SCALEXIO LabBox

Getting Started

Release 2021-A – May 2021

dSPACE

How to Contact dSPACE

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How to Contact dSPACE Support

If you encounter a problem when using dSPACE products, contact your local dSPACE representative:

- Local dSPACE companies and distributors: http://www.dspace.com/go/locations
- For countries not listed, contact dSPACE GmbH in Paderborn, Germany.
  Tel.: +49 5251 1638-941 or e-mail: support@dspace.de

You can also use the support request form: http://www.dspace.com/go/supportrequest. If you are logged on to mydSPACE, you are automatically identified and do not need to add your contact details manually.

If possible, always provide the relevant dSPACE License ID or the serial number of the CmContainer in your support request.

Software Updates and Patches

dSPACE strongly recommends that you download and install the most recent patches for your current dSPACE installation. Visit http://www.dspace.com/go/patches for software updates and patches.

Important Notice

Contents

About This Document

Contents

This guide introduces you to the first steps with a SCALEXIO LabBox. It describes how to connect and register a SCALEXIO LabBox at the host PC.

Target group

This document is primarily targeted at engineers who want to work with a SCALEXIO LabBox.

Required knowledge

Knowledge in handling computer hardware, the host PC, and working with Microsoft Windows is assumed.

Symbols

dSPACE user documentation uses the following symbols:

Symbol	Description
DANGER	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a hazard that, if not avoided, could result in property damage.
Note	Indicates important information that you should take into account to avoid malfunctions.
Tip	Indicates tips that can make your work easier.
	Indicates a link that refers to a definition in the glossary, which you can find at the end of the document unless stated otherwise.
	Precedes the document title in a link that refers to another document.

Naming conventions

dSPACE user documentation uses the following naming conventions:

%name% Names enclosed in percent signs refer to environment variables for file and path names.

< > Angle brackets contain wildcard characters or placeholders for variable file and path names, etc.

Special folders

Some software products use the following special folders:

Common Program Data folder A standard folder for application-specific configuration data that is used by all users.

```
%PROGRAMDATA%\dSPACE\<InstallationGUID>\<ProductName>
```

or

```
%PROGRAMDATA%\dSPACE\<ProductName>\<VersionNumber>
```

Documents folder A standard folder for user-specific documents.

```
%USERPROFILE%\Documents\dSPACE\<ProductName>\
<VersionNumber>
```

Local Program Data folder A standard folder for application-specific configuration data that is used by the current, non-roaming user.

```
%USERPROFILE%\AppData\Local\dSPACE\<InstallationGUID>\
<ProductName>
```

Accessing dSPACE Help and PDF Files

After you install and decrypt dSPACE software, the documentation for the installed products is available in dSPACE Help and as PDF files.

dSPACE Help (local) You can open your local installation of dSPACE Help:

- On its home page via Windows Start Menu
- On specific content using context-sensitive help via **F1**

dSPACE Help (Web) You can access the Web version of dSPACE Help at www.dspace.com/go/help.

To access the Web version, you must have a *mydSPACE* account.

PDF files You can access PDF files via the icon in dSPACE Help. The PDF opens on the first page.

Safety Precautions and Notes

Introduction

To avoid the risk of injury and/or damage to the SCALEXIO system, read and ensure that you comply with the following safety precautions. These precautions must be observed during all phases of system operation.

Where to go from here

Information in this section

General Safety Precautions

Potential hazards

Using and installing a SCALEXIO system can be dangerous. Your actions affect or control electronic systems using the SCALEXIO system. Your actions can cause hazards which result in death, serious injury, fire, and/or property damage.

Therefore, it is essential to read carefully the following notes and the documents provided by dSPACE. Observe all the warnings which are attached to the system and its components.

Liability

It is your responsibility to adhere to instructions and warnings. Any unskilled operation or other improper use of this product in violation of the respective safety instructions, warnings, or other instructions contained in the user documentation constitutes contributory negligence, which may lead to a limitation of liability by dSPACE GmbH, its representatives, agents and regional dSPACE companies, to the point of total exclusion, as the case may be. Any exclusion or limitation of liability according to other applicable regulations, individual agreements, and applicable general terms and conditions remain unaffected.

User qualification

A SCALEXIO system and the connected electric equipment must be installed only by a skilled electrician or by instructed persons under the supervision and guidance of a skilled electrician and in accordance with electrical engineering rules and regulations.

A skilled electrician is a person with sufficient technical training, knowledge, and experience, and knowledge of the relevant regulations, to assess the tasks assigned to him/her and to recognize possible dangers.

Overview of safety precautions and notes

⚠ WARNING

To avoid the risk of injury and/or damage to the SCALEXIO system, read and ensure that you comply with the following safety precautions. These precautions must be observed during all phases of system operation.

- Safety Precautions for Installing SCALEXIO LabBox on page 8
- Safety Precautions for Connecting SCALEXIO LabBox on page 10
- Safety Precautions for Working with SCALEXIO LabBox on page 13

Safety Precautions for Installing SCALEXIO LabBox

Requirements on the location

- Do not place the SCALEXIO system on an unstable cart, stand, or table. The cart, stand, or table must be able to carry the weight of the SCALEXIO system as well as the external cable harness, external devices, etc.
- Do not drop the SCALEXIO system or its components.
- Position the SCALEXIO system away from heat sources such as radiators, heat storage devices, power amplifiers, and other products producing heat.
- When positioning the SCALEXIO system, make sure that you can easily unplug the power cords if you have to disconnect the system from the power supply.
- The SCALEXIO system and its components are not waterproof. Do not expose them to water or other liquids.
- Route all the external cables so that they are not likely to be walked on or pinched by items placed on or against them.

- Do not block the ventilation inlets and outlets at the front and rear of SCALEXIO LabBox. There must be at least 200 mm (7.9 in) space in front of these openings.

Transporting the SCALEXIO system

You can transport a SCALEXIO system with all its boards installed. However, there are some transportation conditions you have to comply with.

To prevent personal injury or property damage, comply with the following transportation conditions:

- Disconnect the host PC and all the external devices (e.g., ECU, external loads, tester devices) from the SCALEXIO system.
- Disconnect all external cabling from the SCALEXIO system, for example, the external cable harness, the Ethernet connection cable, the power cords.
- Depending on the weight of the SCALEXIO system, use a cart to transport it.
- Handle the SCALEXIO system with care and do not drop it. The SCALEXIO system and/or its components can be damaged if the system is dropped.
- The SCALEXIO system and its components are not waterproof. Do not expose them to water or other liquids.
- Ensure that the temperature is in the range -20 °C … +80 °C (-4 °F … 176 °F) while transporting the SCALEXIO system.

Installing hardware

Only qualified persons with experience in installing computer hardware and electric devices should perform the installation. Any damage to or malfunction of dSPACE hardware caused by improper installation is not covered by the warranty, unless the handling and installation instructions are shown to be defective.

Before doing any installation work:

- Read the related instructions carefully and note all warnings given.
- Make sure that SCALEXIO LabBox is switched off.
- Make sure that no external devices are connected to SCALEXIO LabBox.

During the installation process, install the components of your system in exactly the order stated. Any other sequence may lead to unpredictable results or even damage the system.

Handling hardware with electrostatic sensitive devices

dSPACE hardware contains sensitive electronic devices. There is a risk of damaging the hardware or reducing its lifetime due to electrical fields or electrostatic discharge (ESD) that occur on touch. To avoid this risk, take the following precautions:

- Only qualified persons with knowledge of protective measures for electrostatic sensitive devices are allowed to unpack, install, or remove sensitive electronic devices.
- During the transport and storage of a sensitive electronic device, place it in closed ESD packaging.
- While handling a sensitive electronic device, place it on a properly grounded workstation, such as a special ESD desk or desk mat.

- You must ensure potential equalization between the environment and you, e.g., by wearing a grounded ESD wristband.
- Do not touch the board or the contacts of the connectors, even after installing the sensitive electronic device.

Handling hardware with fans

Improper handling can damage the fans of SCALEXIO hardware:

- Do not touch any components of a fan during operation.
- Do not try to stop a rotating fan that is slowing down with your fingers or with tools.
- Do not apply pressure to a fan bearing or fan blade during installation and removal of any hardware.

Related topics

Basics

Safety Precautions for Working with SCALEXIO LabBox..... 13

Safety Precautions for Connecting SCALEXIO LabBox

Connecting external devices

To avoid risk of injury and prevent damage to the hardware:

- Do not connect to the ECU/load connectors any external devices which generate voltages above the safety extra-low voltage (SELV) limits.
- Do not apply voltages/currents outside the specified ranges to the connector pins.
- To prevent uncontrolled current flow, it is recommended to avoid direct connections between signal ground (KL 31) and earth ground. For details on ground potentials, refer to Ground Potentials (SCALEXIO Hardware Installation and Configuration 🕮).
- The maximum potential difference between signal ground and earth ground must not exceed 10 V (max.).
- Ensure that the system's I/O signals stay within the SELV limits if larger ground shifts are likely to occur.
- Do not connect or disconnect any devices while the SCALEXIO system is powered up and/or external devices are switched on. Make sure that the host PC, the SCALEXIO system and external devices are turned off beforehand.
- High voltages can be present at pins of the ECU/load connectors. Therefore, do not leave the connectors unconnected during operation.
- To reduce the risk of damage and fire, always use approved wiring material with an appropriate cross-section, isolation, etc. for building the external cable harness. Route the external cable harness along a path that is fire-protected.
- To reduce the risk of uncontrolled fire spreading, it is recommended to operate the SCALEXIO system including all external devices in a fire-protected area.

- To avoid the risk of stumbling, do not lay the external cables along a route where people have to walk.

Establishing LAN connections

All the local area network (LAN) ports of a SCALEXIO system contain safety extra-low voltage (SELV) circuits, which must be connected only to other SELV circuits.

