned int Accuracy

This is the neighborhood around the target coordinates, which is getting hit in the target position and the momentum generated by the stop.

#### 6.61.2.2 unsigned int SyncOutFlags

[Flags of synchronization output.](#)

#### 6.61.2.3 unsigned int SyncOutPeriod

This value specifies number of encoder pulses or steps between two output synchronization pulses when `SYNCO-UT_ONPERIOD` is set.

#### 6.61.2.4 unsigned int SyncOutPulseSteps

This value specifies duration of output pulse.

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

#### 6.61.2.5 unsigned int uAccuracy

This is the neighborhood around the target coordinates in microsteps (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`).

## 6.62 `uart_settings_t` Struct Reference

UART settings.

### Data Fields

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

### 6.62.1 Detailed Description

UART settings.

This structure contains UART settings.

See Also

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

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

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

### 6.62.2 Field Documentation

#### 6.62.2.1 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 companion 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](#)  
*Move settings which use user units.*
- 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, which use user units.*
- 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](#)  
*Edges settings which use user units.*
- struct [pid\\_settings\\_t](#)  
*PID settings.*

- struct [sync\\_in\\_settings\\_t](#)  
*Synchronization settings.*
- struct [sync\\_in\\_settings\\_calb\\_t](#)  
*Synchronization settings which use user units.*
- 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](#)  
*Control settings which use user units.*
- struct [joystick\\_settings\\_t](#)  
*Joystick settings.*
- struct [ctp\\_settings\\_t](#)  
*Control position settings(is only used with stepper motor).*
- struct [uart\\_settings\\_t](#)  
*UART settings.*
- struct [calibration\\_settings\\_t](#)  
*Calibration settings.*
- struct [controller\\_name\\_t](#)  
*Controller user name and flags of setting.*
- struct [nonvolatile\\_memory\\_t](#)  
*Userdata for save into FRAM.*
- struct [emf\\_settings\\_t](#)  
*EMF settings.*
- struct [engine\\_advanced\\_setup\\_t](#)  
*EAS settings.*
- struct [extended\\_settings\\_t](#)  
*EST settings.*
- struct [command\\_add\\_sync\\_in\\_action\\_t](#)  
*This command adds one element of the FIFO commands.*
- struct [command\\_add\\_sync\\_in\\_action\\_calb\\_t](#)  
*This command adds one element of the FIFO commands which use user units.*
- struct [get\\_position\\_t](#)  
*Position information.*
- struct [get\\_position\\_calb\\_t](#)  
*Position information.*
- struct [set\\_position\\_t](#)  
*Position information.*
- struct [set\\_position\\_calb\\_t](#)  
*Position information which use user units.*
- struct [status\\_t](#)  
*Device state.*
- struct [status\\_calb\\_t](#)  
*Device state which use user units.*
- struct [measurements\\_t](#)

- The buffer holds no more than 25 points.*

  - struct [chart\\_data\\_t](#)  
*Additional device state.*
  - struct [device\\_information\\_t](#)  
*Read command controller information.*
  - struct [serial\\_number\\_t](#)  
*Serial number structure and hardware version.*
  - struct [analog\\_data\\_t](#)  
*Analog data.*
  - struct [debug\\_read\\_t](#)  
*Debug data.*
  - struct [debug\\_write\\_t](#)  
*Debug data.*
  - struct [stage\\_name\\_t](#)  
*Stage user name.*
  - struct [stage\\_information\\_t](#)  
*Stage information.*
  - struct [stage\\_settings\\_t](#)  
*Stage settings.*
  - struct [motor\\_information\\_t](#)  
*motor information.*
  - struct [motor\\_settings\\_t](#)  
*Physical characteristics and limitations of the motor.*
  - struct [encoder\\_information\\_t](#)  
*Encoder information.*
  - struct [encoder\\_settings\\_t](#)  
*Encoder settings.*
  - struct [hallsensor\\_information\\_t](#)  
*Hall sensor information.*
  - struct [hallsensor\\_settings\\_t](#)  
*Hall sensor settings.*
  - struct [gear\\_information\\_t](#)  
*Gear information.*
  - struct [gear\\_settings\\_t](#)  
*Gear settings.*
  - struct [accessories\\_settings\\_t](#)  
*Additional accessories information.*
  - struct [init\\_random\\_t](#)  
*Random key.*
  - struct [globally\\_unique\\_identifier\\_t](#)  
*Globally unique identifier.*
  - struct [command\\_change\\_motor\\_t](#)  
*Change motor - command for switching output relay.*



## Macros

- #define [XIMC\\_API](#)  
*Library import macro Macros allows to automatically import function from shared library.*
- #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

- #define [ENUMERATE\\_PROBE](#) 0x01  
*Check if a device with OS name name is XIMC device.*
- #define [ENUMERATE\\_ALL\\_COM](#) 0x02  
*Check all COM devices.*
- #define [ENUMERATE\\_NETWORK](#) 0x04  
*Check network devices.*

### Flags of move state

Specify move states.

See Also

[get\\_status](#)

[status.t::move\\_state](#)

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

- #define [MOVE\\_STATE\\_MOVING](#) 0x01  
*This flag indicates that 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

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

Specify power states.

See Also

[status.t::power\\_state](#)  
[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\\_REDUCE](#) 0x04  
*Motor windings are powered by reduced current to lower power consumption.*
- #define [PWR\\_STATE\\_MAX](#) 0x05  
*Motor windings are powered by maximum current driver can provide at this voltage.*

### Status flags

Controller flags returned by device query. Contains boolean part of controller state. May be combined with bitwise OR.

See Also

[status.t::flags](#)  
[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  
*Flags of security.*
- #define [STATE\\_ALARM](#) 0x0000040  
*Controller is in alarm state indicating that something dangerous had 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_CURRENT_MOTOR_BITS` 0x00C0000  
*Bits indicating the current operating motor on boards with multiple outputs for engine mounting.*
- #define `STATE_CURRENT_MOTOR0` 0x0000000  
*Motor 0.*
- #define `STATE_CURRENT_MOTOR1` 0x0040000  
*Motor 1.*
- #define `STATE_CURRENT_MOTOR2` 0x0080000  
*Motor 2.*
- #define `STATE_CURRENT_MOTOR3` 0x00C0000  
*Motor 3.*
- #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 input signal.*

### Status flags of the GPIO outputs

GPIO state flags returned by device query. Contains boolean part of controller state. May be combined with bitwise OR.

See Also

`status_t::gpioflags`  
[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 flag set; otherwise 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**

*Encoder state returned by device query.*

See Also

[status\\_t::encsts](#)  
[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**

*Motor winding state returned by device query.*

See Also

[status\\_t::windsts](#)  
[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

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

[status\\_t::mvcmdsts](#)  
[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 have finished with an error, 0 - move command have finished correctly).*
- #define [MVCMD\\_RUNNING](#) 0x80  
*Move command state (0 - move command have finished, 1 - move command is being executed).*

### Flags of engine settings

Specify motor shaft movement algorithm and list of limitations. 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::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

Specify settings of microstep mode. Using 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

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

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

Specify power settings. Flags returned by query of power settings.

See Also

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

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

### Flags of secure settings

Specify secure settings. Flags returned by query of secure settings.

See Also

[secure\\_settings\\_t::flags](#)  
[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 Alarm state on driver overheat signal.*
- #define [LOW\\_UPWR\\_PROTECTION](#) 0x02  
*If this flag is set turn off motor when 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 USB brake reconnect module will be enable.*
- #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 Alarm state on response of the engine control action.*

### Position setting flags

Flags used in setting of 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.

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.

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

See Also

[sync\\_settings.t::syncin\\_flags](#)  
[get\\_sync\\_settings](#)  
[set\\_sync\\_settings](#)  
[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 go to position specified in Position and uPosition, if this flag is set.*

### Flags of synchronization output



See Also

[sync\\_settings.t::syncout\\_flags](#)

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

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

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

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

### External IO setup flags

See Also

[extio\\_settings.t::setup\\_flags](#)

[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 flag is set, works as input otherwise.*
- #define [EXTIO\\_SETUP\\_INVERT](#) 0x02  
*Interpret EXTIO states and fronts inverted if flag is set.*

### External IO mode flags

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 behaviour 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 behaviour 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 Alarm state.*
- #define `EXTIO_SETUP_MODE_OUT_MOTOR_ON` 0x40  
*EXTIO pin stays active when windings are powered.*
- #define `EXTIO_SETUP_MODE_OUT_MOTOR_FOUND` 0x50  
*EXTIO pin stays active when motor is connected (first winding).*

### Border flags

Specify types of borders and motor behaviour 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 position on limit switches, if not set.*
- #define `BORDER_STOP_LEFT` 0x02  
*Motor should stop on 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

Specify electrical behaviour 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

Specify behaviour 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 off power of step motor, if this flag is set.*

### Control flags

*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 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 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

*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

*Specify settings of position control. 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  
*Position control is enabled, if flag set.*
- #define **CTP\_BASE** 0x02  
*Position control is based on revolution sensor, if this flag is set; otherwise it is based on encoder.*
- #define **CTP\_ALARM\_ON\_ERROR** 0x04  
*Set ALARM on mismatch, if flag set.*
- #define **REV\_SENS\_INV** 0x08  
*Sensor is active when it 0 and invert makes active level 1.*
- #define **CTP\_ERROR\_CORRECTION** 0x10  
*Correct errors which appear when slippage if the flag is set.*

### Home settings flags

*Specify behaviour for home command. May be combined with bitwise OR.*

See Also

[get\\_home\\_setting s](#)  
[set\\_home\\_settings](#)  
[command\\_home](#)  
[home\\_settings.t::HomeFlags](#), [get\\_home\\_settings](#), [set\\_home\\_settings](#)

