User Information

These short instructions contain an overview of the most important safety information and handling instructions for installation and startup of hexapod systems. A hexapod system consists of a controller and hexapod with the above-mentioned product numbers (x: any number).

Subject to change. These short instructions are superseded by any new release. The latest respective release is available for download on our website.

Downloading and Reading the Manual

The actions during unpacking, installation, startup, operation, and maintenance require additional information from the manuals for the hexapod and/or the controller.

Manuals may be titled as follows: "User Manual", "Technical Note".

Downloading the Manuals from the Website

1. Open the website www.pi.ws.
2. Search the website for the product number (e.g., C-663.12) or the product family (e.g., PICMA® Bender).
3. Click the corresponding product to open the product detail page.
4. Click Downloads.
   The manuals are shown under Documentation.
5. Click the desired manual and fill out the enquiry form.
   The download link will then be sent to the email address entered.

If you cannot find the manual you are looking for or if you have any questions: Contact our customer service department via service@pi.de.
General Safety Instructions

Intended Use
The hexapod and controller are laboratory devices as defined by DIN EN 61010-1. They are intended for indoor use and use in an environment that is free of dirt, oil, and lubricants. The hexapod is intended for positioning loads in six axes. The controller is intended for closed-loop operation of a hexapod from PI, which is equipped with drives with integrated motor drivers.

The intended use of the hexapod and controller is only possible in conjunction with all system components (cable set, power adapters). The hexapod system may only be used in compliance with the technical specifications and instructions in the user manuals. The user is responsible for process validation.

The hexapod system may not be used for purposes other than those stated in the user manual. The hexapod system may only be installed, operated, maintained, and cleaned by authorized and appropriately qualified personnel.

Transport
Improper handling of the hexapod during transport can lead to injuries from crushing.

- If necessary: Use suitable auxiliary equipment for transporting, e.g., a crane.
- Pay attention to the unpacking instructions for the hexapod.

Installation
If the hexapod is vacuum-compatible, attention must be paid to cleanliness.

- Touch the hexapod and the cable only with powder-free gloves.
- If necessary: Wipe the hexapod and the cable to clean it.

An impermissible mechanical load can damage the hexapod.

- Ship the hexapod in the original packaging with transport safeguard only.
- When lifting the hexapod, only hold onto its baseplate or if applicable, the transport safeguard.
- Avoid high forces and torques on the motion platform.
- Avoid unintentional changes in the position of the hexapod when servo mode is switched off or when there is no power supply.
- Make sure that no collisions between the hexapod, the load to be moved, and the surroundings are possible in the workspace of the hexapod.
- Avoid impermissible mechanical loads on the cable, e.g., pull forces, tight bending radii or recurring motion.

Unsuitable mounting could warp the baseplate and therefore reduce accuracy and the lifetime of the hexapod.

- Mount the hexapod on a flat surface (see the hexapod’s manual for the recommended flatness).

Incorrectly fitted screws and locating pins can cause damage.

- Pay attention to the maximum tightening torque.
- Select the screw length according to the depth of the mounting holes.
- Do not insert locating pins too deeply into the motion platform.

Startup
Risk of minor injuries from crushing between the moving parts of the hexapod and a stationary part or obstacle.

- Keep your fingers away from areas where they could be caught by moving parts.
- If necessary: Install suitable touch protection or mark the danger zones according to regulations.
- If several controllers are displayed in the PC software when establishing communication, make sure that you select the right controller.
When the load of the hexapod exceeds the maximum holding force, switching off the servo mode can cause unintentional position changes of the hexapod.

- Pay attention to the load on the hexapod before switching the servo mode off, restarting the controller or switching it off.

**Installing the System**

**Installing the PC Software**

**Installing the PC software in Windows**

1. Start the PI_<product number>.CD_Setup.exe installation assistant.
   The InstallShield Wizard window opens.
2. Follow the instructions on the screen.
3. If necessary: Update the PC software and positioner database with the PIUpdateFinder (see the manual for the controller).