- To avoid electric shock, do not connect the LAN ports of a SCALEXIO system to non-SELV circuits, e.g., telecommunication network voltage (TNV) circuits.
- The LAN or LAN segment of a SCALEXIO system and all connected equipment must be part of the same low-voltage power distribution system and be located within a single building.
- Do not use RJ45 connectors of wide area network (WAN) ports, because WAN ports can contain TNV circuits.
- When connecting external devices, e.g., an ECU, to the LAN ports of a SCALEXIO system, keep in mind that the LAN ports' shield conductors are galvanically connected to the earth ground (protective earth) of the SCALEXIO system.
- To avoid a fire caused by overheated wiring due to excessive current flow in the shield conductor, do not connect LAN shield conductors to ECU housings, ECU grounds, or the signal ground of the SCALEXIO system.
- LAN cables can occasionally be subject to hazardous transient voltages, such as lightning or disturbances in the electric utilities power grid. Handle exposed metal components of the network with caution.
- Do not connect the RJ45 connectors of a DS6330M1 Automotive Ethernet Module with a standard Ethernet network.

Establishing RS232 and USB connections

Observe the following notes when connecting a device via RS232 or USB to a DS6001 Processor Board.

- Connecting a device to the DS6001 Processor Board via RS232 or USB can bridge the SCALEXIO system ground to the earth ground (protective earth) and establish a ground loop with external devices that are connected to the SCALEXIO system.
- A ground loop can cause an uncontrolled, excessive current flow in the SCALEXIO system ground which can disturb the I/O signals of the SCALEXIO system.
- To avoid an excessive current flow make sure that there is no potential shift in the earth connection between the SCALEXIO system and any external device.

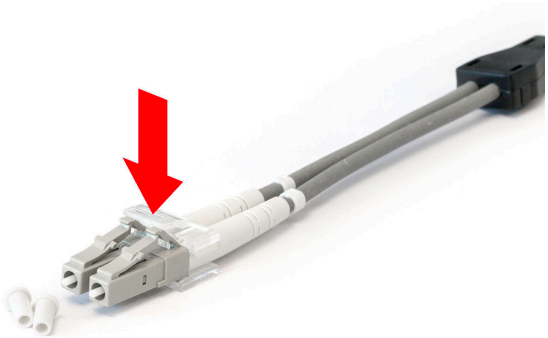
Handling fiber-optic cables and modules

Do not damage the fiber optics.

- Handle the fiber optics with care.
- Make sure that fiber-optic cables are not stretched or overstretched.
- Do not bend fiber-optic cables past a radius of 40 mm.
- When you unplug fiber-optic connections, handle only the connector housings and locking mechanisms. Do not pull the fiber-optic cables.

- Use protective caps for all the unused ports of fiber-optic modules.
- Place protective caps on the ends of unconnected fiber-optic cables. Do not touch the ends of fiber-optic cables when they are unprotected.

Locking mechanisms of fiber-optic cables The connectors of fiber-optic cables are assembled in pairs. These two connectors have a locking mechanism. To release the cables from a fiber-optic module, press down the latch on the connectors. Refer to the following illustration:



The two connectors are clipped together loosely and can shift. Make sure that the two connectors stay next to each other when you plug them into a fiber-optic module.

Connecting to the power source

Note the following points when connecting the SCALEXIO system to the power source:

- Operate the SCALEXIO system only from the kind of power source indicated on the rear panel.
- Use appropriate miniature circuit breakers with a rated current of max. 16 A.
- It is recommended to connect the SCALEXIO system via residual current operated protective devices.
- Always use approved power cords with an appropriate cross-section, isolation, etc. for connection to the power source.
- The SCALEXIO system has protection class 1: The system must be operated with a protective earth/ground connection via the protective earth/grounding conductor of the power cord(s).
- Always ensure that the system is operated from properly grounded wall outlets only.
- Use multiple socket outlets only if they comply with the system's power requirements. Multiple socket outlets can cause hazardous touch currents due to the accumulation of earth leakage currents.

Safety Precautions for Working with SCALEXIO LabBox

Potential hazards

⚠ WARNING

Risk of death, serious injury, fire, and/or property damage

The SCALEXIO system can carry high currents and high voltages. According to international standards, a voltage higher than 33 V_{RMS}/46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. This presents a risk to people and equipment (death, serious injury, fire, and/or property damage). Therefore, personnel who work with the SCALEXIO system must be informed about the possible dangers and must take suitable safety precautions.

Operating the SCALEXIO system

Note the following points during the operation of the SCALEXIO system:

- The operator must keep unauthorized people away from the SCALEXIO system by taking suitable safety precautions, for example, locking the system or training the personnel.
- Use the SCALEXIO system only for measurements of measurement category I. Do not use it for measurements of categories II, III, or IV.
- The maximum voltage of I/O signals must not exceed 60 V.
- Operate a SCALEXIO system only with closed enclosures, i.e., all unused slots of the system must be covered by front plates.
- Do not work on the external cable harness while the SCALEXIO system is running.
- Before connecting the SCALEXIO system to the power source, perform a visual inspection of the enclosure and all the connected cables. Do not operate the SCALEXIO system if it looks damaged.
- Some circuits are live even with the main supply turned off. Before removing or installing I/O boards, switch the power supplies of the host PC and SCALEXIO LabBox off and unplug the power cords. Wait at least one minute to allow all components to discharge. Some of the components, for example, power supply capacitors, can carry residual voltage.
- The On/Off button at the front of SCALEXIO LabBox does not disconnect the SCALEXIO system from the mains. For complete disconnection, unplug the power cord from the socket.
- The SCALEXIO hardware provides electrical energy at the I/O pins, which can cause a fire if external components such as sensors/actuators are not appropriately connected. To prevent a fire, apply the general fire safety regulations, e.g., supervise the operation, remove fire loads, and use fire-proof materials and enclosures.
- High voltages can be present at pins of the ECU/load connectors. Therefore, do not leave the connectors unconnected during operation.
- High currents can be present at connector pins or interfaces where they are not expected, for example, due to incorrect external wiring.

- If you measure analog signals with unshielded I/O cables, do not operate mobile phones, hand-held transceivers, or any other sources of electromagnetic fields close to the cable harness of the SCALEXIO system during run time. Otherwise, you might influence the measurements.

Using measurement instruments

To avoid an electric shock and/or property damage, note the following points when you work with measurement instruments (for example, oscilloscope or tester device):

- Use only suitable and tested measuring instruments. Observe all the safety instructions when making measurements.
- Connect and disconnect the measuring instruments only when the SCALEXIO system is turned off.
- Before starting measurements, check that the measuring instruments and their cables are in perfect condition.

Unexpected behavior of the SCALEXIO system

If the miniature circuit breaker or residual current device switches off the SCALEXIO system, disconnect the system from the power source immediately and make sure that it cannot be switched on unintentionally. The SCALEXIO system must not be put into operation again until it has been analyzed, repaired, and approved by dSPACE or an authorized support engineer.

Protecting the SCALEXIO system

- Before a lightning storm, disconnect the LAN and power cords. Alternatively, install appropriate protection devices.
- Do not unplug the connectors by pulling the cables. Hold the plug itself to pull it out.
- Route external cables so that they are not likely to be walked on or pinched by items placed upon or against them.

Cleaning the SCALEXIO system

- Before cleaning, disconnect the SCALEXIO system from the power source.
- Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning.

Getting Started with SCALEXIO LabBox

Where to go from here

Information in this section

Basics on SCALEXIO LabBox

Component description

SCALEXIO LabBox is a compact enclosure of the SCALEXIO family for laboratory use. It comes in two sizes (8-slot and 19-slot) that offer space for up to 7 or up to 18 I/O boards to build a compact real-time system that is ideally suited for function development and testing. SCALEXIO LabBox can be mounted in a SCALEXIO rack or used as desktop version.

The following example shows a desktop version of SCALEXIO LabBox (19-slot).

- Equipped with a DS6001 Processor Board and I/O boards, a SCALEXIO LabBox can constitute a compact stand-alone SCALEXIO system, a root in a distributed SCALEXIO system, or be part of a multiprocessor SCALEXIO system. A DS6001 Processor Board is also required to operate dSPACE Ethernet boards or CompactPCI® Serial boards in the extended I/O slots of a SCALEXIO LabBox.
- Equipped with a DS6051 IOCNET Router and SCALEXIO I/O boards, a SCALEXIO LabBox can constitute a node in a distributed SCALEXIO system that is operated with a SCALEXIO Processing Unit or another LabBox (that holds a processor board).

Connections between the different parts of a (distributed) SCALEXIO system are usually established via fiber-optic IOCNET cables.

Processing hardware

Each SCALEXIO system must have at least one processing hardware component that executes the real-time application and provides an interface to the IOCNET for communication with I/O units, I/O boards, or other processing hardware. The processing hardware communicates with the host PC via Ethernet. In a SCALEXIO system, two types of processing hardware can be used, a DS6001 Processor Board or a SCALEXIO Processing Unit. For system configuration and support, each SCALEXIO processing hardware component has a web interface you can open in any Internet browser.

By default, the Ethernet port for the host PC connection of SCALEXIO processing hardware is preconfigured as follows:

- IP address: 192.168.140.10
- Network mask: 255.255.255.0

Versions of SCALEXIO LabBox

There are three versions of SCALEXIO LabBox for laboratory use on a desktop or within a 19'' rack:

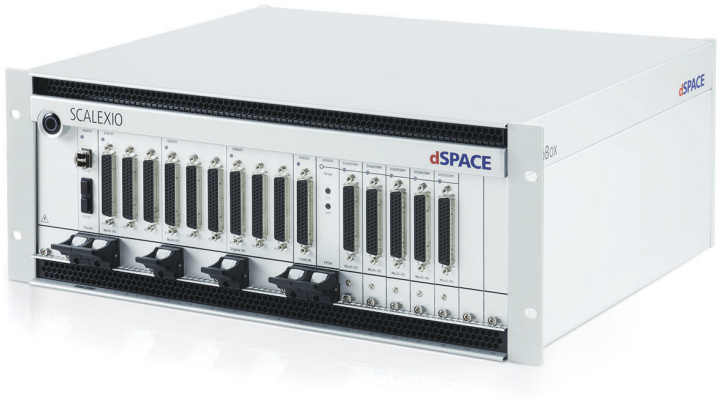
- A single LabBox (8-slot) or LabBox (19-slot) as desktop version
- Two LabBoxes (2 × 8-slot) mounted together or a single LabBox (19-slot) as rack-mount version
- Two LabBoxes (2 × 8-slot) mounted together or a single LabBox (19-slot) as covered rack-mount version

The following illustrations show SCALEXIO LabBox (19-slot).

