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About this Document

Symbols and Typographic Conventions

The following symbols and typographic conventions are used in this technical note:

**CAUTION**

Dangerous situation
If not avoided, the dangerous situation will result in minor injury.

- Actions to take to avoid the situation.

---

**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.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>Warning sign on the product which refers to detailed information in this technical note.</td>
</tr>
</tbody>
</table>

**Figures**

For better understandability, the colors, proportions and degree of detail in illustrations can deviate from the actual circumstances. Photographic illustrations may also differ and must not be seen as guaranteed properties.

**Other Applicable Documents**

The devices and software tools which are mentioned in this documentation are described in their own manuals.

<table>
<thead>
<tr>
<th>Description</th>
<th>Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-867.1U PILine® controller</td>
<td>MS223E user manual</td>
</tr>
<tr>
<td>PMikroMove</td>
<td>SM148E software manual</td>
</tr>
<tr>
<td>PILine® stages</td>
<td>MP121EK short instructions</td>
</tr>
</tbody>
</table>

The latest versions of the user manuals are available for download on our website ([www.pi.ws](http://www.pi.ws)).
Intended Use
The U-761.25 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.

In accordance with its design, the U-761.25 is intended for positioning, adjusting and moving loads on two axes at different velocities in interval operation. The U-761.25 is not intended for applications in areas, in which a failure would present severe risks to human beings or the environment.

The U-761.25 stage is intended to be integrated in Nikon TI and Olympus IX2/IX3 series microscopes.

The intended use of the U-761.25 is only possible when completely mounted and connected.

The U-761.25 uses PILine® ultrasonic piezo linear motors as a drive and must be operated with a suitable controller (p. 10).

Safety Precautions
General Notes on Installation

CAUTION

Dangerous voltage and residual charge on piezo actuators!
Piezomotors are driven by piezo actuators. After disconnection from the electronics, piezo actuators can remain electrically charged for several hours. Temperature changes can also induce charges in piezo actuators. Touching charged parts of the U-761.25 can result in minor injuries from electric shock.

- Do not touch the contacts in the connection sockets of the U-761.25.
- If a connecting cable is connected to the U-761.25, do not touch the contacts in the connection plug.

NOTICE

Lubricants, dirt, condensation!
Dirt, oil, lubricants and condensation will render the motor/drive inoperable.

- Ensure that the piezomotors of the U-761.25 do not come into contact with lubricants.
- Keep the U-761.25 free from dirt and condensation.

NOTICE

Heating up of the U-761.25 during operation!
The heat produced during operation of the U-761.25 can affect your application.

- Install the U-761.25 so that your application is not affected by the dissipating heat.
**NOTICE**

**Unsuitable cables!**

Unsuitable cables can cause damage to the controller and can affect the performance of the U-761.25.

- Only use original PI parts to connect the U-761.25 to the controller.
- If you need longer cables, contact our customer service department (p. 22).

---

**General Notes on Start-Up and Operation**

**CAUTION**

**Risk of electric shock if the protective earth conductor is not connected!**

If a protective earth conductor is not or not properly connected, dangerous touch voltages can occur on the U-761.25 in the case of malfunction or failure of the system. If touch voltages exist, touching the U-761.25 can result in minor injuries from electric shock.

- Connect the U-761.25 to a protective earth conductor (p. 13) before start-up.
- Do not remove the protective earth conductor during operation.
- If the protective earth conductor has to be removed temporarily (e.g., in the case of modifications), reconnect the U-761.25 to the protective earth conductor before starting it up again.

---

**NOTICE**

**Operating voltage too high or incorrectly connected!**

Operating voltages that are too high or incorrectly connected can cause damage to the U-761.25.

- Only operate the U-761.25 with controllers/drivers and original accessories from PI.
- Do not exceed the operating voltage range (p. 23) for which the U-761.25 is specified.
- Only operate the U-761.25 when the operating voltage is properly connected; see "Pin Assignment" (p. 25).
**NOTICE**

Unintentional motion!

Unintentional motion of the stage is possible when connecting the U-761.25 to the controller. Defective software or wrong operation of the software can also result in unintentional motion.

- Do **not** place any objects in areas where they can be caught by moving parts.
- Before connecting the U-761.25, check whether a macro is defined as the start-up macro in the controller and cancel the selection of the start-up macro if necessary.