- #define [HOME\\_DIR\\_FIRST](#) 0x001  
*Flag defines direction of 1st motion after execution of home command.*
- #define [HOME\\_DIR\\_SECOND](#) 0x002  
*Flag defines direction of 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 in start of second movement the first half-turn.*
- #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

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

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

See Also

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

- #define [ENCSET\\_DIFFERENTIAL\\_OUTPUT](#) 0x001  
*If flag is set the encoder has differential output, else single ended output.*
- #define [ENCSET\\_PUSH\\_PULL\\_OUTPUT](#) 0x004  
*If flag is set the encoder has push-pull output, else open drain output.*
- #define [ENCSET\\_INDEXCHANNEL\\_PRESENT](#) 0x010  
*If flag is set the encoder has index channel, else encoder hasn't it.*
- #define [ENCSET\\_REVOLUTIONSENSOR\\_PRESENT](#) 0x040  
*If flag is set the encoder has revolution sensor, else encoder hasn't it.*
- #define [ENCSET\\_REVOLUTIONSENSOR\\_ACTIVE\\_HIGH](#) 0x100  
*If flag is set the revolution sensor active state is high logic state, else active state is low logic state.*

### Magnetic brake settings flags

See Also

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

- #define [MB\\_AVAILABLE](#) 0x01  
*If 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

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

- *If flag is set the limit switch connected to pin SW2 is available.*
- `#define LS_SW1_ACTIVE_LOW 0x04`
- *If flag is set the limit switch connected to pin SW1 is triggered by a low level on pin.*
- `#define LS_SW2_ACTIVE_LOW 0x08`
- *If flag is set the limit switch connected to pin SW2 is triggered by a low level on pin.*
- `#define LS_SHORTED 0x10`
- *If flag is set the Limit switches is shorted.*

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

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 companion structure.*
- `typedef struct device_network_information_t device_network_information_t`  
*Device network information structure.*

### Functions

#### Controller settings setup

Functions for adjusting engine read/write 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 home settings which use user units.*
- `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 home settings which use user units.*
- [result\\_t XIMC\\_API set\\_move\\_settings](#) ([device\\_t](#) id, const [move\\_settings\\_t](#) \*move\_settings)  
*Set command setup movement (speed, acceleration, threshold and etc).*
- [result\\_t XIMC\\_API set\\_move\\_settings\\_calb](#) ([device\\_t](#) id, const [move\\_settings\\_calb\\_t](#) \*move\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Set command setup movement which use user units (speed, acceleration, threshold and etc).*
- [result\\_t XIMC\\_API get\\_move\\_settings](#) ([device\\_t](#) id, [move\\_settings\\_t](#) \*move\_settings)  
*Read command setup movement (speed, acceleration, threshold and etc).*
- [result\\_t XIMC\\_API get\\_move\\_settings\\_calb](#) ([device\\_t](#) id, [move\\_settings\\_calb\\_t](#) \*move\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Read command setup movement which use user units (speed, acceleration, threshold and 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 engine settings which use user units.*
- [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 engine settings which use user units.*
- [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 which use 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 which use 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 synchronization settings which use user units.*
- [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 synchronization settings which use user units.*

- [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 synchronization settings which use user units.*
- [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 synchronization settings which use user units.*
- [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 settings of brake control.*
- [result\\_t XIMC\\_API get\\_brake\\_settings](#) ([device\\_t](#) id, [brake\\_settings\\_t](#) \*brake\_settings)  
*Read settings of brake control.*
- [result\\_t XIMC\\_API set\\_control\\_settings](#) ([device\\_t](#) id, const [control\\_settings\\_t](#) \*control\_settings)  
*Set settings of motor control.*
- [result\\_t XIMC\\_API set\\_control\\_settings\\_calb](#) ([device\\_t](#) id, const [control\\_settings\\_calb\\_t](#) \*control\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Set settings of motor control which use user units.*
- [result\\_t XIMC\\_API get\\_control\\_settings](#) ([device\\_t](#) id, [control\\_settings\\_t](#) \*control\_settings)  
*Read settings of motor control.*
- [result\\_t XIMC\\_API get\\_control\\_settings\\_calb](#) ([device\\_t](#) id, [control\\_settings\\_calb\\_t](#) \*control\_settings\_calb, const [calibration\\_t](#) \*calibration)  
*Read settings of motor control which use user units.*
- [result\\_t XIMC\\_API set\\_joystick\\_settings](#) ([device\\_t](#) id, const [joystick\\_settings\\_t](#) \*joystick\_settings)  
*Set settings of joystick.*
- [result\\_t XIMC\\_API get\\_joystick\\_settings](#) ([device\\_t](#) id, [joystick\\_settings\\_t](#) \*joystick\_settings)  
*Read settings of joystick.*
- [result\\_t XIMC\\_API set\\_ctp\\_settings](#) ([device\\_t](#) id, const [ctp\\_settings\\_t](#) \*ctp\_settings)  
*Set settings of control position(is only used with stepper motor).*
- [result\\_t XIMC\\_API get\\_ctp\\_settings](#) ([device\\_t](#) id, [ctp\\_settings\\_t](#) \*ctp\_settings)  
*Read settings of control position(is only used with stepper motor).*
- [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\\_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 controller name and flags of setting from FRAM.*
- [result\\_t XIMC\\_API get\\_controller\\_name](#) ([device\\_t](#) id, [controller\\_name\\_t](#) \*controller\_name)  
*Read user controller name and flags of setting from FRAM.*
- [result\\_t XIMC\\_API set\\_nonvolatile\\_memory](#) ([device\\_t](#) id, const [nonvolatile\\_memory\\_t](#) \*nonvolatile\_memory)  
*Write userdata into FRAM.*
- [result\\_t XIMC\\_API get\\_nonvolatile\\_memory](#) ([device\\_t](#) id, [nonvolatile\\_memory\\_t](#) \*nonvolatile\_memory)  
*Read userdata 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 stop the engine, the transition to the STOP, mode key BREAK (winding short-circuited), the regime "retention" is deactivated for DC motors, keeping current in the windings for stepper motors (with Power management settings).*
  - [result\\_t XIMC\\_API command\\_add\\_sync\\_in\\_action](#) ([device\\_t](#) id, const [command\\_add\\_sync\\_in\\_action\\_t](#) \*the\_command\_add\_sync\_in\_action)
    - This command adds one element of the FIFO commands that are executed when input clock pulse.*
  - [result\\_t XIMC\\_API command\\_add\\_sync\\_in\\_action\\_calb](#) ([device\\_t](#) id, const [command\\_add\\_sync\\_in\\_action\\_calb\\_t](#) \*the\_command\_add\_sync\_in\_action\_calb, const [calibration\\_t](#) \*calibration)
    - This command adds one element of the FIFO commands that are executed when input clock pulse which use user units.*
  - [result\\_t XIMC\\_API command\\_power\\_off](#) ([device\\_t](#) id)
    - Immediately power off motor regardless its state.*
  - [result\\_t XIMC\\_API command\\_move](#) ([device\\_t](#) id, int Position, int uPosition)
    - Upon receiving the command "move" the engine starts to move with pre-set parameters (speed, acceleration, retention), to the point specified to the Position, uPosition.*
  - [result\\_t XIMC\\_API command\\_move\\_calb](#) ([device\\_t](#) id, float Position, const [calibration\\_t](#) \*calibration)
    - Move to position which use user units.*
  - [result\\_t XIMC\\_API command\\_movr](#) ([device\\_t](#) id, int DeltaPosition, int uDeltaPosition)
    - Move to offset.*
  - [result\\_t XIMC\\_API command\\_movr\\_calb](#) ([device\\_t](#) id, float DeltaPosition, const [calibration\\_t](#) \*calibration)
    - Move to offset using user units.*
  - [result\\_t XIMC\\_API command\\_home](#) ([device\\_t](#) id)
    - The positive direction is to the right.*
  - [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 point to a distance GENG :: Antiplay, then move to the same point.*
  - [result\\_t XIMC\\_API command\\_sstp](#) ([device\\_t](#) id)
    - Soft stop engine.*
  - [result\\_t XIMC\\_API get\\_position](#) ([device\\_t](#) id, [get\\_position\\_t](#) \*the\_get\_position)
    - Reads the value position in steps and micro for stepper motor and encoder steps 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 all engines.*
  - [result\\_t XIMC\\_API set\\_position](#) ([device\\_t](#) id, const [set\\_position\\_t](#) \*the\_set\_position)
    - Sets any position value in steps and micro for stepper motor and encoder steps of all engines.*
  - [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 which use user units.*
  - [result\\_t XIMC\\_API command\\_zero](#) ([device\\_t](#) id)
    - Sets the current position and the position in which the traffic moves by the move command and movr zero for all cases, except for movement to the target position.*

### Group of commands to save and load settings

- [result\\_t XIMC\\_API command\\_save\\_settings \(device\\_t id\)](#)  
*Save all settings from controller's RAM to controller's flash memory, replacing previous data in controller's flash memory.*
- [result\\_t XIMC\\_API command\\_read\\_settings \(device\\_t id\)](#)  
*Read all settings from controller's flash memory to controller's RAM, replacing previous data in controller's RAM.*
- [result\\_t XIMC\\_API command\\_save\\_robust\\_settings \(device\\_t id\)](#)  
*Save important settings (calibration coefficients and etc.) from controller's RAM to controller's flash memory, replacing previous data in controller's flash memory.*
- [result\\_t XIMC\\_API command\\_read\\_robust\\_settings \(device\\_t id\)](#)  
*Read important settings (calibration coefficients and etc.) from controller's flash memory to controller's RAM, replacing previous data in controller's RAM.*
- [result\\_t XIMC\\_API command\\_eesave\\_settings \(device\\_t id\)](#)  
*Save settings from controller's RAM to stage's EEPROM memory, which spontaneity connected to stage and it isn't change without it mechanical reconstruction.*
- [result\\_t XIMC\\_API command\\_eeread\\_settings \(device\\_t id\)](#)  
*Read settings from controller's RAM to stage's EEPROM memory, which spontaneity connected to stage and it isn't change without it mechanical reconstruction.*
- [result\\_t XIMC\\_API command\\_start\\_measurements \(device\\_t id\)](#)  
*Start measurements and buffering of speed, following error.*
- [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 sequence error.*
- [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 controller's firmware version.*
- [result\\_t XIMC\\_API service\\_command\\_updf \(device\\_t id\)](#)  
*Command puts the controller to update the firmware.*