Desktop version The desktop version comes with handles and plastic feet. Refer to the following illustration:

Rack-mount versions

- The rack-mount version that is flush mounted with the rack's front to allow clear access to the box's cables. Refer to the following illustration:



- The covered rack-mount version is mounted deeper inside the rack behind an additional front cover that hides the box's (rack-internal) cables. Refer to the following illustration:

Related topics

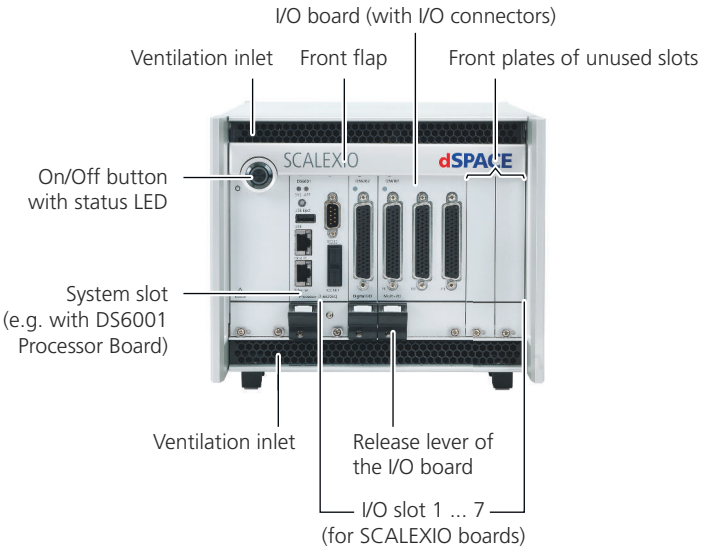
Basics

SCALEXIO LabBox (SCALEXIO Hardware Installation and Configuration 🕮)

Overview of SCALEXIO LabBox (8-Slot)

Front view

The following illustration shows the front view of SCALEXIO LabBox (8-slot, desktop version) with a DS6001 Processor Board (installed in the system slot and I/O slot 1).



The design of the desktop version and the rack-mount versions is identical, except for the handles and the plastic feet. The rack-mount versions of SCALEXIO LabBox have mounting brackets instead of the handles and no plastic feet to stand on.

On/Off button with status LED Lets you switch SCALEXIO LabBox between standby mode and operating mode.

To start the operating mode of SCALEXIO LabBox via its On/Off button, the power source switch on the rear side of the box's power supply unit must be switched on.

The integrated status LED displays the states of the SCALEXIO LabBox.

Note

Switching to standby mode can be disabled or delayed by software. Refer to System Shutdown (ConfigurationDesk I/O Function Implementation Guide 🕮).

Front flap Covers the upper fastening screws of the installed SCALEXIO I/O boards.

System slot Use this slot to insert a DS6051 IOCNET Router or DS6001 Processor Board. The system slot is named *slot 0*. If you use a DS6001 Processor Board, *I/O slot 1* is also occupied by this board.

I/O slots 1 … 7 Use these I/O slots to insert up to seven I/O boards. The slots are numbered from left to right.

Slots 3 … 7 are extended I/O slots that additionally provide support for dSPACE Ethernet boards and dSPACE-qualified CompactPCI® Serial boards as follows:

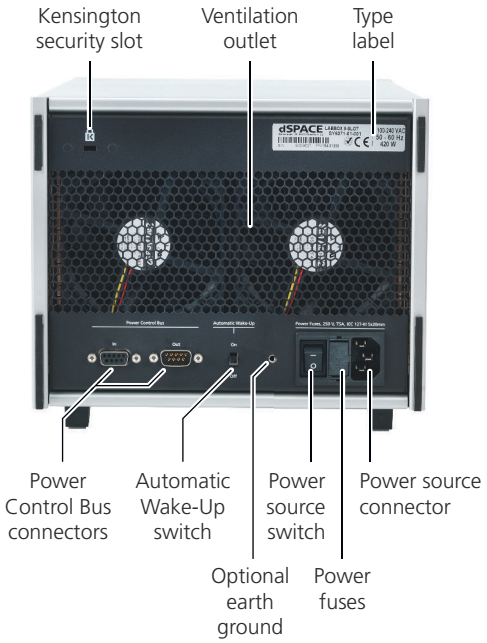
- Slots 3 and 7: PCIe x4 (up to 2000 MByte/s)
- Slots 4, 5, and 6: PCIe x1 (up to 500 MByte/s)

Note

Unused slots must be covered by front plates to ensure electromagnetic compatibility (EMC) and precise airflow for cooling.

Rear view

The following illustration shows the rear view of SCALEXIO LabBox (8-slot, desktop version).



Kensington security slot Lets you use the Kensington lock anti-theft system and connect a security cable.

Type label Displays the version and the serial number of SCALEXIO LabBox among other information.

Power control bus connectors Lets you cascade SCALEXIO AutoBoxes/LabBoxes to power them up or down at the same time. Refer to Powering Up and Shutting Down the LabBox on page 30.

Automatic Wake-Up switch A switch to specify the start behavior.

- On means that SCALEXIO LabBox starts the operating mode automatically when its internal power supply unit is powered up via the power source switch.

- **Off** means that SCALEXIO LabBox is set to standby mode when its internal power supply unit is powered up via the power source switch. SCALEXIO LabBox will start the operating mode if you press the **On/Off button** on the front side.

New states of this switch take effect only after SCALEXIO LabBox was powered down completely and powered up again.

Optional earth ground M4 press nut to connect an additional *earth ground* if you install SCALEXIO LabBox in a SCALEXIO rack.

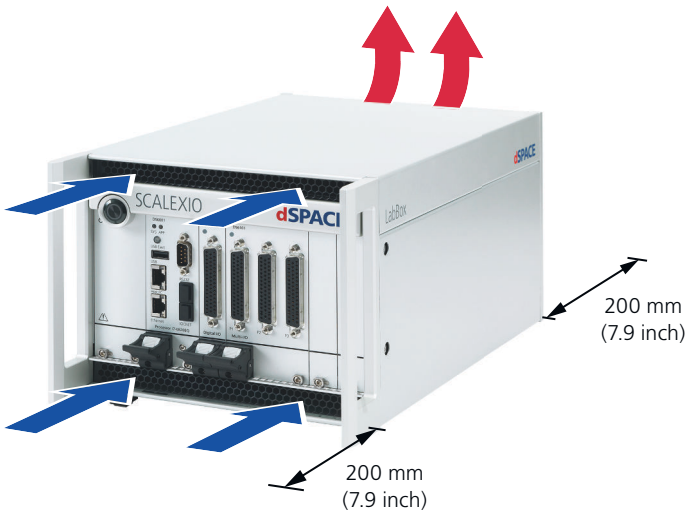
Power source switch Connects or disconnects the internal power supply to or from the external power source.. For details, refer to Powering Up and Shutting Down the LabBox on page 30.

Power fuses Two power fuses (5 x 20 mm, T 5 A).

Power source connector Connects the LabBox to the power source.

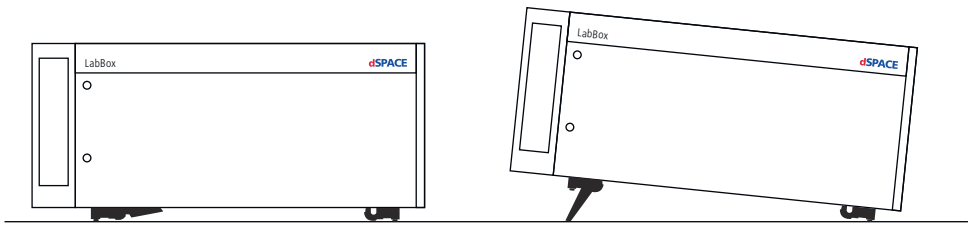
Clearances

Do not block the ventilation inlets and outlets of SCALEXIO LabBox. For sufficient heat dissipation and free airflow, observe the minimum clearance of 200 mm (7.9 in) to walls, other devices or objects in front of and behind these openings.



Placement

The desktop version of SCALEXIO LabBox has front feet with tilt legs on the bottom that let you stand SCALEXIO LabBox up.



Related topics

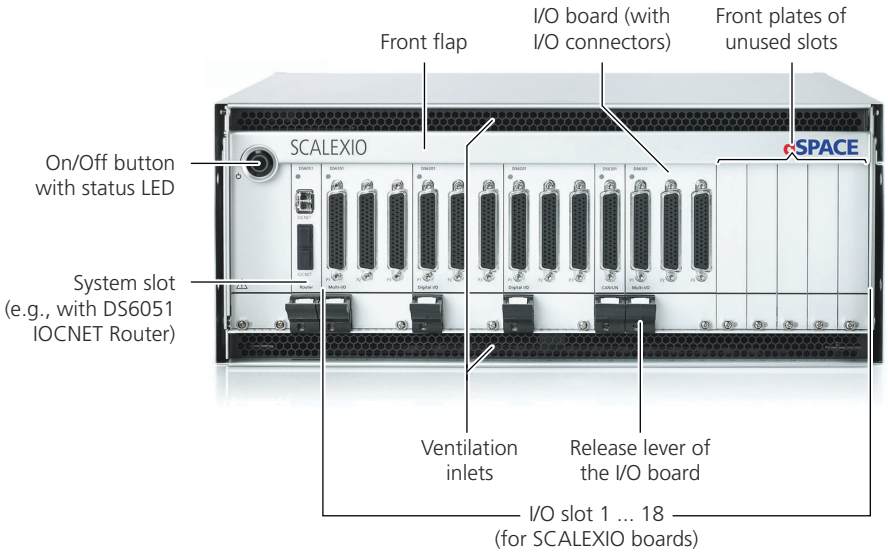
Basics

Features of SCALEXIO LabBox (SCALEXIO Hardware Installation and Configuration 🕮)

Overview of SCALEXIO LabBox (19-Slot)

Front view

The following illustration shows the front view of SCALEXIO LabBox (19-slot).



