

DriveLab

User Guide



About this document

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This document applies to version 1.0 of the DriveLab software.

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For more information visit www.piezomotor.com or send your question to support@piezomotor.se



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About DriveLab

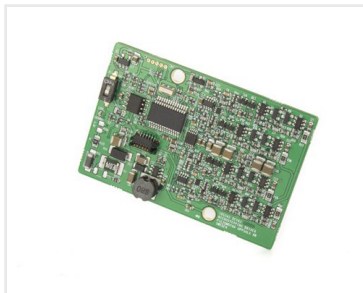
PiezoMotor DriveLab is a software tool that provides a test environment for the Piezo LEGS® range of linear and rotary precision motors. DriveLab is mainly intended for demo and starter kits.

System requirements

Operating system: Windows 7/10

Supported controllers

The PiezoMotor DriveLab software supports the following controllers:



**Piezo LECS® Controller
PMD401**



**Piezo LECS® Controller
PMD301**

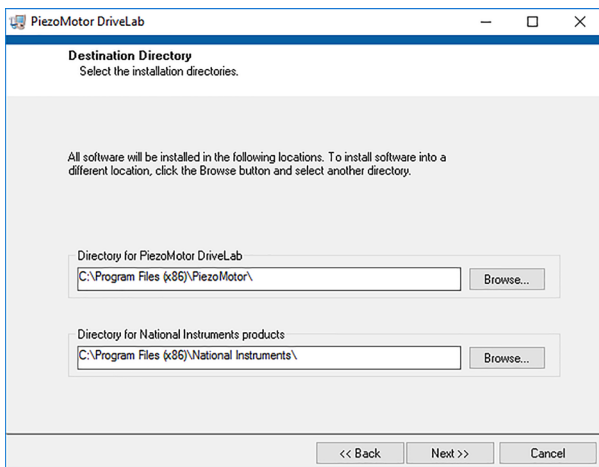


**Piezo LECS® Controller
PMD101**

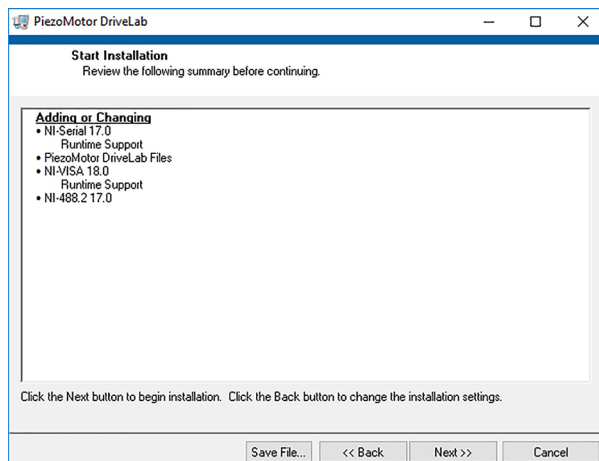
PMD101 is not recommended for new designs.

Installing DriveLab

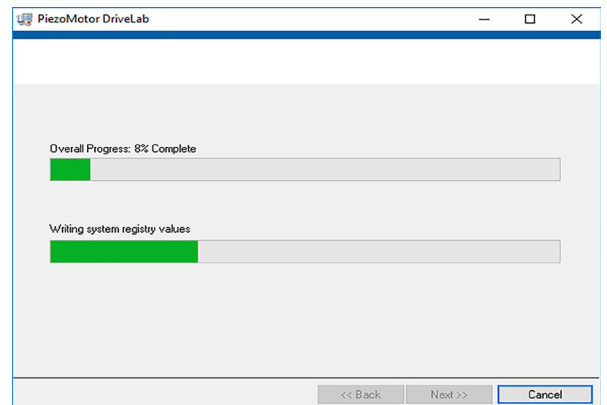
1. Download the DriveLab software from www.piezomotor.com.
2. To start the installation procedure, navigate to the directory where the downloaded files are saved. Unzip the downloaded file.
3. Double-click the file `setup.exe`. The installation wizard starts.
4. To use the default installation directories, click **Next**. To install the software into a different location, click the **Browse** button and select another directory. Note that the DriveLab software also incorporates support files from National Instruments.