### 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 controller's flash memory.*
- [result\\_t XIMC\\_API get\\_analog\\_data \(device\\_t id, analog\\_data\\_t \\*analog\\_data\)](#)  
*Read analog data structure that contains raw analog data from ADC embedded on board.*
- [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.*

### Group of commands to work with EEPROM

- [result\\_t XIMC\\_API set\\_stage\\_name \(device\\_t id, const stage\\_name\\_t \\*stage\\_name\)](#)  
*Write user stage name from EEPROM.*
- [result\\_t XIMC\\_API get\\_stage\\_name \(device\\_t id, stage\\_name\\_t \\*stage\\_name\)](#)  
*Read user stage name from EEPROM.*
- [result\\_t XIMC\\_API set\\_stage\\_information \(device\\_t id, const stage\\_information\\_t \\*stage\\_information\)](#)  
*Set stage information to EEPROM.*
- [result\\_t XIMC\\_API get\\_stage\\_information \(device\\_t id, stage\\_information\\_t \\*stage\\_information\)](#)  
*Read stage information from EEPROM.*
- [result\\_t XIMC\\_API set\\_stage\\_settings \(device\\_t id, const stage\\_settings\\_t \\*stage\\_settings\)](#)  
*Set stage settings to EEPROM.*
- [result\\_t XIMC\\_API get\\_stage\\_settings \(device\\_t id, stage\\_settings\\_t \\*stage\\_settings\)](#)  
*Read stage settings from EEPROM.*
- [result\\_t XIMC\\_API set\\_motor\\_information \(device\\_t id, const motor\\_information\\_t \\*motor\\_information\)](#)  
*Set motor information to EEPROM.*
- [result\\_t XIMC\\_API get\\_motor\\_information \(device\\_t id, motor\\_information\\_t \\*motor\\_information\)](#)

- Read motor information from EEPROM.*

  - [result\\_t XIMC\\_API set\\_motor\\_settings](#) ([device\\_t id](#), const [motor\\_settings\\_t \\*motor\\_settings](#))

*Set motor settings to EEPROM.*

  - [result\\_t XIMC\\_API get\\_motor\\_settings](#) ([device\\_t id](#), [motor\\_settings\\_t \\*motor\\_settings](#))

*Read motor settings from EEPROM.*

  - [result\\_t XIMC\\_API set\\_encoder\\_information](#) ([device\\_t id](#), const [encoder\\_information\\_t \\*encoder\\_information](#))

*Set encoder information to EEPROM.*

  - [result\\_t XIMC\\_API get\\_encoder\\_information](#) ([device\\_t id](#), [encoder\\_information\\_t \\*encoder\\_information](#))

*Read encoder information from EEPROM.*

  - [result\\_t XIMC\\_API set\\_encoder\\_settings](#) ([device\\_t id](#), const [encoder\\_settings\\_t \\*encoder\\_settings](#))

*Set encoder settings to EEPROM.*

  - [result\\_t XIMC\\_API get\\_encoder\\_settings](#) ([device\\_t id](#), [encoder\\_settings\\_t \\*encoder\\_settings](#))

*Read encoder settings from EEPROM.*

  - [result\\_t XIMC\\_API set\\_hallsensor\\_information](#) ([device\\_t id](#), const [hallsensor\\_information\\_t \\*hallsensor\\_information](#))

*Set hall sensor information to EEPROM.*

  - [result\\_t XIMC\\_API get\\_hallsensor\\_information](#) ([device\\_t id](#), [hallsensor\\_information\\_t \\*hallsensor\\_information](#))

*Read hall sensor information from EEPROM.*

  - [result\\_t XIMC\\_API set\\_hallsensor\\_settings](#) ([device\\_t id](#), const [hallsensor\\_settings\\_t \\*hallsensor\\_settings](#))

*Set hall sensor settings to EEPROM.*

  - [result\\_t XIMC\\_API get\\_hallsensor\\_settings](#) ([device\\_t id](#), [hallsensor\\_settings\\_t \\*hallsensor\\_settings](#))

*Read hall sensor settings from EEPROM.*

  - [result\\_t XIMC\\_API set\\_gear\\_information](#) ([device\\_t id](#), const [gear\\_information\\_t \\*gear\\_information](#))

*Set gear information to EEPROM.*

  - [result\\_t XIMC\\_API get\\_gear\\_information](#) ([device\\_t id](#), [gear\\_information\\_t \\*gear\\_information](#))

*Read gear information from EEPROM.*

  - [result\\_t XIMC\\_API set\\_gear\\_settings](#) ([device\\_t id](#), const [gear\\_settings\\_t \\*gear\\_settings](#))

*Set gear settings to EEPROM.*

  - [result\\_t XIMC\\_API get\\_gear\\_settings](#) ([device\\_t id](#), [gear\\_settings\\_t \\*gear\\_settings](#))

*Read gear settings from EEPROM.*

  - [result\\_t XIMC\\_API set\\_accessories\\_settings](#) ([device\\_t id](#), const [accessories\\_settings\\_t \\*accessories\\_settings](#))

*Set additional accessories information to EEPROM.*

  - [result\\_t XIMC\\_API get\\_accessories\\_settings](#) ([device\\_t id](#), [accessories\\_settings\\_t \\*accessories\\_settings](#))

*Read additional accessories information from EEPROM.*

  - [result\\_t XIMC\\_API get\\_bootloader\\_version](#) ([device\\_t id](#), unsigned int \*Major, unsigned int \*Minor, unsigned int \*Release)

*Read controller's firmware version.*

  - [result\\_t XIMC\\_API get\\_init\\_random](#) ([device\\_t id](#), [init\\_random\\_t \\*init\\_random](#))

*Read random number from 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 die but is not a random value.*

  - [result\\_t XIMC\\_API command\\_change\\_motor](#) ([device\\_t id](#), const [command\\_change\\_motor\\_t \\*the\\_command\\_change\\_motor](#))

*Change motor - command for switching output relay.*

  - [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 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.*
- [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](#) ()  
*Reset library locks in a case of deadlock.*
- [result\\_t](#) [XIMC\\_API ximc\\_fix\\_usbser\\_sys](#) (const char \*device\_uri)  
*Fix for errors in Windows USB driver stack.*
- 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 Alarm state on 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 position on limit switches, if not set.

#### 7.1.2.6 `#define BORDER_STOP_LEFT 0x02`

Motor should stop on 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 off power of step motor, if this flag is set.

7.1.2.11 `#define CONTROL_BTN_LEFT_PUSHED_OPEN 0x04`

Pushed left button corresponds to 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 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 flag set.

7.1.2.18 `#define CTP_BASE 0x02`

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

7.1.2.19 `#define CTP_ENABLED 0x01`

Position control is enabled, if flag set.

7.1.2.20 `#define CTP_ERROR_CORRECTION 0x10`

Correct errors which appear when slippage if the flag is set.

It works only with the encoder. Incompatible with 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 set, engine makes backlash (play) compensation procedure and reach the predetermined position accurately on low speed.

7.1.2.35 `#define ENGINE_CURRENT_AS_RMS 0x02`

Engine current meaning flag.

If the flag is unset, then engine current value is interpreted as maximum amplitude value. If the flag is set, then engine current value is interpreted as 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, engine uses maximum speed achievable with the present engine settings as 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 OS name name is XIMC device.

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

7.1.2.48 `#define EXTIO_SETUP_INVERT 0x02`

Interpret EXTIO states and fronts inverted if flag is set.

Falling front as input event and low logic level as 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 behaviour 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 Alarm state.

7.1.2.57 `#define EXTIO_SETUP_MODE_OUT_BITS 0xF0`

Bits of the output behaviour selection.

7.1.2.58 `#define EXTIO_SETUP_MODE_OUT_MOTOR_FOUND 0x50`

EXTIO pin stays active when motor is connected (first winding).

7.1.2.59 `#define EXTIO_SETUP_MODE_OUT_MOTOR_ON 0x40`

EXTIO pin stays active when windings are powered.

7.1.2.60 `#define EXTIO_SETUP_MODE_OUT_MOVING 0x20`

EXTIO pin stays active during moving state.

7.1.2.61 `#define EXTIO_SETUP_MODE_OUT_OFF 0x00`

EXTIO pin always set in inactive state.

7.1.2.62 `#define EXTIO_SETUP_MODE_OUT_ON 0x10`

EXTIO pin always set in active state.

7.1.2.63 `#define EXTIO_SETUP_OUTPUT 0x01`

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

7.1.2.64 `#define FEEDBACK_EMF 0x04`

Feedback by EMF.

7.1.2.65 `#define FEEDBACK_ENC_REVERSE 0x01`

Reverse count of encoder.

7.1.2.66 `#define FEEDBACK_ENC_TYPE_AUTO 0x00`

Auto detect encoder type.

7.1.2.67 `#define FEEDBACK_ENC_TYPE_BITS 0xC0`

Bits of the encoder type.