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I/O slots 1 … 18 These slots are I/O slots where you insert up to 18 I/O boards. The slots are numbered from left to right.

Slots 3 … 7 are extended I/O slots (LabBox version SY6072-*03*-xxx and later) that additionally provide support for dSPACE Ethernet boards and dSPACE-qualified CompactPCI® Serial boards as follows:

- Slots 3 and 7: PCIe x4 (up to 2000 MByte/s)
- Slots 4, 5, and 6: PCIe x1 (up to 500 MByte/s)

Note

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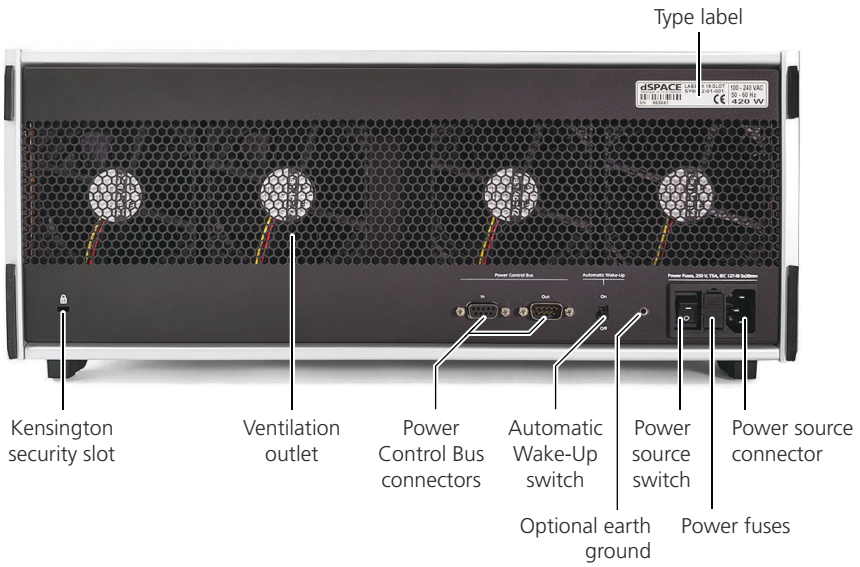
Rear view

The following illustration shows the rear view of SCALEXIO LabBox (19-slot, desktop version).



Kensington security slot Lets you use the Kensington lock anti-theft system and connect a security cable.

Type label Displays the version and the serial number of SCALEXIO LabBox among other information.

Power Control Bus connectors Lets you cascade SCALEXIO AutoBoxes and SCALEXIO LabBoxes (LabBox version SY6072-*03*-xxx and later) to power them up or down at the same time. Refer to Powering Up and Shutting Down the LabBox on page 30.

Automatic Wake-Up switch A switch to specify the start behavior.

- On means that SCALEXIO LabBox starts the operating mode automatically when its internal power supply unit is powered up via the power source switch.
- Off means that SCALEXIO LabBox is set to standby mode when its internal power supply unit is powered up via the power source switch. SCALEXIO LabBox will start the operating mode if you press the On/Off button on the front side.

New states of this switch take effect only after SCALEXIO LabBox was powered down completely and powered up again.

Optional earth ground M4 press nut to connect an additional *earth ground* if you install SCALEXIO LabBox in a SCALEXIO rack.

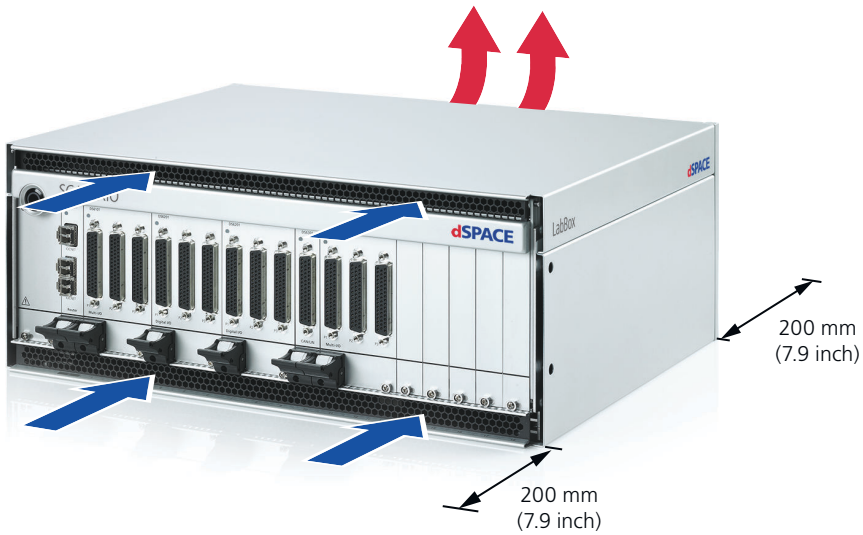
Power source switch Connects or disconnects the internal power supply to or from the external power source.. For details, refer to Powering Up and Shutting Down the LabBox on page 30.

Power fuses Two power fuses (5 x 20 mm, T 5 A).

Power source connector Connects the LabBox to the power source.

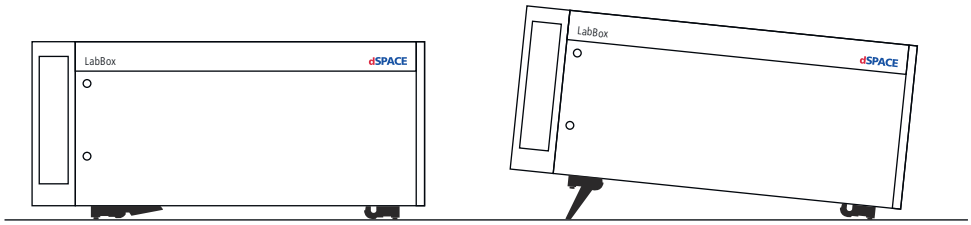
Clearances

Do not block the ventilation inlets and outlets of SCALEXIO LabBox. For sufficient heat dissipation and free airflow, observe the minimum clearance of 200 mm (7.9 in) to walls, other devices or objects in front of and behind these openings.



Placement

The desktop version of SCALEXIO LabBox has front feet with tilt legs on the bottom that let you stand SCALEXIO LabBox up.



Connecting a LabBox Using a DS6001 Processor Board

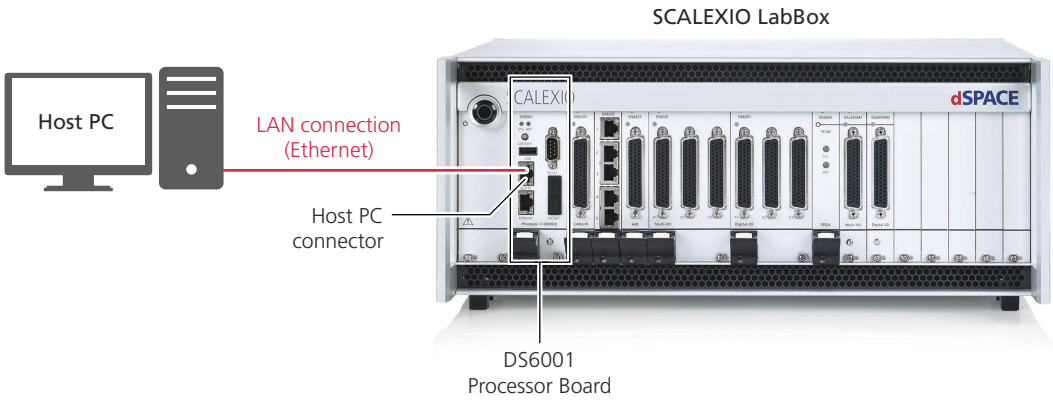
Introduction

Equipped with a DS6001 Processor Board and I/O boards, a SCALEXIO LabBox can constitute a compact stand-alone SCALEXIO system, a root in a distributed SCALEXIO system, or be part of a multiprocessor SCALEXIO system. A DS6001 Processor Board is also required to operate dSPACE Ethernet boards or CompactPCI® Serial boards in the extended I/O slots of a SCALEXIO LabBox.