**NOTICE**

Damage from collisions!

Collisions can damage the U-761.25, the load to be moved, and the surroundings.

- Make sure that no collisions are possible between the U-761.25, the load to be moved, and the surroundings in the motion range of the U-761.25.
- Do **not** place any objects in areas where they can be caught by moving parts.
- Stop the motion immediately if a controller malfunction occurs.
- If possible, adapt the travel range limits of your mechanical system in the software that you use for commanding the motion.

**NOTICE**

Uncontrolled oscillation!

Your application can be damaged by uncontrolled oscillation of the U-761.25. If you encounter noise during operation:

- Immediately switch off the servo-control system of the affected axes.
- Check the settings of the servo-control parameters.
NOTICE

Collision of the motion platform with the hard stop!
Collision of the motion platform of the U-761.25 with one of the hard stops can lead to
damage or considerable wear on the U-761.25.
- Prevent motions in open-loop operation.
- If motions in open-loop operation are necessary with the C-867 controller:
  - Set the control value with the SMO command so that the axes move with low
    velocity.
  - Stop the axes in time. For this purpose, use the #24, STP or HLT command, or
    set the control value to zero with the SMO command.
- Ensure that the end of the travel range is approached at low velocity.
- Only make changes to the velocity, acceleration, deceleration and load in small steps.

INFORMATION

Although the U-761.25 operates quietly in theory, noise levels of up to 50 dB (A) are
possible during operation. The ultrasonic drive of the U-761.25 can also generate higher
noise levels at frequencies between 100 and 500 kHz.

INFORMATION

The repeatability of the positioning is only ensured when the reference point switch is
always approached from the same side. Controllers from PI fulfill this requirement due to
the automatic direction sensing for reference moves to the reference point switch.

INFORMATION

For maximum force generation, a run-in procedure is necessary during the start-up of the
U-761.25 and after longer downtimes. The U-761.25 will generate its maximum dynamic
force after the run-in procedure.
- For run-in, command a few motion cycles at low velocity (<50 mm/s) over the entire
  travel range.

INFORMATION

The directions of motion of the U-761.25 are indicated in the product view (see below).
Product View

Figure 1: Product view of U-761.25 (example view)

1 Motion platform (X axis and Y axis)
2 Base body
3 Connection socket for controller cable (Y axis)
4 Connection socket for controller cable (X axis)
5 Protective earth connection
X Positive direction of motion of the X axis
Y Positive direction of motion of motion of the Y axis
# Product Labeling

<table>
<thead>
<tr>
<th>Labeling</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axis X</td>
<td>Connection socket for controller cable (X axis)</td>
</tr>
<tr>
<td>Axis Y</td>
<td>Connection socket for controller cable (Y axis)</td>
</tr>
<tr>
<td>U-761.25</td>
<td>Product name</td>
</tr>
<tr>
<td>116055789</td>
<td>Serial number (example), individual for each U-761.25</td>
</tr>
<tr>
<td></td>
<td>Meaning of the places (counting from left):</td>
</tr>
<tr>
<td></td>
<td>1 = internal information</td>
</tr>
<tr>
<td></td>
<td>2 and 3 = manufacturing year</td>
</tr>
<tr>
<td></td>
<td>4 to 9 = consecutive numbers</td>
</tr>
<tr>
<td>PILine®</td>
<td>Brand name</td>
</tr>
<tr>
<td>!</td>
<td>Warning sign &quot;Observe manual!&quot;</td>
</tr>
<tr>
<td>🚫</td>
<td>Old equipment disposal (p. 26)</td>
</tr>
<tr>
<td>Country of origin: Germany</td>
<td>Country of origin</td>
</tr>
<tr>
<td><a href="http://WWW.PI.WS">WWW.PI.WS</a></td>
<td>Manufacturer's address (website)</td>
</tr>
<tr>
<td>![PI]</td>
<td>Manufacturer's logo</td>
</tr>
<tr>
<td>![CE]</td>
<td>CE conformity mark</td>
</tr>
<tr>
<td><img src="%E6%8E%A5%E5%9C%B0" alt="接地" /></td>
<td>Symbol for the protective earth conductor, marks the protective earth connection of the U-761.25</td>
</tr>
</tbody>
</table>
## Scope of Delivery

