

User Manual PNDS3

For Plug & Drive Studio 3 Version 3.1.7

User Manual Version: 1.3.0

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1 Document aim and conventions

Beside technical data, this document explains product use and function. For possible combination with other Nanotec products, please ask your Nanotec sales partner. Before using the product, please note document font styles and conventions.

Underlined text marks a cross reference or hyperlink.

Example 1: Observe our safety notes.

Example 2: Download needed code templates from our website for EMEA / APAC or AMERICA.

Gray bold italics call out menu paths, buttons, tab and file names.

Example 1: Select Home > Connect controller > CANopen.

Example 2: In the NanoJ tab, select NanoJ project and open Analog Input.cpp.

Plain italics mark *Freehand entries* and *foreign-language* expressions. They also emphasize words of critical weight. Alternatively, bracketed exclaim marks(!) give critical weight.

Example 1: Enter *Plug & Drive Studio*. In addition to users (= *Nutzer; usuario; utente; utilisateur; utente* etc.), this document also addresses:

- Third-party users (= Drittnutzer; tercero usuario; terceiro utente; tiers utilisateur; terzo utente etc.).

- End users (= Endnutzer; usuario final; utente final; utilisateur final; utente finale etc.).

Example 2: Protect yourself, others and your equipment. Follow our *general* safety notes that are generally applicable to *all* Nanotec products. Also follow the *specific* safety notes that apply to *this* specific product.

Courier marks code blocks or programming commands.

Example 1: Via Bash, call sudo make install to copy shared objects; then call ldconfig.

Example 2: Use the following NanoLibAccessor function to change the logging level in NanoLib:

```
//
***** C++ variant *****
void setLoggingLevel(LogLevel level);
```

The verb to co-click

Co-clicking means a mouse click by secondary key to open context menus etc.

Example 1: Co-click the file, select Rename, and rename the file.

Example 2: Co-click the file to check and select Properties.

Numerical values

Numbers appear in decimal. Hexadecimal notation ends in $_{subscript h}$. Objects in the object dictionary notate in hexadecimal as <Index>:<Subindex>, non-notated subindices as 00_h . Example: $1003_h:05_h$ is subindex 5 in object 1003_h . And 6040_h is subindex 00 in object 6040_h .

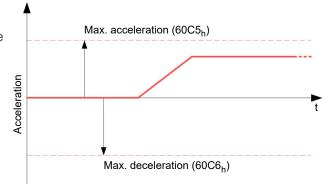
Bits	I	MSE	3						LSB	
Each object bit counts up from LSB (bit number 0),	Bit Nummer									
such as data type UNSIGNED8:	Bits	0	1	0	1	0	1	0	1	$ m \triangleq 55_{hex} m \triangleq 85_{dec}$





Count direction (arrows)

Illustrations always count arrow-wards; both example objects ${\tt 60C5}_h$ and ${\tt 60C6}_h$ are thus positive.





2 For your safety

Before product use, please ensure that all users read, understand and follow the instructions in this document fully.

2.1 Warn and risk levels

Please note: our hazard warnings, alert symbols and signal words mark different risk levels.

[CAUTION!
Â	CAUTION warns of possible physical danger!
	Minor / moderate injury possible.
	Instruction against unhealthy user errors.
	NOTICE
	A NOTICE warns of wrong operation.
	Material or ecological damage possible (not strictly injury).
	Instruction against destructive user errors (= mere material risks).

Note: Explains or simplifies a process by additional information.

v3.1.7

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3 Before you start

Before product use, you need to prepare the PC and verify product intent / limits. Via online help, you can learn how to install and set up projects and how PNDS3 runs. Observe the safety notes in the manual (www.nanotec.com).

3.1 System and hardware requirements

Plug & Drive Studio 3 (PNDS3) needs 64-bit operating systems. Nanotec recommends controller firmware *FIR-v2213* or newer. PNDS3 offers a special control for <u>firmware update</u>.

PNDS3 64-bit OS requirements

Fieldbus adapters / cables

- Windows 10
- .NET Framework 4.8
- Display resolution 1920x1080
- □ IXXAT USB-to-CAN V2
- □ Nanotec ZK-USB-CAN-1
- Modbus RTU:

CANopen:

- Nanotec ZK-USB-RS485-1 or equivalent USB-RS485 adapter
- □ USB cable via virtual comport (VCP)
- Modbus TCP:
 - □ suitable ethernet cable
- Ethernet (REST), EtherCAT, Profinet:
 - suitable ethernet cable
 - WinPcap 4.1.3, or Npcap installation, see <u>Installation and</u> <u>adapter</u>

3.2 Intended use and audience

NOTICE

Damage: from unskilled staff!

- Use the product only for the purpose described in this document.
- Restrict use to expert staff only.
- ► Follow valid OEM and system prescriptions for all equipment involved.

Plug & Drive Studio 3 (PNDS3) is a free software for easy Nanotec drive commissioning. The underlying operating system / hardware (PC) is **not** real-time capable. **Never** use PNDS3 for time-critical or synchronous multi-axis motion **nor** integrate it as a safety component in a product or system.