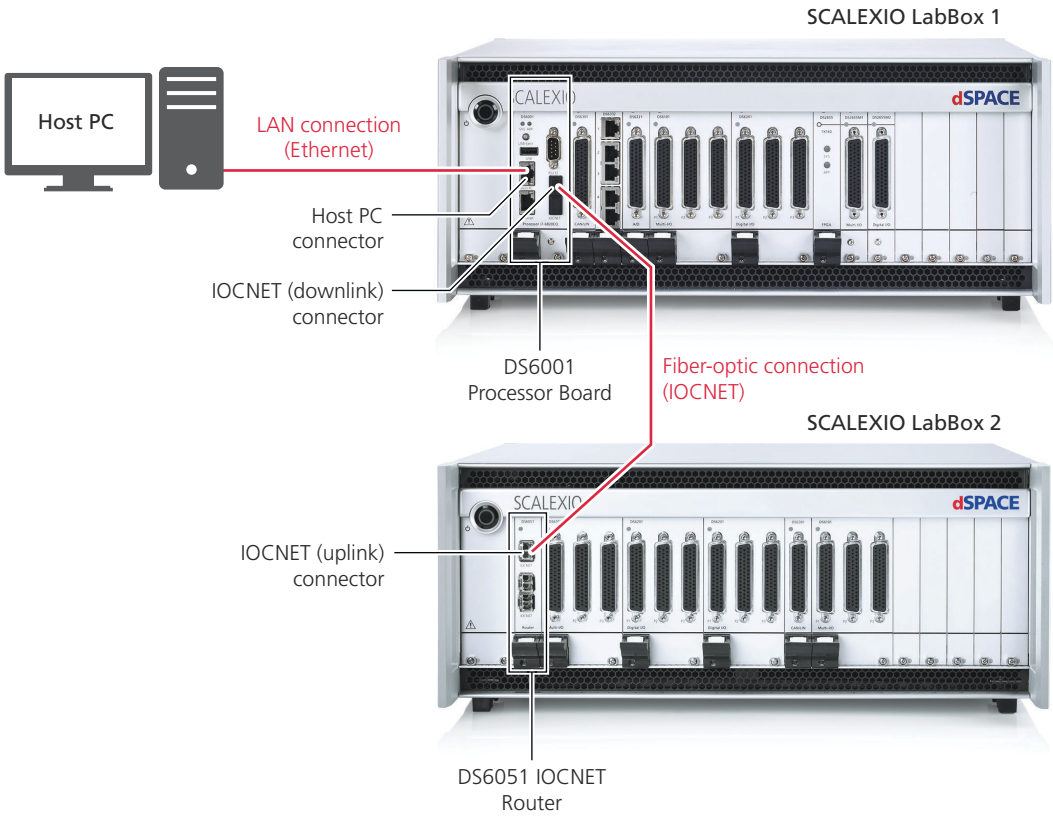
SCALEXIO LabBox is connected to the host PC or network via the **Host PC** Ethernet (RJ45) connector on the front of the DS6001 Processor Board. Refer to Overview of the DS6001 Processor Board (SCALEXIO Hardware Installation and Configuration 🕮).

The following illustrations show SCALEXIO LabBox (19-slot).

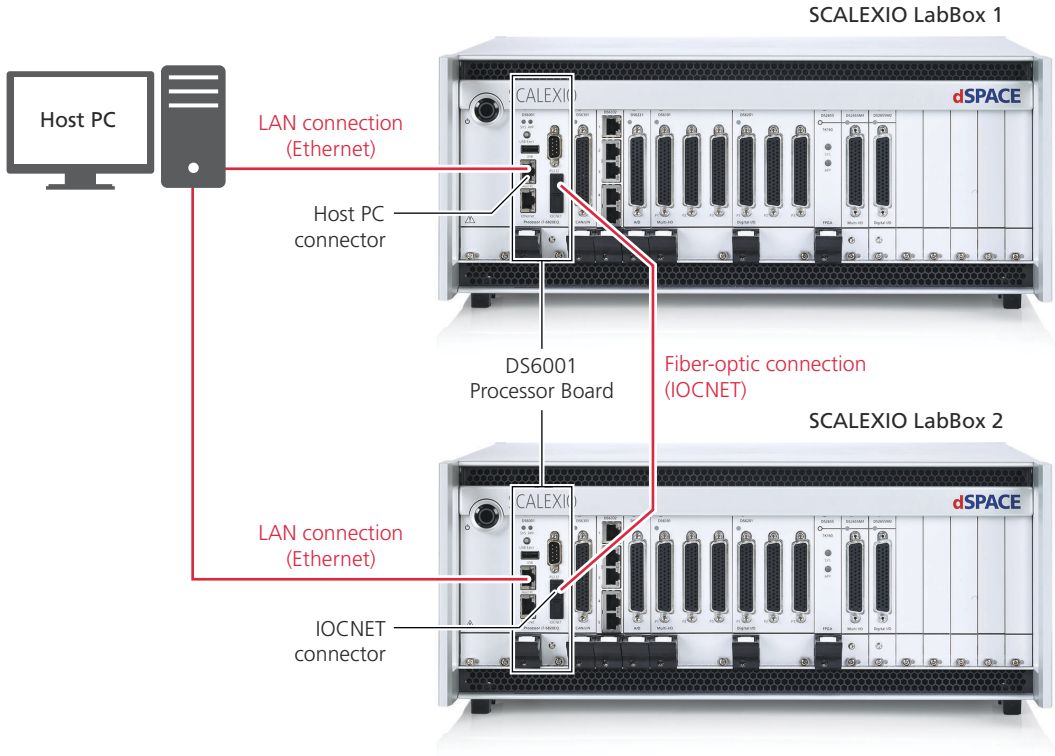
Use as stand-alone SCALEXIO system



Use as a node in a distributed SCALEXIO system



Use in a multiprocessor system



Related topics

Basics

Connecting a LabBox Using a DS6051 IOCNET Router.....27
Connecting the SCALEXIO System to the Host PC (SCALEXIO Hardware Installation and Configuration 🕮)
DS6001 Processor Board (SCALEXIO Hardware Installation and Configuration 🕮)

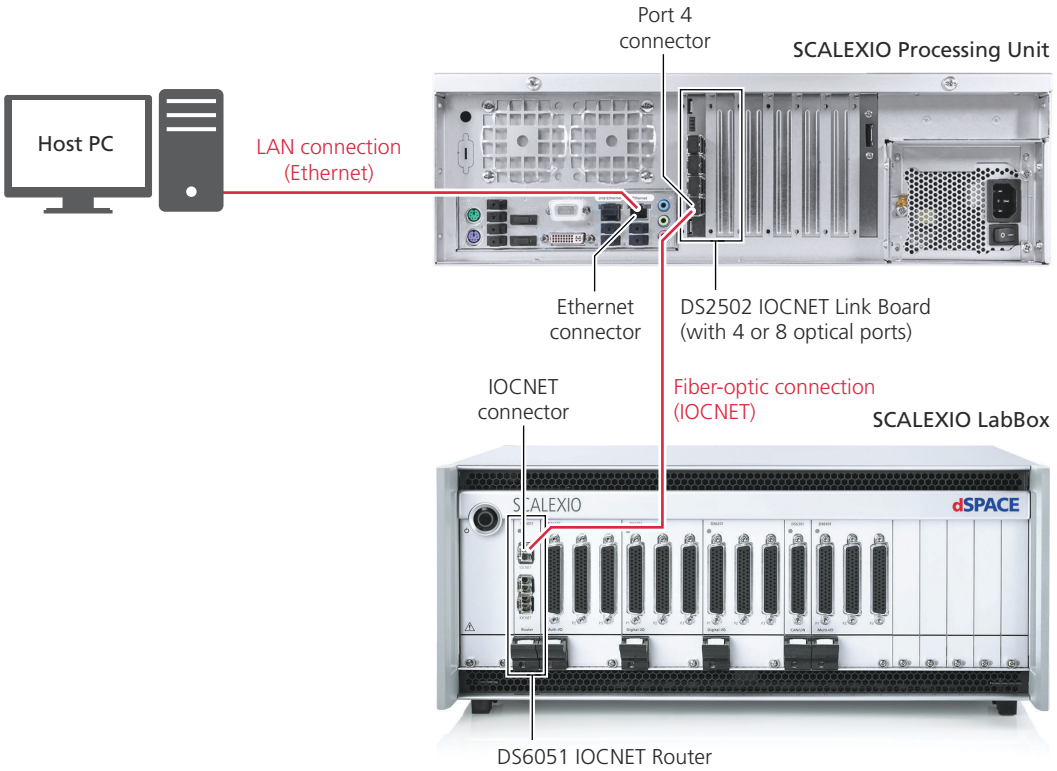
Connecting a LabBox Using a DS6051 IOCNET Router

Introduction

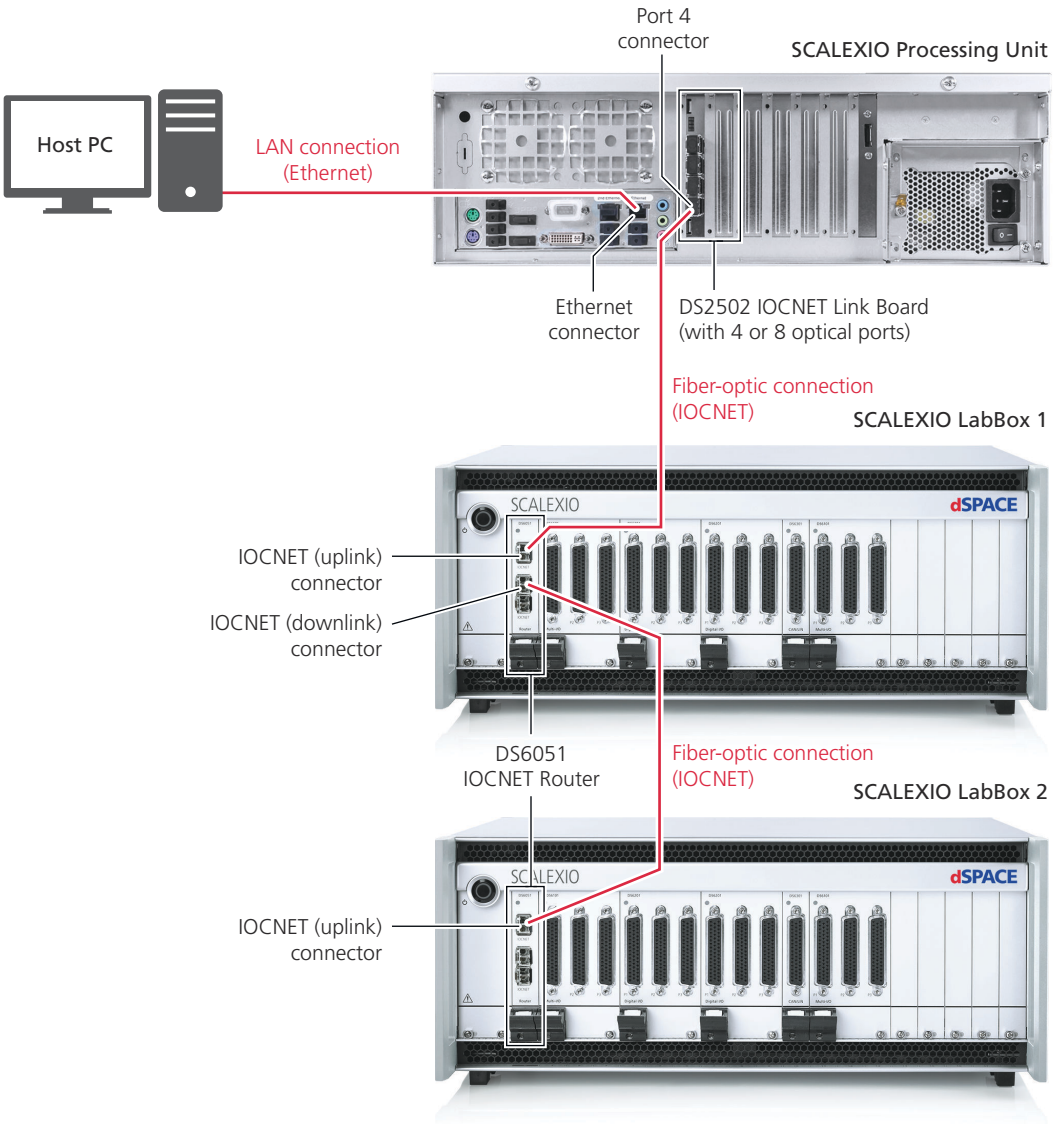
Equipped with a DS6051 IOCNET Router and SCALEXIO I/O boards, a SCALEXIO LabBox can constitute a node in a distributed SCALEXIO system that is operated with a SCALEXIO Processing Unit or another LabBox (that holds a processor board).

