MicroAutoBox III

Hardware and Software Overview

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dSPACE

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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

Content

This document gives you a brief introduction on the MicroAutoBox III and an overview on the hardware and software products that are provided by dSPACE to support typical use scenarios.

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.

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.

MicroAutoBox III Hardware Overview

Where to go from here

Information in this section

Application Areas of the MicroAutoBox III

Application areas

The MicroAutoBox III is a compact and robust rapid control prototyping (RCP) system dedicated for in-vehicle use. It provides a powerful multicore ARM processor and is available in several variants that provide a set of commonly used I/O interfaces for various automotive applications, including all major automotive bus systems, such as CAN, CAN FD, LIN, FlexRay, standard Ethernet and automotive Ethernet. MicroAutoBox III can be used in fullpass and bypass scenarios for different RCP applications:

- E-mobility, electrification, and powertrain control
- Assisted, highly automated, and autonomous driving
- Chassis, body, and vehicle dynamics control
- Supervisory and domain control
- Bus/network gateway and monitoring
- Noise, vibration, position, and motion control

Hardware Components of the MicroAutoBox III and their Features

Hardware components

A MicroAutoBox III consists of a processor board and at least one I/O board.

The processor board executes the real-time application and the I/O board provides the electrical interfaces for measuring and controlling signals of external devices and for bus and network communication, such as CAN or Ethernet communication.

You can order a MicroAutoBox III with different I/O boards to match the I/O requirements of the application. The I/O board configuration of a delivered MicroAutoBox III cannot be changed, but you can add or replace the I/O modules of the DS1514 FPGA Base Board.

A MicroAutoBox III variant with WLAN interface (MicroAutoBox III (WLAN)) provides a radio interface.

Processor board

The DS1403 Processor Board provides a processor for executing the real-time application and the communication to the host PC. The host communication lets you access the MicroAutoBox III with the host PC for downloading and controlling the real-time application, for example.

For more information on the features of the DS1403 Processor Board, refer to Features of the DS1403 Processor Board (MicroAutoBox III Hardware Installation and Configuration).

I/O boards

The following I/O boards are available for the MicroAutoBox III:

I/O Board	Description	Feature Overview
DS1511 Multi-I/O Board	The DS1511 Multi-I/O Board is a universal I/O board that provides additional digital I/O channels. The DS1511B1 is a variant of the DS1511 Multi-I/O Board with an extended measuring range for analog inputs.	Features of the DS1511 Multi-I/O Board (MicroAutoBox III Hardware Installation and Configuration)
DS1513 Multi-I/O Board	The DS1513 Multi-I/O Board is a universal I/O board that provides additional analog I/O channels and CAN interfaces.	Features of the DS1513 Multi-I/O Board (MicroAutoBox III Hardware Installation and Configuration)
DS1514 FPGA Base Board	The DS1514 FPGA Base Board provides an FPGA for application-specific I/O extensions and for user-programmable FPGA applications. You must install I/O modules in this board providing the I/O interface.	Features of the DS1514 FPGA Base Board (MicroAutoBox III Hardware Installation and Configuration)
DS1521 Bus Board	The DS1521 Bus Board is a bus and network board that mainly provides	Features of the DS1521 Bus Board (MicroAutoBox III Hardware Installation and Configuration)

I/O Board	Description	Feature Overview
	automotive bus interfaces, such as CAN FD and automotive Ethernet.	

I/O modules

You can install the following I/O modules in the DS1514 FPGA Base Board.

I/O Module	Description	Feature Overview
DS1552 Multi-I/O Module	The DS1552 Multi-I/O Module is a universal I/O module. The DS1552B1 is a variant of the DS1552 Multi-I/O Module with an extended measuring range for analog inputs.	Features of the DS1552 Multi-I/O Module (MicroAutoBox III Hardware Installation and Configuration)
DS1553 AC Motor Control Module	The DS1553 AC Motor Control Module provides an I/O interface that is optimized for controlling various electric drives.	Features of the DS1553 AC Motor Control Module (MicroAutoBox III Hardware Installation and Configuration)
DS1554 Engine Control I/O Module	The DS1554 Engine Control I/O Module provides an I/O interface for the advanced control of combustion engines.	Features of the DS1554 Engine Control I/O Module (MicroAutoBox III Hardware Installation and Configuration)
DS4340 FlexRay Interface Module	The DS4340 FlexRay Interface Module provides a FlexRay interface.	Features of the DS4340 FlexRay Interface Module (MicroAutoBox III Hardware Installation and Configuration)
DS4342 CAN FD Interface Module	The DS4342 CAN FD Interface Module provides two CAN channels supporting flexible data rates (CAN FD).	Features of the DS4342 CAN FD Interface Module (MicroAutoBox III Hardware Installation and Configuration)

Built-in Embedded PC

A MicroAutoBox III Embedded PC is a compact PC system that can be integrated into the housing of a MicroAutoBox III. The Embedded PC can be used for developing and validating advanced driver assistance, infotainment, and telematics, or to execute ControlDesk directly on the MicroAutoBox III system.

For more information, refer to Embedded PC Features (MicroAutoBox III Embedded PC Hardware Installation and Configuration).

Built-in Cooling Unit

The MicroAutoBox III Cooling Unit ensures an adequate heat dissipation to use the MicroAutoBox III at operating temperatures up to 80 °C (176 °F).

For more information, refer to Features of the MicroAutoBox III Cooling Unit (MicroAutoBox III Hardware Installation and Configuration).