**Installing the PC software in Linux**

1. Unpack the tar archive from the /linux directory of the product CD to a directory on your PC.
2. Change to the directory where the tar archive was unpacked.
3. As superuser (root privileges), execute ./INSTALL to start the installation.
4. Follow the instructions on the screen.
5. If necessary: Update the PC software and positioner database (see the manual for the controller).

**Installing the Controller**

**NOTICE**

High temperatures can overheat the controller.

- Install the controller so that there is a gap of at least 10 cm to the top and at least 5 cm to its sides or make sure that the surroundings are sufficiently cooled.
- Ensure sufficient ventilation at the place of installation.
- Keep the ambient temperature at a noncritical level (5-40 °C).

When the controller is to be used as a benchtop device:

- Make sure that the controller is standing safely and securely.

If the controller is to be mounted:

1. Bore the required holes into the underlying surface.
2. Affix the controller on each recess with a suitably sized screw.

**Grounding the Controller**

The controller is not grounded via the power adapter connection.

**Requirements**

- The controller is switched off.

**Tools and accessories**

- Suitable protective earth conductor with cable lug
- Mounting hardware for the protective earth conductor; is on the protective earth connector on delivery of the controller
- Suitable tools

**Grounding the controller**

- Attach the cable lug of the protective earth conductor to the protective earth connector using the mounting hardware supplied.

**Connecting the protective earth conductor to the controller**

1. Threaded bolt
2. Flat washer
3. Cable lug with protective earth conductor
4. Safety washer
5. Nut
Preparing the Hexapod for Installation

Tools and accessories
- Suitable tools for the transport safeguard
- Snap-on ferrite, in the scope of delivery of the hexapod

Preparing the hexapod
1. If necessary: Remove the transport safeguard (see manual for the hexapod).

Attaching the snap-on ferrite
1. Power supply cable
2. Snap-on ferrite
3. Connectors
   * to the controller or power adapter

2. Attach the snap-on ferrite to the power supply cable of the hexapod.

Fixing the Hexapod and Load

Requirements
- You have provided a suitable underlying surface with the necessary mounting holes (see manual for the hexapod).
- You have determined the workspace and the maximum loads of the hexapod (see manual for the controller).
- You have read and understood the user manual for the hexapod.

Fixing the hexapod and load
1. Insert the screws and locating pins supplied through the mounting holes in the hexapod's base plate and tighten onto the underlying surface.
2. Affix the load to the mounting holes of the motion platform.

Grounding the hexapod
The hexapod is not grounded via the power adapter connection. If function grounding is necessary for equipotential bonding, connect the base plate and the motion platform to the protective earth conductor.

Tools and accessories
- Suitable protective earth conductor with cable lug
- Mounting hardware for the protective earth conductor of the base plate, in the scope of delivery of the hexapod
- Mounting hardware for the protective earth conductor of the motion platform, not in the scope of delivery
- Suitable tools

Grounding the hexapod
1. Attach the cable lug of the protective earth conductor to the protective earth connector for the base plate using the mounting hardware supplied.

Connecting the protective earth conductor to the hexapod
1. Protective earth connector in the base plate of the hexapod
2. Safety washer
3. Flat washer
4. Cable lug with protective earth conductor
5. M4 screw

2. Affix the protective earth conductor to a mounting hole of the motion platform appropriately.
Connecting the Hexapod System

Requirements
✔ The controller is switched off.
✔ If the hexapod has a separate power adapter: The power adapter is not connected to the power socket.
✔ You have read and understood the user manual for the hexapod and the controller.

Connecting the hexapod system
The connection assignment is specified on the connector label. See the hexapod manual for cabling with line driver boxes or in a vacuum.
1. Connect the hexapod to the controller with the data transmission cable.
2. Connect the power adapter (PA) of the controller to the 24 V In connector of the controller.
3. Connect the hexapod to the 24 V Out of the controller or the separate power adapter of the hexapod.
4. Secure the connectors against unintentional removal.
5. C-887.5x2/C-887.5x3 controllers only: Connect the shorting plug to the E-Stop socket of the controller.
6. Connect the controller to the PC or an EtherCAT master.

