ECU Interfaces Hardware

Installation and Configuration

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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.
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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

Content

This document shows you how to connect ECUs to the host PC using dSPACE ECU interfaces. It also provides the data sheets of these interfaces and of the relevant connection cables.

Note

The application-specific configuration of the system – as carried out, for example, by ECU calibration or bypassing engineers – is not described in this guide but in the ControlDesk documentation. Refer to Introduction to ControlDesk (ControlDesk Introduction and Overview 🕮).

Required knowledge

Detailed knowledge about your specific ECU and the effects of connecting devices to it is assumed. Knowledge in handling the host PC and Microsoft Windows operating systems is also 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.

Symbol	Description
	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 Legal Information

Introduction

To avoid risk of injury and/or damage to the dSPACE hardware, 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 Warning When Using the ControlDesk Software

Introduction

Note the following warning when using the ControlDesk software.

Danger potential

⚠ WARNING

Risk of serious injury and/or property damage

Using this product can be dangerous. You must observe the following safety instructions and the relevant instructions in the user documentation.

Using the ControlDesk software can have a direct effect on networked electronic systems connected to it.

Improper or negligent use can result in serious personal injury and/or property damage.

Only persons who are qualified to use this software, and who have been informed of the above dangers and possible consequences, are permitted to use this product.

ControlDesk provides advanced features to send messages to a connected network (CAN, Ethernet, FlexRay, LIN) and all connected network nodes or to modify ECU memory content directly. Using these features increases the risk of property damage or personal injury, as ControlDesk cannot detect operating errors made by the user.

When ControlDesk is controlled via an automation interface, the risk of property damage or personal injury also exists. ControlDesk is then part of an overall system and may not be visible to the end user. It nevertheless produces a direct effect on the technical system or networked electronic system via the controlling application that uses the automation interface.

⚠ WARNING

Risk of serious injury and/or property damage

When the Signal Editor is used, it downloads signal generators directly to the dSPACE real-time processor. These run in parallel to the real-time application until they are stopped explicitly (closing the ControlDesk program is not sufficient to stop running signal generators). Signal generators directly affect the output behavior of the dSPACE hardware at run time without any further user interaction or user notification.

When work is carried out with ECUs, ControlDesk complies with the ASAM-MCD 2 standard, and therefore provides suitable measures for avoiding dangerous situations, including but not only by specifying limits for the system's parameters. The user can and should take such measures to minimize the danger involved in influencing the system.

When the Variable Editor is used, variable descriptions can be created or modified. Accessing networked electronic systems connected to ControlDesk using an incorrect variable description may lead to unforeseeable system behavior with an increased risk of property damage or personal injury. Correct specification of variable descriptions and responsible use of safety measures such as system parameter limits are therefore crucial and are the sole responsibility of the user.

All technical systems interfaced by ControlDesk where malfunctions or misoperation involve the danger of injury or death must be examined for potential hazards by the user, who must if necessary take additional measures for protection (for example, an emergency off switch).

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.

Data loss during operating system shutdown

The shutdown procedure of Microsoft Windows operating systems causes some required processes to be aborted although they are still being used by dSPACE software. To avoid data loss, the dSPACE software must be terminated manually before a PC shutdown is performed.

General Warning When Using the Internal Bypass Plug-In for the RTI Bypass Blockset

Introduction

Note the following warning when using the Internal Bypass Plug-In for the RTI Bypass Blockset.

Danger potential

Using this product can be dangerous. You must observe the following safety instructions and the relevant instructions in the user documentation.

⚠ WARNING

Improper or negligent use can result in serious personal injury and/or property damage.

The Internal Bypass Plug-In for the RTI Bypass Blockset allows the integration of function code and associated data in ECU image and ECU variable description files. Programming ECUs with these image files and accessing ECUs via calibration tools with these ECU description files can have a direct effect on networked electronic systems and may lead to unforeseeable system behavior with an increased risk of property damage or personal injury.

Only persons who are qualified to use the Internal Bypass Plug-In for the RTI Bypass Blockset, who have been informed about the above dangers, and who are able to assess the possible consequences to take appropriate precautions, are permitted to use this product.

All applications where malfunctions or misoperation involve danger of property damage, injury or death must be examined for potential hazards by the user, who must if necessary take additional measures for protection, for example, by implementing an emergency off switch, and/or by clearly labeling files to prevent original ECU image and ECU description files being confused with those modified by the Internal Bypass Plug-In for the RTI Bypass Blockset.

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.

Warning About Using a dSPACE ECU Interface

Introduction

Note the following warning when using a dSPACE ECU interface.

Danger potential

Connecting a dSPACE ECU interface to devices such as an electronic control unit can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use dSPACE ECU interfaces, and who have been informed of the dangers and possible consequences, are permitted to use the interfaces.

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 integrating an interface and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

dSPACE ECU interfaces are designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to a dSPACE ECU interface, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to a dSPACE ECU interface, for example, when it is connected to an engine ECU which typically generates transient hazardous voltages for ignition, one of the following measures must be taken **to avoid the risk of serious injury or death due to electrical shock**:

- dSPACE ECU interfaces and all devices connected to them must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.
- dSPACE provides dedicated interface cables to ensure an electrically safe connection to the host PC for systems featuring voltages up to 300 V DC/AC_{RMS}, or 600 V_{peak}. These cables must be used to connect dSPACE ECU interfaces to the host PC. The dSPACE ECU interfaces and the devices connected to them must be within a separate test area. When the above-mentioned cables are used, the host PC can be located outside the test area.

NOTICE

Protecting dSPACE ECU interfaces against electrical discharge

Depending on your order, a dSPACE ECU interface such as the DCI-GSI2 is delivered without an enclosure. Such an interface can be damaged or destroyed by electrical discharge. Each interface must be kept in its storage package until it is installed. The interface should be taken out of its package, configured, and installed only at a workplace that is protected against electrical discharge.

This warning does not apply to the following interfaces:

- DCI-CAN2
- DCI-CAN/LIN1
- DCI-KLine1

These interfaces always come with an enclosure protecting them against electrical discharge.