Hardware Supporting a MicroAutoBox III in an RCP System

Provided hardware

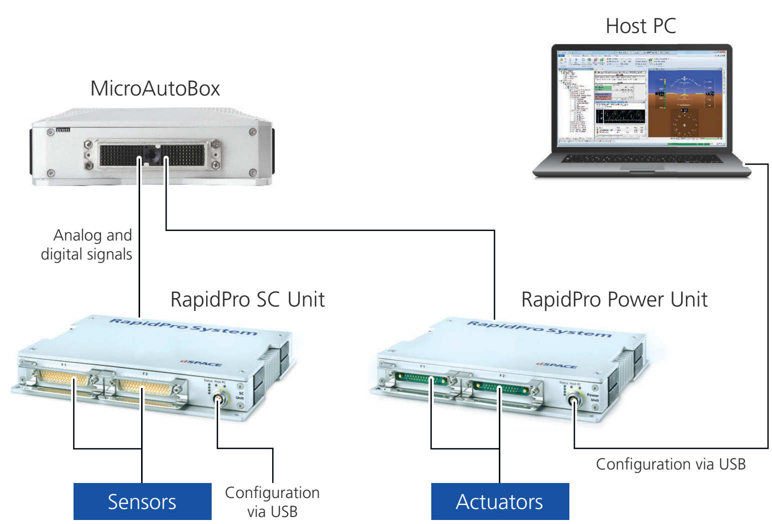
Hardware from dSPACE extends the capabilities of a MicroAutoBox III. The following use scenarios are enabled by different hardware products:

- Conditioning signals on page 10
- Accessing ECUs on page 11
- Executing Windows- or Linux-based applications on page 11
- Accessing and changing the cable harness on page 12

Conditioning signals

The wide variety of sensors and actuators used in the automotive field means that each sensor or actuator often requires its own signal conditioning and power stage circuits. RapidPro from dSPACE helps you meet demanding signal conditioning and power stage requirements.

The RapidPro SC Unit and the RapidPro Power Unit can be used as separate units in conjunction with the MicroAutoBox III as shown in the following example:



The RapidPro SC Unit supports the MicroAutoBox III if signal conditioning tasks such as signal protection, amplification, attenuation, filtering, and electrical isolation have to be performed.

The RapidPro Power Unit provides the MicroAutoBox III with the required power stages for actuators such as drives, valves, injectors, lamps, and relays.

Automotive protection and extensive diagnostic capabilities are especially important for power stages. Using ConfigurationDesk for RapidPro, you can configure the RapidPro hardware and carry out diagnostics. In this use scenario, the RapidPro hardware can be used for developing control applications in fields such as engine, transmission, chassis, body, and drive control.

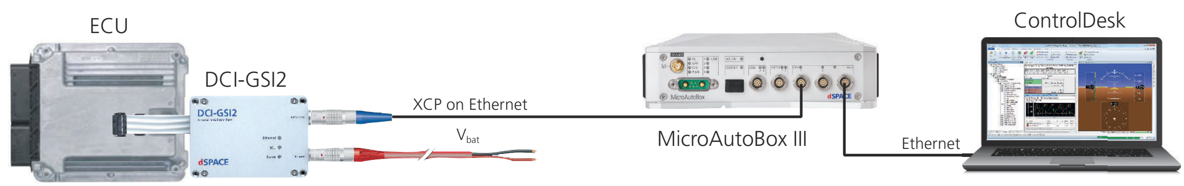
For more information, refer to Introduction to RapidPro Hardware (RapidPro System Hardware Installation Guide 🕮).

Note

The MicroAutoBox III supports only the RapidPro SC Units and the RapidPro Power Units. The RapidPro Control Units are not supported.

Accessing ECUs

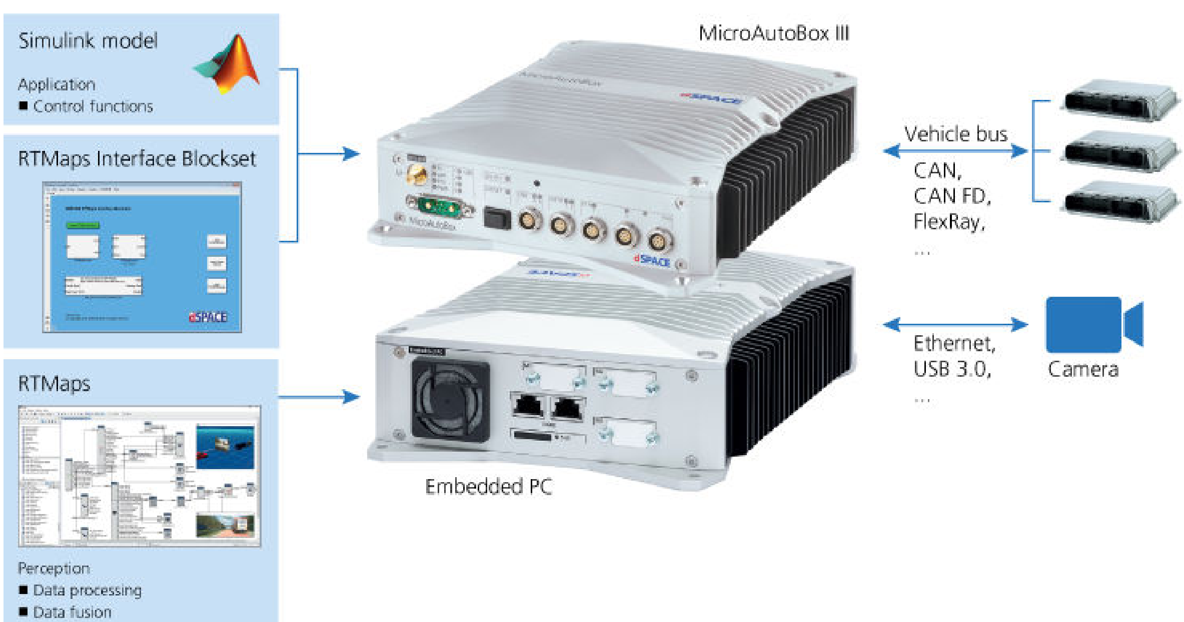
The dSPACE DCI-GSI2 is a specific interface between the on-chip debug interface of the microcontroller of an ECU and the MicroAutoBox III. The DCI-GSI2 can be used for ECU calibration, measurement, ECU flash programming, and external ECU interfacing such as function bypassing.



For more information, refer to Features of the DCI-GSI2 (DCI-GSI2 Feature Reference 🕮).

