



# Application Note

How to use *Homing* in *NanoJ*

Version 1.0.0

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## 1 Intended use and audience

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

*Homing* offers a template for selecting and parametrizing the homing function for Nanotec motor controllers. You can use this template to perform a homing on the encoder index, a reference/limit switch, the actual position or on block.

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.

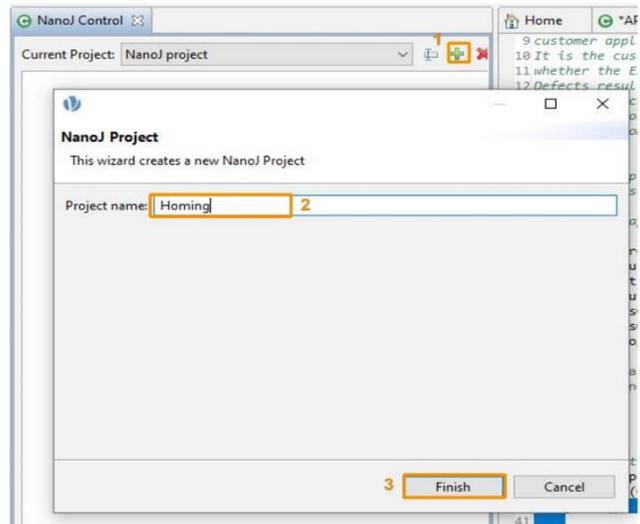
You must have the correct Plug & Drive Studio version installed on your computer:

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.

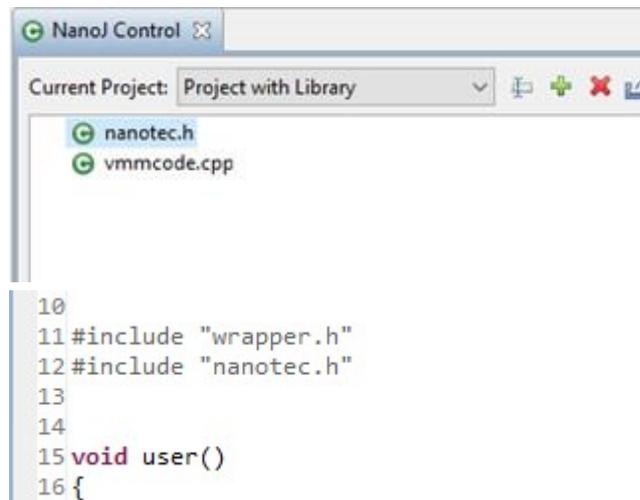


### 4 Including the nanotec.h library into your NanoJ project

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 for analog input in NanoJ

#### 5.1 Including libraries, mappings

For our case, we use the code template's 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 29 to our code.

```

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

```

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

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

## 5.2 Main program loop: `void user()`

### 5.2.1 Selecting the homing operation mode / method

- Line 38: For operation mode, we select `ModesOfOperation(6)` for object `0x6060` (cf. line 27).
- Line 39: By writing `35` into object `0x6098`, we select homing method `35` for this example. Please refer to the product manual to find the suitable homing method for your application.
- Line 42 to 45: We ensure the homing speed for objects `0x6099:01` and `0x6099:02`, and the homing acceleration for object `0x609A:00`.

```
35void user()
36{
37    //Activation of the Homing operation mode:
38    ModesOfOperation(6);
39    od_write(0x6098, 0x00, 35);           //Homing Method, please refer to the manual to select the method, fitting your applicaiotn
40    yield();
41
42    od_write(0x6099, 0x01, 50);          //Homing Speed: Speed During Search For Switch
43    od_write(0x6099, 0x02, 10);         //Homing Speed: Speed During Search For Zero
44    od_write(0x609A, 0x00, 500);        //Homing Acceleration
45    yield();
```

- Line 47 to 49: For homing on block, we configure objects `0x203A:01` (= blocking current level) and `0x203A:02` (= blocking time).
- Line 51 to 53: For homing on a switch, we assign value `7` to object `0x3240:01` (= digital inputs control, special function enabled). We enable the switches for negative limit (= bit 0), positive limit (= bit 1), and home (= bit 2). Home offset defines the actual position after homing success.

```
47    od_write(0x203A, 0x01, 0xFFFFFBA); //Homing On Block Configuration: Minimum Curren for Block Detection (only for Homing on Block)
48    od_write(0x203A, 0x02, 200);       //Homing On Block Configuration: Block Detection Time (only for Homing on Block)
49    yield();
50
51    od_write(0x3240, 0x01, 7);          //Digital Inputs Control: Special Function Enable (only for Homing on Switches)
52    od_write(0x607C, 0x00, 0);         //Home Offset
53    yield();
```

- Line 55 to 56: With the homing parameter fully configured, we first switch the power state machine to `EnableOperation()`. Only then, we use `NewSetPoint(true)` to toggle the control word bit 4 and start homing.
- Line 58 to 61: The motor is to run if bit 10 (= target reached) and bit 12 (= new setpoint acknowledged) are not set, yet.

```
55    EnableOperation();                 //switch to Operation Enabled
56    NewSetPoint(true);                 //start the Homing
57
58    while(!TargetReached() & !NewSetPointAcknowledge()) //wait while homing is not complete (Bit 10 and Bit 12 are not set yet)
59    {
60        yield();
61    }
```

- Line 63 to 64: After homing success, we set bit 4 (= control word) back to 0. We also switch the state machine **off**.
- Line 66 to 68: Finally, we set object `0x2300:00` to 0. This ends program execution and prevents a rerun / remapping from the very beginning.

```
63    NewSetPoint(false);
64    Shutdown();                       //switch off
65
66    od_write(0x2300, 0x00, 0);         //stop the NanoJ-Program
67    yield();
68 }
```

Your code is finally implemented.

## 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.

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## 7 Imprint

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**Nanotec Electronic GmbH & Co. KG** | Kapellenstraße 6 | 85622 Feldkirchen | Germany  
Tel. +49 (0)89 900 686-0 | Fax +49 (0)89 900 686-50 | [info@nanotec.de](mailto:info@nanotec.de) | [www.nanotec.com](http://www.nanotec.com)