Guidelines for safe in-vehicle use of dSPACE products

Any in-vehicle use of dSPACE products in line with the contractual purposes requires the use of enclosed test tracks that are specially safety-secured for the specific purpose, i.e., with appropriately restricted access and additional appropriate safety measures.

If you intend to use dSPACE products outside enclosed tracks, you have to check with the relevant authorities in your country under which circumstances this is possible. You and the local authorities involved bear full responsibility for this type of use.

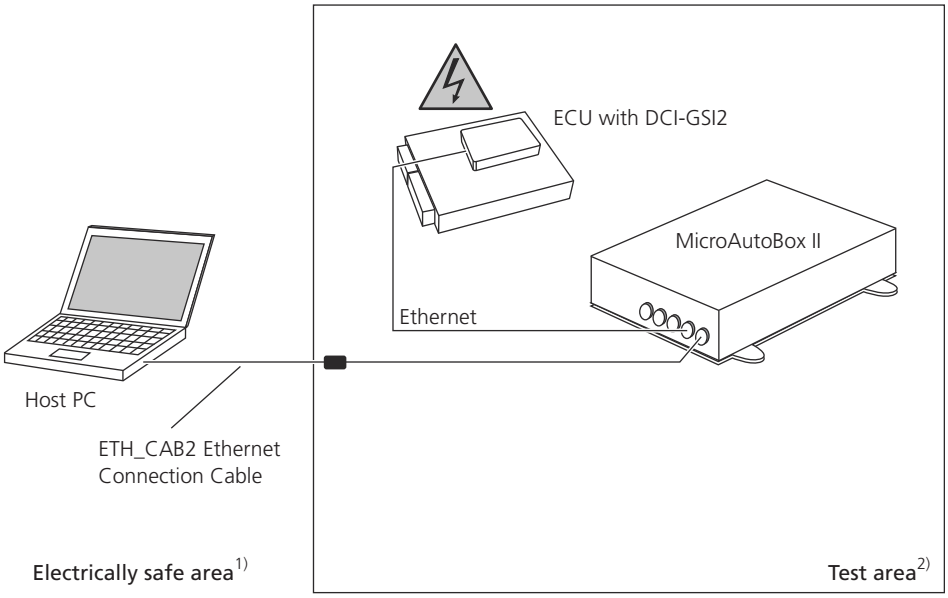
You must take appropriate measures to ensure that the overall system enters a safe state if a dangerous situation occurs, e.g., by implementing emergency shutdown or a limp-home mode. This particularly applies in the following cases:

- Where safety-critical interventions that affect vehicle behavior are performed, e.g., the stimulation of a bus system, such as CAN, or the calibration or bypassing of in-vehicle electronic control units (ECUs) that control powertrain, chassis, or body systems.
- Where dSPACE products are deployed in conjunction with ECUs that can pose a hazard if they malfunction.

Accordingly, the guidelines apply to the use of dSPACE products in aircraft or vessels in compliance with the contractual purposes.

Example: ECU with DCI-GSI2 connected to a MicroAutoBox II

As an example, the illustration below shows a setup with an ECU with DCI-GSI2 connected to a MicroAutoBox II. The MicroAutoBox II is connected to the host PC by the galvanically isolated ETH_CAB2 Ethernet Connection Cable. The cable name is printed on the cable. The cable ensures an electrically safe connection to the host PC if hazardous voltages occur within the test area in case of a hardware failure. For information on the maximal voltage levels, refer to the cable's data sheet.



1) No hazardous voltages occur.
2) Hazardous voltages can occur.

Order of installation

Install the components of your system in the exact order stated. Any other sequence may lead to unpredictable results or even damage the system.

Read the instructions carefully before starting installation. Observe all warnings given.

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.

Important Information when Monitoring and Logging Ethernet Traffic

Introduction

ControlDesk provides means to monitor and log Ethernet traffic on a low protocol level to support the development of ECUs communicating over Ethernet (e.g., for ADAS scenarios). This makes it possible for ControlDesk to log the entire Ethernet traffic between the PC and the respective network segment.

Intended use

ControlDesk's monitoring and logging function is intended to support the development of electronic control units (ECUs) that communicate via Ethernet. The functionality integrated in ControlDesk is exclusively intended for detecting and analyzing irregularities and weaknesses in the data input and output of the Ethernet traffic between ECUs.

NOTICE

It is highly recommended to use the functionality only in network segments where only PCs for ECU development are accessible.

Danger potential

If you add other tools or hardware, such as an Ethernet switch with monitoring mode, or in case of intentional manipulation, data from outside the network segment that is directly connected to the PC might also be captured and logged. This is not the intended use of ControlDesk and its monitoring and logging function. It must also be noted that intercepting and using external or private data requires the consent of the respective data owner, unless otherwise stipulated by law. Otherwise, this might violate legal regulations, especially with regard to criminal and data protection laws.

NOTICE

You are responsible for ensuring that ControlDesk's monitoring and logging function is used only in accordance with the intended purpose and the legal regulations.

Related topics

Basics

Important Information on Replaying Logged Ethernet Raw Data..... 18
Important Information on Using an External Decoder for Interpreting Ethernet Raw Data..... 19

Important Information on Replaying Logged Ethernet Raw Data

Introduction

ControlDesk can establish an Ethernet connection to monitor/capture interpreted and noninterpreted Ethernet data.

In addition, this connection can be used to replay previously recorded Ethernet raw data.

Danger potential

The Ethernet replay feature can lead to unpredictable behavior of the system under test (to which the data is sent). For example, a faulty or unexpected package might cause the system to crash, slow down, or close ports. ControlDesk is not responsible for any such malfunctions.

Related topics

Basics

Important Information on Using an External Decoder for Interpreting Ethernet Raw Data 19
Important Information when Monitoring and Logging Ethernet Traffic 17

Important Information on Using an External Decoder for Interpreting Ethernet Raw Data

Introduction

If you installed an instance of an external decoder on the PC you are using, you can click **External Decoder** to start the exchange of Ethernet raw data between ControlDesk and the external decoder.

Using an external decoder is optional. External decoders are third-party products that are independent of ControlDesk and dSPACE.

If you click **External Decoder** after you connected an external decoder, you leave ControlDesk. Both the decision for installing a decoder on the PC and connecting the decoder with ControlDesk are your responsibility.