Executing Windows- or Linux-based applications

The MicroAutoBox III Embedded PC is a compact PC system. While the actual control functions are computed on the MicroAutoBox III, additional Windows- or Linux-based applications, such as Intempora RTMaps for perception and sensor-fusion, run on the Embedded PC. The following illustration shows the use of RTMaps for perception and sensor-fusion applications:



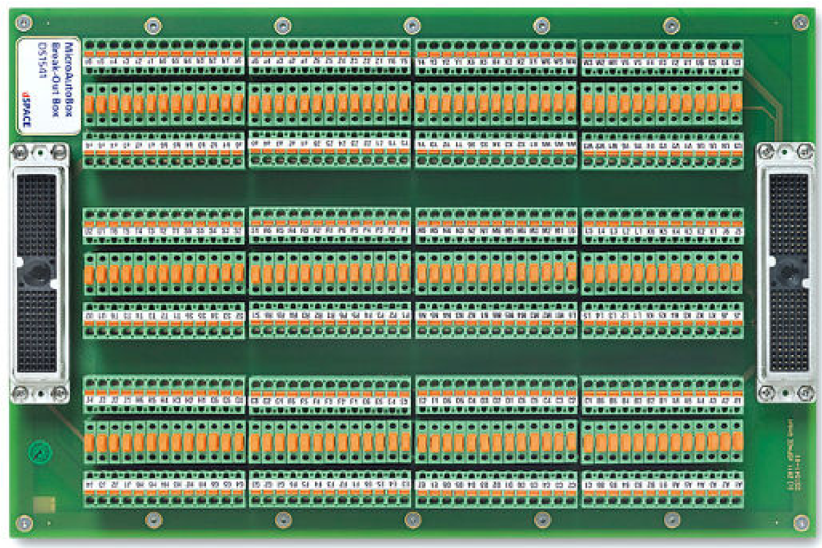
The Embedded PC can be used stand-alone or built in the housing of the MicroAutoBox III.

For more information, refer to MicroAutoBox III Embedded PC Hardware Installation and Configuration 🕮.

Accessing and changing the cable harness

The DS1541 MicroAutoBox Break-Out Box provides easy access to all the signals of the MicroAutoBox III ZIF I/O connectors. For example, you can:

- Check and/or reconnect signals without changing the existing cable harness
- Connect sensors and/or actuators
- Connect measurement devices

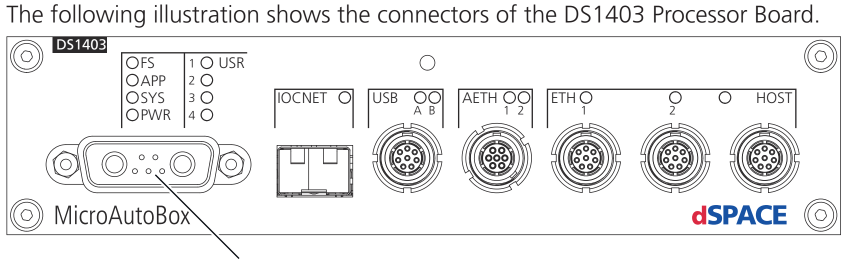


For more information, refer to Using the MicroAutoBox Break-Out Box DS1541 (MicroAutoBox III Hardware Installation and Configuration 🕮).

Preconfigured Connection Cables for the MicroAutoBox III

Connection cables for the DS1403 Processor Board

The following illustration shows the connectors of the DS1403 Processor Board.



Power input connector

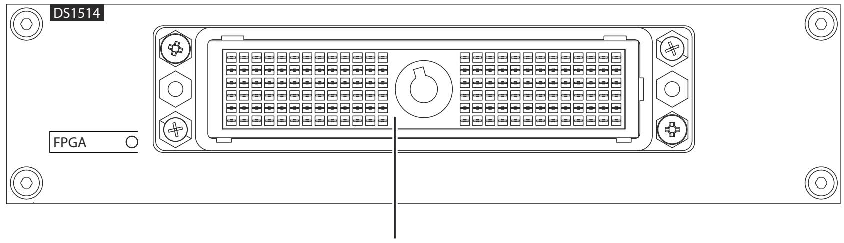
Connector	Proper Cable	Description
Power input connector	CB6073PW (order no. POWER_CAB_MABX_III)	Power supply cable to operate the MicroAutoBox III with one of the following power supplies: ▪ Laboratory power supply ▪ 12 V/24 V/28 V vehicle battery
USB	USB_CAB14	1.8 m USB cable with type A jack to connect USB mass storage devices to the USB port A.
AETH (7-pin)	AETH_CAB2	5 m automotive Ethernet cable with open wires and max. 1 Gbit/s transfer rate.
AETH (4-pin)	AETH_CAB1	5 m automotive Ethernet cable with a 4-pin LEMO connector and max. 100 Mbit/s transfer rate. Only the DS1403 revision 4[1)] provides a 4-pin AETH connector.
ETH	ETH_CAB1	5 m Ethernet cable with RJ45 jack.
	ETH_CAB2	4.5 m Ethernet cable with galvanic isolation and RJ45 jack.
	ETH_CAB3	5 m Ethernet cable with LEMO jack, for example, to connect a DCI-GSI2.
	ETH_CAB4	10 m Ethernet cable with RJ45 jack.
	ETH_CAB5	5 m Ethernet cable with extended operating temperature range and RJ45 jack.
	ETH_CAB6	5 m Ethernet cable with extended operating temperature range and LEMO jack, for example, to connect a DCI-GSI2.
	ETH_CAB7	10 m Ethernet cable with extended operating temperature range and LEMO jack, for example, to connect a DCI-GSI2.
HOST	ETH_CAB1	5 m Ethernet cable to connect the host PC. One cable is delivered with the MicroAutoBox III.
	ETH_CAB2	4.5 m Ethernet cable with galvanic isolation to connect the host PC.
	ETH_CAB4	10 m Ethernet cable to connect the host PC.
	ETH_CAB5	5 m Ethernet cable with extended operating temperature range to connect the host PC.

1) The revision number is displayed in the Platform Manager after you register the MicroAutoBox III.

For more information, refer to Connection Cables (MicroAutoBox III Hardware Installation and Configuration).

Connection cables for the DS1514 FPGA Base Board

The ZIF I/O connector of the DS1514 FPGA Base Board can provide FlexRay bus signals if the DS4340 CAN FD Interface Module is installed. The following illustration shows the ZIF I/O connector of the DS1514 FPGA Base Board.

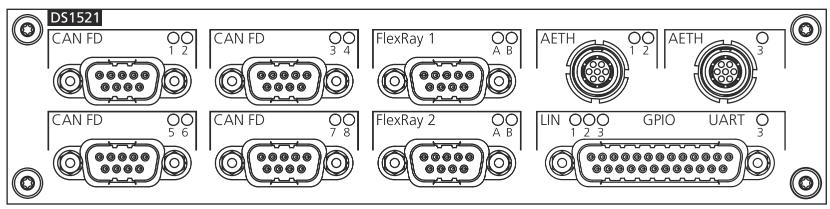


Connector	Proper Cable	Description
ZIF I/O connector	FR_CAB3	Connection cable to connect a FlexRay bus via Sub-D connectors.