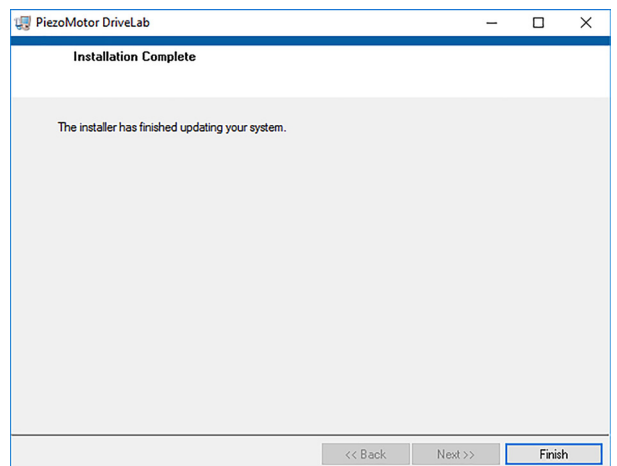
5. Click **Next** to start the installation procedure.



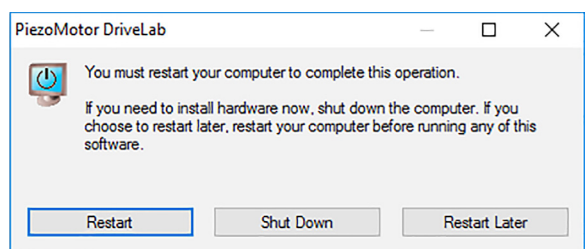
6. The progress bars show how the installation proceeds.



7. When the installation is complete, click **Finish**.



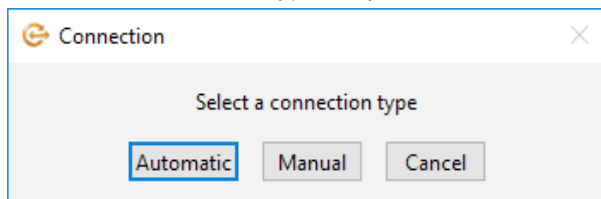
8. To complete the installation, restart your computer. Select how to perform the restart.



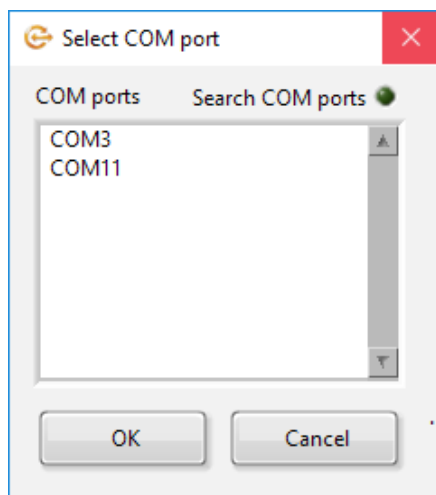
Starting DriveLab

Important: Make sure to plug in the power supply to the controller before you connect the USB cable to your computer.

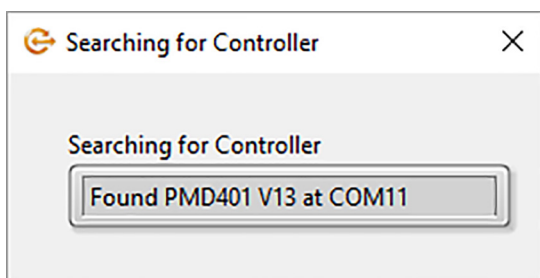
1. Connect your controller (PMD301 with a USB or RS-485 cable, PMD401 with a RS-485 cable, or PMD101 with a USB cable) to the computer.
2. Double-click the **PiezoMotor DriveLab** icon to start the DriveLab software.
3. The **Connection** dialog box is displayed. Select the connection type for your controller.



- **Automatic** is the recommended connection type. Note that this connection type sends a question to each of the COM ports on your computer. DriveLab connects to the controller via the port that sends the correct answer.
- Select the connection type **Manual** to display a dialog box where you can specify the port where the controller is connected.



4. When DriveLab finds a controller on the specified connection, the following message is displayed:



When the connection to the controller is established, DriveLab displays the **Control** page.