If you decide to connect external decoders by clicking the button, ControlDesk channels the Ethernet raw data to the decoder via interprocess communication and retrieves the Ethernet raw data interpreted by the decoder via interprocess communication without influencing the function of the decoder or its results.

Danger potential

If external decoders are used, incorrect or sensitive data could be displayed, e.g., personal data. In particular, note the Important Information when Monitoring and Logging Ethernet Traffic on page 17.

Use only decoders you know or have tested and check the results provided by a decoder, especially before using them in safety-critical applications. If you cannot guarantee safe and legally compliant use of the decoder, do not use the **External Decoder** function.

dSPACE is not liable for the error-free operation of an external decoder, nor for the results or repercussions of processing incorrectly decoded data in ControlDesk that stem from using an external decoder.

Related topics

Basics

Important Information on Replaying Logged Ethernet Raw Data..... 18
Important Information when Monitoring and Logging Ethernet Traffic..... 17

Legal Information on ASAM Binaries and ASAM Documentation

Overview

Note

Legal Information on ASAM binaries and ASAM documentation
dSPACE software also installs components that are licensed and released by ASAM e.V. (Association for Standardisation of Automation and Measuring Systems).
dSPACE hereby confirms that dSPACE is a member of ASAM and as such entitled to use these licenses and to install the ASAM binaries and the ASAM documentation together with the dSPACE software.
You are not authorized to pass the ASAM binaries and the ASAM documentation to third parties without permission. For more information, visit http://www.asam.net/license.html.

Connecting the Hardware

Where to go from here

Information in this section

Connecting ECUs for ECU Calibration

Introduction

dSPACE provides interfaces that allow you to connect one or more ECUs to your host PC for ECU calibration.

Where to go from here

Information in this section

Basics on Connecting ECUs for ECU Calibration

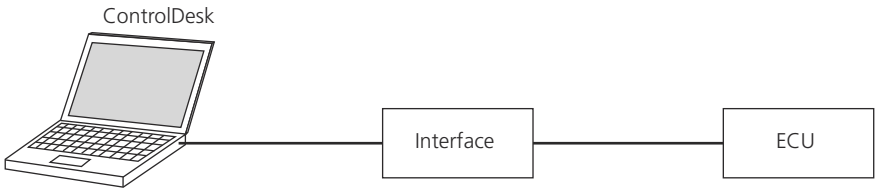
Introduction

Before you can perform ECU calibration, you have to connect the ECU(s) to your host PC.

Connection Scenarios for ECU Calibration

Possible connection scenarios

The following illustration shows the principle of connecting an ECU to the host PC, using dSPACE ECU interfaces:



Scenario for ECU calibration

Details on the individual connection scenarios for ECU calibration are listed in the following table.

Connection Between Host PC and Interface	Interface / Interface Module	Connection Between Interface and ECU	ECU ...
Ethernet[1)]	DCI-GSI2[2)]	Via ECU's debug interface	... Optionally with dSPACE Calibration and Bypassing Service
USB	DCI-CAN2 or DCI-CAN/LIN1[3)]	CAN	... With CCP or XCP on CAN
Ethernet	– (not required)	Ethernet	... With XCP on Ethernet

1) Directly or via Ethernet switch
2) The DCI-GSI2 can be used for simultaneous measurement, calibration and ECU interfacing access to the same ECU.
3) Further interface modules are supported. For an overview, refer to Supported CAN Interfaces (ControlDesk Platform Management 🕮).

Related topics

Basics

Basics on Accessing an ECU (ControlDesk Platform Management 🕮)

Connecting an ECU with DCI-GSI2

Introduction

The DCI-GSI2 must be connected to a power supply, to the ECU debug interface, to the host PC, and/or to a dSPACE real-time system. You can mount the DCI-GSI2 on the ECU enclosure.

Where to go from here

Information in this section

Warning About Using a DCI-GSI2

Introduction	Note the following warning and safety precautions when using a DCI-GSI2.
Danger potential	*Connecting a DCI-GSI2 to an electronic control unit can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use a DCI-GSI2, and who have been informed of the dangers and possible consequences, are permitted to use the DCI-GSI2.*

Before integrating the DCI-GSI2 and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

The DCI-GSI2 is designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to the DCI-GSI2, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to a DCI-GSI2, for example, when it is connected to an engine ECU which typically generates transient hazardous voltages for ignition, one of the following measures must be taken **to avoid the risk of serious injury or death due to electrical shock**:

- The DCI-GSI2 and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.
- dSPACE provides dedicated interface cables to ensure an electrically safe connection to the host PC for systems featuring voltages up to 300 V DC/AC_{RMS} , or 600 V_{peak}: The ETH_CAB2 Ethernet Connection Cable must be used for connecting the DCI-GSI2 to the host PC.
  The DCI-GSI2 and the devices connected to it must be within a separate test area. When the above-mentioned cable is used, the host PC can be located outside the test area.

Using the DCI-GSI2 on wet locations

According to IEC 61010-1 (product safety), the DCI-GSI2 is not intended to be used on wet locations.

Unless the DCI-GSI2 is protected by a waterproof enclosure complying with the IP66 protection classification, using it in wet conditions might result in electric shock due to hazardous voltages or might damage the DCI-GSI2 and any connected ECU.

Electromagnetic compatibility

The DCI-GSI2 is a CE class A device. This equipment may cause interference in a residential installation. In this case the user is encouraged to perform appropriate measures to correct the interference. For details on CE compliance, refer to Certifications of the DCI-GSI2 on page 138.

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.

Connecting the DCI-GSI2 to a Power Supply

Introduction

The power of a DCI-GSI2 can be supplied by the vehicle battery or an external power supply, for example, if the DCI-GSI2 is used on a test bench. The DCI-GSI2 can be directly connected to a vehicle battery.

Tip

The DCI-GSI2 is equipped with a *Status* LED that indicates the power supply status. Refer to Status LEDs on page 134.

Power supply options

There are two options for supplying power to a DCI-GSI2:

- You can connect an external power supply to the DCI-GSI2 via the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation. The cable must be ordered separately. Refer to Using an external power supply.
- You can connect the DCI-GSI2 to the vehicle power supply within the ECU via the *internal power supply cable*. Refer to Using the vehicle power supply within the ECU.