For more information, refer to Connection Cables (MicroAutoBox III Hardware Installation and Configuration).

Connection cables for the DS1521 Bus Board

The following illustration shows the connectors of the DS1521 Bus Board.



Connector	Proper Cable	Description
AETH (7-pin)	AETH_CAB2	5 m automotive Ethernet cable with open wires and max. 1 Gbit/s transfer rate.

For more information, refer to Connection Cables (MicroAutoBox III Hardware Installation and Configuration).

MicroAutoBox III Software Overview

Where to go from here

Information in this section

Software for Implementing Applications on the MicroAutoBox III

Software for implementing

Software products of dSPACE enable the implementation of applications that are executed in real time on the MicroAutoBox III. The following implementation tasks are enabled by different software products.

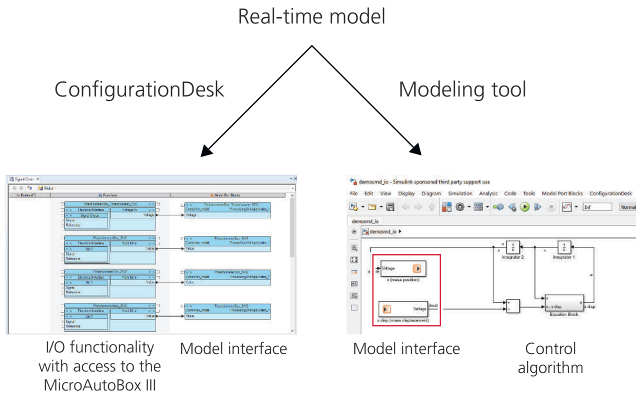
- Modeling and building the real-time application on page 15
- Configuring CAN and LIN communication on page 17
- Configuring Ethernet communication on page 18
- Configuring FlexRay communication on page 18
- Interfacing ECUs on page 19
- Programming FPGA base boards on page 20
- Exchanging data with RTMaps based applications on page 21

Modeling and building the real-time application

The real-time application is based on a real-time model, which is divided into the I/O functionality with the hardware access and a behavior model.

The behavior model does not contain any information about the hardware that makes it independent from the used hardware. A modeling tool such as

MATLAB®/Simulink® from MathWorks can be used to engineer the behavior model. Generic interface blocks are provided to specify the interface between the behavior model and the I/O functionality in ConfigurationDesk.



Modeling the behavior model MATLAB®/Simulink® from MathWorks can be used for modeling the behavior model.

The Model Interface Package for Simulink from dSPACE lets you specify the interface of behavior models that you can use in ConfigurationDesk.

For more information, refer to Features of the Model Interface Package for Simulink (Model Interface Package for Simulink - Modeling Guide).

Alternative modeling tools ConfigurationDesk lets you work with different code container files containing a behavior model. You can integrate them into your executable application and execute them on the MicroAutoBox III.

For supported container files, refer to Introduction to Working With Container Files as Behavior Models (ConfigurationDesk Real-Time Implementation Guide).

Modeling the hardware access ConfigurationDesk provides function block types to implement the access to the hardware resources of the MicroAutoBox III.

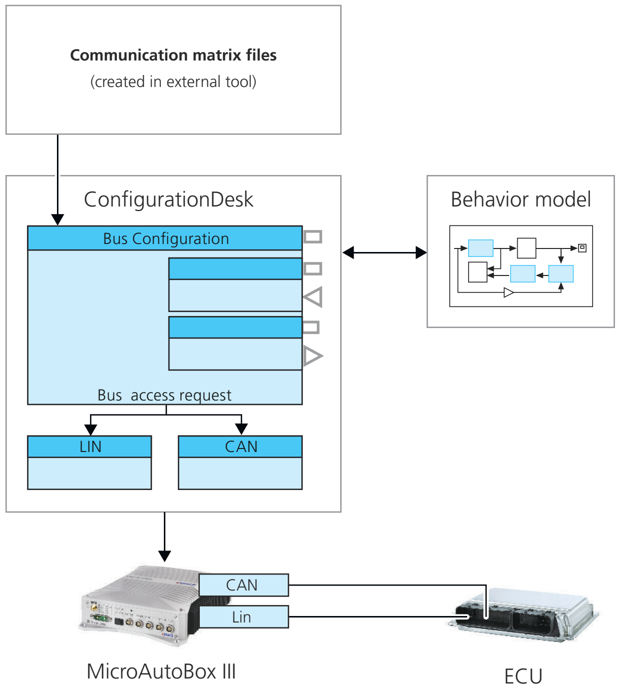
For an overview of the function block types supporting the MicroAutoBox III, refer to Overview of MicroAutoBox III I/O Functionality (MicroAutoBox III Hardware Installation and Configuration).

Building the real-time application ConfigurationDesk is the software to build the real-time application. For more information, refer to Building Real-Time Applications (ConfigurationDesk Real-Time Implementation Guide).

More information For more information on ConfigurationDesk, refer to Introduction to ConfigurationDesk (ConfigurationDesk Real-Time Implementation Guide).

Configuring CAN and LIN communication

The Bus Manager in ConfigurationDesk lets you configure CAN and LIN bus communication and implement it in real-time applications. The following illustration shows the basic elements to implement CAN/LIN communication to the MicroAutoBox III.



Communication matrices contain the definitions for bus communication. The Bus Manager in ConfigurationDesk lets you import communication matrices and create bus configurations.

Tip

The Bus Manager provides the `Basic_ComMatrix.arxml` communication matrix. If you do not have a communication matrix, you can use this file as a starting point to set up basic CAN communication.

For more information on the Bus Manager, refer to Overview of the Bus Manager (ConfigurationDesk Bus Manager Implementation Guide 📖).

