

Guide to Grounding and Shielding

For Positioning Devices and Electronics

Positioning devices and electronics from PI fulfil all statutory requirements with respect to the influence of interference. Furthermore, they are optimized so that any external interference has the least possible effect on the extremely accurate sensor signals from our positioning devices.

Nevertheless – depending on other devices operating in the vicinity of our positioning devices and electronics – our devices can be subject to interference. To keep this as low as possible, the following measures should be taken to avoid interference.

Depending on the application and circumstance, it is possible to introduce various measures to improve the reduction of interference. Avoiding interference is extremely important if you want to achieve the highest resolutions with our systems and we recommend that you familiarize yourself with this topic in depth.

If you have already taken the following measures and still have interference, contact our customer service department (p. 2).

Objective and Target Group for this User Information

This user information includes recommendation for interference-free operation of positioning devices and electronics.

Basic knowledge of electrotechnology and suitable safety measures is assumed.

Positioning devices and electronics from PI may only be installed, started, operated, maintained, and cleaned by authorized and appropriately qualified personnel.

Basic Measures for Grounding and Shielding

- Follow the installation instructions in the manuals for the devices and pay attention to the section on troubleshooting.
- Ground each device that you use.
- Use properly shielded cables for the sensor and motor lines:
Properly shielded cables are cables with continuous braided or foil shielding that is connected conductively to the plug housing.
- When routing the cables, keep the largest possible gap between cables that transmit strong currents or high voltages (e.g., motor cables, power cords), and sensitive components. For example, sensitive components are sensors (particularly capacitive sensors) and analog sensor signal cables.
- Twist cable pairs with differential signals.
- Grounding cables should have low impedance and be as short as possible.
- Connect and route the different types of grounding cables (e.g., signal ground, housing ground, and motor ground) separately, and then connect them at one point only.

Further Measures

INFORMATION

Interference can be induced into the system easily via ground loops. Ground loops occur when devices are grounded at more than one point.

Often, it is not possible to avoid this because most devices are grounded directly via the power plug and power supply as well as indirectly via the housing ground of other devices.

- Avoid and remove double grounding and ground loops as far as possible.

- Check the voltage at different grounding points, e.g., with an oscilloscope: Interference detected?
If yes: Identify the source of interference and eliminate if possible.

In order to identify the sources of interference, it may be helpful to operate individual devices via an isolating transformer.

- Try out different ways of connecting between the grounding points:
 - It could help not to connect grounding points with interference directly to the ground of sensitive (sensor) components but instead to a more remote grounding point.
 - The same applies to housing grounds that could absorb external interference. These should also not be connected directly to the ground of sensitive components.
 - If ground loops run over the power plugs of several devices and are therefore not removable:
In many countries, power plugs can be inserted into the power socket turned about 180° and therefore the line conductor (phase) and neutral conductor are reversed.
Turn the individual power plugs around and try out the various combinations.

Customer Service Department

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

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