<table>
<thead>
<tr>
<th>Product number</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U-761.25</td>
<td>1</td>
<td>PI-Line® XY microscope stage</td>
</tr>
<tr>
<td>000036450</td>
<td>1</td>
<td>M4 screw set for protective earth, consisting of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 1 M4x8 flat-head screw with cross recess, ISO 7045</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 2 safety washers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 2 flat washers</td>
</tr>
<tr>
<td>000048988</td>
<td>1</td>
<td>Screw set for mounting spacer plates to the stage, consisting of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 5 M5x12 screws, ISO 4762</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 5 M5x16 screws, ISO 4762</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 1 hex key</td>
</tr>
<tr>
<td>M545E1029</td>
<td>2</td>
<td>Spacer plate for mounting the U-761.25 to a Nikon TI microscope</td>
</tr>
<tr>
<td>M545E1028</td>
<td>2</td>
<td>Spacer plate for mounting the U-761.25 to an Olympus IX2/IX3 series microscope</td>
</tr>
<tr>
<td>U761T0001</td>
<td>1</td>
<td>Technical note for U-761.25 (this document)</td>
</tr>
</tbody>
</table>

Also in the scope of delivery when the U-761.25 is part of the U-760.DNOS system:

<table>
<thead>
<tr>
<th>Product number</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-867.2U2</td>
<td>1</td>
<td>Piezomotor controller / driver, networkable, 2 channels, for PI-Line® systems (scope of delivery see documentation of the controller)</td>
</tr>
<tr>
<td>U-600.AMD</td>
<td>2</td>
<td>PI-Line® adapter cable MDR14 (m) to Sub-D 15 (m), 1.5 m, for connection with the electronics</td>
</tr>
<tr>
<td>C-819.JD</td>
<td>1</td>
<td>Digital joystick for 2 axes, 3 programmable buttons</td>
</tr>
</tbody>
</table>

## Suitable Controllers

<table>
<thead>
<tr>
<th>Product number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-867.2U2</td>
<td>Piezomotor controller / driver, networkable, 2 channels, for PI-Line® systems</td>
</tr>
</tbody>
</table>
Compatibility

The U-761.25 is designed to provide a highly stable mounting platform for the PInano® series of piezoelectric nanopositioning stages. The PInano® series was designed for microscopy applications and has accessories that facilitate positioning the sample near the bottom surface of the stage and within the focal range of the microscopes.

The U-761.25 also has holes for mounting a variety of other PI nanopositioning stages.

The following is a list of PI stages that can be used with the U-761.25:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-545</td>
<td>PI nano® series XY and XYZ stages, all versions</td>
</tr>
<tr>
<td>P-736</td>
<td>PI nano® series Z high-speed Z scanner (P-736.AP1 adapter kit required)</td>
</tr>
<tr>
<td>P-5x7 and P-528</td>
<td>PI multi-axis piezo scanner, all versions</td>
</tr>
<tr>
<td>P-561 and P-562</td>
<td>PI Mars XYZ piezo system, all versions</td>
</tr>
<tr>
<td>P-541 and P-542</td>
<td>PI low-profile nanopositioning stage, all versions</td>
</tr>
<tr>
<td>P-733</td>
<td>Compact, high-precision XYZ nanopositioning stage, all versions (P-733.AP1 adapter kit required)</td>
</tr>
</tbody>
</table>

Accessories

Adapter Kits

<table>
<thead>
<tr>
<th>Product number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-736.AP1</td>
<td>Adapter kit for mounting the high-speed P-736 Z slide scanner onto the U-761.25</td>
</tr>
<tr>
<td>P-733.AP1</td>
<td>Adapter kit for mounting a P-733 onto the U-761.25</td>
</tr>
</tbody>
</table>

Holders for Petri Dishes, Microscope Slides and Accessories

<table>
<thead>
<tr>
<th>Product number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-545.PD3</td>
<td>Petri dish holder, 35 mm</td>
</tr>
<tr>
<td>P-545.SH3</td>
<td>Microscope slide holder</td>
</tr>
<tr>
<td>P-545.PP3</td>
<td>Universal holder plate for accessories</td>
</tr>
</tbody>
</table>

➢ To order, contact our customer service department (p. 22).
ID Chip

The U-761.25 supports the ID chip functionality, i.e. the stage is equipped with one ID chip per axis. Information on the stage (e.g., type, serial number, date of manufacture, version of the hardware) is stored in parameters on the ID chip. When switched on or rebooted, controllers from PI read the data from the ID chip. For more information on the ID chip recognition, see the manual of the controller used.