Starting and Operating the System
The PIMikroMove PC software is recommended for initial startup. Initial motion can be started with PIMikroMove and shown in a 3-D display with the active coordinate system.

NOTICE
The hexapod moves along an undefined path during a reference move or when a new motion command is sent during motion. On this undefined path, collisions with the environment of the hexapod are possible.
➢ Avoid sending new target positions while the hexapod is still moving.
➢ If new target positions need to be sent while the hexapod is still moving: Only send target positions that do not deviate from the current position by more than the value of Path Control Step Size (ID 0x19001504).
➢ When the hexapod has been referenced successfully and needs to be moved back to the reference position: Send the reference position as target position. Do not start a new reference move.
Requirements

✔ You have read and understood the PIMikroMove manual and the general notes on startup. The software manuals are on the controller CD.
✔ You have installed and updated the software on the PC.
✔ You have installed the hexapod and controller as they will be used in your application.
✔ If you have connected the controller to the network or PC via the TCP/IP interface:
  ▪ Network with DHCP server or direct connection to the PC (controller is connected directly to the Ethernet socket of the PC): No adjustment of the interface parameters is necessary.
  ▪ Network without DHCP server or direct connection to a static IP address:
    ▪ The startup behavior of the controller must be changed so that the controller uses a static IP address (see manual for the controller).
    ▪ The IP addresses and subnet masks of the controller and all other network devices must match accordingly (see manual for the controller).

Switching the Hexapod System On
1. Plug the power cord of the controller's power adapter into the power socket.
2. If necessary: Connect the power cord of the hexapod power adapter to the power socket.
3. Switch the controller on.
The PWR and STA LEDs light up when the starting procedure has completed. The controller also performs the following actions during the starting procedure:
  ▪ Switching on the servo mode for the hexapod
  ▪ Activating the settings in the nonvolatile memory
  ▪ If applicable: Running the startup macro

Establishing Communication with PIMikroMove
1. Start PIMikroMove.
The Start up controller window opens for the Connect controller step.
If the Start up controller window does not open automatically, select the Connections > New.... menu item in the main window.

PIMikroMove: Connect controller
1. Controller selection field
2. Tabs for interface
3. Interface parameters
4. Connect button
2. Select the C-887 controller in the controller selection box (1).
3. Select the tab on the right-hand side of the window that corresponds to the interface of the controller (2).
4. If necessary: Set the interface parameters according to the controller (3).
5. If necessary: Select the controller from the list (3).
6. Click the Connect button (4) to establish communication.
Starting Motion

1. If necessary: Perform the reference move for the axes in the Start up axes step so that the controller knows the absolute position of the axes. To do this, click Ref. position or Automatic.

2. After a successful reference move, click OK > Close.

The PIMikroMove main window opens with the Positioner Platform docking window (1) and the Positioner 3D View card (4).

- If the Positioner Platform window (1) does not open automatically, select the C-887 > Show Positioner platform settings menu item in the main window.
- If the Positioner 3D View card (4) does not open automatically, select the C-887 > Positioner 3D View > Show menu item in the main window.

3. Test the motion of the hexapod several times.
   a. Enter a target position for one or multiple axes into the Positioner Platform docking window (1) under Position and absolute Move (2).
   b. Click Move to Target (3) to start motion to the target position.

A new target position cannot be entered during motion.

If a node of the dynamics profile or the target position cannot be reached, motion is not started and a window will open with an error message.

The motion is displayed graphically in the Positioner 3D View card (4).
**Hexapod Maintenance**

The hexapod does not need to be relubricated when used under laboratory conditions.

- If the hexapod is moved over a short travel range during continuous operation (<20% of the travel range): Do maintenance runs regularly over the entire travel range.
- If the hexapod is operated under difficult conditions: Contact our customer service department to determine individual maintenance requirements.

**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.

PI undertakes environmentally correct and free disposal of all old PI equipment made available to the market after 13 August 2005.

If you have an old device from PI, you can send it to PI free of charge.