Using an external power supply

If connecting the DCI-GSI2 power supply to either KL15 or KL30 is unsuitable or even impossible, you can connect the DCI-GSI2 to an external power supply.

The external power supply can be connected to the DCI-GSI2 via the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation.

Note

Do not connect another power supply cable to extend the connection.

Using the vehicle power supply within the ECU

You can supply power to a DCI-GSI2 via the vehicle power supply within the ECU. You can connect the *internal power supply cable* of the DCI-GSI2 to KL30 (12-V input from the positive terminal of the vehicle battery; continuous power supply) or KL15 (output of the ignition/driving switch) within the ECU:

Connecting to KL30 If the ECU provides KL30, you are recommended to connect the DCI-GSI2 power supply to KL30. The DCI-GSI2 is then continuously

supplied with power even if the engine is not running. The DCI-GSI2 works in standby mode in that case. For the load on the vehicle battery in standby mode, refer to Technical Specifications of the DCI-GSI2 on page 132.

Connecting to KL15 As an alternative to KL30, you can connect the DCI-GSI2 power supply to KL15. The DCI-GSI2 is then supplied with power only when the ignition is switched on. The DCI-GSI2 is powered up together with the ECU.

Note

- Powering up the DCI-GSI2 can affect ECU booting time. In some cases, this is not desired, for example, for quick-start measurements. Connecting the DCI-GSI2 power supply to KL15 is not useful in such cases. Use the connection to KL30 or an external power supply instead.
- Note the recommendations for the power supply of the DCI-GSI2. Refer to Recommendations for Powering the DCI-GSI2 by the Vehicle Battery on page 27.

NOTICE

When using the internal power supply, make sure to set correct polarity. Connecting the DCI-GSI2 to the internal power supply the wrong way might damage the DCI-GSI2 and/or the ECU. Refer to How to Connect a DCI-GSI2 to an ECU on page 35.

Related topics

Basics

Recommendations for Powering the DCI-GSI2 by the Vehicle Battery 27

HowTos

How to Connect a DCI-GSI2 to an ECU 35

References

PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation 168
Technical Specifications of the DCI-GSI2 132

Recommendations for Powering the DCI-GSI2 by the Vehicle Battery

Introduction

If you power the DCI-GSI2 by the vehicle battery, you should avoid ground loops that can lead to signal errors.

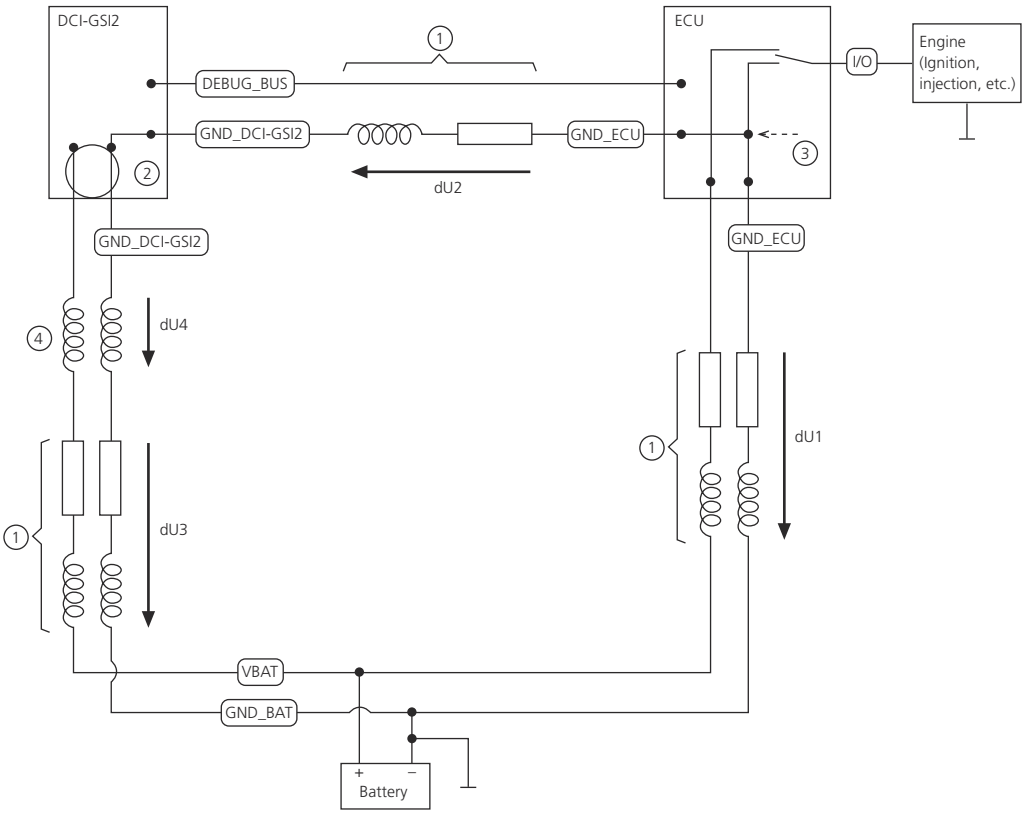
General recommendations

Note the following general recommendations:

- Connect the DCI-GSI2 power supply and ground as close as possible to the ECU.
- Ensure a good electrical connection between the DCI-GSI2 ground and the ECU ground.

Signal errors due to ground loop between ECU and DCI-GSI2

When the ECU is switching high loads, for example, the ignition or injection of an engine, there is a current flow from the ECU to the vehicle battery via the ECU power cable. This current flow causes the voltage drop dU1 between the battery ground and the ECU ground.



dU = Rl + L dl/dt

dU1 = dU2 + dU3 + dU4

[1] Wiring impedance (not a component) approx. 1µH/m

[2] Small ferrite

[3] Switching external loads causes dl/dt

[4] Optional ferrite increases line inductance

Voltage drop and current flow on the debug bus In the wiring scheme shown above, the power supply of the DCI-GSI2 is connected directly to the vehicle battery. Since the DCI-GSI2 does not switch any high loads, the DCI-GSI2

ground potential is almost equal to the battery ground potential. For this reason, the voltage drop dU2 causes a current flow on the ground line of the debug bus. This decreases the noise margin on the debug bus. Detecting logic low and high signal levels on the debug bus, which often has fast changing signals at low voltage levels, is therefore difficult. Since most debug buses do not provide checksum or other error detection mechanisms, signal errors are even more likely to occur.