7.1.2.68 `#define FEEDBACK_ENC_TYPE_DIFFERENTIAL 0x80`

Differential encoder.

7.1.2.69 `#define FEEDBACK_ENC_TYPE_SINGLE_ENDED 0x40`

Single ended encoder.

7.1.2.70 `#define FEEDBACK_ENCODER 0x01`

Feedback by encoder.

7.1.2.71 `#define FEEDBACK_ENCODER_MEDIATED 0x06`

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

7.1.2.72 `#define FEEDBACK_NONE 0x05`

Feedback is absent.

7.1.2.73 `#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.

7.1.2.74 `#define HOME_DIR_FIRST 0x001`

Flag defines direction of 1st motion after execution of home command.

Direction is right, if set; otherwise left.

7.1.2.75 `#define HOME_DIR_SECOND 0x002`

Flag defines direction of 2nd motion.

Direction is right, if set; otherwise left.

7.1.2.76 `#define HOME_HALF_MV 0x008`

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

7.1.2.77 `#define HOME_MV_SEC_EN 0x004`

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

7.1.2.78 `#define HOME_STOP_FIRST_BITS 0x030`

Bits of the first stop selector.

7.1.2.79 `#define HOME_STOP_FIRST_LIM 0x030`

First motion stops by limit switch.

7.1.2.80 `#define HOME_STOP_FIRST_REV 0x010`

First motion stops by revolution sensor.

7.1.2.81 `#define HOME_STOP_FIRST_SYN 0x020`

First motion stops by synchronization input.

7.1.2.82 `#define HOME_STOP_SECOND_BITS 0x0C0`

Bits of the second stop selector.

7.1.2.83 `#define HOME_STOP_SECOND_LIM 0x0C0`

Second motion stops by limit switch.

7.1.2.84 `#define HOME_STOP_SECOND_REV 0x040`

Second motion stops by revolution sensor.

7.1.2.85 `#define HOME_STOP_SECOND_SYN 0x080`

Second motion stops by synchronization input.

7.1.2.86 `#define HOME_USE_FAST 0x100`

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

7.1.2.87 `#define JOY_REVERSE 0x01`

Joystick action is reversed.

Joystick deviation to the upper values correspond to negative speeds and vice versa.

7.1.2.88 `#define LOW_UPWR_PROTECTION 0x02`

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

7.1.2.89 `#define MICROSTEP_MODE_FRAC_128 0x08`

1/128 step mode.

7.1.2.90 `#define MICROSTEP_MODE_FRAC_16 0x05`

1/16 step mode.

7.1.2.91 `#define MICROSTEP_MODE_FRAC_2 0x02`

1/2 step mode.

7.1.2.92 `#define MICROSTEP_MODE_FRAC_256 0x09`

1/256 step mode.

7.1.2.93 `#define MICROSTEP_MODE_FRAC_32 0x06`

1/32 step mode.

7.1.2.94 `#define MICROSTEP_MODE_FRAC_4 0x03`

1/4 step mode.

7.1.2.95 `#define MICROSTEP_MODE_FRAC_64 0x07`

1/64 step mode.

7.1.2.96 `#define MICROSTEP_MODE_FRAC_8 0x04`

1/8 step mode.

7.1.2.97 `#define MICROSTEP_MODE_FULL 0x01`

Full step mode.

7.1.2.98 `#define MOVE_STATE_ANTIPLAY 0x04`

Motor is playing compensation, if flag set.

7.1.2.99 `#define MOVE_STATE_MOVING 0x01`

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

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

7.1.2.100 `#define MOVE_STATE_TARGET_SPEED 0x02`

Target speed is reached, if flag set.

7.1.2.101 #define MVCMD\_ERROR 0x40

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

This flags is actual when MVCMD\_RUNNING signals movement finish.

7.1.2.102 #define MVCMD\_HOME 0x06

Command home.

7.1.2.103 #define MVCMD\_LEFT 0x03

Command left.

7.1.2.104 #define MVCMD\_LOFT 0x07

Command loft.

7.1.2.105 #define MVCMD\_MOVE 0x01

Command move.

7.1.2.106 #define MVCMD\_MOVR 0x02

Command movr.

7.1.2.107 #define MVCMD\_NAME\_BITS 0x3F

Move command bit mask.

7.1.2.108 #define MVCMD\_RIGHT 0x04

Command rigt.

7.1.2.109 #define MVCMD\_RUNNING 0x80

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

7.1.2.110 #define MVCMD\_SSTP 0x08

Command soft stop.

7.1.2.111 #define MVCMD\_STOP 0x05

Command stop.

7.1.2.112 #define MVCMD\_UKNWN 0x00

Unknown command.

7.1.2.113 `#define POWER_OFF_ENABLED 0x02`

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

7.1.2.114 `#define POWER_REDUCT_ENABLED 0x01`

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

7.1.2.115 `#define POWER_SMOOTH_CURRENT 0x04`

Current ramp-up/down is performed smoothly during `current_set_time`, if this flag is set.

7.1.2.116 `#define PWR_STATE_MAX 0x05`

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

7.1.2.117 `#define PWR_STATE_NORM 0x03`

Motor windings are powered by nominal current.

7.1.2.118 `#define PWR_STATE_OFF 0x01`

Motor windings are disconnected from the driver.

7.1.2.119 `#define PWR_STATE_REDUCT 0x04`

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

7.1.2.120 `#define PWR_STATE_UNKNOWN 0x00`

Unknown state, should never happen.

7.1.2.121 `#define REV_SENS_INV 0x08`

Sensor is active when it 0 and invert makes active level 1.

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

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`

Controller is in alarm state indicating that something dangerous had 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.

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).

7.1.2.132 #define STATE\_CURRENT\_MOTOR0 0x0000000

Motor 0.

7.1.2.133 #define STATE\_CURRENT\_MOTOR1 0x0040000

Motor 1.

7.1.2.134 #define STATE\_CURRENT\_MOTOR2 0x0080000

Motor 2.

7.1.2.135 #define STATE\_CURRENT\_MOTOR3 0x00C0000

Motor 3.

7.1.2.136 #define STATE\_CURRENT\_MOTOR\_BITS 0x00C0000

Bits indicating the current operating motor on boards with multiple outputs for engine mounting.



7.1.2.137 #define STATE\_DIG\_SIGNAL 0xFFFF

Flags of digital signals.

7.1.2.138 #define STATE\_EEPROM\_CONNECTED 0x0000010

EEPROM with settings is connected.

7.1.2.139 #define STATE\_ENC\_A 0x2000

State of encoder A pin.

7.1.2.140 #define STATE\_ENC\_B 0x4000

State of encoder B pin.

7.1.2.141 #define STATE\_ENGINE\_RESPONSE\_ERROR 0x0800000

Error response of the engine control action.

7.1.2.142 #define STATE\_ERRC 0x0000001

Command error encountered.

7.1.2.143 #define STATE\_ERRD 0x0000002

Data integrity error encountered.

7.1.2.144 #define STATE\_ERRV 0x0000004

Value error encountered.

7.1.2.145 #define STATE\_EXTIO\_ALARM 0x1000000

The error is caused by the input signal.

7.1.2.146 #define STATE\_GPIO\_LEVEL 0x0020

State of external GPIO pin.

7.1.2.147 #define STATE\_GPIO\_PINOUT 0x0010

External GPIO works as Out, if flag set; otherwise works as In.

7.1.2.148 #define STATE\_LEFT\_EDGE 0x0002

Engine stuck at the left edge.

7.1.2.149 #define STATE\_LOW\_USB\_VOLTAGE 0x0002000

USB voltage is insufficient for normal operation.

7.1.2.150 #define STATE\_OVERLOAD\_POWER\_CURRENT 0x0000800

Power current exceeds safe limit.

7.1.2.151 #define STATE\_OVERLOAD\_POWER\_VOLTAGE 0x0000400

Power voltage exceeds safe limit.

7.1.2.152 #define STATE\_OVERLOAD\_USB\_CURRENT 0x0004000

USB current exceeds safe limit.

7.1.2.153 #define STATE\_OVERLOAD\_USB\_VOLTAGE 0x0001000

USB voltage exceeds safe limit.

7.1.2.154 #define STATE\_POWER\_OVERHEAT 0x0000100

Power driver overheat.

7.1.2.155 #define STATE\_REV\_SENSOR 0x0400

State of Revolution sensor pin.

7.1.2.156 #define STATE\_RIGHT\_EDGE 0x0001

Engine stuck at the right edge.

7.1.2.157 #define STATE\_SECUR 0x1B3FFC0

Flags of security.

7.1.2.158 #define STATE\_SYNC\_INPUT 0x0800

State of Sync input pin.

7.1.2.159 #define STATE\_SYNC\_OUTPUT 0x1000

State of Sync output pin.

7.1.2.160 #define SYNCIN\_ENABLED 0x01

Synchronization in mode is enabled, if this flag is set.

7.1.2.161 #define SYNCIN\_GOTOPOSITION 0x04

The engine is go to position specified in Position and uPosition, if this flag is set.

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

7.1.2.162 #define SYNCIN\_INVERT 0x02

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

7.1.2.163 #define SYNCOUT\_ENABLED 0x01

Synchronization out pin follows the synchronization logic, if set.

It governed by SYNCOUT\_STATE flag otherwise.

7.1.2.164 #define SYNCOUT\_IN\_STEPS 0x08

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

7.1.2.165 #define SYNCOUT\_INVERT 0x04

Low level is active, if set, and high level is active otherwise.

7.1.2.166 #define SYNCOUT\_ONPERIOD 0x40

Generate synchronization pulse every SyncOutPeriod encoder pulses.