Add proper warnings and instructions for safe use / operation to each end user product with a Nanotecproduced component. Submit any Nanotec warning directly to end users. The product addresses skilled experts in industry use cases alone. Expert means:

- Training / experience in motor and controller handling
- Understanding this document plus Nanotec drive manuals
- Knowledge of valid regulations



3.3 Delivery scope and warranty

PNDS3 comes as a *.*zip* folder from our download website for either <u>EMEA / APAC</u> or <u>AMERICA</u>. Duly store and unzip your download before setup. The product package contains:

- Software as an executable file
- Project templates

- Current firmware release
- Online help file

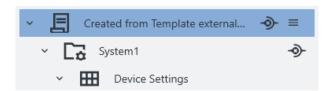
For scope of warranty, please observe our terms and conditions for either <u>EMEA / APAC</u> or <u>AMERICA</u>. **Note:** Nanotec is not liable for wrong quality, handling, installation, operation, use, and maintenance of third-party equipment! Follow valid OEM instructions.



4 Your product

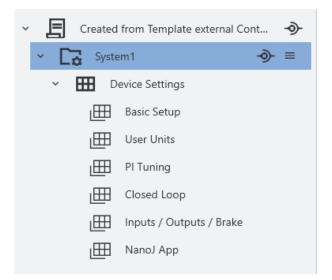
With PNDS3, you parametrize and commission Nanotec drives. Using templates for various Nanotec drives, you can add your own projects, systems and modules to the modular user interface. The software comes with a default folder structure (*Project, System, Module Group, Module,* etc.).

Project



You manage all settings and device parameters in projects, save these as a file and im- / export them, say, as a template. Such a reusable **Project** can have multiple systems, say, the axes of a machine.

System

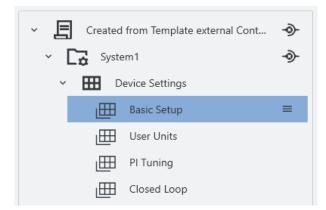


In a project (here: external controller), you create and store drive systems (here: X-axis). Each is im- / exportable as template.

You can extend such a reusable **System**, of at least motor and controller, by modules or module groups for encoder, gearbox, brake, settings, parameters, etc.

By parameters, sortable / poolable into several modules or module groups, you quickly control all system elements.

Module (Group)



A module (group) contains parameters or controls (groups) and is im- / exportable, single or grouped, as template.



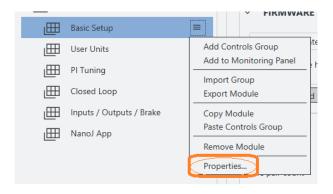
Controls Group

Created from Template external Cont	 CONFIGURATION 	
~ 🕞 System1 -9-		Show current values
 	CLOSED LOOP SUBMODE	
Basic Setup	Position Loop for Velocity-Modes	Only Velocity loop
User Units	Auto Alignment	0#
PI Tuning	Real Torque Mode	Off MO
Closed Loop =	Slow Speed Mode	011
Inputs / Outputs / Brake	 START AUTOSETUP 	
ManoJ App	Short Auto Setup run	OFF
	Auto Setup speed in %	1000
	Auto Setup	
	🖏 Autosetup	

A **Controls group** pools single device parameters (objects from the dictionary in the controller) and / or **Special controls**.

You im- / export such a control group together with set values, say, as template.

Property editing



Simply co-click an element, select **Properties**, insert a visible name, version number, and description: This way you create your individual user interface.



5 Installation and adapter

Install the software, set up the adapter – and PNDS3 is ready to go. You find PNDS3 software online as a zip download.

- 1. Open the website Nanotec > Products > Software > Plug & Drive Studio 3.
- 2. Download and extract the product zip file.
- 3. Run the executable file PNDS3.exe.
- 4. Only with PNDS3 installed: Prepare your fieldbus adapter (see below).

CANopen

- 1. Decide: Ixxat USB-to-CAN? Or Nanotec ZK-USB-CAN-1?
- 2. For Ixxat USB-to-CAN: Download the driver (<u>www.ixxat.com/</u>); install it by hand.
- 3. Connect the adapter to the computer. For Nanotec ZK-USB-CAN-1: Wait for self-installation.
- 4. Via correct cable (see product manual): Connect the installed adapter to the controller.

USB: Nanotec Virtual COM-Port (VCP)

- 1. Connect the voltage supply to the controller and switch it on.
- 2. Via correct USB cable: Connect the PC to the controller (= "mass storage device").
- 3. In Explorer > Controller directory: Select cfg.txt (= pd4ccfg.txtfor a PD4C).
- 4. Open the file via text editor (Notepad etc.).
- **5.** Add the lines 2102 | =0x100000 and 4015:01=0. Save the file.
- 6. Restart the controller and check if its COM port appears in the device manager.

Modbus RTU

- 1. For Nanotec ZK-USB-RS485-1: Connect the adapter to the computer and wait for self-installation.
- 2. For other equivalent adapters: Follow valid OEM instructions to install the driver.

Modbus TCP

Configure the IP address of the drive and the ethernet adapter accordingly, as described in the drive manual.

EtherCAT

Install WinPcap 4.1.3 or Npcap and make sure the corresponding driver is activated for the designated ethernet adapter.

Profinet

- 1. Install Win10cap or Npcap and make sure the corresponding driver is activated for the designated ethernet adapter.
- 2. Configure the IP address of the drive and the ethernet adapter accordingly, as described in the drive manual.

Ethernet (REST)

Configure the IP address of the drive and the ethernet adapter accordingly, as described in the drive manual.



6 User interface (UI)

Thanks to flexible areas and windows, fitted into the main window or usable stand-alone, you can master a wide range of tasks. Before product use, please understand the UI structure.

