

N-725

PIFOC[®] Piezo Nanofocusing Z Drive with NEXACT[®] Linear Motor



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About this Document

This user manual contains information necessary for the intended use of the N-725.

It assumes that the reader has a fundamental understanding of basic servo systems as well as motion control concepts and applicable safety procedures.

Symbols and Typographic Conventions

The following symbols and typographic conventions are used in this user manual:

NOTICE



Dangerous situation

If not avoided, the dangerous situation will result in damage to the equipment.

- Actions to take to avoid the situation.

INFORMATION

Information for easier handling, tricks, tips, etc.

The following symbols and markings are used in the user manuals of PI:

Symbol	Meaning
1.	Action consisting of several steps whose sequential order must be observed
2.	
➤	Action consisting of one or several steps whose sequential order is irrelevant
▪	List item
S. 5	Cross-reference to page 5

Other Applicable Documents

The devices and software tools that are mentioned in this user manual are described in their own manuals.

Product	Document
P-721.0xQ	P721T0002 technical note
E-861.1A1	PZ205E user manual
PIMikroMove	SM148E software manual

Downloading Manuals

INFORMATION

If a manual is missing or problems occur with downloading:

- Contact our customer service department (p. 11).

INFORMATION

For products that are supplied with software (CD in the scope of delivery), access to the manuals is protected by a password. Protected manuals are only displayed on the website after entering the password.

The password is included on the CD of the product.

For products with CD: Identify the password

1. Insert the product CD into the PC drive.
2. Switch to the Manuals directory on the CD.
3. In the Manuals directory, open the Release News (file including *releasenews* in the file name).
4. Find the user name and the password in the section "User login for software download" in the Release News.

Downloading manuals

1. Open the website www.pi.ws.
2. If access to the manuals is protected by a password:
 - a) Click **Login**.
 - b) Log in with the user name and password.
3. Click **Search**.
4. Enter the product number up to the period (e.g., P-882) or the product family (e.g., PICMA® Bender) into the search field.

5. Click **Start search** or press the **Enter** key.
6. Open the corresponding product detail page in the list of search results:
 - a) If necessary: Scroll down the list.
 - b) If necessary: Click **Load more results** at the end of the list.
 - c) Click the corresponding product in the list.
7. Scroll down to the **Downloads** section on the product detail page.

The manuals are displayed under **Documentation**.

8. Click the desired manual and save it to the hard disk of your PC or to a data storage medium.

Safety

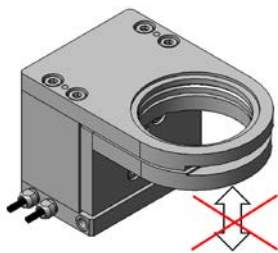
Intended Use

The N-725 is a laboratory device as defined by DIN EN 61010-1. It is intended for indoor use and use in an environment that is free of dirt, oil and lubricants.

Based on its design and realization, the N-725 is intended for maximum pull forces of 10 N and maximum push forces of 10 N. The N-725 can be mounted horizontally or vertically.

The intended use of the N-725 is only possible when completely mounted and connected and only in conjunction with suitable electronics. The N-725 can be operated using the E-861.1A1 NEXACT® servo controller.

Safety Precautions



NOTICE



Damage due to manual displacement and unallowable forces on the movable part!

Manual displacement of the movable part (see figure above) and unallowable forces can cause irreparable damage to the piezo modules in the NEXACT® linear motor.

- Do not displace the movable part of the N-725 manually!
- Do not apply a force ≥ 10 N on the movable part!

NOTICE



Fixed operation frequency for permanent operation!

- For permanent operation of the drives do not exceed operation frequencies of 800 Hz.

NOTICE



Unsuitable cables!

Unsuitable cables can damage the electronics and the N-725.

- Only use cables from PI for connecting the N-725 to the electronics.

INFORMATION

Extended cables can affect the performance of the N-725.