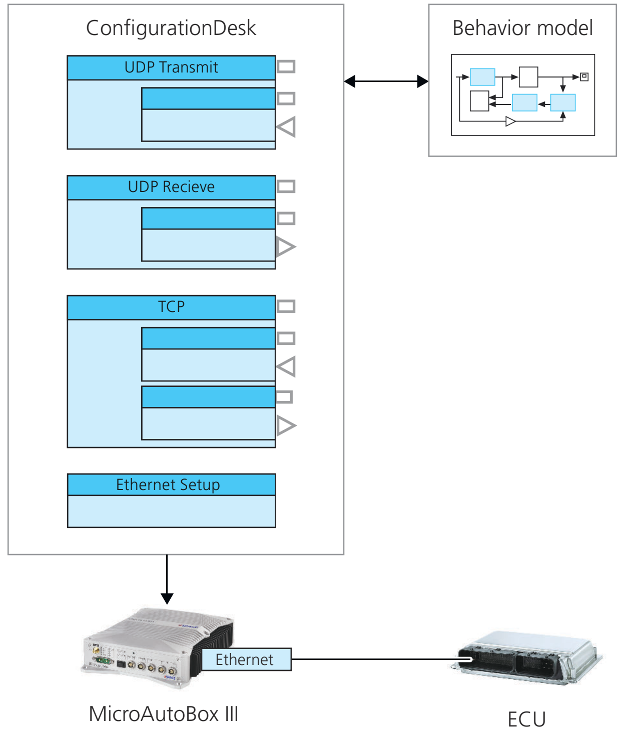
For information on the supported file formats of communication matrices, refer to Working with Communication Matrices (ConfigurationDesk Bus Manager Implementation Guide 📖).

Note

The RTI CAN MultiMessage Blockset and the RTI LIN MultiMessage Blockset do not support the MicroAutoBox III.

Configuring Ethernet communication

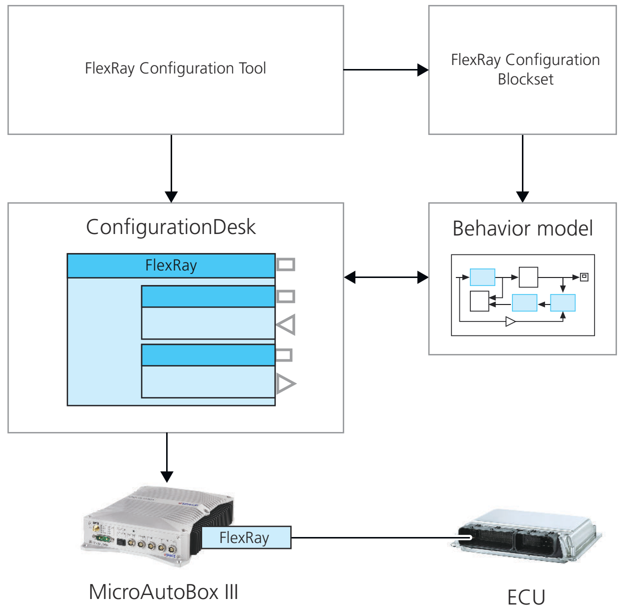
ConfigurationDesk lets you configure standard and automotive Ethernet communication and implement it in real-time applications. The following illustration shows the basic elements to implement Ethernet communication.



For more information, refer to Basics on Implementing Ethernet Communication in ConfigurationDesk (ConfigurationDesk I/O Function Implementation Guide 📖).

Configuring FlexRay communication

The dSPACE FlexRay Configuration Package lets you connect an ECU to a FlexRay node that is simulated by the MicroAutoBox III. The FlexRay Configuration package consisting of the FlexRay Configuration Tool and the FlexRay Configuration Blockset. The following illustration shows the basic elements to implement FlexRay communication.

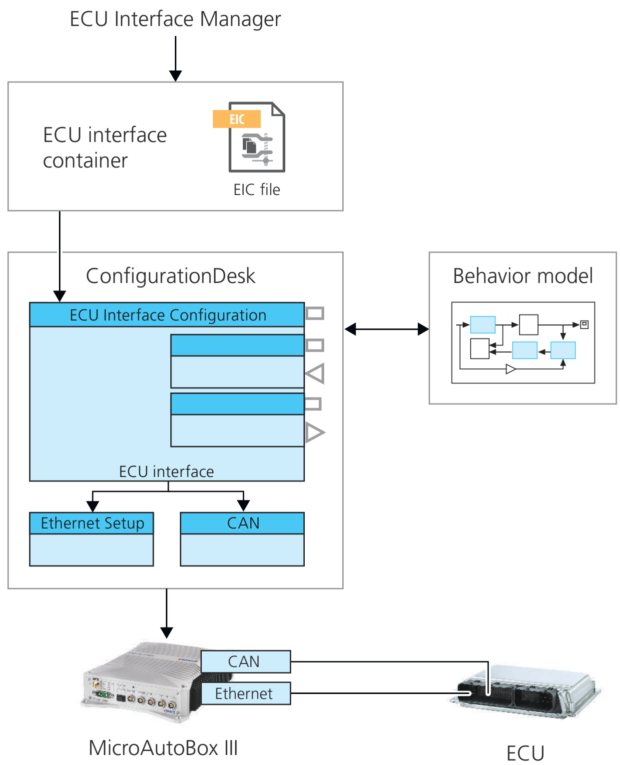


To work with the dSPACE FlexRay Configuration Package, MATLAB/Simulink must be used as modeling tool.

For more information on the dSPACE FlexRay Configuration Package, refer to Features of the dSPACE FlexRay Configuration Package (Model Interface Package for Simulink - Modeling Guide 🕮).

Interfacing ECUs

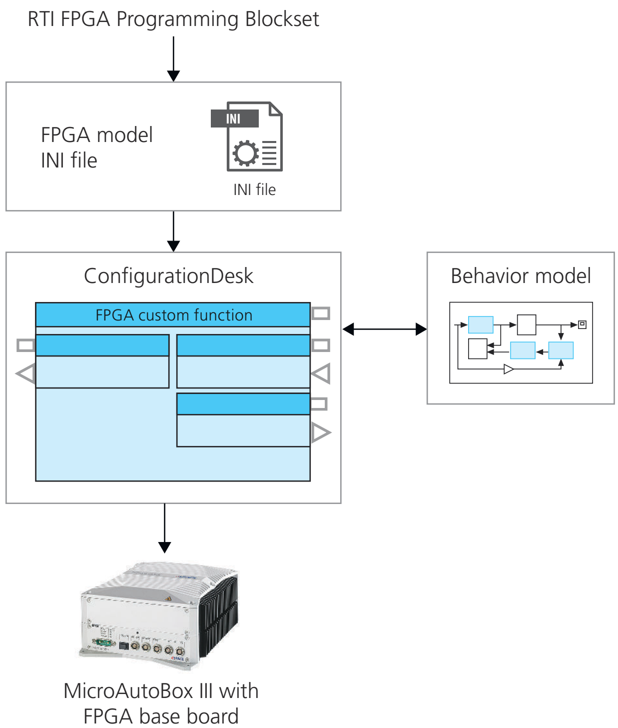
The ECU Interface Manager lets you prepare and configure ECU applications for ECU interfacing. ECU interfacing includes methods and tools for replacing an existing ECU function, implementing sampling step delays, integrating a function call, or to bypass the I/O of the ECU. The following illustration shows the basic elements to implement the interfacing of ECUs.