Open recent			Create from template	Add template
Integration Testing C:\Users\andreas.faltermeier\Down	loads\Integration Testing_1.0_20230907 (2).nprj	28.03.2024 11:40	Blank Project	
PD Motors C\Users\andreas.faltermeier\Down	loads\PD Motors 031123.nprj	28.03.2024 09:44	CSL3 Template	
			Template external Controller	
			Template PD-Motor	
	D. Open Recent 🕅 🗛 Search	n on computer	Project Name:	Create Project
Benics Settings Benics Settings Benics Settings Benics Settings User Units	Type CAN los v	H Sou M	Auto Retriedi Help	fine List Navel 00 Monitor Help
		V 0 Convets H San M H San D Centert	Auto Sathash Holp a	
	No locating to a statute a statute of the statute o		Auto Sathash Holp a	
	Na Linnay	O Connect to H Start Dy Connect to	A And Andream Anny No. Tring Topos have been waterable	03 Minter <u>Hig</u>
	Na Lange Na Lan	O Connect to H Start Dy Connect to	Come Come	00 Hondor <u>Hong</u>
	Na Longo Walker Sandha Walker Walke	Count 1	Constant results Constant results	00 Montor <u>Hop</u>
	كلا العادية العالية ال العالية العالية ال معالية العالية الع معالية العالية الع معالية العالية العالي معالية العالية	Const	A Information Annonement Annone	00 Montor <u>Hop</u>
	NAL JONES TOTAL STATES TOTAL	Convert Convert Convert Convert Convert Convert Convert Convert	A Information Annonement Annone	00 Montor <u>hop</u> - O Ever (M New)
	كلا العادية العالية ال العالية العالية ال معالية العالية الع معالية العالية الع معالية العالية العالي معالية العالية	Convert Convert Convert Convert Convert Convert Convert Convert	A Information Annonement Annone	00 Montor <u>Hop</u>
	كلا العادية العالية ال العالية العالية ال معالية العالية الع معالية العالية الع معالية العالية العالي معالية العالية	Convert Convert Convert Convert Convert Convert Convert Convert	A Information Annonement Annone	00 Montor <u>Hop</u>
	كلا العادية العالية ال العالية العالية ال معالية العالية الع معالية العالية الع معالية العالية العالي معالية العالية	Convert Convert Convert Convert Convert Convert Convert Convert	A Information Annonement Annone	00 Montor <u>hop</u> - O Ever (M New)
	كلا العادية العالية ال العالية العالية ال معالية العالية الع معالية العالية الع معالية العالية العالي معالية العالية	Convert Convert Convert Convert Convert Convert Convert Convert	A Information Annonement Annone	00 Montor <u>hop</u> - O Ever (M New)
	Na Longo Na Lon	Convert Convert Convert Convert Convert Convert Convert Convert	A Information Annonement Annone	00 Montor <u>hop</u> - O Ever (M New)

When PNDS3 starts for the first time, you are asked to create a new project: either a blank one or one based on a template.

If you open a blank project, the project tree is empty at first.

If you create a new project or load a template, the interface fills up according to your needs. This way, you design your own UI.

Using the **View** options in the main menu you can further customize the UI by changing the theme, showing/hiding features or opening them in separate windows.



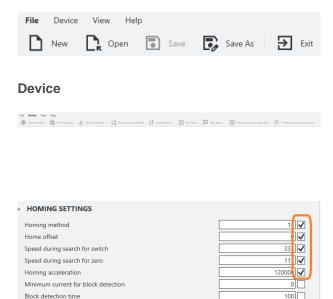


- Header for main menu (1).
- Display wall (2) for monitoring, object directory, help etc.
- Work desk (3) for user controls etc.
- Project (or side) bar (4) for systems etc.

6.1 Header (1)

As a prominent layout bracket on top in the user interface, the UI header contains all basic functions and commands relevant to projects, devices and the UI view.

File



Leftmost above the header, you find the main menu for project files. You can load new – and save, reopen, edit existing projects.

Read, write, and save device parameters. Govern <u>NanoJ programs</u> and fieldbus network (with CANopen).

Set Parameters: Transmits *the selected* parameter values to system-connected controllers.

Note: You can select parameters to be set by ticking them.



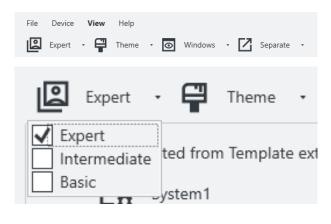
Get Parameters: *Reads* the values of systemconnected controllers.

Store Parameters: *Stores* **Set**-transmitted values of system-connected controllers.

Restore Factory Default: The stored objects are discarded, with the exception of the category *Tuning* and the fieldbus-specific category. You can find further details in the chapter *Discarding the saved data* in the manual of your controller.

The change does not take effect until after the controller is restarted (**Restart Device**).

View



Here you can customize the UI by changing the theme, showing/hiding features or opening them in separate windows.

You can also set the **User level**, to govern user rights for the following roles:

- Expert: Project owner with all rights. May create and edit projects, rights, visibilities, etc. Governs via Properties, for each single parameter up to a complete Controls group, who may see and edit exactly what.
- Intermediate: May change device parameters, but can't edit a project.
- Basic: Similar to Intermediate, but often gets fewer editing rights from Expert.

Help

File Device View **Help**

Open the online help or PNDS3 version info.

6.2 Project bar (4)

This side bar diplays your loaded project as a tree list by which you create the user interface. **Note:** Depending on assembly, you can check connections and attributes of all tree list items in the work desk (3).



Tree list



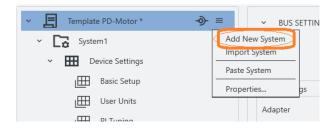
You find the project bar in the very left of the user screen.