Focal Point Location

Figure 2: P-545 stage and U-761.25 XY stage in a microscope (section)

1 Upper focal plane (approx. 3 mm above the lower mounting surface)
2 Lower focal plane limit (approx. 10 mm below upper limit, depending on the microscope)
3 Microscope objective

Unpacking

NOTICE

Motion platform slips and collides with the hard stop!
When the U-761.25 is oriented vertically, the motion platform can slip and collide with one of the hard stops. A collision of the motion platform with the hard stop can cause damage to the U-761.25.

- Make sure that the U-761.25 is always horizontal.
- If the U-761.25 must be brought to a vertical position during installation, secure the motion platform against slipping.
1. Unpack the U-761.25 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 U-761.25 to the Protective Earth Conductor

INFORMATION

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

There is an M4 hole in the U-761.25 for connecting the protective earth conductor. This hole is marked with the protective earth symbol 🦇. The position of the hole is shown in the product view (p. 8).

![Figure 3: Connecting the protective earth conductor (profile view)](image)

- 1 Base body of the U-761.25
- 2 Flat washer
- 3 Safety washer
- 4 Screw
- 5 Cable lug
- 6 Protective earth conductor
Requirements

✓ You have read and understood the general notes on installation (p. 4).
✓ The U-761.25 is not connected to the controller.

Tools and accessories

- Suitable protective earth conductor: Cross-sectional area of the cable ≥0.75 mm²
- M4 screw set supplied for the connecting the protective earth conductor (p. 10)
- Suitable screwdriver

Connecting the U-761.25 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 U-761.25 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 Ω at 25 A.

Mounting the U-761.25 onto a Nikon TI Microscope Base

Requirements

✓ You have read and understood the general notes on installation (p. 4).
✓ The U-761.25 is not connected to the controller.

Tools and accessories

- Two M545E1029 spacer plates (p. 10) for mounting the U-761.25 to the microscope base
- Four M5x12 screws (p. 10)
- Four M5x16 screws (p. 10)
- Hex key (p. 10)
Mounting the U-761.25 onto a Nikon TI microscope base

The figure serves as an example and can differ from your stage model.

- Mount the U-761.25 onto the microscope base as depicted in the figure.

![Mounting of the U-761.25 onto a Nikon TI microscope base](image)

**Figure 4: Mounting of the U-761.25 onto a Nikon TI microscope base**
Mounting the U-761.25 onto an Olympus IX2/IX3 Series Microscope Base

Requirements

✓ You have read and understood the general notes on installation (p. 4).
✓ The U-761.25 is not connected to the controller.

Tools and accessories

- Two M545E1028 spacer plates (p. 10) for mounting the U-761.25 to the microscope base
- Four M5x16 screws (p. 10)
- Hex key (p. 10)

Mounting the U-761.25 onto an Olympus IX2/IX3 series microscope base

The figure serves as an example and can differ from your stage model.

➢ Mount the U-761.25 onto the microscope base as depicted in the figure.

Figure 5: Mounting of the U-761.25 onto an Olympus IX2/IX3 series microscope base
Mounting Accessories onto the U-761.25

Mounting a P-736.AP1 adapter kit onto the U-761.25

The figure serves as an example and can differ from your stage model.

- Mount the P-736.AP1 adapter kit onto the U-761.25 as depicted in the figure.

Figure 6: Mounting of the P-736.AP1 adapter kit onto the U-761.25
Mounting a P-733.AP1 adapter kit onto the U-761.25

The figure serves as an example and can differ from your stage model.

- Mount the P-733.AP1 adapter kit onto the U-761.25 as depicted in the figure.

Connecting the Stage to the Controller

Requirements

- You have read and understood the general notes on installation (p. 4).
- You have read and understood the user manual of the controller (p. 3).
- The controller is switched off.
- You have connected the stage to the protective earth conductor (p. 13).