- If you need longer cables, contact our customer service department.

Product Description

Product View

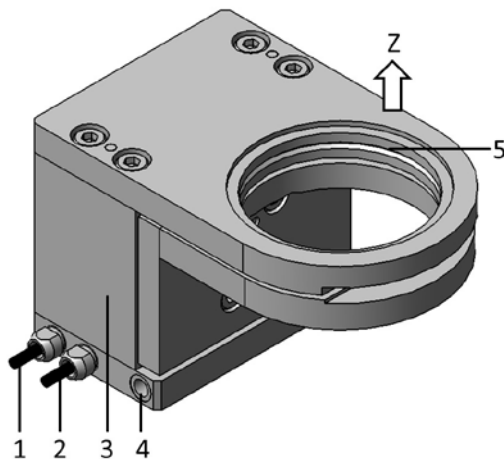


Figure 1: N-725.2A

- 1 Cable exit for piezo voltage
- 2 Cable exit for sensor signals
- 3 Housing
- 4 M4 mounting hole for connecting protective earth conductor
- 5 Movable part of the Z drive with threaded aperture

Scope of Delivery

Product number	Description
N-725.2A	PIFOC® piezo nanofocusing Z drive with NEXACT® linear motor, 2 mm travel range, with linear encoder
P721T0002	Technical note for QuickLock thread option
N725T0002	User manual for N-725.2A (this document)

Suitable Electronics

Product number	Description
E-861.1A1	NEXACT® controller, 1 channel, with linear encoder

- To order, contact our customer service department (p. 11).

Accessories

Product number	Description
P-721.05Q	QuickLock® thread adapter, M32 × 0.75

- To order, contact our customer service department (p. 11).

Unpacking

1. Unpack the N-725 with care.
2. Compare the contents with the items listed in the contract and the packing list.
3. Inspect the contents for signs of damage. If parts are missing or you notice signs of damage, contact PI immediately.
4. Keep all packaging materials in case the product needs to be returned.

Installation

Connecting the N-725 to the Protective Earth Conductor


INFORMATION

- Observe the applicable standards for connecting the protective earth conductor.

INFORMATION

When a Z drive is grounded via its protective earth connection as well as by the shield of the connecting cable for the electronics, ground loops can occur.

- If a ground loop occurs, contact our customer service department (p. 11).

On the N-725, there is an M4 hole for connecting the protective earth conductor. This hole is marked with the symbol for the protective earth conductor . See "Dimensions" (p. 13) for the location of the hole.

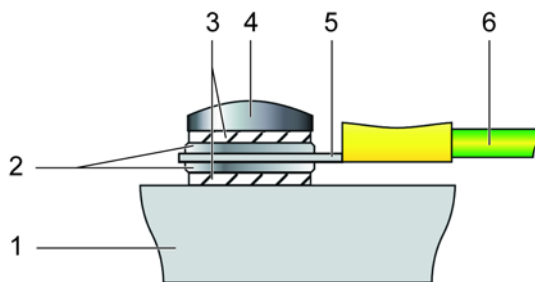


Figure 2: Connecting the protective earth conductor (profile view)

- 1 Housing] of the N-725
- 2 Flat washer
- 3 Safety washer
- 4 Screw
- 5 Cable lug
- 6 Protective earth conductor

Requirements

- ✓ You have read and understood the safety precautions (p. 5).
- ✓ The N-725 is **not** connected to the electronics.

Tools and accessories

- Suitable protective earth conductor: Cross-sectional area of the cable $\geq 0.75 \text{ mm}^2$
- M4 screw set for the connecting the protective earth conductor (p. 7)
- Suitable screwdriver

Connecting the N-725 to the protective earth conductor

1. If necessary, attach a suitable cable lug to the protective earth conductor.
2. Use the M4 screw (together with the washers and self-locking washers) to affix the cable lug of the protective earth conductor to the protective earth connection of the N-725 as shown in the profile view.
3. Tighten the M4 screw with a torque of 1.2 Nm to 1.5 Nm.
4. Make sure that the contact resistance at all connection points relevant for connecting the protective earth conductor is $<0.1 \Omega$ at 25 A.