A project (here: for an *external controller*) tree-lists all systems and the items therein (see also <u>Project</u> <u>setup</u>). *One* project and *one* system are minimum; further items are optional and later on define the entire UI layout.

System 1 contains the module groups *Quick Start* with modules for the basic settings and *Application Settings* with further controls and parameter groups.

For each module, you may add one or more controls groups to the <u>work desk</u> (3) further to the right.

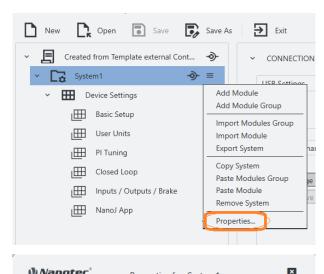
Project > System



A system represents a motor with controller, that is, one per motor in a multi-axis application.

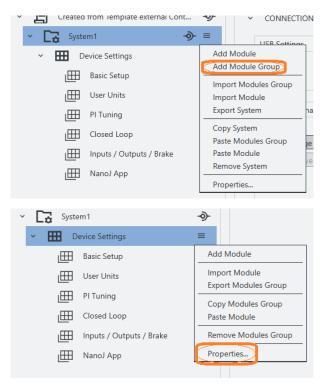
- 1. To set up a system: Co-click the project.
- 2. In the context menu: Either create a new system via Add New System.
- 3. Or fetch an existing one via Import System.





PLUG & DAIVE	Properties for: System1	_
Key	Value	
System name		System1
Version		
Description		System1
Check device		PD5
Check firmware		2213

Project > System > Module group



- 4. A new node (= blue) appears in the tree list.
- 5. To name it: Co-click the node, select **Properties**. **Note:** You can edit *any* object via **Properties**.

- 6. In the pop-up: Name the system as needed.
- 7. If needed: Versionize and describe the system. You can add a string for the device name and firmware version, which should be checked after connecting to a device.
- **8.** After last entry: Set a tab stop (so that all is stored).
- 9. Only then: Close the pop-up.
- **10.**Assemble the system with module groups (see below).

A module group bundles *several* motor functions (= modules). Depending on assembly, you can check its connections and attributes in the <u>work desk</u> (3).

- 1. To set up a module group: Co-click the system.
- 2. In the context menu: Either create a new module group via Add module group.
- 3. Or fetch an existing one via Import module group.
- 4. A new node appears in the tree list.
- 5. To name it: Co-click the node, select **Properties**. **Note:** You can edit *any* object via **Properties**.



Nanotec [®]	Properties for: Application Settin
Кеу	Value
Module group name	Application Settings
Version	
Description	

Project > System > Module group > Module

Y Lo System1	•
✓	
Basic Setup	Add Module
User Units	Import Module Export Modules Group
PI Tuning	Copy Modules Group
Closed Loop	Paste Module
Inputs / Outputs / Brake	Remove Modules Group

	KE
Basic Setup	
User Units Add Controls Group	ite
PI Tuning Add to Monitoring Panel Import Group	- ! r
Closed Loop Export Module	d
Inputs / Outputs / Brake Copy Module	
Paste Controls Group	_
Remove Module	
Properties	

Nanotec [®]	Properties for: User Units	×
Кеу	Value	
Module name		User Units
Version		
Description		
Add to Monitor		

- 6. In the pop-up: Name the module group as needed (here: *Controller template*).
- **7.** If needed: Versionize and describe the module group.
- **8.** After last entry: Set a tab stop (so that all is stored).
- **9.** Only then: Close the pop-up.
- **10.**Assemble the module group with modules (see below).

A module allows you to add a *single* motor function (= parameter set etc.). Depending on assembly, you can check its connections and attributes in the <u>work desk</u> (3).

- 1. To set up a module: Co-click the module group (here: *Controller template*).
- 2. In the context menu: Either create a new module via Add Module.
- 3. Or fetch an existing one via Import Module.
- 4. A new node appears in the tree list.
- 5. To name it: Co-click the node, select **Properties**. **Note:** You can edit *any* object via **Properties**.

- **6.** In the pop-up: Name the module as needed (here: *Communication settings*).
- **7.** If needed: Versionize and describe the module, add it to a Monitor
- **8.** After last entry: Set a tab stop (so that all is stored).
- **9.** Only then: Close the pop-up.



Project > System > Module group > Module > Controls group

Closed Loop			Differential Select
Imputs / Outp	uts / Brake		Limit switch option
I NanoJ App		Add to Import Export Copy M Paste C	Module Iodule Controls Group e Module
START AUTOSETUP Short Auto Setup run Auto Setup peed in %e Auto Setup	🖏 Autosetup	OFF	Add Parameter Add Special Controls Get Group Get Group Ummak Group Export Group Copy Group Controls
MEASURED RESULTS Resistance [Ohm] Inductance [H] Magnetic flux [Vs]		0E+00 0E+00 0E+00	Paste Control Remove Group Properties
	Properties	for: New con	trol group
Key	Value		
Controls group name			New control group
Version			
Description			
Visibility	Basic		~

Basic

A controls group bundles individual operating elements or parameter sets.

- **1.** To set up a controls group: Co-click the module.
- 2. In the context menu: Either create a new controls group via Add Controls Group.
- 3. Or fetch an existing one via Import Group.
- In any case, the controls group appears in the work desk (3).
- 5. Right there: Co-click the group and its **Properties**. **Note:** You can edit *any* object via **Properties**.
- 6. In the pop-up: Name the controls group as needed.
- If needed: Versionize and describe the group.
 Note the pull-downs for granted viewing and editing rights (here: both *Basic*).
- **8.** After last entry: Set a tab stop (so that all is stored).
- 9. Only then: Close the pop-up.