The following illustrations show SCALEXIO LabBox (19-slot).

Use as a single node with a SCALEXIO Processing Unit



Use in a distributed SCALEXIO system



Related topics

Basics

Connecting a LabBox Using a DS6001 Processor Board.....25
Connecting the SCALEXIO System to the Host PC (SCALEXIO Hardware Installation and Configuration 🕮)
DS6051 IOCNET Router (SCALEXIO Hardware Installation and Configuration 🕮)
SCALEXIO Processing Unit (SCALEXIO Hardware Installation and Configuration 🕮)

Powering Up and Shutting Down the LabBox

Introduction

There are different methods for powering up and shutting down the LabBox.

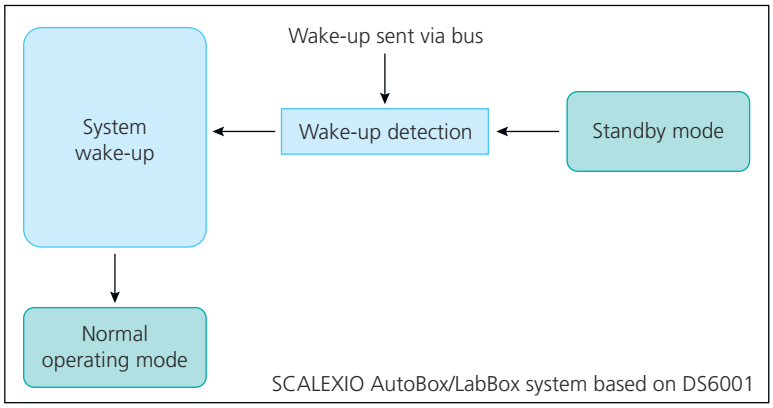
Control elements

The following control elements let you decide how to power up or shut down the LabBox:

- Power source switch on the rear side to switch the internal power supply unit of the LabBox on or off.
- Automatic Wake-Up switch on the rear side to specify the start behavior of the LabBox.
- On/Off button on the front side.

Waking up SCALEXIO LabBoxes via bus signals

A SCALEXIO AutoBox/LabBox with a DS6001 Processor Board can change its operating mode from standby to normal operating mode when it receives a dedicated wake-up message or frame via a CAN or LIN bus.



SCALEXIO AutoBox/LabBox system based on DS6001

To use the wake-up feature, the SCALEXIO system must consist of the following components:

- A DS6001 Processor Board installed in a SCALEXIO LabBox.
- One or more of the following bus boards:
  - DS6301 CAN/LIN Board
  - DS6341 CAN Board
  - DS6351 LIN Board

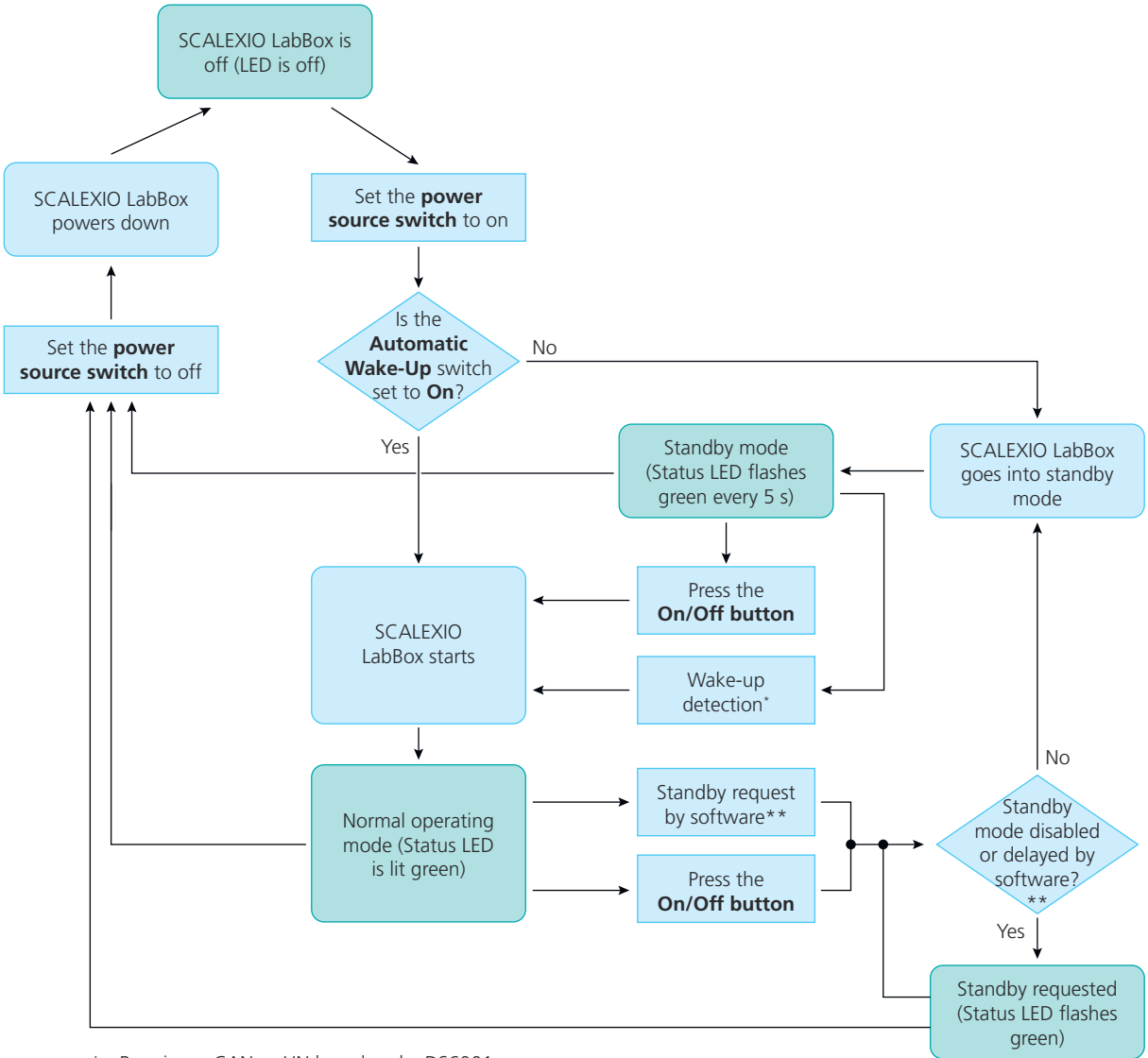
If multiple LabBoxes are daisy-chained via the power control bus, all the boxes are powered-up when a wake-up message or frame is received by a bus board installed in one of the LabBoxes.

For details, refer to Waking up SCALEXIO AutoBoxes/LabBoxes via Bus Signals (SCALEXIO – Hardware and Software Overview 🕮).

To set the SCALEXIO LabBox to standby mode via bus signals, you can use the **System Shutdown** function block. Refer to Basics on Using the System Shutdown Functionality (ConfigurationDesk I/O Function Implementation Guide 🕮).

Flow chart

The following simplified flow chart displays the different operating modes of the SCALEXIO LabBox and how to switch between them.



* Requires a CAN or LIN board and a DS6001
** Requires a DS6001

Note

Due to internal energy buffers, it can take up to 15 seconds to power down the SCALEXIO LabBox completely after switching off the power source switch. (SCALEXIO LabBox version SY6072-02-xxx requires up to 1 minute to power down.)
Do not establish or remove connections of the power control bus during the powering down period.

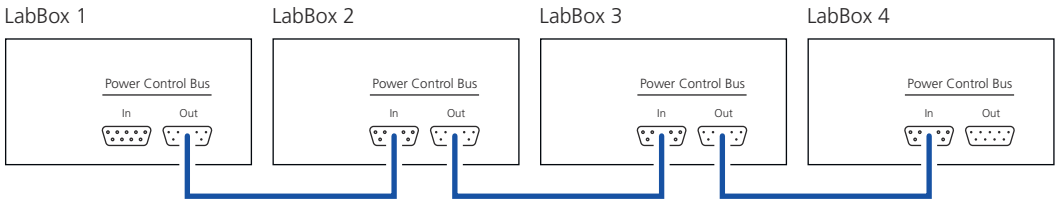
Tip

Pressing the **On/Off button** for more than 5 seconds starts a *forced shutdown* from operating mode to standby mode, which might cause data loss.

Power control bus

The power control bus lets you cascade SCALEXIO AutoBoxes/LabBoxes to power them up or down at the same time by pressing only one of their On/Off buttons. Further, power-up might be performed for all cascaded SCALEXIO AutoBoxes/LabBoxes after a dedicated wake-up message or frame is received at an installed bus board.