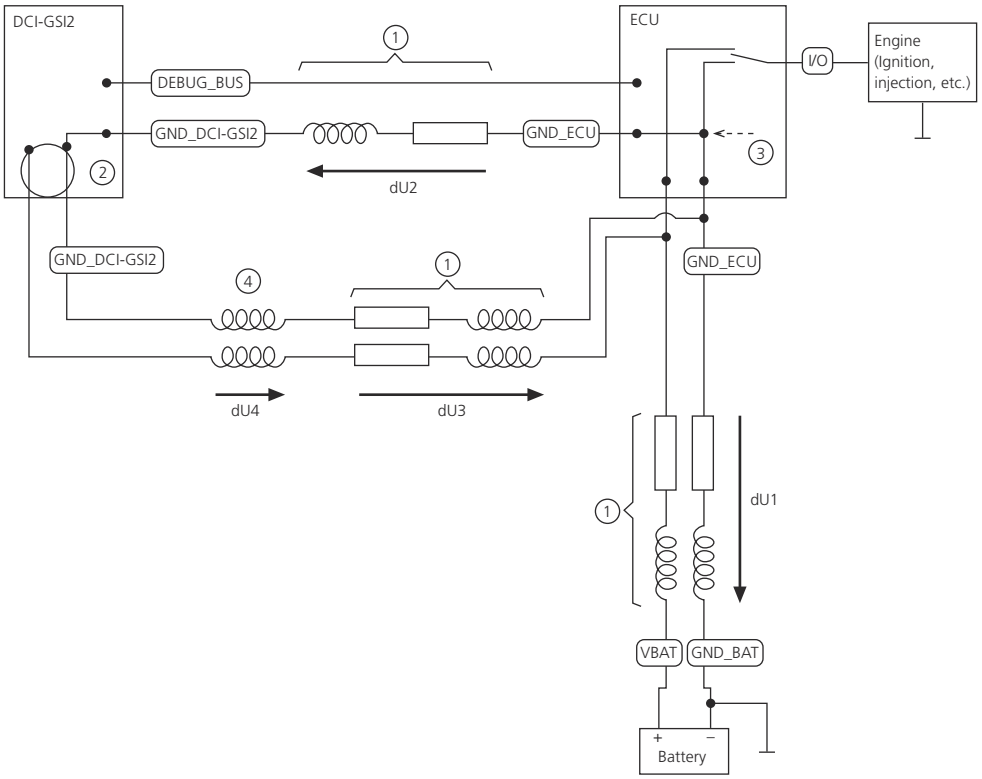
Attaching a ferrite Attaching a ferrite – see 4) in the illustration above – to the DCI-GSI2 power cable reduces the current flow on the debug bus and the DCI-GSI2 power cable, and also the voltage drop dU2. The more windings through the ferrite, the better the effect will be. This makes the debug bus work better, but it is not the optimum solution.

Solution 1: DCI-GSI2 power as close as possible to the ECU

The DCI-GSI2 power supply and ground should be connected as close as possible to the ECU.

Reduced voltage drop and current flow on the debug bus In the wiring scheme shown below, I/O current changes in the ECU when switching high loads no longer influence the voltage drop dU2. dU2 is now independent of dU1. This improves the detection of logic low and high signal levels on the debug bus, which often has fast changing signals at low voltage levels.

Optimum connection place The optimum place to connect the DCI-GSI2 power supply and ground is on the ECU's printed circuit board. Since this is impossible in many cases, connections should be made at the wiring harness close to the ECU. If there is still some wire left between the ECU and the DCI-GSI2 power cable, you can attach a ferrite on the DCI-GSI2 power cable to make the debug bus work better.



dU = RI + L dI/dt

dU2 = – (dU3 + dU4)

[1] Wiring impedance (not a component) approx. 1µH/m

[2] Small ferrite

[3] Switching external loads causes dI/dt

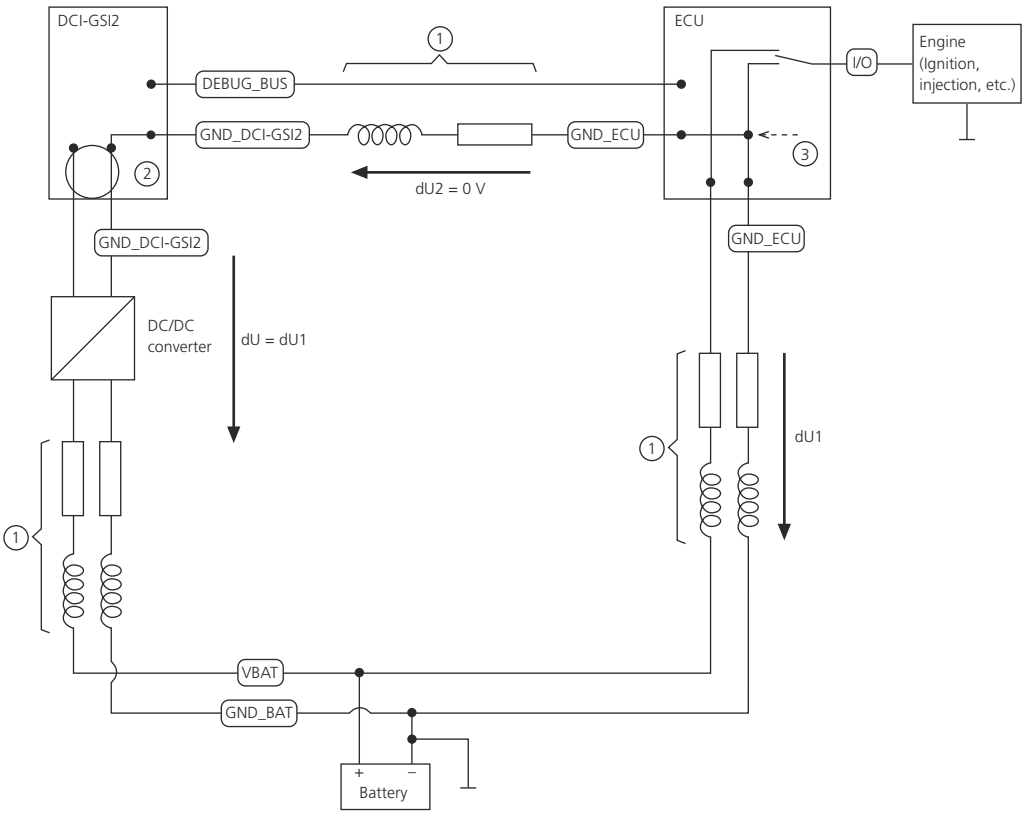
[4] Optional ferrite increases line inductance