6.3 Work desk (3)

Editability

At the work desk, in the user screen's half-left, you edit the properties / contents / controls of your project and systems. Depending on assembly, different tabs are above the worktable:

~

An **Attributes** area accompanies all items (also module groups); **Bus settings**, by contrast, only the project itself. The **Connection settings** tab, finally, is for systems only; and **Configuration** is only for modules. Each tab opens different aspects:

Controls groups Operator clusters

Parameters Operator values

Special controls Feature operators

Complex controls Multi-level operators

Controls group > Parameter

START AUTOSETUP			
Short Auto Setup run		OFF	Add Parameter
Auto Setup speed in ‰		1000	
Auto Setup			Set Group Get Group
			Mark Group
	🖏 Autosetup		Unmark Group
			Export Group
MEASURED RESULTS			Copy Group Controls
Resistance [Ohm]	OE	+00	Paste Control
nductance [H]		+00	Remove Group
nuuctance [n]	01		Properties

1. To add a parameter: Co-click the controls group and click Add Parameter.



() Nanotec	Add parameter to : "Brake Settings" group			×
Expand / Collapse All	Filter: device			
Name		Access	Index	Sub
	Device Type			
	Manufacturer Device Name			
 (0x4041) Device Id 	Device Id	R	0x4041	0x00
Device Id		к	0x4041	0000
() Nanotec	Add parameter to : "Brake Settings" group			×
Expand / Collapse All	Filter: device			
Name		Access	Index	Sub
• (0x1000)	Device Type			
	Manufacturer Device Name			
- (0x4041)	Device Id	R	0x4041	0x00
Device Id		ĸ	0x4041	0x00
() Nanotec	Add parameter to : "Brake Settings" group			×
	Please select visual representation from the list below			
Standa	rd Control			
Read O	nly Control			
Bit Con	trol			
Drop D	own Control			
Drop D	No options available own Listbox Mask Control	£		
Read O	nly Key Value List Control	٢		
Colorer	List Box Control			
Colored	a back solve control			
		K Back		Finish
L				

- 2. In the pop-up: Enter *device* or *0x4041* to filter for the **Device Id** object.
- 3. You may expand objects by mouse (or tick at **Expand all**).
- 4. Click Device Id and Next (if wrong: step Back).
- 5. In the next pop-up: Select the visual reprentation and click Finish.

Controls group > Special controls

 CONFIGURATION 			Ê Co
		Show current	values
 CLOSED LOOP SUBMODE 			■ Auto Refr
Position Loop for Velocity-Modes		Only Velocity loop	Add Parameter
Auto Alignment		Off	
Real Torque Mode		Off	
Slow Speed Mode		Off	Get Group Mark Group
 START AUTOSETUP 			Unmark Group
			Export Group
Short Auto Setup run		OFF	Copy Group Controls
Auto Setup speed in ‰		1000	Paste Control
Auto Setup			Remove Group
			Properties
	🕲 Autosetup		

	×
Complex C Device Co	
Control List	
Autosetup	
Firmware Update	
Jog Console	
Motion lest	
NanoJ Control	
Memo Text	
Preview Complex Control	
Jog Mode	
Velocity [rpm]	
« »	
	Cancel Add

- 1. Co-klick a controls goup to open its context menu.
- 2. Select Add Special Controls to open the Complex controls list.
- 3. In the pop-up: Select the needed item.
- 4. To confirm: Click Add.



6.4 Display wall (2)

The display wall contains the monitors, error list, current OD values, help and console.

Monitoring	OD Monitor	Help
Console	Error List	NanoJ
Currently no errors occurred		
Console	Error List	NanoJ
Monitoring	OD Monitor	Help
+ Add → Import		
> MONITOR		-
> STATUS		
 LIMITS SETTINGS 		
ČURRENT LIMITS		
Peak current/torque [m	A] 2500	
Motor nominal current	[mA], (Datasheet) 2000	
Max current	1000	
Maximum duration of p	peak current 0	
Y SPEED LIMITS		
Max motor speed (User	Unit) 30000	
Max profile velocity	30000	
Max acceleration	5000	
Max deceleration	5000	
Y POSITION LIMITS		
		•

Several tabs facilitate navigation in the display wall, in the user screen's upper right.

In the **Monitoring** tab, you combine either single or grouped monitors to track individual system behavior in real time.

- 1. To set up a monitor: Co-click the tab Monitoring.
- 2. In the context menu: Either create a new monitor via Add Monitor Module.
- 3. Or fetch an existent one via Import Module.

The bottom part of the monitor display contains always the system monitor which shows the current device and connection status information.



Console	Error List	NanoJ
Monitoring	OD Monitor	Help
C+ Read Dump)	
OD Description BOOLEAN	Index Sub Index Value Hex 0x0001 0x00	Bin
INTEGER8	0x0002 0x00	
INTEGER16	0x0003 0x00	
INTEGER32	0x0004 0x00	
UNSIGNED8	0x0005 0x00	
UNSIGNED16	0x0006 0x00	
UNSIGNED32	0x0007 0x00	
REAL32	0x0008 0x00	
VISIBLE_STRING	0x0009 0x00	
OCTET_STRING	0x000A 0x00	
UNICODE_STRING	0x000B 0x00	
TIME_OF_DAY	0x000C 0x00	
TIME_DIFFERENCE	0x000D 0x00	
DOMAIN	0x000F 0x00	
Number of entries	0x0020 0x00	
COB-ID	0x0020 0x01	
Transmission Type	0x0020 0x02	
Inhibit Time	0x0020 0x03	
Reserved	0x0020 0x04	
Event Timer	0x0020 0x05	
SYNC start value	0x0020 0x06	
Number of entries	0x0021 0x00	
1st object to be mapped	0x0021 0x01	
2nd object to be mapped	0x0021 0x02	
3rd object to be mapped	0x0021 0x03	
Ath object to be manned	∩v0021 0v0A	· · · · ·

OD Monitor: Lists all objects from the controller's dictionary, together with their current values. For updates: Click **Read**.