To use the power control bus, each SCALEXIO LabBox has a 9-pin, female Sub-D **In** connector and a 9-pin, male Sub-D **Out** connector at its rear. You can use the power control bus as shown in the following example to create a daisy chain of SCALEXIO AutoBoxes/LabBoxes.



Observe the following points when using the power control bus:

- You can cascade up to 5 SCALEXIO LabBoxes via standard 9-pin Sub-D cables with one-to-one connections from the male (Out) to the female (In) connector.
- Do not exceed a cable length of 3 m between the single LabBoxes.
- Each LabBox must be directly connected to the power source. (The power control bus does not provide a power connection.)
- The LabBox that has an unconnected power control bus **In** connector works as master. (In the example shown above LabBox 1 is the master.) The setting of the **Automatic Wake-Up** switch of this master LabBox is valid for all the daisy-chained LabBoxes.

Note

- When connecting or disconnecting the power control bus, each LabBox must be switched off by the related power source switch on the rear and shut down properly.
- Only line topologies (as shown above) are allowed to connect the power control bus. Do not connect the power control bus in a loop topology.
- Do not connect the power control bus to the **RS232** connector of a DS6001 Processor Board or vice versa.

Related topics

Basics

DS6301 CAN/LIN Board (SCALEXIO Hardware Installation and Configuration 🕮)
DS6341 CAN Board (SCALEXIO Hardware Installation and Configuration 🕮)
DS6351 LIN Board (SCALEXIO Hardware Installation and Configuration 🕮)

How to Set Up the SCALEXIO System

Objective

To work with a SCALEXIO system, all of its components must be connected to the mains and to a host PC.

Requirements for the host PC

The host PC is a standard PC that the dSPACE test and experiment software is installed on. Via the host PC, you can configure the SCALEXIO hardware, download a real-time application to the system and control the simulation.

To work with the SCALEXIO system, the host PC must provide the following minimum system requirements:

- Software requirements: A dSPACE installation valid for SCALEXIO systems.
- Hardware requirements: A network interface card.

For further general software and hardware requirements for the host PC, refer to Appendix (Installing dSPACE Software 🕮).

Method

To set up the SCALEXIO system

1. If you work with a distributed SCALEXIO system, you must connect the single SCALEXIO components via fiber-optic IOCNET cables.

   For examples on connecting SCALEXIO LabBox, refer to Connecting a LabBox Using a DS6001 Processor Board on page 25 and Connecting a LabBox Using a DS6051 IOCNET Router on page 27.
2. Connect SCALEXIO LabBox and its processing hardware to the host PC via a peer-to-peer connection or a network connection.

You must always use the *autonegotiation* (also called NWay) mode for communication between the SCALEXIO system and the host PC.

For further details on the LAN connection, refer to Setting up the Connection to the Host PC (SCALEXIO Hardware Installation and Configuration 🕮).

3. If the power control bus is to be used, connect the power control bus of the related LabBoxes before connecting the LabBoxes to the mains.
4. Connect all the components to the mains.
5. If you use the desktop version of SCALEXIO LabBox, set the mains switch at its rear to on.
6. Use the **On/Off button** at the front of SCALEXIO LabBox to power it up.
7. If you use the desktop version of the SCALEXIO Real-Time PC, set the mains switch at its rear to on.

Result

You set up the SCALEXIO system.

The **SYS LED** of the related SCALEXIO processing hardware indicates different states of the boot and initialization processes. The SCALEXIO system is ready for operation when the **SYS LED** is green.

For details on the LED states of the related SCALEXIO processing hardware, refer to:

- LEDs of the DS6001 Processor Board (SCALEXIO Hardware Installation and Configuration 🕮)
- LEDs of the SCALEXIO Processing Unit (SCALEXIO Hardware Installation and Configuration 🕮)

Next steps

To access the SCALEXIO system via your host PC, you first have to register the processing hardware to make it known to the dSPACE software products, for example, ConfigurationDesk. To do this, you need the IP address of the SCALEXIO system you want to register.

- If you want to change the IP address and the network mask, refer to How to Change the Network Configuration via a Command Prompt Window on page 35.
- To register your system with ConfigurationDesk, refer to How to Register a SCALEXIO System with ConfigurationDesk on page 38.

Related topics

HowTos

How to Change the Network Configuration via a Command Prompt Window

Objective

As an alternative to using the Web interface of the SCALEXIO processing hardware, you can use a Command Prompt window to change the network configuration of the processing hardware. This method is required if you do not know the current IP address of the SCALEXIO processing hardware.

Required information

For changing the network configuration, you need:

- Either the current IP address of the SCALEXIO system.
- Or the MAC address of the SCALEXIO system.

By default, the Ethernet port for the host PC connection of SCALEXIO processing hardware is preconfigured as follows:

- IP address: 192.168.140.10
- Network mask: 255.255.255.0

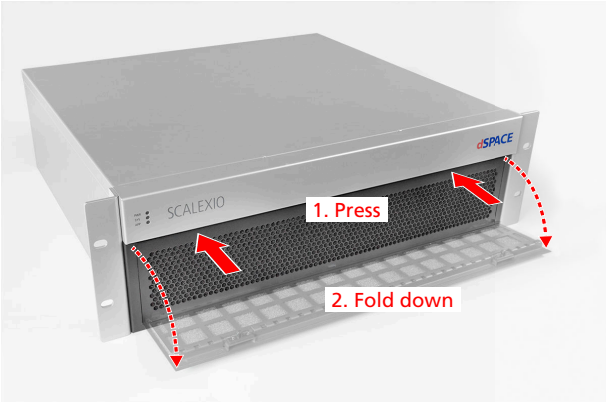
MAC address label of SCALEXIO processing hardware

Each SCALEXIO processing hardware comes with a label that shows its individual MAC address.

DS6001 Processor Board You find the individual MAC addresses for the network interfaces of the board's Host PC and Ethernet connectors on a label at the bottom of the DS6001 Processor Board.

You must remove the DS6001 Processor Board temporary, to see the label. Refer to How to Remove a Board from the LabBox (SCALEXIO Hardware Installation and Configuration 🕮).

SCALEXIO Real-Time PC You find the individual MAC address of the SCALEXIO Processing Unit's host PC interface on a label behind the front flap. (The following illustration shows housing variant 3.)



Preconditions

- The SCALEXIO system must be connected to the host PC in a peer-to-peer connection.
- The host PC must have a static IP address.

Method

To change the network configuration via a Command Prompt window

1 Switch on the host PC and the SCALEXIO system.

The SCALEXIO system has booted completely when the SYS LED of the SCALEXIO processing hardware is green or flashes orange and green.

2 On the Windows Start menu, select dSPACE RCP and HIL 20xx-x – Command Prompt for dSPACE RCP and HIL 20xx-x to open a Command Prompt window in which the required paths and environment settings are preset.

3 Enter `DsNetConfig -?`.

The syntax and all the available commands of the DsNetConfig tool are displayed.

4 **Note**

The SCALEXIO system and the Ethernet interface of the host PC must have the same network mask (for example, `255.255.255.0`).
The IP address of the SCALEXIO system and the IP address of the host PC's Ethernet interface must be part of the same subnetwork (for example, `192.168.1.x`).

You can now specify a static IP address or let a DHCP server set the IP address:

- To set a static IP address without gateway, enter the new IP address and the network mask:

  `DsNetConfig <MAC_address> -ip <IP_address> <subnet_mask>`

  (for example, `DsNetConfig 00:03:2D:19:09:3A -ip 192.168.0.2 255.255.255.0`)
- To set a static IP address with gateway, enter the new IP address, the network mask, and the gateway address:

  `DsNetConfig MAC_address> -ip <IP_address> <subnet_mask> -gw <gateway_address>`

  (for example, `DsNetConfig 00:03:2D:19:09:3A -ip 192.168.0.2 255.255.255.0 -gw 192.168.0.1`)
- To let a DHCP server set the IP address, enter:

  `DsNetConfig <MAC_address> -dhcp`

  (for example, `DsNetConfig 00:03:2D:19:09:3A -dhcp`)

  Depending on the DHCP configuration, the IP address is fixed or variable and might change each time the SCALEXIO system signs onto the network.

The SYS LED and the APP LED indicate the configuration state.

LED Status	Configuration State
Flashes green (3 times)	The configuration was successful. Continue with step 5.
Flashes red (3 times)	The SCALEXIO system received the configuration command but the configuration was not successful. Make sure that the SCALEXIO system is not being accessed by software, such as

LED Status	Configuration State
	ConfigurationDesk or ControlDesk, and that no real-time application is loaded to the SCALEXIO system. Then repeat steps 2 … 4.
No reaction	The SCALEXIO system has not received the configuration command. Check the configuration of the host PC and/or the Ethernet connection between the SCALEXIO system and the host PC. Then repeat steps 2 … 4.

5 Shut down the SCALEXIO system.

6 Wait until the SCALEXIO system has shut down completely, then restart it to invoke the new IP address.

7 In the Command Prompt window, enter `DsNetConfig -scan`.

The SCALEXIO system is displayed with its MAC address, the specified IP address, the network mask (subnet mask), and the board name.

Tip

If the SCALEXIO system is not displayed:
- Check if the subnet masks of the SCALEXIO processing hardware and of the host PC are the same.
- Check if the IP address of the SCALEXIO system is part of the subnetwork of the host PC's Ethernet interface.
- Check if the IP address of the SCALEXIO system is within the valid ranges and specified correctly.

Result

You changed the network configuration for the processing hardware of your SCALEXIO system.

Related topics

Basics

Web Interface of the DS6001 Processor Board (SCALEXIO Hardware Installation and Configuration 🕮)
Web Interface of the SCALEXIO Processing Unit (SCALEXIO Hardware Installation and Configuration 🕮)

HowTos

How to Start the DS6001 Processor Board in Secure Mode (SCALEXIO Hardware Installation and Configuration 🕮)

How to Register a SCALEXIO System with ConfigurationDesk

Objective

To access the hardware resources of your SCALEXIO system, you must register its processing hardware to make the system known to your host PC.