Axis address

Every PMD301 and PMD401 controller delivered from factory has the default address 0.

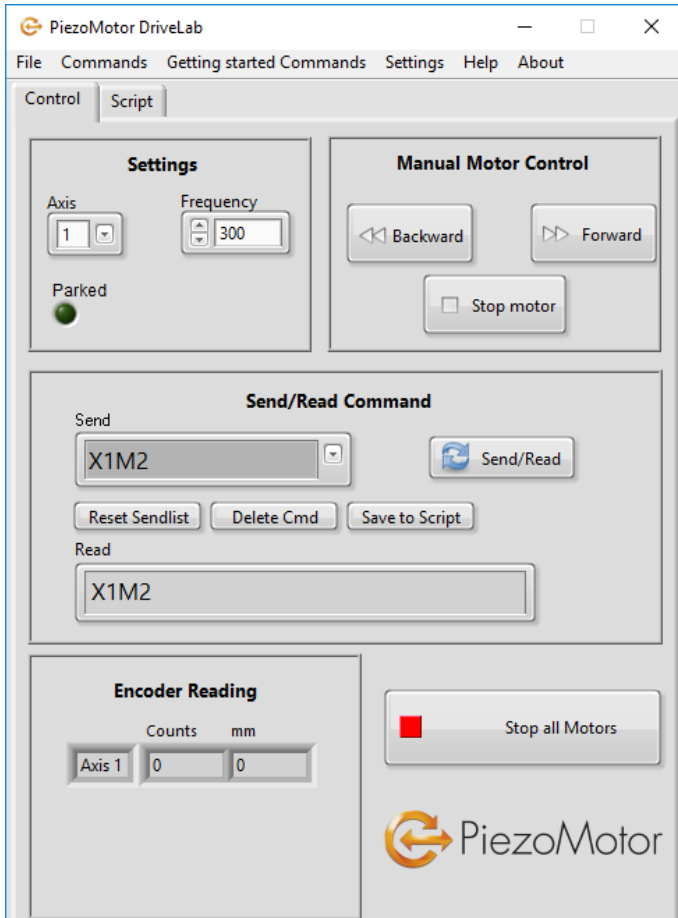
When the controller is connected to DriveLab, the axis address is automatically set to 1. For each additional controller that is connected, the axis address is incremented by 1.

The highest possible axis address that you can set in DriveLab is 4. For more information, see Troubleshooting on page 10.

Note: PMD101 has no multi-axis support and therefore it can only handle one axis address.

Control page

Use the **Control** page to manually control the connected motor.



Settings

Axis	Select the axis to control from this page. The maximum number of axes is 4. Note: DriveLab displays the axis information also for a controller that was disconnected, if the axis address is lower than the address of the connected controller.
Frequency	Select the frequency of the motor (in Hz). This corresponds to the menu command Command>Settings>Speed .
Parked	This indicator is red when the motor is parked.

Manual Motor Control

Backward	Runs the motor in backward direction. Alternatively, use the F1 key. When you click this button, it is highlighted until the motor motion is stopped.
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Forward	Runs the motor in forward direction. Alternatively, use the F2 key. When you click this button, it is highlighted until the motor motion is stopped.
Stop motor	Stops the motor motion. Alternatively, press Esc on your keyboard.

Send/Read Command

Send	Type the command to send to the controller. If the command has a trailing semicolon (;), the controller does not send a response. Click the arrow in the right-hand side of the text box to see a list of the commands that have been sent. Right-clicking in this text box displays a context menu that contains the same menu commands as the Getting started Commands menu.
Send/Read	Sends a command to the controller and displays the response from the controller in the Read text box.
Reset Sendlist	Resets the list of commands to be sent to the controller
Delete Cmd	Deletes the displayed command from the send list.
Save to Script	Saves the displayed command to a script file. For more information, see Script page on page 9.
Read	Displays the response from the controller.

Encoder Reading

The text boxes display the encoder reading for each axis, in number of counts and in millimeters. To set the count -to -millimeter conversion, choose **Set encoder resolution** from the **Settings** menu.

Stop all Motors

Stops all running motors immediately. This can be used as an emergency stop.

Menus

Menus are located across the top of the screen. The contents of the menus depend on which controller is installed.