To save the list as a text file on the hard drive: Click **Dump**. Keep the text file with current values ready in case of support enquiries.

CONFIGURATION		Console	Error List	NanoJ
	Show current values	Monitoring	00 Monitor	Help
 SI UNIT VELOCITY 		Auto Refresh Help		
SI Velocity Pos Unit	Rev VV	Current Object	Index 0x3240 Sub Index 0x02	
SI Velocity Time Unit	Min v 🗸			
SI Velocity Unit Exponent	none ~ V	OD_3240_02 Function Parent topic: OD_3240_00 Di		
 SI UNIT POSITION 		Object description		
SI Position Unit	liner v V	Index 3240,		
SI Position Unit Exponent	10^-1 V	Object name: Digital Inputs C Object Code: ARRAY	Control	
GEAR RATIO		Data type UNSIGNED32		
Motor revolutions	1 🖌	Savable yes, category	application	
Shaft revolutions	1 🖌	Value description		
FEED CONSTANT		Subindex 02s		
Linear Feed	1	Name Function Inve Data type UNSIGNED3		
Shaft revolutions	1	Access read / write	2	
		PDO mapping RX-PDO		
ATTRIBUTES		Description		
			 This subindex switches from value "1" in object <u>SQED</u>,) to nor value "0"). 	
		normal inputs. If the bit has t	unctions (except for the clock a the value "0", normally open log anges the logic of input 1, bit 1	ic applies; for the value "1", r

Monitoring OD Monitor		Help	
Console Error List		NanoJ	
lug & Drive Studio Console ype 'help' for more information. 3202 1 0x0000 0001 0000 0000 0000 0000 0000			
3200=1			
⊳ [3200=1] Monitoring	OD Monitor	Help	

Help: Displays the description of the currently chosen element (OD object).

Console: Use this to quickly read/write.from/to the device's object dictionary.

Type <od index>:<od subindex> for read.

Type <od index>:<od subindex>=<value> for write.

Error List: Here you can read the actual errors.

Currently no errors occurred



7 Project setup

In a project, you manage your devices, settings, connections, etc. **Note:** Ex works, in the software's templates folder, there is a sample project each for an external andan integrated controller. Nanotec recommends using these templates.

Load / Create a project

Created from Template PD-Motor* System1	
 Device Settings 	FIRMWARE UPDATE
Basic Setup =	Firmware Update
Pi Tuning	No Firmware has been loaded. Please load a firmware from file.
Closed Loop	Lead File Cloud Update E Remove L Update Device
inputs / Outputs / Brake	
Hamo) App	Motor Type Support Support
File Device View	v Help

1. In the user screen: Visit the <u>file menu</u> (1)

- 2. Preferably use **Project > Open** to select an existent sample project for template.
- 3. Or, for a new one instead: Select **Project > New**.
- 4. If a pop-up wants to store the current project: Click Yes.
 - No will close the project unstored and without backup.
 - Cancel will just close the pop-up.
- The newly loaded selection appears in the <u>project</u> <u>bar</u> (4)

If needed: Name the project

🖌 🕞 Template: Motor	Add New System
🖌 🛄 System 1	Import System
 Quick Sta 	Paste System
Basic S	Properties

- 1. Go to the Project bar (4).
- 2. Co-click the current project and Properties.

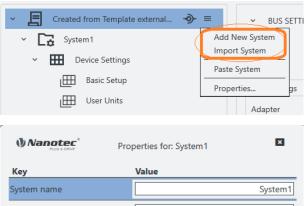
7 Project setup



Nanotec [®]	Properties for: Proejct 1	×
Кеу	Value	
Project name		Proejct 1
Creation date	25.07.2023	15
Version		1
Description		
User level	Expert	~
Protection Write Mechanic	s	

- **3.** In the pop-up: Name, versionize, and describe the project. **Note** the pull-down for granted user rights (here: *Expert*).
- **4.** After last entry: Set a tab stop (so that all is stored).
- 5. Only then: Close the pop-up.

Load / Create a system



Version	
Description	System1
Check device	PD5
Check firmware	2213

In the project: Preferably use Import System to select an existent sample system for template. Or for a new one instead: Select Add new

- 2. Or, for a new one instead: Select Add new system.
- **3.** In the pop-up: Name, versionize, describe the system as needed.
- **4.** After last entry: Set a tab stop (so that all is stored).
- 5. Only then: Close the pop-up.
- 6. Repeat for each additional system.

Connect to adapter



- 1. In the project bar (4): Select your project.
- 2. In the work desk (3): Open the Bus settings tab.
- 3. In the Bus settings tab: Select the Bus type.
- 4. Check setup by Scan adapters. If no result: <u>Set up</u> <u>an adapter</u> and check again.
- 5. Select the needed adapter.



Connect to device

- 1. In the **Bus settings** tab: With the <u>adapter linked</u>, you can see all available devices.
- 2. Click Scan devices. Check Connected device.
- 3. By Pulldown: Select a system to link your device to.