7.1.2.167 #define SYNCOUT\_ONSTART 0x10

Generate synchronization pulse when movement starts.

7.1.2.168 #define SYNCOUT\_ONSTOP 0x20

Generate synchronization pulse when movement stops.

7.1.2.169 #define SYNCOUT\_STATE 0x02

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

7.1.2.170 #define UART\_PARITY\_BITS 0x03

Bits of the parity.

7.1.2.171 #define WIND\_A\_STATE\_ABSENT 0x00

Winding A is disconnected.

7.1.2.172 #define WIND\_A\_STATE\_MALFUNC 0x02

Winding A is short-circuited.

7.1.2.173 `#define WIND_A_STATE_OK 0x03`

Winding A is connected and working properly.

7.1.2.174 `#define WIND_A_STATE_UNKNOWN 0x01`

Winding A state is unknown.

7.1.2.175 `#define WIND_B_STATE_ABSENT 0x00`

Winding B is disconnected.

7.1.2.176 `#define WIND_B_STATE_MALFUNC 0x20`

Winding B is short-circuited.

7.1.2.177 `#define WIND_B_STATE_OK 0x30`

Winding B is connected and working properly.

7.1.2.178 `#define WIND_B_STATE_UNKNOWN 0x10`

Winding B state is unknown.

7.1.2.179 `#define XIMC_API`

Library import macro Macros allows to automatically import function from shared library.

It automatically expands to `__declspec(dllexport)` 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
-----------	-------------------------

7.1.4.2 **result\_t XIMC\_API** `command_add_sync_in_action ( device_t id, const command_add_sync_in_action_t * the_command_add_sync_in_action )`

This command adds one element of the FIFO commands that are executed when input clock pulse.

Each pulse synchronization or perform that action, which is described in SSNI, if the buffer is empty, or the oldest loaded into the buffer action to temporarily replace the speed and coordinate in SSNI. In the latter case this action is erased from the buffer. The number of remaining empty buffer elements can be found in the structure of GETS.

Parameters

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

7.1.4.3 **result\_t XIMC\_API** `command_add_sync_in_action_calb ( device_t id, const command_add_sync_in_action_calb_t * the_command_add_sync_in_action_calb, const calibration_t * calibration )`

This command adds one element of the FIFO commands that are executed when input clock pulse which use user units.

Each pulse synchronization or perform that action, which is described in SSNI, if the buffer is empty, or the oldest loaded into the buffer action to temporarily replace the speed and coordinate in SSNI. In the latter case this action is erased from the buffer. The number of remaining empty buffer elements can be found in the structure of GETS.

Parameters

<i>id</i>	an identifier of device
<i>calibration</i>	user unit settings

7.1.4.4 **result\_t XIMC\_API** `command_change_motor ( device_t id, const command_change_motor_t * the_command_change_motor )`

Change motor - command for switching output relay.

Parameters

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

7.1.4.5 **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
-----------	-------------------------

7.1.4.6 **result\_t XIMC\_API** `command_eeread_settings ( device_t id )`

Read settings from controller's RAM to stage's EEPROM memory, which spontaneity connected to stage and it isn't change without it mechanical reconstruction.

Parameters

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

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

Save settings from controller's RAM to stage's EEPROM memory, which spontaneity connected to stage and it isn't change without it mechanical reconstruction.

Can be used by manufacturer only.

Parameters

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

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

The positive direction is to the right.

A value of zero reverses the direction of the direction of the flag, the set speed. Restriction imposed by the trailer, act the same, except that the limit switch contact does not stop. Limit the maximum speed, acceleration and deceleration function. 1) moves the motor according to the speed FastHome, uFastHome and flag HOME\_DIR\_FAST until limit switch, if the flag is set HOME\_STOP\_ENDS, until the signal from the input synchronization if the flag HOME\_STOP\_SYNC (as accurately as possible is important to catch the moment of operation limit switch) or until the signal is received from the speed sensor, if the flag HOME\_STOP\_REV\_SN 2) then moves according to the speed SlowHome, uSlowHome and flag HOME\_DIR\_SLOW until signal from the clock input, if the flag HOME\_MV\_SEC. If the flag HOME\_MV\_SEC reset skip this paragraph. 3) then move the motor according to the speed FastHome, uFastHome and flag HOME\_DIR\_SLOW a distance HomeDelta, uHomeDelta. description of flags and variable see in description for commands GHOM/SHOM

Parameters

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

See Also

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

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

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

This is a convinient way to calibrate zero position.

Parameters

	<i>id</i>	an identifier of device
out	<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.

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

Start continous moving to the left.

## Parameters

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

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

Upon receiving the command "loft" the engine is shifted from the current point to a distance GENG :: Antiplay, then move to the same point.

## Parameters

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

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

Upon receiving the command "move" the engine starts to move with pre-set parameters (speed, acceleration, retention), to the point specified to the Position, uPosition.

For stepper motor uPosition sets the microstep, for DC motor this field is not used.

## Parameters

<i>id</i>	an identifier of device
<i>Position</i>	position to move.
<i>uPosition</i>	part of the position to move, microsteps. Microstep size and the range of valid values for this field depend on selected step division mode (see MicrostepMode field in engine.settings).

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

Move to position which use user units.

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

## Parameters

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

## Note

The parameter Position is adjusted by the correction table.

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

Move to offset.

Upon receiving the command "movr" engine starts to move with pre-set parameters (speed, acceleration, hold), left or right (depending on the sign of DeltaPosition) by the number of pulses specified in the fields DeltaPosition, uDeltaPosition. For stepper motor uDeltaPosition sets the microstep, for DC motor this field is not used.

## Parameters

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

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

Move to offset using user units.

Upon receiving the command "movr" engine starts to move with pre-set parameters (speed, acceleration, hold), left or right (depending on the sign of `DeltaPosition`) the distance specified in the field `DeltaPosition`.

## Parameters

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

## Note

The end coordinate is calculated using `DeltaPosition`, is adjusted by the correction table. To calculate coordinates correctly, when using a correction table, you do not need to execute `movr` commands in batches.

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

Immediately power off motor regardless its state.

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

## Parameters

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

## See Also

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

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

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

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

## Parameters

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



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

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

Parameters

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

7.1.4.19 **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
-----------	-------------------------

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

Start continuous moving to the right.

Parameters

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

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

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

Parameters

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

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

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

Parameters

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

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

Soft stop engine.

The motor stops with deceleration speed.

Parameters

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

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

Start measurements and buffering of speed, following error.

Parameters

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

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

Immediately stop the engine, the transition to the STOP, mode key BREAK (winding short-circuited), the regime "retention" is deactivated for DC motors, keeping current in the windings for stepper motors (with Power management settings).

Parameters

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

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

Update firmware.

Service command

Parameters

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

7.1.4.27 **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.
out	<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.

7.1.4.28 **result\_t XIMC\_API** command\_zero ( **device\_t** id )

Sets the current position and the position in which the traffic moves by the move command and movr zero for all cases, except for movement to the target position.

In the latter case, set the zero current position and the target position counted so that the absolute position of the destination is the same. That is, if we were at 400 and moved to 500, then the command Zero makes the current position of 0, and the position of the destination - 100. Does not change the mode of movement that is 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 device
--	-----------	-------------------------

7.1.4.29 **device\_enumeration\_t XIMC\_API** enumerate\_devices ( int enumerate\_flags, const char \* hints )

Enumerate all devices that looks like valid.

## Parameters

in	<i>enumerate_flags</i>	enumerate devices flags
in	<i>hints</i>	extended information hints is a string of form "key=value\nkey2=value2". Un-recognized 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. To enumerate network devices you must call <a href="#">set_bindy_key</a> first.

7.1.4.30 **result\_t XIMC\_API** free\_enumerate\_devices ( **device\_enumeration\_t** device\_enumeration )

Free memory returned by *enumerate\_devices*.

## Parameters

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

7.1.4.31 **result\_t XIMC\_API** get\_accessories\_settings ( **device\_t** id, **accessories\_settings\_t** \* accessories\_settings )

Read additional accessories information from EEPROM.

## Parameters

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

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

Read analog data structure that contains raw analog data from ADC embedded on board.

This function used for device testing and deep recalibraton by manufacturer only.

## Parameters

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

7.1.4.33 **result\_t XIMC\_API** `get_bootloader_version ( device_t id, unsigned int * Major, unsigned int * Minor, unsigned int * Release )`

Read controller's firmware version.

Parameters

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

7.1.4.34 **result\_t XIMC\_API** `get_brake_settings ( device_t id, brake_settings_t * brake_settings )`

Read settings of brake control.

Parameters

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

7.1.4.35 **result\_t XIMC\_API** `get_calibration_settings ( device_t id, calibration_settings_t * calibration_settings )`

Read calibration settings.

This function fill structure with calibration settings.

See Also

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

Parameters

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

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

Return device electrical parameters, useful for charts.

Useful function that fill structure with snapshot of controller voltages and currents.

See Also

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

Parameters

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

7.1.4.37 **result\_t XIMC\_API** get\_control\_settings ( **device\_t** id, **control\_settings\_t** \* control\_settings )

Read settings of motor control.

When choosing CTL\_MODE = 1 switches motor control with the joystick. In this mode, the joystick to the maximum engine tends Move at MaxSpeed [i], where i = 0 if the previous use This mode is not selected another i. Buttons switch the room rate i. When CTL\_MODE = 2 is switched on motor control using the Left / right. When you click on the button motor starts to move in the appropriate direction at a speed MaxSpeed [0], at the end of time Timeout [i] motor move at a speed MaxSpeed [i+1]. at Transition from MaxSpeed [i] on MaxSpeed [i +1] to acceleration, as usual.