When you select a motor control command from a menu, the command is executed immediately and the corresponding text command is displayed in the **Send** text box.

Note: DriveLab uses the command `U0` to read the status of an axis. If the `U0` command was sent from the **Send** text box or from the **Commands** menu, DriveLab cannot read the `U0` parameters that are underlined in the Technical Manual.

Commands

For information about the commands on this menu, refer to the Technical Manual for the controller in use.

Note that the menu commands for motor control also show the corresponding text commands.

Getting started Commands

Use the commands on the **Getting started Commands** menu to control the motor in an easy way.

The set of commands on this menu is a subset of the commands on the **Commands** menu.

Target mode position limit A (<A) [Y3]
 Target mode position limit B (>B) [Y4]
 Wfm Delta [M2]
 Wfm Rhomb [M1]
 Run motor-Jog [J]
 Reset Encoder [E0]
 Read encoder [XE]
 Move to target [T]
 Park [M4]

Menu command	Description
Target mode position limit A	Sets the lower limit for the target mode position.
Target mode position limit B	Sets the upper limit for the target mode position.
Wfm Delta M3	Uses the Delta waveform. This is the default waveform.
Wfm Rhomb M1	Uses the Rhomb waveform.
Run motor-Jog J	Runs the motor in open loop mode.

Menu command	Description
Reset Encoder E0	Resets the encoder value to zero.
Read encoder XE	Reads the current encoder value.
Move to target T	Displays a dialog box where you can set the speed and the target position for the closed loop motion. The position is defined by encoder counts. The motor starts running. If the motor does not run to the specified target, make sure the values for Target mode position limit A and Target mode position limit B are high or low enough, respectively.
Park M4	Parks the motor, that is the driver voltage to the motor is shut off.

Settings

Use the commands on the **Settings** menu to make settings for scripting and encoder resolution.

Scripting	Path to script
Set Encoder Resolution	Delay

Menu command	Description
Scripting>Path to script	Displays a dialog box where you can browse to and select the script that you want to load into DriveLab.
Scripting>Delay	Displays a dialog box where you can set a delay time and write it to a script.
Set Encoder Resolution	Displays a dialog box where you can set the resolution, in $\mu\text{m}/\text{count}$, for the first three axes.

Help

This menu contains links to the PiezoMotor website and to the Technical Manuals for the PMD301 and the PMD401 controllers.

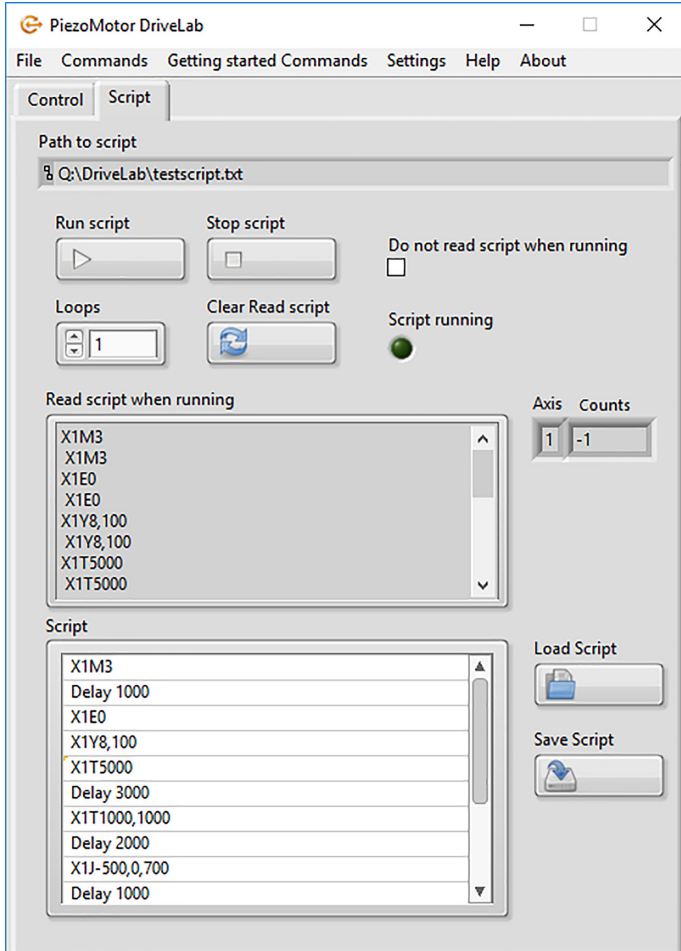
About

Click the **About** menu to display a dialog box with the version number of the DriveLab software and the contact information for PiezoMotor.