4. You can link / unlink the device via **Connect** icon (here: green).

Select the OD file

PNDS3 shows objects that match the controller firmware with correct OD file only (object dictionary). If the system is linked, a **Object Dictionary Entries** tab shows if the correct OD file is loaded. Otherwise, the generic file *Common OD* loads, by which you reach available objects of all Nanotec products.

Object Dictionary Entries		
≓ Change OD File		Correct OD
Remove OD File	Device Name / Code	: PD4-C5918X4204-E-01 / 43
	Hardware Version	: W006
→ Load From Cloud	Firmware Version	: FIR-v2139-B1022383
	Serial Number	B958420 20/23-0010
	OD.xml	:

- **1.** Select the system.
- 2. Open the Object Dictionary Entries tab.
- Common OD: Reloadable via Remove OD File
- OD file of choice: Loadable via Change OD File
- Firmware-correct OD files for all Nanotec controllers: In the Firmware package on the PNDS3 website or via Load From Cloud (internet access necessary).

Wrong OD files report an error (= red).



8 Special controls

Via **Special controls**, you add **Complex controls** and **Device communication settings** to the user interface. Both help you to use advanced controller functions.

Basic principle

CLOSED LOOP SUBMODE Postion Loop for Velocity-Modes Only Velocity-Modes Only Velocity-Modes Only Velocity-Modes Only Velocity-Modes Only Velocity-Mode Only Add Special Controls Bed Torque Mode Off Unmark Group Export Group Exp		
CLOSED LOOP SUBMODE Proteinon Loop for Velocity-Modes Auto Adignment Real Torque Mode Get Group Control List Auto Setup properties Complex C Device Co Control List Autosetup Firmware Update Jog Console Motion lest NanoJ Control Memo Text	, CONFIGURATION	Î.
Complex Curror for Velocity-Modes Auto Alignment Auto Setup Trans Autor Complex Curror Complex Curror Control List Autosetup Firmware Update Jog Console Motion Lest NanoJ Control Jog Mode Velocity [rpm]		Show current values
Auto Alignment Real Torque Mode Stow Speed Mode Off Staff AUTOSETUP Short AUTOSETUP Short AUTOSETUP Short AUTOSETUP Copy Citing Controls Remore Group Properties Complex C Device Co Control List Autosetup Firmware Update Jog Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	 CLOSED LOOP SUBMODE 	= Auto
Autoraphinans Autoraphinans Stew Speed Mode Stew Speed Mode Stew Speed In % Auto Setup un Auto Setup paged in % Autosetup Complex C Control List Autosetup Firmware Update Log Console Motion lest NanoJ Control Jog Mode Velocity [rpm]	Position Loop for Velocity-Modes	
Rel Torque Mode Off Cel Comp Cel	Auto Alignment	
Stow Speed Mode Off Mark Group Stark AUTOSETUP Short Auto Setup run Auto Setup speed in %- Tool (Control List Autosetup Firmware Update Jog Console Motion lest Nano J Control Memore Control Stark Soft Preview Complex Control Jog Mode Velocity [rpm]	Real Torque Mode	Get Group
Start AUTOSETUP Short AUTOSETUP DEF Concup Copy Group Controls Remove Group Poperties Complex C Device Co Control List Autosetup Firmware Update Jog Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Slow Speed Mode	Off Mark Group
Short Auto Setup run OFF Copy Group Controls Auto Setup Totol Auto Setup Remove Group Properties Complex Campoint Complex Campoint Device Coampoint Control List Autosetup Firmware Update Jog Console Motion lest Nano J Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	 START AUTOSETUP 	
Auto Setup peed in %- Auto Setup Auto Setup Auto Setup Parte Control Remove Couplex Complex C Perview Complex Control Jog Mode Velocity [rpm] Perview Complex Control	Short Auto Setup run	000
Properties Properties Properties Properties Properties Provide Name Complex C Device Co Control List Autosetup Firmware Update Jog Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Auto Setup speed in ‰	
Autosetup Complex C Device Co Control List Autosetup Firmware Update log Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Auto Setup	Remove Group
Complex C Device Co Control List Autosetup Firmware Update Jog Console Motion lest NanoJ Control Memo Text	19. Autosetup	Properties
Complex C Control List Autosetup Firmware Update log Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Cg Pattoccop	
Complex C Control List Autosetup Firmware Update log Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]		
Complex C Control List Autosetup Firmware Update log Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Napotec [®]	R
Control List Autosetup Firmware Update Jog Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	PCUG & DRIVE	_
Control List Autosetup Firmware Update Jog Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Complex C Device Co	
Autosetup Firmware Update Jog Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Complex C	
Autosetup Firmware Update Jog Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Control List	
Firmware Update Jog Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Control Est	
Jog Console Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Autosetup	
Motion lest NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Firmware Update	
NanoJ Control Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Jog Console	
Memo Text Preview Complex Control Jog Mode Velocity [rpm]	Motion lest	
Preview Complex Control Jog Mode Velocity [rpm]	NanoJ Control	
Jog Mode Velocity [rpm]	Memo Text	
Jog Mode Velocity [rpm]		
Jog Mode Velocity [rpm]		
Velocity [rpm]	Preview Complex Control	
	Jog Mode	
	Velocity (rpm)	
		»
		>
		<u> </u>
Cancel Add		Cancel Add

Special controls define and monitor (as macro collections) the system behavior. Depending on assembly, you can check their connections and attributes in the work desk.

- 1. To set up complex controls or device communication: Co-click the controls group.
- 2. In the context menu: Select Add Special Controls.
- 3. Complex controls? Device communication settings? Open the tab of choice.
- 4. Select the needed item and Add.