Solution 2: DCI-GSI2 power via DC/DC converter

Connecting the power supply of the DCI-GSI2 to the vehicle battery via a DC/DC converter is the optimum solution to avoid ground loops leading to signal errors. If a DC/DC converter is used, no ferrite is needed on the DCI-GSI2 power cable.

Tip

The PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation provides a DC/DC converter and can be used for this purpose.



dU = Rl + L dI/dt

[1] Wiring impedance (not a component) approx. 1µH/m

[2] Small ferrite

[3] Switching external loads causes dI/dt

Related topics

Basics

Connecting the DCI-GSI2 to a Power Supply..... 26

References

PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation..... 168

Connecting the DCI-GSI2 to the ECU Debug Interface

Introduction

The DCI-GSI2 is connected to the ECU via a debug interface such as JTAG/Nexus or JTAG/OCDS. The DCI-GSI2 provides a bus connector that interfaces your ECU via a connector adapter that is specific to the ECU debug interface. The

connector adapter mainly routes the bus signals from the ECU to the DCI-GSI2 and vice versa. A ribbon cable is usually used to connect the connector adapter to the ECU debug interface.

Tip

The DCI-GSI2 is equipped with an *ECU* LED that indicates the status of the connected ECU. Refer to Status LEDs on page 134.

Recommendations for the connection

Note the following recommendations when connecting the DCI-GSI2 to the ECU debug interface:

- Keep the length of the ribbon cable between the DCI-GSI2 and the ECU debug interface as short as possible. Do not extend the cable provided by dSPACE.
- Connect all the ground lines of the DCI-GSI2 connector adapter to ground lines of the ECU debug interface.

  Ideally, the ribbon cable provides one ground line for each signal line. Ground lines and signal lines should alternate across the cable.
- Take care when routing the cable from the ECU to the DCI-GSI2. Keep the cable away from any mechanical and electrical sources of disturbance.
- If possible, use shielded cables for the connection between the DCI-GSI2 and the ECU. Additionally, the DCI-GSI2 enclosure should be mounted directly on the ECU enclosure to create optimal shielding against external influences. This is especially important for in-vehicle use.
- The printed circuit board of the ECU must provide a connector for the debug interface. The ECU debug interface connector should be placed as close to the microcontroller as possible.

  If there is no such connector on the ECU, contact dSPACE to connect the DCI-GSI2 to your ECU. Otherwise, dSPACE cannot guarantee that the DCI-GSI2 will function properly.

  If the connector is not present on the ECU printed circuit board and an additional ECU internal adapter is used, ensure a proper ground connection. Do not use loose wires for the connection. Use a flat ribbon cable or properly shielded wires.
- Some debug interface connectors do not have a latching mechanism. In these cases, additional measures may be necessary for ensuring a working physical connection.
- Do not have multiple debug interface connectors or any signal stubs on the ECU printed circuit board, as this can significantly reduce the signal quality due to signal reflections.
- For some interfaces, it is good practice to insert serial resistors for all ECU output signals close to the ECU microcontroller. In certain scenarios, this can improve the signal quality.

Related topics

Basics

Mounting the DCI-GSI2 on an ECU....33
Status LEDs....134

HowTos

How to Connect a DCI-GSI2 to an ECU....35

Mounting the DCI-GSI2 on an ECU

Introduction

You can mount the DCI-GSI2 on an ECU enclosure.

Mounting the DCI-GSI2 on the ECU enclosure

You can mount the DCI-GSI2 by screwing it onto the ECU enclosure. The DCI-GSI2 is mounted with its enclosure for in-vehicle use. A hole in the ECU enclosure is required to connect the DCI-GSI2 connector adapter to the ECU debug interface with a ribbon cable.

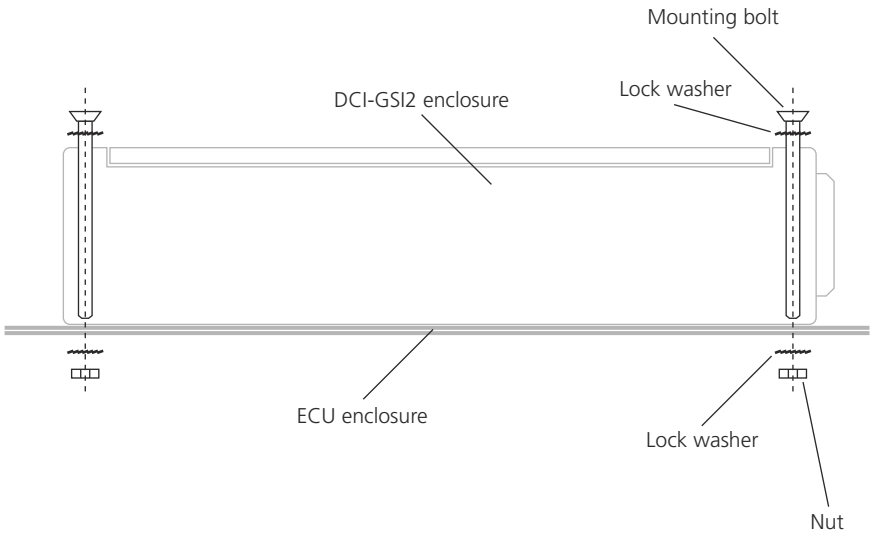
Note

Mounting the DCI-GSI2 on the ECU enclosure is possible only with the *DCI-GSI2 enclosure for in-vehicle use*. The DCI-GSI2 enclosure for laboratory use does not provide mounting holes for mounting it on an ECU.