Parameters

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

7.1.4.38 **result\_t XIMC\_API** get\_control\_settings\_calb ( **device\_t** id, **control\_settings\_calb\_t** \* control\_settings\_calb, const **calibration\_t** \* calibration )

Read settings of motor control which use user units.

When choosing CTL\_MODE = 1 switches motor control with the joystick. In this mode, the joystick to the maximum engine tends Move at MaxSpeed [i], where i = 0 if the previous use This mode is not selected another i. Buttons switch the room rate i. When CTL\_MODE = 2 is switched on motor control using the Left / right. When you click on the button motor starts to move in the appropriate direction at a speed MaxSpeed [0], at the end of time Timeout [i] motor move at a speed MaxSpeed [i+1]. at Transition from MaxSpeed [i] on MaxSpeed [i +1] to acceleration, as usual.

Parameters

	<i>id</i>	an identifier of device
out	<i>control_settings_- calb</i>	structure contains settings motor control by joystick or buttons left/right.
	<i>calibration</i>	user unit settings

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

Read user controller name and flags of setting from FRAM.

Parameters

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

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

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

When controlling the step motor with 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 (flag CTP\_ENABLED), the controller stores the current position in the footsteps of SM and the current position of the encoder. Further, at each step of the position encoder is converted into steps and if the difference is greater CTPMinError, a flag STATE\_CTP\_ERROR. When controlling the step motor with speed sensor (CTP.BASE 1), the position is controlled by him. The active edge of input clock controller stores the current value of steps. Further, at each turn checks how many steps shifted. When a mismatch CTPMinError a flag STATE\_CTP\_ERROR.

Parameters

	<i>id</i>	an identifier of device
out	<i>ctp_settings</i>	structure contains settings of control position

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

Read data from firmware for debug purpose.

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

Parameters

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

7.1.4.42 **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
----	---------------------------	--

7.1.4.43 **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](#)

7.1.4.44 **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

7.1.4.45 **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 device
out	<i>edges_settings</i>	edges settings, specify types of borders, motor behaviour and electrical behaviour of limit switches

7.1.4.46 **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 which use user units.

See Also

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

Parameters

	<i>id</i>	an identifier of device
out	<i>edges_settings_calb</i>	edges settings, specify types of borders, motor behaviour and electrical behaviour 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.

7.1.4.47 **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 device
out	<i>emf_settings</i>	EMF settings

7.1.4.48 **result\_t XIMC\_API** get\_encoder\_information ( **device\_t** id, **encoder\_information\_t** \* encoder\_information )

Read encoder information from EEPROM.

## Parameters

	<i>id</i>	an identifier of device
out	<i>encoder_-information</i>	structure contains information about encoder

7.1.4.49 **result\_t XIMC\_API** get\_encoder\_settings ( **device\_t** id, **encoder\_settings\_t** \* encoder\_settings )

Read encoder settings from EEPROM.

## Parameters

	<i>id</i>	an identifier of device
out	<i>encoder_settings</i>	structure contains encoder settings

7.1.4.50 **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 device
out	<i>engine_-advanced_setup</i>	EAS settings

7.1.4.51 **result\_t XIMC\_API** get\_engine\_settings ( **device\_t** id, **engine\_settings\_t** \* engine\_settings )

Read engine settings.

This function fill structure with set of useful motor settings stored in 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 device
out	<i>engine_settings</i>	engine settings

7.1.4.52 **result\_t XIMC\_API** get\_engine\_settings\_calb ( **device\_t** id, **engine\_settings\_calb\_t** \* engine\_settings\_calb, const **calibration\_t** \* calibration )

Read engine settings which use user units.

This function fill structure with set of useful motor settings stored in 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 device
out	<i>engine_settings-</i> <i>calb</i>	engine settings
	<i>calibration</i>	user unit settings

7.1.4.53 **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 device
out	<i>entype_settings</i>	structure contains settings motor type and power driver type

7.1.4.54 **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-</i> <i>enumeration</i>	opaque pointer to an enumeration device data
in	<i>device_index</i>	device index
out	<i>controller_name</i>	controller name

7.1.4.55 **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-</i> <i>enumeration</i>	opaque pointer to an enumeration device data
in	<i>device_index</i>	device index
out	<i>device-</i> <i>information</i>	device information data

7.1.4.56 **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

7.1.4.57 **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
in	<i>device_index</i>	device index
out	<i>serial</i>	device serial number

7.1.4.58 **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

7.1.4.59 **result\_t XIMC\_API** `get_extended_settings ( device_t id, extended_settings_t * extended_settings )`

Read extended settings.

See Also

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

Parameters

	<i>id</i>	an identifier of device
out	<i>extended_settings</i>	EST settings

7.1.4.60 **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 controller's memory.

See Also

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

Parameters

	<i>id</i>	an identifier of device
out	<i>extio_settings</i>	EXTIO settings

7.1.4.61 **result\_t XIMC\_API** `get_feedback_settings ( device_t id, feedback_settings_t * feedback_settings )`

Feedback settings.

Parameters

	<i>id</i>	an identifier of 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.

7.1.4.62 **result\_t XIMC\_API** `get_firmware_version ( device_t id, unsigned int * Major, unsigned int * Minor, unsigned int * Release )`

Read controller's firmware version.

Parameters

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

7.1.4.63 **result\_t XIMC\_API** `get_gear_information ( device_t id, gear_information_t * gear_information )`

Read gear information from EEPROM.

Parameters

	<i>id</i>	an identifier of device
out	<i>gear_information</i>	structure contains information about step gearhead

7.1.4.64 **result\_t XIMC\_API** `get_gear_settings ( device_t id, gear_settings_t * gear_settings )`

Read gear settings from EEPROM.

Parameters

	<i>id</i>	an identifier of device
out	<i>gear_settings</i>	structure contains step gearhead settings

7.1.4.65 **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 die but is not a random value.

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 device
out	<i>globally_unique_identifier</i>	the result of fields 0-3 concatenated defines the unique 128-bit device identifier.

7.1.4.66 **result\_t XIMC\_API** `get_hallsensor_information ( device_t id, hallsensor_information_t * hallsensor_information )`

Read hall sensor information from EEPROM.

Parameters

	<i>id</i>	an identifier of device
out	<i>hallsensor_information</i>	structure contains information about hall sensor

7.1.4.67 **result\_t XIMC\_API** `get_hallsensor_settings ( device_t id, hallsensor_settings_t * hallsensor_settings )`

Read hall sensor settings from EEPROM.

Parameters

	<i>id</i>	an identifier of device
out	<i>hallsensor_settings</i>	structure contains hall sensor settings

7.1.4.68 **result\_t XIMC\_API** `get_home_settings ( device_t id, home_settings_t * home_settings )`

Read home settings.

This function fill structure with settings of calibrating position.

See Also

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

## Parameters

	<i>id</i>	an identifier of device
out	<i>home_settings</i>	calibrating position settings

7.1.4.69 **result\_t XIMC\_API** `get_home_settings_calb ( device_t id, home_settings_calb_t * home_settings_calb, const calibration_t * calibration )`

Read home settings which use user units.

This function fill structure with settings of calibrating position.

See Also

[home\\_settings\\_calb\\_t](#)

## Parameters

	<i>id</i>	an identifier of device
out	<i>home_settings_calb</i>	calibrating position settings
	<i>calibration</i>	user unit settings

7.1.4.70 **result\_t XIMC\_API** `get_init_random ( device_t id, init_random_t * init_random )`

Read random number from controller.

## Parameters

	<i>id</i>	an identifier of device
out	<i>init_random</i>	random sequence generated by the controller

7.1.4.71 **result\_t XIMC\_API** `get_joystick_settings ( device_t id, joystick_settings_t * joystick_settings )`

Read settings of joystick.

If joystick position is outside DeadZone limits from the central position a movement with speed, defined by the joystick DeadZone edge to 100% deviation, begins. Joystick positions inside DeadZone limits correspond to zero speed (soft stop of motion) and positions beyond Low and High limits correspond 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 next speed in list is zero (both integer and microstep parts), the button press is ignored. First speed in list shouldn't be zero. The DeadZone ranges are illustrated on the following picture. [!/attachments/download/5563/range25p.png!](#) The relationship between the deviation and the rate is exponential, allowing no switching speed combine high mobility and accuracy. The following picture illustrates this: [!/attachments/download/3092/ExpJoystick.png!](#) The nonlinearity parameter is adjustable. Setting it to zero makes deviation/speed relation linear.

## Parameters

	<i>id</i>	an identifier of device
out	<i>joystick_settings</i>	structure contains joystick settings

7.1.4.72 **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 sequence error.

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 completely full, then it is recommended to repeat the readings every 5 ms until the buffer again becomes filled with 20 points.

See Also

[measurements\\_t](#)

Parameters

	<i>id</i>	an identifier of device
out	<i>measurements</i>	structure with buffer and its length.

7.1.4.73 **result\_t XIMC\_API** get\_motor\_information ( **device\_t** id, **motor\_information\_t** \* motor\_information )

Read motor information from EEPROM.

Parameters

	<i>id</i>	an identifier of device
out	<i>motor-information</i>	structure contains motor information

7.1.4.74 **result\_t XIMC\_API** get\_motor\_settings ( **device\_t** id, **motor\_settings\_t** \* motor\_settings )

Read motor settings from EEPROM.

Parameters

	<i>id</i>	an identifier of device
out	<i>motor_settings</i>	structure contains motor settings

7.1.4.75 **result\_t XIMC\_API** get\_move\_settings ( **device\_t** id, **move\_settings\_t** \* move\_settings )

Read command setup movement (speed, acceleration, threshold and etc).

Parameters

	<i>id</i>	an identifier of device
out	<i>move_settings</i>	structure contains move settings: speed, acceleration, deceleration etc.