 \rightarrow The control / setting of choice appears in the work desk.

8.1 Complex controls

With the **Complex controls** macro collection, you create your own controller functions. Next to **Autosetup** and **Firmware update**, these include **Jog Console**, **Motion Test**, **NanoJ Control** and **Memo Text**.

Autosetup

Autosetup detects the motor type and connected sensors (encoder / Hall sensors).



CAUTION!

Injury: from abrupt motor travel after auto-setup (= parameter loss)!

- ▶ For motors with integrated controllers: Avert auto-setup (since it comes factory-run already).
- ▶ Otherwise: Restart the motor after auto-setup (homing alone won't suffice).
- Stay clear of moving motor parts.
- ► Touch the motor at standstill only.

NOTICE

Motor malfunction: from auto-setup user error!

- Close possible NanoJ programs (object 2300_h:00_h Bit 0 = "0"; cf. 2300h NanoJ Control).
- ▶ Keep the motor load-free, and freely rotable in any direction.
- **Don't** touch the motor.

Auto Setup		
	🖏 Autosetup	

As long as the motor on the controller or the feedback sensors (encoder / Hall) remain the same: Run **Autosetup** only once, on initial commissioning.

Firmware update

Ť

Nanotec recommends controller firmware *FIR-v2213* or newer. Please find the current version in the **Firmware** folder on the PNDS3-website or via **Load From Cloud** (see <u>Select the OD file</u> internet access necessary).

File name:	
File firmware version:	FIR-v2213-B1031134-97034e08
Product codes:	1; 2; 3; 23; 39; 43
Device name:	PD4-C5918X4204-E-01
Hardware version:	W006
Firmware version:	FIR-v2139-B1022383
Product code:	43

- 1. Open or add the Firmware update control.
- 2. Click Load from file.
- 3. Select a firmware file and click Open.
- 4. PNDS3 checks via product code if the chosen file fits to the product.
- 5. Click Update device.
- 6. Firmware updates itself.

Note: The chosen firmware file will be stored as part of the project the next time the latter is stored. If you don't want this to happen, click **Remove from project** before.

Jog Console

Jog Mode	Via Jog Console, y
Velocity [rpm]	You can select two
< <u>500</u> >	as long as you use
	left / right rotation.

/ia **Jog Console**, you test the motor in velocity mode. You can select two target speeds. The motor runs as long as you use the mouse to press the button for eft / right rotation.



NOTICE

The console may be deactivated, in case the controller is cu



Motion Test

Mo	de: P	osition Abs	olute 🗸	Loop: End	ess 👻		
	Start		Stop				Set Current Position (7)
	Step	Position	Vel	Acc Ramp	Dec Ramp	Pause (ms)	
~		Position 1 500	Vel	Acc Ramp	Dec Ramp 200		

In **Motion Test**, you test the motor in position / velocity / torque mode. Your options include target values, acceleration / deceleration ramps, repetition cycles, test run duration etc.

NanoJ Control

Project	
Project	NanoJ App
Version	1.0.0
ন্ট্রী Import Coo	de E* Export Code

In **NanoJ control**, you create a NanoJ new project (= **New**) or **Import** an existing one. The button **Build** compiles the project.

Note: The next time you store the project, the selected NanoJ file merges into the project. If you don't wish this to happen, click **Remove** before.

Memo Text

Adds a freely editable text box.

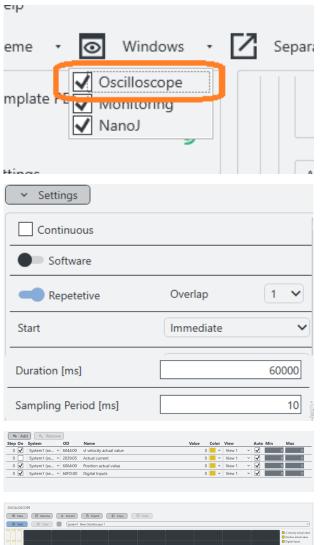
8.2 Device communication

With these controls, you parametrize the device communication. **Note:** Coding switches for setting the communication parameters overwrite the software settings on some devices. For details: Follow valid OEM instructions.



9 Oscilloscope

Via **Oscilloscope**, you monitor and control in real time the current value of device parameters from the object dictionary, say, for recording.



To open the oscillosope, go to the **Main Menu > Windows** and select it.

Under Settings you can configure the following:

- Continuous: If chosen, the oscilloscope starts imeediately and runs continuously, until the buffer is full (if On-Device) or after the set Duration expires (if Software is selected). If not selected you can further define the conditions for start/stop.
- Start: Immediate, Condition (On-Device, as soon as a parameter of choice changes), or Motion test (Software, Motion test triggers the scope).
- **Stop: Duration** (of recording) or manual.

In the right bottom corner you can add channels by selecting from the object dictionary or remove them.

For recording, you open a new (or import an existing) oscilloscope in the tab above the settings and click **Start**.



10 Imprint, versions

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Document	Changes	PNDS3
1.0.0 (06/2022)	Edition	V1.3.0
1.0.1 (11/2022)	New software version V1.4.0, new firmware FIR-v2213	V1.4.0
1.1.0 (11/2023)	New software version V1.5.2	V1.5.2
1.2.0 (04/2024)	New software version V1.6.0	V1.6.0
1.3.0 (10/2024)	New software version V3.1.7 (1.7.0 according to the old versioning).	V3.1.7
	Modbus TCP support added.	
	Firmware and OD file can now be directly downloaded from cloud, see <u>Select the</u> <u>OD file</u> .	