Fastening the N-725

Requirements

- ✓ You have read and understood the safety precautions (p. 5).
- ✓ The N-725 is **not** connected to the electronics.

Fastening the N-725

- Fasten the objective to the thread intended for this purpose.

For detailed instructions refer to the separate technical note P721T0002 for PIFOC® QuickLock thread options.

Start-Up and Operation

General Notes on Start-Up and Operation

NOTICE



Uncontrolled oscillation!

Oscillations can cause irreparable damage to the Z-drive. Oscillations are indicated by a humming and can result from the following causes:

- The load and/or dynamics of operation differ too much from the calibration settings.
- The Z-drive is operated near its resonant frequency.
- If you notice oscillations, stop the Z-drive immediately.

Starting Up and Operating the N-725

Requirements

- ✓ You have read and understood the safety precautions (p. 5) and the general notes on start-up and operation.
- ✓ You have installed (p. 7) the N-725 correctly and connected it to the electronics.
- ✓ You have read and understood the user manual of the controller (p. 7) used.

Starting up and operating the N-725

- Follow the instructions in the manual of the controller for start-up and operation of the N-725.

Maintenance

NOTICE



Misalignment from loosening screws!

The N-725 is maintenance-free and precisely aligned.

- Do **not** try to manipulate or to open the N-725.

Cleaning the N-725

Requirements

- ✓ You have disconnected the N-725 from the electronics.

Cleaning the N-725

- Clean the surfaces of the N-725 with a cloth that is dampened with a mild cleanser or disinfectant (e.g., isopropyl alcohol).
- Do **not** do any ultrasonic cleaning.

Customer Service

For inquiries and orders, contact your PI sales engineer or send us an email (service@pi.de).

- If you have questions concerning your system, have the following information ready:
 - Product and serial numbers of all products in the system
 - Firmware version of the controller (if present)
 - Version of the driver or the software (if present)
 - Operating system on the PC (if present)
- If possible: Take photographs or make videos of your system that can be sent to our customer service department if requested.

The latest versions of the user manuals are available for download (p. 4) on our website.

Technical Data

Specifications

	N-725.2A	Unit	Tolerance
Active axes	Z		
Motion and positioning			
Integrated sensor	Optical linear encoder		
Closed-loop travel	2000	µm	
Min. incremental motion, closed-loop	5	nm	typ.
Mechanical properties			
Step-and-settle time for a 3 µm step at 200 g payload, 100 nm settling band	<20	ms	
Recommended load*	700	g	max.
Drive properties			
Piezoceramics	NEXACT®		
Miscellaneous			
Operating temperature range	0 to 50	°C	
Material	Aluminum		
Mass	290	g	±5 %
Cable length	1.5	m	±10 mm

* For dynamic operation. Higher dynamics are possible with a reduced load.

All specifications based on room temperature (22 °C ±3 °C).

Maximum Ratings

The N-725 is designed for the following maximum ratings:

Maximum operating voltage	Maximum operating frequency	Maximum power consumption
45 V	1500 Hz	20 W

Ambient Conditions and Classifications

The following ambient conditions and classifications for the N-725 must be observed:

Area of application	For indoor use only
Maximum altitude	2000 m
Air pressure	1100 hPa to 0.1 hPa
Relative humidity	Highest relative humidity 80 % for temperatures up to 31 °C Decreasing linearly to 50 % relative humidity at 40 °C
Storage temperature	0 °C to 70 °C
Transport temperature	-20 °C to 70 °C
Overvoltage category	II
Protection class	I
Degree of pollution	1
Degree of protection according to IEC 60529	IP20

Dimensions

Dimensions in mm. Note that the decimal places are separated by a comma in the drawings.