For more information, refer to RCP Use Cases (ECU Interfacing Overview 📖).

Programming FPGA base boards

The RTI FPGA Programming Blockset is a Simulink blockset to build a custom FPGA application for an FPGA base board. The following illustration shows the basic elements to implement an FPGA application to the MicroAutoBox III.

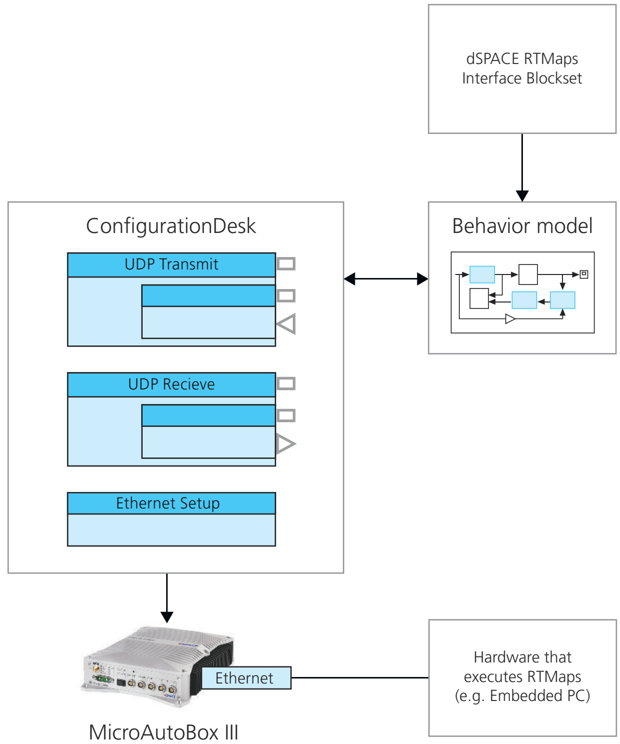


To work with the RTI FPGA Programming Blockset, the XILINX® Vivado® Design Suite is required.

For more information on the blockset, refer to Introduction to the RTI FPGA Programming Blockset (RTI FPGA Programming Blockset Guide 📖).

Exchanging data with RTMaps based applications

The dSPACE RTMaps Interface Blockset provides Simulink blocks for a bidirectional communication via UDP/IP between RTMaps from Intempora and the MicroAutoBox III. The following illustration shows the basic elements to exchange data with a RTMaps-based application.



To work with the RTMaps Interface Blockset, MATLAB/Simulink must be used as modeling tool.

For more information on the dSPACE RTMaps Interface Blockset, refer to https://www.dspace.com/en/pub/home/products/sw/impsw/rtmaps-interface-bs.cfm.

Software for Experimenting with the MicroAutoBox III

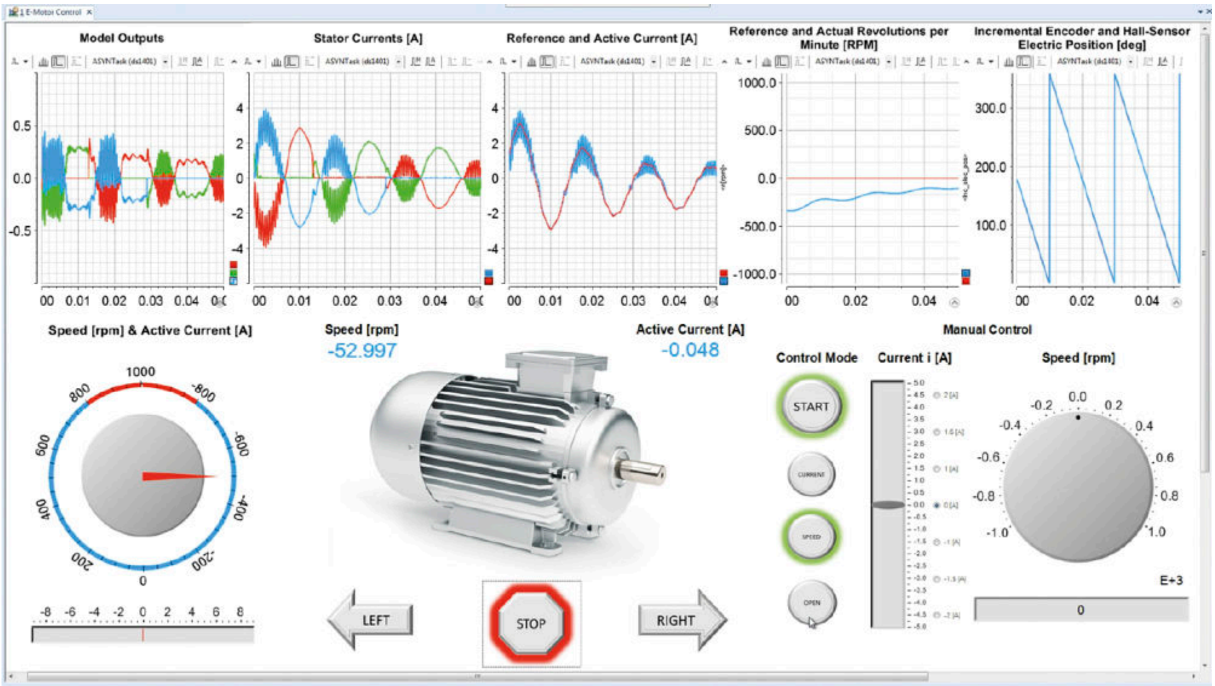
Software for experimenting

Software products from dSPACE support you in your experiments with the MicroAutoBox III.

- Controlling applications and measuring signals on page 22
- Logging data on page 23
- Performing synchronous tasks on page 23

Controlling applications and measuring signals

ControlDesk is a software tool for experimenting with a MicroAutoBox III. It can be used for downloading the real-time application, calibrating parameters, and measuring signals. The following example shows the user interface of ControlDesk.



Main features ControlDesk provides an environment for your experiment, calibration, measurement, and diagnostic tasks. A variety of features dedicated to data analysis ensure efficient measurement data handling.