7.1.4.76 **result\_t XIMC\_API** get\_move\_settings\_calb ( **device\_t** id, **move\_settings\_calb\_t** \* move\_settings\_calb, const **calibration\_t** \* calibration )

Read command setup movement which use user units (speed, acceleration, threshold and etc).

Parameters

	<i>id</i>	an identifier of device
out	<i>move_settings-calb</i>	structure contains move settings: speed, acceleration, deceleration etc.
	<i>calibration</i>	user unit settings

7.1.4.77 **result\_t XIMC\_API** `get_nonvolatile_memory ( device_t id, nonvolatile_memory_t * nonvolatile_memory )`

Read userdata from FRAM.

Parameters

	<i>id</i>	an identifier of device
out	<i>nonvolatile_memory</i>	structure contains previously set userdata

7.1.4.78 **result\_t XIMC\_API** `get_pid_settings ( device_t id, pid_settings_t * pid_settings )`

Read PID settings.

This function fill structure with set of motor PID settings stored in controller's memory. These settings specify behaviour of PID routine for positioner. These factors are slightly different for different positioners. All boards are supplied with standard set of PID setting on controller's flash memory.

See Also

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

Parameters

	<i>id</i>	an identifier of device
out	<i>pid_settings</i>	pid settings

7.1.4.79 **result\_t XIMC\_API** `get_position ( device_t id, get_position_t * the_get_position )`

Reads the value position in steps and micro for stepper motor and encoder steps all engines.

Parameters

	<i>id</i>	an identifier of device
out	<i>the_get_position</i>	structure contains move settings: speed, acceleration, deceleration etc.

7.1.4.80 **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 all engines.

Parameters

	<i>id</i>	an identifier of device
out	<i>the_get_position_calb</i>	structure contains move settings: speed, acceleration, deceleration etc.
	<i>calibration</i>	user unit settings

Note

Attention! Some parameters of the `the_get_position_calb` structure are corrected by the coordinate correction table.

7.1.4.81 **result\_t XIMC\_API** get\_power\_settings ( **device\_t** id, **power\_settings\_t** \* power\_settings )

Read settings of step motor power control.

Used with stepper motor only.

Parameters

	<i>id</i>	an identifier of device
out	<i>power_settings</i>	structure contains settings of step motor power control

7.1.4.82 **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 device
out	<i>secure_settings</i>	critical parameter settings to protect the hardware

See Also

`status_t::flags`

7.1.4.83 **result\_t XIMC\_API** get\_serial\_number ( **device\_t** id, unsigned int \* SerialNumber )

Read device serial number.

Parameters

	<i>id</i>	an identifier of device
out	<i>SerialNumber</i>	serial number

7.1.4.84 **result\_t XIMC\_API** get\_stage\_information ( **device\_t** id, **stage\_information\_t** \* stage\_information )

Read stage information from EEPROM.

Parameters

	<i>id</i>	an identifier of device
out	<i>stage-information</i>	structure contains stage information

7.1.4.85 **result\_t XIMC\_API** get\_stage\_name ( **device\_t** id, **stage\_name\_t** \* stage\_name )

Read user stage name from EEPROM.

Parameters

	<i>id</i>	an identifier of device
out	<i>stage_name</i>	structure contains previously set user stage name



7.1.4.86 **result\_t XIMC\_API** `get_stage_settings ( device_t id, stage_settings_t * stage_settings )`

Read stage settings from EEPROM.

Parameters

	<i>id</i>	an identifier of device
out	<i>stage_settings</i>	structure contains stage settings

7.1.4.87 **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](#)

7.1.4.88 **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](#)

7.1.4.89 **result\_t XIMC\_API** `get_sync_in_settings ( device_t id, sync_in_settings_t * sync_in_settings )`

Read input synchronization settings.

This function fill structure with set of input synchronization settings, modes, periods and flags, that specify behaviour of input synchronization. All boards are supplied with standard set of these settings.

See Also

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

Parameters

	<i>id</i>	an identifier of device
out	<i>sync_in_settings</i>	synchronization settings

7.1.4.90 **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 synchronization settings which use user units.

This function fill structure with set of input synchronization settings, modes, periods and flags, that specify behaviour of input synchronization. All boards are supplied with standard set of these settings.

See Also

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

Parameters

	<i>id</i>	an identifier of device
out	<i>sync_in_settings_calb</i>	synchronization settings
	<i>calibration</i>	user unit settings

7.1.4.91 **result\_t XIMC\_API** `get_sync_out_settings ( device_t id, sync_out_settings_t * sync_out_settings )`

Read output synchronization settings.

This function fill structure with set of output synchronization settings, modes, periods and flags, that specify behaviour of output synchronization. All boards are supplied with standard set of these settings.

See Also

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

Parameters

	<i>id</i>	an identifier of device
out	<i>sync_out_settings</i>	synchronization settings

7.1.4.92 **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 synchronization settings which use user units.

This function fill structure with set of output synchronization settings, modes, periods and flags, that specify behaviour of output synchronization. All boards are supplied with standard set of these settings.

See Also

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

Parameters

	<i>id</i>	an identifier of device
out	<i>sync_out_settings_calb</i>	synchronization settings
	<i>calibration</i>	user unit settings

7.1.4.93 **result\_t XIMC\_API** `get_uart_settings ( device_t id, uart_settings_t * uart_settings )`

Read UART settings.

This function fill structure with UART settings.

See Also

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

Parameters

	<i>Speed</i>	UART speed
out	<i>uart_settings</i>	UART settings

7.1.4.94 **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.

7.1.4.95 **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

7.1.4.96 **result\_t XIMC\_API** `load_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
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.

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](#)

7.1.4.97 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

7.1.4.98 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

7.1.4.99 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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7.1.4.100 **device\_t** **XIMC\_API** open\_device ( const char \* uri )

Open a device with OS uri *uri* and return identifier of the device which can be used in calls.

Parameters

<i>in</i>	<i>uri</i>	a device uri Device uri has form "xi-com:port" or "xi-net://host/serial" or "xi-emu:///file". In case of USB-COM port the "port" is the OS device uri. For example "xi-com:\\.\\.COM3" in Windows or "xi-com:/dev/tty.s123" 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". Note: to open network device you must call <a href="#">set_bindy_key</a> first. In case of virtual device the "file" is the full filename with device memory state, if it doesn't exist then it is 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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7.1.4.101 **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

<i>in</i>	<i>uri</i>	- a device uri
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7.1.4.102 **result.t XIMC\_API** `service_command_updf ( device.t id )`

Command puts the controller to update the firmware.

After receiving this command, the firmware board sets a flag (for loader), sends echo reply and restarts the controller.

7.1.4.103 **result.t XIMC\_API** `set_accessories_settings ( device.t id, const accessories_settings.t * accessories_settings )`

Set additional accessories information to EEPROM.

Can be used by manufacturer only.

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<i>accessories.- settings</i>	structure contains information about additional accessories

7.1.4.104 **result.t XIMC\_API** `set_bindy_key ( const char * keyfilepath )`

Set network encryption layer (bindy) key.

Parameters

<i>in</i>	<i>keyfilepath</i>	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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7.1.4.105 **result.t XIMC\_API** `set_brake_settings ( device.t id, const brake_settings.t * brake_settings )`

Set settings of brake control.

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<i>brake_settings</i>	structure contains settings of brake control

7.1.4.106 **result.t XIMC\_API** `set_calibration_settings ( device.t id, const calibration_settings.t * calibration_settings )`

Set calibration settings.

This function send structure with calibration settings to controller's memory.

See Also

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

Parameters

	<i>id</i>	an identifier of device
in	<i>calibration_settings</i>	calibration settings

7.1.4.107 **result\_t XIMC\_API** set\_control\_settings ( **device\_t** id, const **control\_settings\_t** \* control\_settings )

Set settings of motor control.

When choosing CTL\_MODE = 1 switches motor control with the joystick. In this mode, the joystick to the maximum engine tends Move at MaxSpeed [i], where i = 0 if the previous use This mode is not selected another i. Buttons switch the room rate i. When CTL\_MODE = 2 is switched on motor control using the Left / right. When you click on the button motor starts to move in the appropriate direction at a speed MaxSpeed [0], at the end of time Timeout [i] motor move at a speed MaxSpeed [i+1]. at Transition from MaxSpeed [i] on MaxSpeed [i + 1] to acceleration, as usual.

Parameters

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

7.1.4.108 **result\_t XIMC\_API** set\_control\_settings\_calb ( **device\_t** id, const **control\_settings\_calb\_t** \* control\_settings\_calb, const **calibration\_t** \* calibration )

Set settings of motor control which use user units.

When choosing CTL\_MODE = 1 switches motor control with the joystick. In this mode, the joystick to the maximum engine tends Move at MaxSpeed [i], where i = 0 if the previous use This mode is not selected another i. Buttons switch the room rate i. When CTL\_MODE = 2 is switched on motor control using the Left / right. When you click on the button motor starts to move in the appropriate direction at a speed MaxSpeed [0], at the end of time Timeout [i] motor move at a speed MaxSpeed [i+1]. at Transition from MaxSpeed [i] on MaxSpeed [i + 1] to acceleration, as usual.

Parameters

	<i>id</i>	an identifier of device
in	<i>control_settings_calb</i>	structure contains settings motor control by joystick or buttons left/right.
	<i>calibration</i>	user unit settings

7.1.4.109 **result\_t XIMC\_API** set\_controller\_name ( **device\_t** id, const **controller\_name\_t** \* controller\_name )

Write user controller name and flags of setting from FRAM.