Tools and accessories

- Two U-600.AMD PILine® adapter cables (p. 10)
Connecting the stage to the controller

1. Connect the MDR connector of the first cable to the **Axis X** socket of the stage.
2. Connect the Sub-D connector on the other end of the cable to the **Axis 1** socket of the controller.
3. Connect the MDR connector of the second cable to the **Axis Y** socket of the stage.
4. Connect the Sub-D connector on the other end of the cable to the **Axis 2** socket of the controller.

Start-Up and Operation

Starting Up the U-761.25 with the C-867 Controller

**NOTICE**

Incorrect parameter settings!

If you use the software that is included in the scope of delivery of the controller (p. 10), the operating parameters of the U-761.25 can be loaded from a stage database. The stage database contains the standard parameter values of the XY stage for performing initial test motions during start-up. Depending on the application, using the default parameter values (e. g., for P term, I term, D term, acceleration and velocity) can cause damage to the XY stage, especially when operated with heavy loads.

- If possible: Perform the first start-up without a load.
- Perform initial start-up at a low velocity (<50 mm/s).
- Always install the latest version of the stage database on your PC.

For start-up with a load:

- Before start-up, make sure that the U-761.25 has been properly installed (p. 13).
- For optimum performance of the moving axis, adjust the operating parameters of the controller (e. g. P term, I term, D term, acceleration, velocity; see controller user manual).
- Save the new parameter values to a stage database on the PC or to the nonvolatile memory of the controller for future use (see controller manual and PIMikroMove manual).
INFORMATION

For each axis of the U-761.25, a separate stage type with specially adapted parameters is available in the stage database from which the operating parameters can be loaded.

- In the PC software, assign the suitable stage type to the axes. The cable connections between the XY stage and the controller determine the assignment of the stage type.

If the U-761.25 is part of a preconfigured system, suitable parameter sets are already stored in the controller. In this case, it is not necessary to assign a stage type in the PC software. Default configuration when the C-867.2U2 controller is used:

- For axis 1 of the controller (Axis 1 socket), the parameter set for axis X of the XY stage is stored in the controller.
- For axis 2 of the controller (Axis 2 socket), the parameter set for axis Y of the XY stage is stored in the controller.
- Connect the U-761.25 to the controller with the cables according to the assignments specified in the parameter sets stored in the controller.

Requirements

- You have read and understood the general notes on start-up and operation (p. 5).
- You have read and understood the user manual of the controller (p. 3).
- The U-761.25 is properly installed (p. 13).
- The controller (p. 10) and the required software have been installed. All connections on the controller have been set up (see controller manual).

Starting up the U-761.25 with the C-867 controller

- Start up one axis of the U-761.25 (see controller manual) and repeat the procedure for the second axis.

Start-up involves the following steps:

- Selecting the stage type
- Defining the reference point of the axis
- Commanding initial motion in closed-loop operation for testing and for run-in of the mechanical system

The controller manual describes start-up using the PIMikroMove program.
Maintenance

General Notes on Maintenance

NOTICE

Damage due to improper maintenance!
Improper maintenance can result in the failure of the U-761.25.

- Only loosen screws according to the instructions in this technical note.
- Ensure that the piezomotors of the U-761.25 do not come into contact with lubricants.

Performing a Maintenance Run

Depending on the operating conditions and the period of use of the U-761.25, the following maintenance measures are required:

Maintenance run

The maintenance run is performed to distribute the existing lubricant on the guides of the U-761.25.

- To evenly distribute the existing lubricant on the stage guides, perform a maintenance run across the entire travel range after 500 hours of operation, or after 1 year at the latest.
- If you move the U-761.25 continuously over a small working range (<20% of the entire travel range) in industrial operation, perform a maintenance run across the entire travel range every 5000 motion cycles.

Lubrication

Under laboratory conditions, the guides of the U-761.25 only need to be lubricated in exceptional cases. For continuous industrial use, the lubrication intervals must be defined individually.

- Do not lubricate the guides of the U-761.25 without consulting our customer service department (p. 22).
- Ensure that the piezomotors of the U-761.25 do not come into contact with lubricants.

Cleaning the U-761.25

Requirements

- You have disconnected the U-761.25 from the controller.