For more general information on ControlDesk, refer to Introduction to ControlDesk (ControlDesk Introduction and Overview 🕮).

To work with the MicroAutoBox III, ControlDesk can be extended with the following tools:

- The Signal Editor Module lets you create, configure, display, and manage signals in signal description sets. You can use signal description sets as signal generators to stimulate model variables of real-time applications running on the simulator.

  For more information, refer to Introduction to the Signal Editor (ControlDesk Signal Editor 🕮).
- The Bus Navigator Module lets you handle CAN, LIN, FlexRay, and Ethernet PDUs, manipulate PDUs before transmission, exclude them from being transmitted, etc.

  For more information, refer to Introduction to the Bus Navigator (ControlDesk Bus Navigator 🕮).

Logging data ControlDesk lets you log data on a USB mass storage device that is connected to the MicroAutoBox III. For more information, refer to General Information on Data Logging (ControlDesk Measurement and Recording 🕮).

Performing synchronous tasks With Real-Time Testing (RTT), you can execute scripts synchronously to the real-time application on the MicroAutoBox III.

Application Areas Some application areas where real-time testing is useful:

- Stimulus without latency

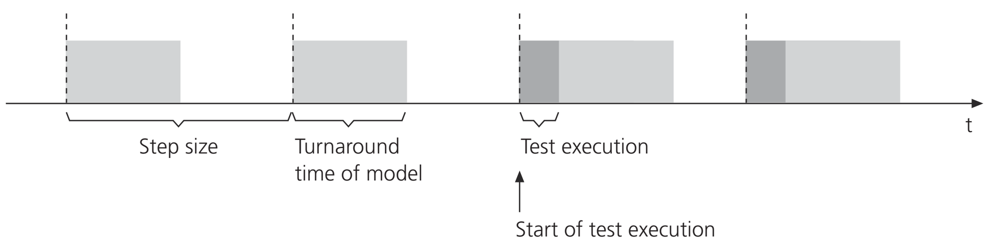
  You can access the variables of the real-time application in the same sampling step before or after the real-time application is calculated.
- More precise time measurement

  There is no latency between time measurement in RTT sequences and the real-time application. The resolution of the measurement depends only on the step size of the simulation.
- Signal monitoring without data capture and postprocessing

  Because the RTT sequence can read Simulink variables and evaluate conditions containing these variables, there is no need for data capturing and postprocessing on the host PC. Test results can therefore be evaluated online instead of offline.

For more application areas, refer to Application Areas (Real-Time Testing Guide 🕮).

Basic principle The basis of real-time testing is a Python interpreter running on the MicroAutoBox III. The Python interpreter contains special modifications that make it suitable for real-time environments. The MicroAutoBox III calls the Python interpreter and executes the test in each sampling step. Executing the Python interpreter requires some processing time as shown in the following illustration.



More information For an introduction to the RTT, refer to Introduction to Real-Time Testing (Real-Time Testing Guide 🕮).

For instructions on enabling the RTT support, refer to How to Enable Real-Time Testing for MicroAutoBox III (Real-Time Testing Guide 🕮).

Glossary

Introduction

The glossary briefly explains the most important expressions and naming conventions used in the MicroAutoBox III documentation.

Where to go from here

Information in this section

A

AC motor control module Module type that is optimized for controlling various electric drives.

Automotive Ethernet Ethernet standard that uses a single twisted-pair cable to connect Ethernet devices. This standard is intended for in-vehicle applications.

B

Behavior model A part of the real-time model that contains the control algorithm, but not the I/O access to the MicroAutoBox III.

Behavior models can be modeled, for example, in MATLAB/Simulink by using Simulink Blocksets and Toolboxes from the MathWorks®.

Bus board A board type that mainly provides bus and serial interfaces.

C

CAN FD interface module Module type that provides CAN FD interfaces.

Channel type A category of channels on an I/O board or I/O module that provides exactly the same characteristics.

Chassis ground Ground potential of vehicles. The chassis ground must be connected to the negative pole of the vehicle battery to operate a MicroAutoBox III.

Common ground Ground potential that levels out reference voltage differences between connected devices. A common ground line can also be used as signal ground for robust digital signals.

ConfigurationDesk The dSPACE software product for configuring the I/O functionality of the MicroAutoBox III and to build the real-time application.

ControlDesk The dSPACE software product for experimenting with a dSPACE platform. It can be used for downloading the real-time application, calibrating parameters, and measuring signals.

Controller Circuit that provides the interface to a network. The electric signaling levels and methods of the network are handled by a transceiver or PHY.

D

DS number Unique number to identify dSPACE hardware.

Dynamic IP A network address that is assigned to an Ethernet controller by a DHCP server.

E

ECU Abbreviation of *electronic control unit*.

ECU interfacing Methods and tools that synchronously read and/or write individual variables of an application running on an ECU.

Engine control I/O module Module type that provides an I/O interface for the advanced control of combustion engines.

Ethernet adapter Circuit that provides access to an Ethernet network. An Ethernet adapter comprises a controller, a PHY, and a port.

Ethernet device Device that can be connected to an Ethernet network.

Ethernet switch Circuit that connects several Ethernet devices to create an Ethernet network. An Ethernet switch switches the data traffic so that data packets reach the receiver in a targeted manner.

Experiment software Generic term for software products that can be used for calibrating parameters and measuring signals of a real-time application. ControlDesk is the dSPACE software product for experimenting.

F

Feed-through pins Connector pins that loop bus signals. Feed-through pins shorten the stub length when connecting a bus device to a network.

Flash application Real-time application that is stored to the flash memory. A flash application can automatically start from the flash memory after the MicroAutoBox III is switched on.

FlexRay interface module Module type that provides FlexRay interfaces.

FPGA application An application that provides the custom-coded bitstream to program an FPGA base board. The FPGA application for a MicroAutoBox III is part of the real-time application.

FPGA base board A board type that provides an FPGA for FPGA applications. I/O modules are connected to the FPGA base board to provide the I/O functionality.

Function block A graphical representation in ConfigurationDesk that provides I/O functionality and access to the hardware.

Function block type A software plug-in for ConfigurationDesk that provides a specific I/O functionality. Every function block type has unique features that are different from other function block types. An instance of it is a function block.

G

Gain drift Parameter that indicates the dependency of the gain parameter to another physical parameter, mainly temperature.

Gain error Parameter that indicates the deviation of a measured gain from its ideal gain. With the MicroAutoBox III, the ideal gain is a linear gain.

