

Application Note

How to use *Torque Mode* in *NanoJ*

Version 1.0.1

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1 Intended use and audience

This application note shows you how to implement the torque mode in a NanoJ program. Please find the respective NanoJ code template in the download folder.

Torque Mode offers a NanoJ template for setting the target / rated / maximum torques for precise motor operation. The implementation uses one the torque mode of operation and a start button. It offers various torque parameters, such as slope, easy to parametrize.

Template opening / editing requires Plug & Drive Studio software which, like NanoJ itself, is for use with Nanotec products only, by trained experts only.

2 Prerequisites

NOTICE

Malfunction from incompatibility! Plug & Drive Studio comes in various software versions. Install the correct one for your Nanotec motor controller in advance.

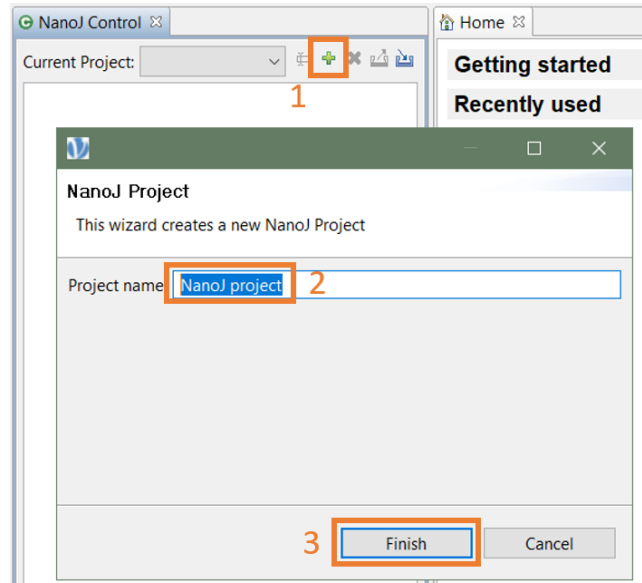
You must have the correct Plug & Drive Studio version installed on your computer:

1. Open the [Nanotec software webpage](#).
2. Click on the *Plug & Drive Studio* buttons.
3. Browse *Compatible Products* for the version compatible with your motor controller.
4. Download and install the latest compatible Plug & Drive Studio on your computer.
5. If not done so yet: Also download the latest [NanoJ V2 Library](#) (= nanotec.h).

3 Creating a new project in Plug & Drive Studio

Open the *NanoJ Control* tab and click the **+** icon (1).
A *NanoJ Project* tab pops up:

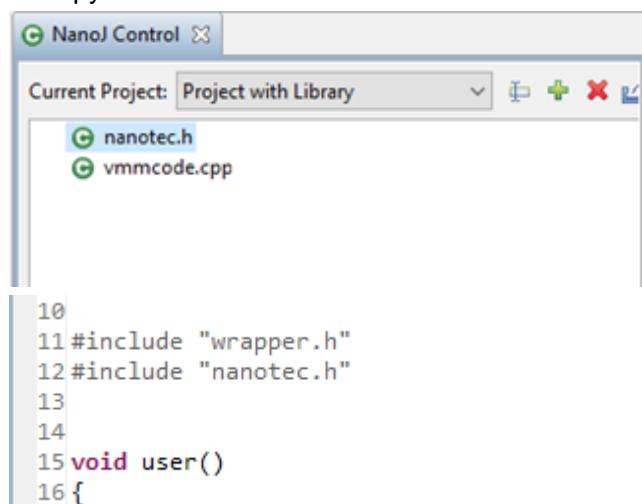
1. Assign a new project name (2).
2. Click on *Finish* (3) to close the tab.
3. Your new project is now created.



4 Including the nanotec.h library into your NanoJ project

The Plug & Drive Studio installation folder does include wrapper.h. But you must download the NanoJ V2 library (= nanotec.h) from our [knowledge base](#) and copy it into NanoJ:

1. Create a new NanoJ project or open an existing one.
2. Copy the nanotec.h file into the project tree via drag & drop.
3. To implement the NanoJ V2 library: Add `#include wrapper.h` and `#include nanotec.h` to your code.



5 Using the code template in NanoJ

5.1 Including libraries, mappings

For our case, we use the Nanotec NanoJ V2 library `nanotec.h` to provide basic motor-control functions.

To make the `nanotec.h` library usable, we must at least add the object mappings in lines 23 to 30 to our code.

```
23map U16 Controlword as inout 0x6040:00
24map U16 Statusword as input 0x6041:00
25map U32 Inputs as input 0x60FD:00
26map U32 Outputs as inout 0x60FE:01
27map S08 ModesOfOperation as output 0x6060:00
28map S08 ModesOfOperationDisplay as input 0x6061:00
29map S16 AnalogInput as input 0x3220:01
30map S16 TargetTorque as inout 0x6071:00

32#include "wrapper.h"
33#include "nanotec.h"
```

Only then, we include the libraries `wrapper.h` and `nanotec.h`.

5.2 Main program loop: void user()

5.2.1 Selecting the torque profile

- Line 38 to 41: First, we select the profile velocity mode via mapped object (0x6060=4) `ModesOfOperation(4)`.

```
38void user()
39{
40
41    ModesOfOperation(4);
```

5.2.2 Defining variables

- Line 46: With `Shutdown()`, we set the state machine to *ReadyToSwitchOn*.
- Line 48: By setting the target torque to 850 (0x6071 = 850), we select a rated motor torque of 85 percent (rated torque / current defined by value in object 0x203B:01).
- Line 50: With object 0x6072 (maximum torque) set to 1000, we select a 100 percent maximum of the rated torque.
- Line 52: By setting object 0x6087 (torque slope) to 1000, we change the rated torque slope to 100 percent within 1s.

```
46    Shutdown();
47
48    InOut.TargetTorque = 850;
49
50    od_write(0x6072, 0x00, 1000);
51
52    od_write(0x6087, 0x00, 1000);
```

5.2.3 Start button (input 5)

- Line 57 to 59: We assign input 5 as a start button (a high input will start the motor).
- Line 61: Via `nanotec.h` library function `EnableOperation()`, we switch the power state machine to *Operation Enabled*.
- Line 66: If we use `Shutdown()` to set the power state machine to *ReadyToSwitchOn*, and if the start button is low, the motor stops.
- Your code is finally implemented.

```
57    while(true)
58    {
59        if(DigitalInput(5))
60        {
61            EnableOperation();
62        }
63
64        else
65        {
66            Shutdown();
67        }
68
69        yield();
70    }
```

6 Liability

This Application Note is based on our experience with typical user requirements in a wide range of industrial applications. The information in this Application Note is provided without guarantee regarding correctness and completeness and is subject to change by Nanotec without notice.

It serves as general guidance and should not be construed as a commitment of Nanotec to guarantee its applicability to all customer applications without additional tests under the specific conditions and – if and when necessary – modifications by the customer.

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