Basics on registering a SCALEXIO system

To register a SCALEXIO system, you can use one of the following products:

- AutomationDesk
- ConfigurationDesk
- ControlDesk

When registering the SCALEXIO system or managing the registration data, use only one of these programs and close the other program. The SCALEXIO system is also registered for the other program and present the next time you start it.

For basics and further details (for example, advanced features) on registering hardware and on managing registered hardware, refer to Basics on Registering Real-Time Hardware (ConfigurationDesk Real-Time Implementation Guide 🕮).

In this topic, you will learn, how to register a SCALEXIO system with ConfigurationDesk.

Preconditions

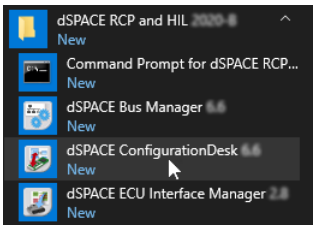
The following preconditions must be fulfilled:

- ConfigurationDesk is installed on your host PC and ConfigurationDesk must belong to the RCP and HIL installation that is currently active. For instructions, refer to How to Install dSPACE Software (Installing dSPACE Software 🕮).
- Your host PC must be connected to the same network as the SCALEXIO system you want to register in ConfigurationDesk.
- The SCALEXIO system is switched on.

Method

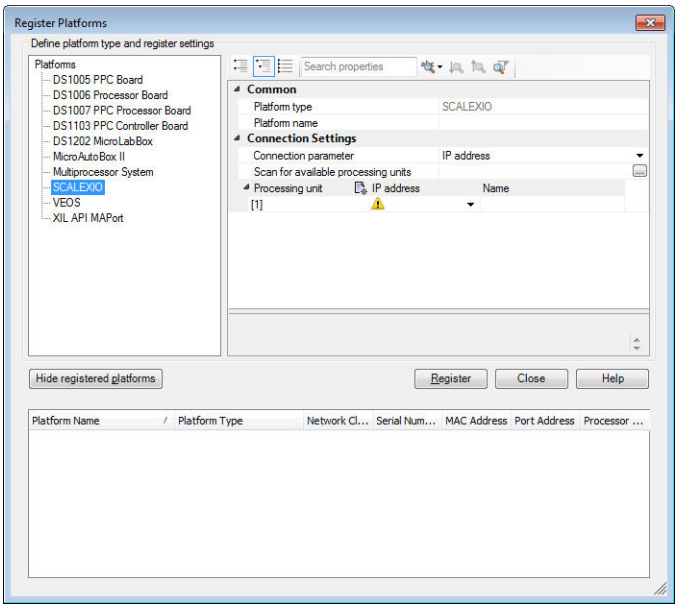
To register SCALEXIO hardware

1 Start ConfigurationDesk.



2 On the Platforms ribbon, click Platform Management – Register Platforms.

The Register Platforms dialog opens.



3 In the Platform name edit field, specify a unique user-defined platform name for the SCALEXIO system if required.

4 Specify the connection settings for the SCALEXIO system and its processing hardware you want to register: Specify either its IP address, its MAC address, board name, or its alias name.

Tip

You can also scan the local network for connected platform hardware. To do so, select the Scan local network entry from the IP address drop-down list. The scope is limited to the current subnetwork.

Note

If your SCALEXIO system is installed in a different subnetwork connected to your host PC's network via a router or gateway, you must enter the IP address for registering.

5 If you want to register a multiprocessor system, click  to add an new processing hardware and specify either its IP address, its MAC address, board name, or its alias name.

Note

You cannot subsequently add processing hardware to a SCALEXIO system that is already registered.

6 Click Register to complete the registration of the SCALEXIO system.

The registered processing hardware is displayed with its registration settings in the **Registered platforms** list.

7 Click **Close** to close the **Register Platforms** dialog.

Result

You have registered the SCALEXIO system independently of ConfigurationDesk projects and applications. ConfigurationDesk created a platform for each item of registered hardware. The registration data is stored in the recent platform configuration.

The **Platform Manager** displays the hardware topology of all the registered platforms. The hardware topologies are displayed in the order in which the registered hardware systems are detected in the network. Each hardware topology is displayed in a hierarchical structure.

Next steps

When you have started ConfigurationDesk and registered your SCALEXIO system, you can:

- Start to work with a demo application as described in Accessing the CfgStartingWithExternalDevices Demo Project and Its Applications (ConfigurationDesk Tutorial Starting with External Devices 🕮)
- Make yourself familiar with basic concepts of ConfigurationDesk as described in Basic Concepts of ConfigurationDesk (ConfigurationDesk Getting Started 🕮) or
- Make yourself familiar with the workflows in ConfigurationDesk as described in Typical Workflows for Beginners (ConfigurationDesk Getting Started 🕮).

Certifications

CE compliance

SCALEXIO LabBox meets the requirements of the European directives 2014/30/EU (Electromagnetic Compatibility Directive) and 2014/35/EU (Low Voltage Directive) for CE marking.

Applied standards

SCALEXIO LabBox fulfills the following standards:

Tested Characteristics	Applied Standard	Description
Electromagnetic compatibility (EMC)	EN 61326-1 Table 2	Immunity standard for industrial environments[1)]
	CISPR 11, EN 55011 Group 1, Class A	Emission standard for industrial environments
Safety requirements	EN 61010-1	Safety requirements for electric equipment for measurement, control, and laboratory use

1) Tested with an I/O cable length < 3 m. Connected cables might affect the specified characteristics due to physical effects such as crosstalk, voltage drops, and influences through electromagnetic fields.

Data Sheet of SCALEXIO LabBox (8-Slot)

Technical data

The following table shows the technical data of SCALEXIO LabBox (8-slot).

Parameter		Specification[1]
Slots		8 slots: ▪ 1 system slot for: ▪ DS6051 IOCNET Router ▪ DS6001 Processor Board[2] ▪ Up to 7 I/O slots for I/O boards Among them 5 extended I/O slots with PCIe interface support to operate SCALEXIO Ethernet boards or dSPACE-qualified CompactPCI® Serial boards in conjunction with a DS6001 Processor Board: ▪ 2 × PCIe v2.0 x4 (up to 2000 MByte/s) ▪ 3 × PCIe v2.0 x1 (up to 500 MByte/s)
Grounding		System ground is isolated from earth ground
Ambient temperature		▪ For normal operation: 0 °C … 50 °C (32 °F … 122 °F) ▪ For transports in powerless state: -20 °C … 80 °C (-4 °F … 176 °F)
Environment		For indoor use only
Altitude		Up to 2000 m
Degree of protection		IP20, according to EN 60529
Relative humidity		5% … 95% (non-condensing environment)
Pollution degree		2, according to IEC 664 (normal clean and dry environment)
Protection class		1
Power source connection		100 … 240 V AC, 50 … 60 Hz, max. 420 W input power
Available output power (for SCALEXIO boards)		max. 170 W (max. 7.1 A, at +24 V)
Power consumption in standby mode		< 2 W
Physical size	Desktop version	One single LabBox: 224 × 193 × 394 mm (width × height × depth)
	Rack-mount version	Two LabBoxes mounted together: 483 × 178 × 355 mm (width × height × depth)
	Covered rack-mount version	Two LabBoxes mounted together: 483 × 178 × 493 mm (width × height × depth)
	19'' form factor	4 U
Mass		approx. 7.25 kg (without boards)

[1] Unless stated otherwise, the specifications are valid only if the dSPACE hardware is correctly powered, switched on, and ready for operation.

[2] The DS6001 Processor Board is a double-slot board that occupies the system slot (slot 0) and the I/O slot 1.

Data Sheet of SCALEXIO LabBox (19-Slot)

Technical data

The following table shows the technical data of SCALEXIO LabBox (19-slot).

Parameter		Specification[1]
Slots		19 slots: ▪ 1 system slot for: ▪ DS6051 IOCNET Router ▪ DS6001 Processor Board[2] (LabBox version SY6072-*03*-xxx and later) ▪ Up to 18 I/O slots for I/O boards Among them 5 extended I/O slots (LabBox version SY6072-*03*-xxx and later) with PCIe interface support to operate SCALEXIO Ethernet boards or dSPACE-qualified CompactPCI® Serial boards in conjunction with a DS6001 Processor Board : ▪ 2 × PCIe x4 (up to 2000 MByte/s) ▪ 3 × PCIe x1 (up to 500 MByte/s)
Grounding		System ground is isolated from earth ground
Ambient temperature		▪ For normal operation: 0 °C … 50 °C (32 °F … 122 °F) ▪ For transports in powerless state: -20 °C … 80 °C (-4 °F … 176 °F)
Environment		For indoor use only
Altitude		Up to 2000 m
Degree of protection		IP20, according to EN 60529
Relative humidity		5% … 95% (non-condensing environment)
Pollution degree		2, according to IEC 664 (normal clean and dry environment)
Protection class		1
Power source connection		100 … 240 V AC, 50 … 60 Hz, max. 420 W input power
Available output power (for SCALEXIO boards)		▪ max. 285 W (max. 11.875 A, at +24 V) (up to LabBox version SY6072-*02*-xxx) ▪ max. 335 W (max. 13.96 A, at +24 V) (LabBox version SY6072-*03*-xxx and later)
Power consumption in standby mode		< 2 W
Physical size	Desktop version	447 × 193 × 394 mm (width × height × depth)
	Rack-mount version	483 × 178 × 355 mm (width × height × depth)
	Covered rack-mount version	483 × 178 × 493 mm (width × height × depth)
	19'' form factor	4 U
Mass		approx. 11.5 kg (without boards)

[1] Unless stated otherwise, the specifications are valid only if the dSPACE hardware is correctly powered, switched on, and ready for operation.

[2] The DS6001 Processor Board is a double-slot board that occupies the system slot (slot 0) and the I/O slot 1.