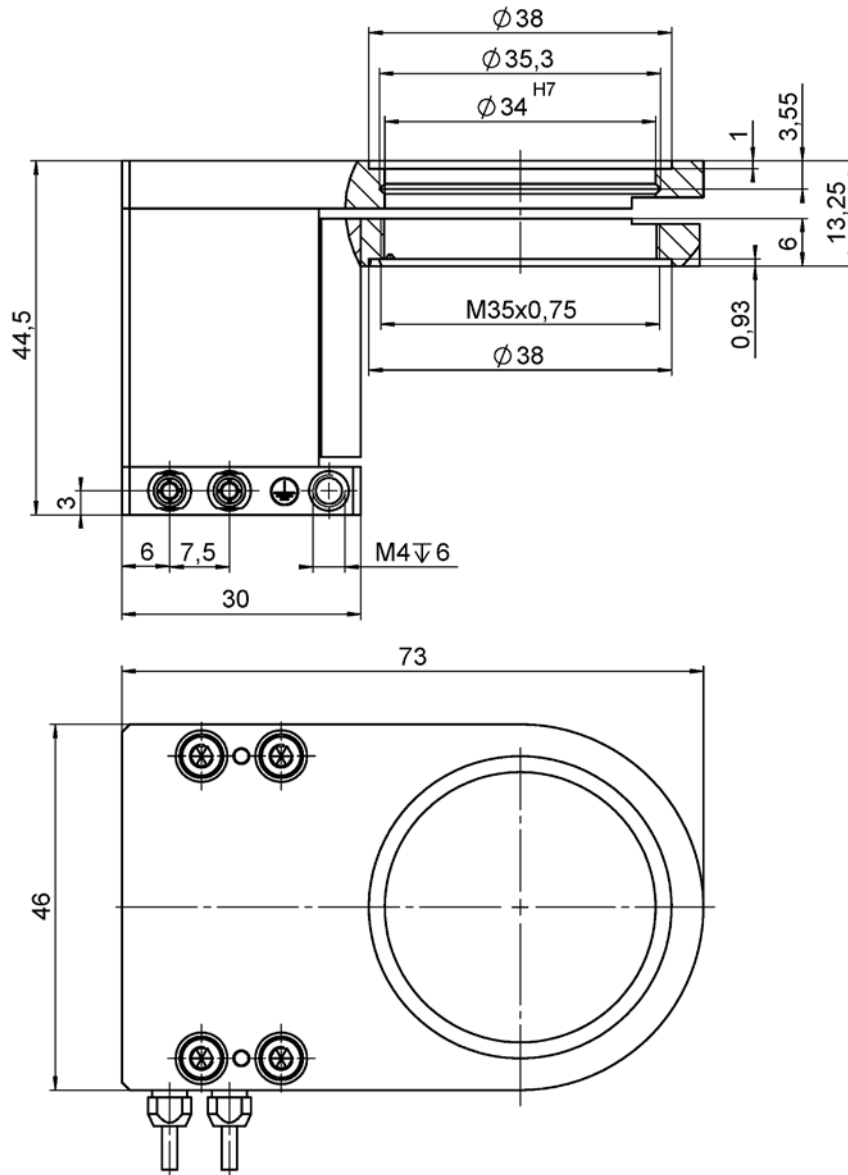


Figure 3: Dimensions of the N-725

Old Equipment Disposal

In accordance with EU law, electrical and electronic equipment may not be disposed of in EU member states via the municipal residual waste.

Dispose of your old equipment according to international, national, and local rules and regulations.

In order to fulfil its responsibility as the product manufacturer, Physik Instrumente (PI) GmbH & Co. KG undertakes environmentally correct disposal of all old PI equipment made available on the market after 13 August 2005 without charge.

Any old PI equipment can be sent free of charge to the following address:

Physik Instrumente (PI) GmbH & Co. KG
Auf der Roemerstr. 1
D-76228 Karlsruhe, Germany