Script page

Use the **Script** page to save your commands to a script. For more information about the commands, refer to the Technical Manual for the controller in use.

The following example script uses axis 1.



Path to script	Displays the path to the script that you specified with the menu command Settings>Path to script , by clicking the button Save to script on the Control page, or by clicking the button Load Script .
Run script	Starts the execution of the script.
Stop script	Stops the execution of the script.
Do not read script when running	Select this option to prevent the reading of the script during the execution.
Loops	Select the number of times that the script will be executed.
Clear Read script	Click this button to clear the contents of the list Read script when running .
Script running	This indicator has a green light when a script is running.

Read script when running	Displays the specific script command that is being executed. If the command requires a response from the controller, this response is also displayed here.
Axis/Counts	When the script is executing, these text boxes display the encoder positions of the axes in counts.
Script	Displays the commands of the loaded script. This area is editable, which means that you can add, replace, or remove commands.
Load Script	Click this button to load an existing script.
Save Script	Click this button to save any changes that were made to the loaded script. However, if you need to make changes to a script, it is easier to edit the script text file in an external editor and then load that script file into DriveLab again.

The example script contains the following commands:

Command	Description
X1M3	Set the waveform to Delta.
Delay 1000	Set a 1000 ms delay.
X1E0	Set the encoder value to 0.
X1Y8,100	Set target speed to 100 Hz.
X1T5000	Set target to 5000 counts. The motor starts running.
Delay 3000	Set a 3000 ms delay.
X1T1000,1000	Set target to 1000 counts and speed to 1000 full steps/second. The motor starts running.
Delay 2000	Set a 2000 ms delay.
X1J-500,0,700	Run the motor 500 full steps, then 0 microsteps, and sets the speed to 700 Hz. The motor starts running.
Delay 1000	Set a 1000 ms delay.
X1H700	Set open loop speed to 700 Hz.
X1J-500	Run the motor 500 full steps. The motor starts running.
Delay 2000	Set a 2000 ms delay.
X1T0,600	Set target to 0 counts and set speed to 600 Hz. The motor starts running.
X1?	Read controller type and firmware revision number.

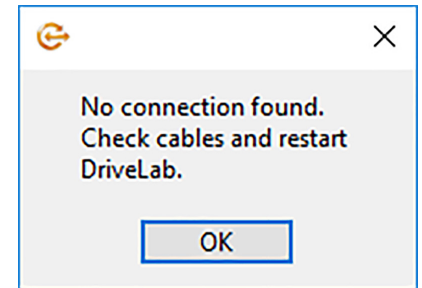
Note: The Delay command only affects the DriveLab software. No command is sent to the controller.

Troubleshooting

Axis address higher than 4

If you change the address of an axis to for example 7 while working with DriveLab, you can use this address as long as DriveLab is running. If it is restarted, the axis cannot be found and an error message is displayed.

To solve this, change the address of the axis. For information about how to set up multiple axes and how to set their addresses, see the Technical Manual for the controller in use.



Two controllers with the same axis address

If you connect two controllers with the same axis address when you start DriveLab, an error message is displayed:

To solve this :

1. Unplug the power supply.
2. Disconnect the USB cable.
3. Disconnect one of the controllers.
4. Plug in the power supply.
5. Connect the USB cable to the computer.
6. Start DriveLab.
7. Set the address of the connected controller to 0 according to the instructions in the Technical Manual.
8. Close DriveLab.
9. Repeat steps 1 and 2.
10. Replace the connected controller with the next controller.
11. Repeat steps number 4-6.
12. Set the address of the connected controller to 1 according to the instructions in the Technical Manual.
13. Close DriveLab.
14. Repeat steps 1 and 2.
15. Connect the other controller.
16. Restart DriveLab. Two controllers with the respective axis addresses 1 and 2 are now connected.