GND Abbreviation of *ground*.

Common ground of the MicroAutoBox III.

H

Host communication Term for the communication between the host PC and the MicroAutoBox III.

Host PC Standard PC or laptop that is connected to the MixcroAutoBox III. Via the host PC, you can configure the MicroAutoBox III, download a real-time application, and control the experiment.

I

I/O board Generic term for multi-I/O boards, bus boards, and FPGA base boards.

I/O Ethernet Term for Ethernet used by the real-time application.

I/O Ethernet communication Term for the communication between the real-time application and the Ethernet devices that are connected to the MicroAutoBox III.

I/O module Generic term for modules that can be installed to an FPGA base board or for logical parts of an I/O board.

IOCNET Abbreviation of *I/O carrier network*.

dSPACE-specific high-speed serial communication bus that connects the I/O boards to the processor board.

IP mode Mode for setting the IP address of the host controller. Depending on the IP mode, the host controller uses a configurable static IP address or uses a dynamic IP.

M

Mounting Computing process that makes a device or file accessible by the operating system.

Multi-I/O board Board type that mainly provides analog and digital I/O interfaces.

Multi-I/O module Module type that mainly provides analog and digital I/O interfaces.

N

Normal operating mode Operating mode in which the MicroAutoBox III is switched on and ready to execute a real-time application or a real-time application runs.

NvData Abbreviation of *nonvolatile data*.

User-defined data that is retained when the power is shut off.

O

Offset drift Parameter that indicates the dependency of the offset parameter to another physical parameter, mainly temperature.

Offset error Parameter that indicates the deviation of a measured offset from its ideal offset. The ideal offset is assumed to be zero.

Operating power Parameter that indicates the required power to operate a device in the intended use at maximum load. The power consumption indicates the power consumed by the device itself. The rated power is the sum of the power consumption and the power of the connected loads (VBATprot, VSENS, USB, …).

Operating temperature Parameter that indicates the temperature at the cooling fins at which a device can be operated with the specified electrical characteristics.

Operating voltage Parameter that indicates the voltage for operating the device in the intended use. The operating voltage of the MicroAutoBox III refers to the voltages at the power input connector of the processor board.

Output current limit Parameter that indicates the current that an output can supply in the event of an error (short circuit).

P

PHY Abbreviation of *physical layer*.

Medium access circuit that provides the electrical interface to the Ethernet network.

Pinout Graphical overview of a connector for locating the signals.

Platform A dSPACE real-time hardware that can be registered and displayed in the Platform Manager, such as a MicroAutoBox III.

Platform Manager A pane of dSPACE software products that lets you handle registered platforms. You can download, start, and stop real-time applications via the Platform Manager. You can also update the firmware of the platform.

Port Mechanical interface for connecting a network cable.

Power ground Ground potential of the power supply, such as a laboratory power supply or the vehicle battery.

Power hold Powering feature that enables the real-time application to prevent the shutdown of the MicroAutoBox III.

Prestart mode Operating mode that separates the start of the MicroAutoBox III and the start of the real-time application. In this mode, the real-time application is loaded, but the application does not run.

Processor board Board type that provides a processor to execute the real-time application.

Protected voltage range Parameter that indicates the range of an applied voltage that does not cause damage.

The protected voltage range is important in the event of a fault and does not imply functional operation.

R

Real-time application An application that runs in real time on a platform. A real-time application is built from a real-time model.

Real-time model A model that is calculated in real time. For a MicroAutoBox III, it consists of a behavior model and the I/O functionality with the hardware access provided by ConfigurationDesk. The real-time application is automatically built from both model parts in ConfigurationDesk.

Real-time processor Processor that executes the real-time application.

Real-time testing A special execution environment that makes it possible to execute tests synchronously with the real-time application. A Python interpreter on a platform executes the tests (RTT sequence) which have access to model variables in every sampling step of the executed real-time application.

Remote control Powering feature that switches on/off the MicroAutoBox III via a pin of the power input connector.

S

Settling time Parameter that indicates the time required for an analog output to make a significant step in the output voltage and to remain in a given error band.

Signal ground Ground potential for connecting a signal. An ideal signal ground line carries the same amount of current as the corresponding signal line.

Signal mapping Overview of the connector pins that are relevant for a functional unit.

Standard Ethernet Ethernet interface that is commonly used for PC networks.

Standby mode Operating mode in which the MicroAutoBox III is powered, but not switched on.

Start-up voltage Parameter that indicates the required operating voltage during the start-up phase of a vehicle.

Static IP address A network address that is manually assigned to an Ethernet controller.

Subnet mask Bitmask that determines the most significant bits of the IP address as the subnetwork address, the least significant bits determine the host address.

Subnetwork Logical subdivision of an network that restricts the Ethernet communication to devices with the same subnetwork address. A default gateway is required to communicate with Ethernet devices of other networks.

Subnetwork address Address that identify the Ethernet controllers accessing the same subnetwork. The subnetwork address is derived from the IP address and the subnet mask.

Supply ground Ground potential of MicroAutoBox III supply voltages such as VSENS.

T

Transceiver Medium access circuit that provides the electrical interface to a network.

U

UART Abbreviation of *universal asynchronous receiver-transmitter*.

Circuit that provides the interface to an asynchronous serial network. The electric signaling levels and methods are handled by a connected transceiver.

V

VBAT Abbreviation of *battery voltage*.

Input voltage for powering the MicroAutoBox III. The power supply can be the vehicle battery or a laboratory power supply.

VBATprot Abbreviation of *protected battery voltage*.

Protected output voltage for driving digital I/O circuits or sensors with an automotive-compatible voltage level. VBATprot follows VBAT within the operating voltage range of the MicroAutoBox III. The DS1511, DS1513, DS1552, and DS1554 provide VBATprot.

VDRIVE Abbreviation of *drive voltage*.

Input voltage for driving the digital I/O circuits of the DS1511, DS1513, DS1552, and DS1554.

VSENS Abbreviation of *sensor voltage*.

Output voltage for driving digital I/O circuits or sensors. The voltage level depends on the I/O board or I/O module.

W

Web interface Graphical user interface for configuration, support, and status information. You open the web interface with the Internet browser of the host PC.

Working current range Parameter that indicates the range of the current flow through the connector pins of a functional unit during proper operation.

Working voltage range Parameter that indicates the range of the applied voltage at the connector pins of a functional unit during proper operation.