Parameters

	<i>id</i>	an identifier of device
in	<i>controller_name</i>	structure contains previously set user controller name

7.1.4.110 **result.t XIMC\_API** set\_ctp\_settings ( **device.t** id, const **ctp\_settings.t** \* ctp\_settings )

Set settings of control position(is only used with stepper motor).

When controlling the step motor with 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 (flag CTP\_ENABLED), the controller stores the current position in the footsteps of SM and the current position of the encoder. Further, at each step of the position encoder is converted into steps and if the difference is greater CTPMinError, a flag STATE\_CTP\_ERROR. When controlling the step motor with speed sensor (CTP\_BASE 1), the position is controlled by him. The active edge of input clock controller stores the current value of steps. Further, at each turn checks how many steps shifted. When a mismatch CTPMinError a flag STATE\_CTP\_ERROR.

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<i>ctp_settings</i>	structure contains settings of control position

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.

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 device
<i>in</i>	<i>edges_settings</i>	edges settings, specify types of borders, motor behaviour and electrical behaviour 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 which use user units.

See Also

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

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<i>edges_settings_calb</i>	edges settings, specify types of borders, motor behaviour and electrical behaviour 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 download the new settings when you change the motor.

See Also

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

## Parameters

	<i>id</i>	an identifier of device
in	<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 )`

Set encoder information to EEPROM.

Can be used by manufacturer only.

## Parameters

	<i>id</i>	an identifier of device
in	<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 )`

Set encoder settings to EEPROM.

Can be used by manufacturer only.

## Parameters

	<i>id</i>	an identifier of device
in	<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 device
<i>in</i>	<i>engine- advansed_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 send structure with set of engine settings to controller's memory. These settings specify motor shaft movement algorithm, list of limitations and rated characteristics. Use it when you change motor, encoder, positioner etc. Please note that wrong engine settings lead to device malfunction, can lead to irreversible damage of board.

See Also

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

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 engine settings which use user units.

This function send structure with set of engine settings to controller's memory. These settings specify motor shaft movement algorithm, list of limitations and rated characteristics. Use it when you change motor, encoder, positioner etc. Please note that wrong engine settings lead to device malfunction, can lead to irreversible damage of board.

See Also

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

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 device
<i>in</i>	<i>entype_settings</i>	structure contains settings motor type and power driver type

7.1.4.121 **result.t XIMC\_API** `set_extended_settings ( device.t id, const extended_settings.t * extended_settings )`

Set extended settings.

See Also

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

Parameters

	<i>id</i>	an identifier of device
in	<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 writes a structure with a set of EXTIO settings to controller's memory. By default input event are signalled through rising front and output states are signalled by high logic state.

See Also

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

Parameters

	<i>id</i>	an identifier of device
in	<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 device
in	<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.
in	<i>FeedbackType</i>	type of feedback
in	<i>FeedbackFlags</i>	flags of feedback
in	<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 )`

Set gear information to EEPROM.

Can be used by manufacturer only.

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 )

Set gear settings to EEPROM.

Can be used by manufacturer only.

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 )

Set hall sensor information to EEPROM.

Can be used by manufacturer only.

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 )

Set hall sensor settings to EEPROM.

Can be used by manufacturer only.

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 send structure with calibrating position settings to controller's memory.

See Also

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

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 home settings which use user units.

This function send structure with calibrating position settings to controller's memory.

See Also

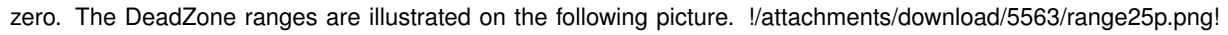
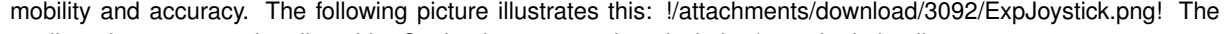
[home\\_settings\\_calb.t](#)

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 settings of joystick.

If joystick position is outside DeadZone limits from the central position a movement with speed, defined by the joystick DeadZone edge to 100% deviation, begins. Joystick positions inside DeadZone limits correspond to zero speed (soft stop of motion) and positions beyond Low and High limits correspond 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 next speed in list is zero (both integer and microstep parts), the button press is ignored. First speed in list shouldn't be zero. The DeadZone ranges are illustrated on the following picture.  The relationship between the deviation and the rate is exponential, allowing no switching speed combine high mobility and accuracy. The following picture illustrates this:  The nonlinearity parameter is adjustable. Setting it to zero makes deviation/speed relation linear.

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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
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7.1.4.132 **result.t XIMC\_API** `set_motor_information ( device.t id, const motor_information.t * motor_information )`

Set motor information to EEPROM.

Can be used by manufacturer only.

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 )

Set motor settings to EEPROM.

Can be used by manufacturer only.

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 )

Set command setup movement (speed, acceleration, threshold and etc).

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<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 )

Set command setup movement which use user units (speed, acceleration, threshold and etc).

## Parameters

	<i>id</i>	an identifier of 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\_nonvolatile\_memory ( **device.t** id, const **nonvolatile\_memory.t** \* nonvolatile\_memory )

Write userdata into FRAM.

## Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<i>nonvolatile_-memory</i>	structure contains previously set userdata

7.1.4.137 **result.t XIMC\_API** set\_pid\_settings ( **device.t** id, const **pid\_settings.t** \* pid\_settings )

Set PID settings.

This function send structure with set of PID factors to controller's memory. These settings specify behaviour of

PID routine for positioner. These factors are slightly different for different positioners. All boards are supplied with standard set of PID setting on 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 device
in	<i>pid_settings</i>	pid settings

7.1.4.138 **result.t XIMC\_API** set\_position ( **device.t** id, const **set\_position.t** \* the\_set\_position )

Sets any position value in steps and micro for stepper motor and encoder steps of all engines.

It means, that changing main indicator of position.

Parameters

	<i>id</i>	an identifier of device
out	<i>the_set_position</i>	structure contains move settings: speed, acceleration, deceleration etc.

7.1.4.139 **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 which use user units.

It means, that changing main indicator of position.

Parameters

	<i>id</i>	an identifier of device
out	<i>the_set_position_calb</i>	structure contains move settings: speed, acceleration, deceleration etc.
	<i>calibration</i>	user unit settings

7.1.4.140 **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 stepper motor only.

Parameters

	<i>id</i>	an identifier of device
in	<i>power_settings</i>	structure contains settings of step motor power control

7.1.4.141 **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 device
	<i>secure_settings</i>	structure with secure data

## See Also

status\_t::flags

7.1.4.142 **result.t XIMC\_API** set\_serial\_number ( **device.t** id, const **serial\_number.t** \* serial\_number )

Write device serial number and hardware version to 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 manufacturer only.

## Parameters

	<i>id</i>	an identifier of device
in	<i>serial_number</i>	structure contains new serial number and secret key.

7.1.4.143 **result.t XIMC\_API** set\_stage\_information ( **device.t** id, const **stage\_information.t** \* stage\_information )

Set stage information to EEPROM.

Can be used by manufacturer only.

## Parameters

	<i>id</i>	an identifier of device
in	<i>stage-information</i>	structure contains stage information

7.1.4.144 **result.t XIMC\_API** set\_stage\_name ( **device.t** id, const **stage\_name.t** \* stage\_name )

Write user stage name from EEPROM.

## Parameters

	<i>id</i>	an identifier of device
in	<i>stage_name</i>	structure contains previously set user stage name

7.1.4.145 **result.t XIMC\_API** set\_stage\_settings ( **device.t** id, const **stage\_settings.t** \* stage\_settings )

Set stage settings to EEPROM.

Can be used by manufacturer only

## Parameters

	<i>id</i>	an identifier of device
in	<i>stage_settings</i>	structure contains stage settings

7.1.4.146 **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 send structure with set of input synchronization settings, that specify behaviour of input synchronization, to controller's memory. All boards are supplied with standard set of these settings.

See Also

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

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<i>sync_in_settings</i>	synchronization settings

7.1.4.147 **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 synchronization settings which use user units.

This function send structure with set of input synchronization settings, that specify behaviour of input synchronization, to controller's memory. All boards are supplied with standard set of these settings.

See Also

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

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<i>sync_in_settings_calb</i>	synchronization settings
	<i>calibration</i>	user unit settings

7.1.4.148 **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 send structure with set of output synchronization settings, that specify behaviour of output synchronization, to controller's memory. All boards are supplied with standard set of these settings.

See Also

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

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<i>sync_out_settings</i>	synchronization settings



7.1.4.149 **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 synchronization settings which use user units.

This function send structure with set of output synchronization settings, that specify behaviour of output synchronization, to controller's memory. All boards are supplied with standard set of these settings.

See Also

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

Parameters

	<i>id</i>	an identifier of device
<i>in</i>	<i>sync_out_settings_calb</i>	synchronization settings
	<i>calibration</i>	user unit settings

7.1.4.150 **result.t XIMC\_API** `set_uart_settings ( device.t id, const uart_settings.t * uart_settings )`

Set UART settings.

This function send structure with UART settings to controller's memory.

See Also

[uart\\_settings.t](#)

Parameters

	<i>Speed</i>	UART speed
<i>in</i>	<i>uart_settings</i>	UART settings

7.1.4.151 **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

7.1.4.152 **result.t XIMC\_API** `ximc_fix_usbser_sys ( const char * device_uri )`

Fix for errors in Windows USB driver stack.

USB subsystem on Windows does not always work correctly. The following bugs are possible: the device cannot be opened at all, or the device can be opened and written to, but it will not respond with data. These errors can be fixed by device reconnection or removal-rescan in device manager. [ximc\\_fix\\_usbser\\_sys\(\)](#) is a shortcut function to do the remove-rescan process. You should call this function if libximc library cannot open the device which was not physically removed from the system or if the device does not respond.

7.1.4.153 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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