To reduce electrostatic discharge and electromagnetic interference, note the following recommendations when mounting the DCI-GSI2 on the ECU enclosure:

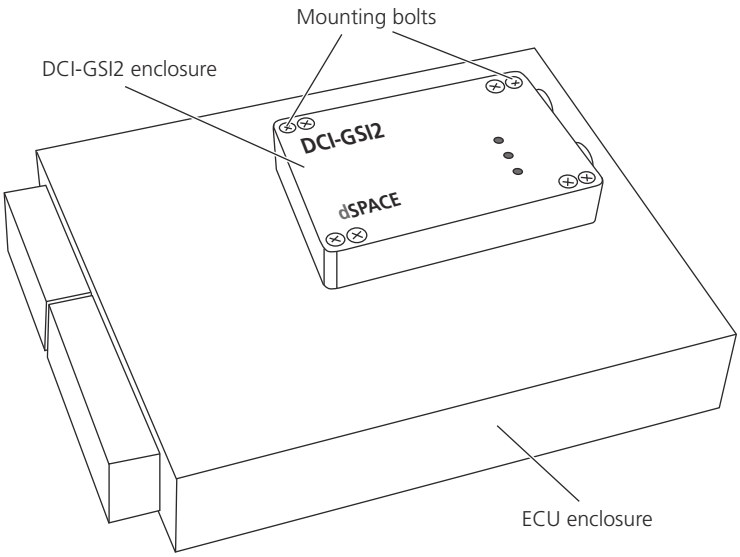
- Screw the DCI-GSI2 enclosure for in-vehicle use and the ECU enclosure together. Use the mounting holes of the DCI-GSI2 enclosure to screw it onto the ECU enclosure. Insert a lock washer between each mounting bolt and the DCI-GSI2 enclosure and the ECU enclosure. This improves the connection of the DCI-GSI2 enclosure to ground potential.

See the following illustration:



- Do not mount the DCI-GSI2 on ECU cooling ribs as that would cause air holes and slots between the DCI-GSI2 enclosure and the ECU enclosure.

The illustration below shows a DCI-GSI2 mounted on an ECU enclosure:



Related topics

Basics

Connecting the DCI-GSI2 to the ECU Debug Interface..... 31

HowTos

How to Connect a DCI-GSI2 to an ECU..... 35

How to Connect a DCI-GSI2 to an ECU

Objective

The DCI-GSI2 must be connected to the ECU.

Basics

For basics on connecting and mounting a DCI-GSI2, refer to:

- Connecting the DCI-GSI2 to a Power Supply on page 26
- Connecting the DCI-GSI2 to the ECU Debug Interface on page 31
- Mounting the DCI-GSI2 on an ECU on page 33

Preconditions

You need the following items:

- ECU
- DCI-GSI2 preconfigured by dSPACE
- Connector adapter
- Cable for connecting the DCI-GSI2 with the ECU (optional, depending on the connector adapter)
- Power supply cable: Either a PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation or an internal power supply cable

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a DCI-GSI2 on page 24.

Method

To connect a DCI-GSI2 to an ECU

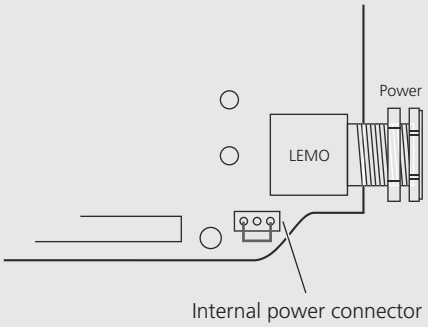
1. If not already done, switch off the power and unplug the Ethernet connection to avoid hardware damage.
2. Mount the connector adapter on the DCI-GSI2.
3. Mount the DCI-GSI2 to the ECU.
4. If possible, install appropriate thermal conduction if you want to integrate the DCI-GSI2 in the ECU enclosure. Use thermal conduction foil that covers the entire DCI-GSI2's underside and has as much contact with the ECU enclosure as possible.
5. Connect the cable to the ECU debug interface and to the connector adapter. If the connector adapter is directly connected to the ECU, no cable is necessary.
6. Connect the DCI-GSI2 to the power supply. There are two options for this:
   - To use the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation, connect the cable's LEMO connector to the 2-pin LEMO power connector on the DCI-GSI2 enclosure. Connect the two open, soldered

leads of the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation to the vehicle electrical system.

Note

Ensure that the bridge on the internal (3-pin) power connector within the DCI-GSI2 is used. Otherwise, the 2-pin power LEMO connector on the DCI-GSI2 enclosure is inactive.

The illustration below shows the location of the internal power connector within the DCI-GSI2. In the illustration, the bridge on the internal power connector within the DCI-GSI2 is used, which is the configuration for powering the DCI-GSI2 externally via the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation.



- To use the internal power supply cable, remove the bridge on the internal power connector within the DCI-GSI2 and connect the internal power supply cable to the internal power connector. Connect the wires of the internal power supply cable to KL15 or KL30 and to ground within the ECU:

Color of Wire	Voltage
Red	VBAT
White	GND

Note

You should not use the internal power supply cable if you work with a DCI-GSI2 in an *enclosure for laboratory use*.

7 Connect the Ethernet cable (8-pin connector) to the DCI-GSI2.

Result

You have connected the DCI-GSI2 to an ECU.

Next steps

Connect the ECU with DCI-GSI2 to the host PC. Refer to How to Connect an ECU with DCI-GSI2 to the Host PC Directly on page 37.

Related topics

Basics

References

How to Connect an ECU with DCI-GSI2 to the Host PC Directly

Objective

An ECU with DCI-GSI2 can be connected to the host PC directly via Ethernet.

Basics

The DCI-GSI2 communicates with the host PC via Ethernet.

Simultaneous calibration and ECU interfacing If you want to perform measurement, ECU calibration, and ECU interfacing in parallel, the host PC (used to access the ECU for ECU calibration and measurement) and the dSPACE real-time system (used to access the ECU for ECU interfacing) must be connected to the DCI-GSI2 via an Ethernet switch. Refer to Connecting an ECU with DCI-GSI2 for Simultaneous Calibration and ECU Interfacing on page 39.