Cleaning the U-761.25

- When necessary, clean the surface of the U-761.25 with a cloth dampened lightly with a mild cleanser or disinfectant.
Customer Service

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

- 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 on our website (www.pi.ws).

Specifications of the U-761.25

<table>
<thead>
<tr>
<th>Preliminary data</th>
<th>U-761.25</th>
<th>Unit</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active axes</td>
<td>X, Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motion and positioning</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel range</td>
<td>25 × 25</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>Integrated sensor</td>
<td>Linear encoder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor resolution</td>
<td>10</td>
<td>nm</td>
<td></td>
</tr>
<tr>
<td>Pitch / yaw</td>
<td>±200</td>
<td>µrad</td>
<td>typ.</td>
</tr>
<tr>
<td>Velocity</td>
<td>100</td>
<td>mm/s</td>
<td>max.</td>
</tr>
<tr>
<td>Reference point switches</td>
<td>Optical, 1 µm repeatability</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mechanical properties</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load capacity</td>
<td>25</td>
<td>N</td>
<td>max.</td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>20 to 40</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Al (black anodized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass (without spacer plates)</td>
<td>2.5</td>
<td>kg</td>
<td>±5 %</td>
</tr>
</tbody>
</table>
Maximum Ratings
The U-761.25 stage is designed for the following operating data:

<table>
<thead>
<tr>
<th>Maximum operating voltage</th>
<th>Operating frequency</th>
<th>Maximum power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 V&lt;sub&gt;pp&lt;/sub&gt; or 71 V&lt;sub&gt;rms&lt;/sub&gt;</td>
<td>152 to 165 kHz</td>
<td>60 W (30 W per axis)</td>
</tr>
</tbody>
</table>

Ambient Conditions and Classifications
The following ambient conditions and classifications must be observed for the U-761.25:

<table>
<thead>
<tr>
<th>Area of application</th>
<th>For indoor use only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum altitude</td>
<td>2000 m</td>
</tr>
<tr>
<td>Air pressure</td>
<td>1100 hPa to 0.1 hPa</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>Highest relative humidity 80 % for temperatures up to 31 °C Decreasing linearly to 50 % relative humidity at 40 °C</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>20°C to 40°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 °C to 75 °C</td>
</tr>
<tr>
<td>Transport temperature</td>
<td>-20 °C to 75 °C</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II</td>
</tr>
<tr>
<td>Protection class</td>
<td>I</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>1</td>
</tr>
<tr>
<td>Degree of protection according to IEC 60529</td>
<td>IP20</td>
</tr>
</tbody>
</table>
Dimensions

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

Figure 8: Dimensions of the U-761.25
## Pin Assignment

**MDR14 connection socket for controller cable**

![MDR14 connection socket](image)

Figure 9: Front view of the MDR14 socket

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>GND</td>
<td>0 V</td>
</tr>
<tr>
<td>A2</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>A3</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>A4</td>
<td>REFSWITCH</td>
<td>Output: Reference point switch</td>
</tr>
<tr>
<td>A5</td>
<td>ID_CHIP</td>
<td>Bidirectional: Data line for ID chip</td>
</tr>
<tr>
<td>A6</td>
<td>VDD</td>
<td>Input: +5 V</td>
</tr>
<tr>
<td>A7</td>
<td>USM_P1</td>
<td>Input: Piezo 71 VAC (RMS)</td>
</tr>
<tr>
<td>B1</td>
<td>USM_P2</td>
<td>Input: Piezo 71 VAC (RMS)</td>
</tr>
<tr>
<td>B2</td>
<td>USM_P3</td>
<td>Input: Piezo 71 VAC (RMS)</td>
</tr>
<tr>
<td>B3</td>
<td>SIN+</td>
<td>Output: Encoder channel SIN, RS-422</td>
</tr>
<tr>
<td>B4</td>
<td>SIN-</td>
<td>Output: Encoder channel SIN (inverted), RS-422</td>
</tr>
<tr>
<td>B5</td>
<td>COS+</td>
<td>Output: Encoder channel COS, RS-422</td>
</tr>
<tr>
<td>B6</td>
<td>COS-</td>
<td>Output: Encoder channel COS (inverted), RS-422</td>
</tr>
<tr>
<td>B7</td>
<td>NC</td>
<td>Not connected</td>
</tr>
</tbody>
</table>
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