Restrictions

You must use only the cables provided by dSPACE to connect dSPACE ECU interfaces. The dSPACE cables have a wider temperature range, higher mechanical strength, and robust, self-latching, keyed connectors. If you use other cables or extend the cables, dSPACE ECU interfaces might not work.

Preconditions

- Before connecting dSPACE ECU interface hardware to the host PC, you must install ControlDesk.
- One of the following Ethernet connection cables:
  - ETH_CAB1 Ethernet Connection Cable
  - ETH_CAB2 Ethernet Connection Cable
  - ETH_CAB4 Ethernet Connection Cable
  - ETH_CAB5 Ethernet Connection Cable
- PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation (optional – depends on the DCI-GSI2)

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a DCI-GSI2 on page 24.

Method

To connect an ECU with DCI-GSI2 to the host PC directly

1 If your DCI-GSI2 needs an external power supply, connect it to the power supply using the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation.

2 Connect the Ethernet connector of the DCI-GSI2 to the Ethernet interface of your host PC.

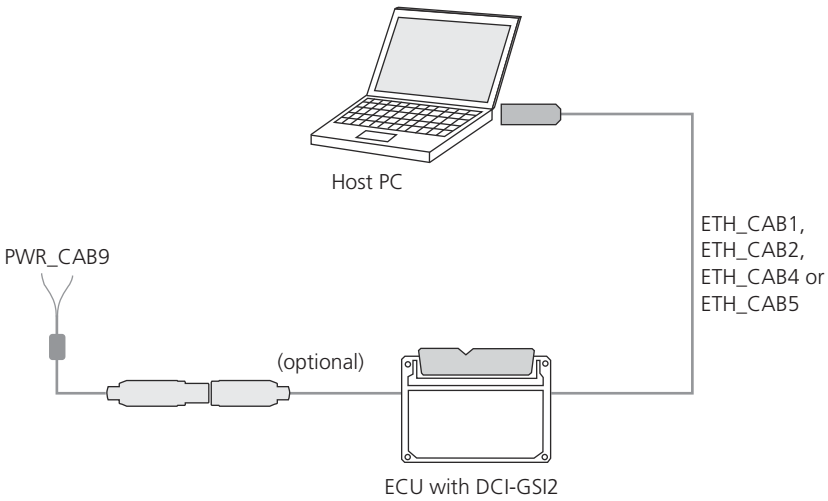
Use one of the following cables:

- ETH_CAB1 Ethernet Connection Cable
- ETH_CAB2 Ethernet Connection Cable
- ETH_CAB4 Ethernet Connection Cable
- ETH_CAB5 Ethernet Connection Cable

Result

You have now connected an ECU with DCI-GSI2 to the host PC.

The following illustration shows the resulting setup:



Next steps

- The Ethernet connection between the host PC and the DCI-GSI2 must be configured. Refer to Setting up the Ethernet Connection Between a DCI-GSI2 and the Host PC on page 111.
- You must configure the DCI-GSI2 via the **DCI Configuration Tool**. You can start it via **Start – Programs – dSPACE DCI-GSI Configuration Package – dSPACE DCI Configuration Tool**. However, you should modify the configuration only if you are familiar with ECU interface hardware.

For further information, refer to the DCI Configuration 🕮 document.

- ControlDesk can access an ECU with DCI-GSI2 only if the corresponding device is configured correctly. For instructions, refer to How to Assign a DCI-GSI2 to a DCI-GSI2 Device (ControlDesk Platform Management 🕮).

Related topics

Basics

Connecting an ECU with DCI-GSI2 for Simultaneous Calibration and ECU Interfacing..... 39

References

Connection Cables..... 150
DCI-GSI2 Data Sheet..... 132
ETH_CAB1 Ethernet Connection Cable..... 151
ETH_CAB2 Ethernet Connection Cable..... 152
ETH_CAB4 Ethernet Connection Cable..... 155
ETH_CAB5 Ethernet Connection Cable..... 156
PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation..... 168

Connecting an ECU with DCI-GSI2 for Simultaneous Calibration and ECU Interfacing

Introduction

The DCI-GSI2 supports the following ECU accesses simultaneously:

- ECU parameter calibration
- Measurement of ECU variables
- ECU interfacing, i.e., reading and/or writing individual functions and variables of an ECU application, for example, for function bypassing

To establish parallel communication between the host PC with ControlDesk and the ECU with DCI-GSI2 on the one hand, and between the dSPACE real-time system and the ECU with DCI-GSI2 on the other hand, the host PC and the dSPACE real-time system must be connected to the DCI-GSI2 via an Ethernet switch.

The connections between the ECU with DCI-GSI2, the host PC, and the dSPACE real-time system vary depending on the dSPACE real-time system used:

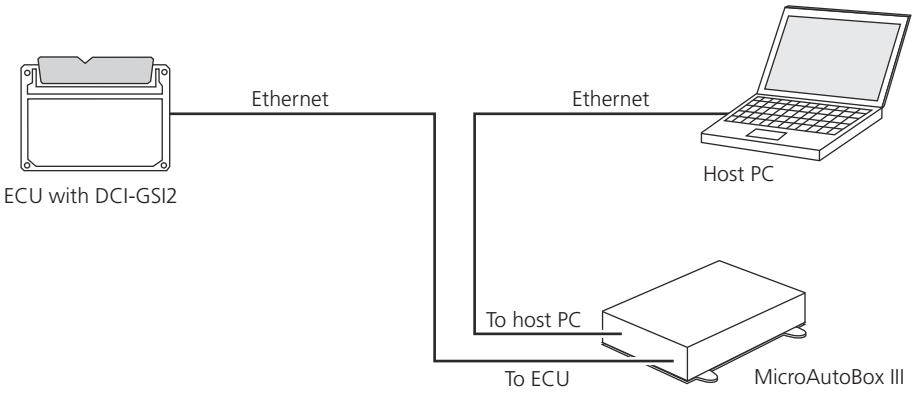
- Connection scenario with the MicroAutoBox II/III
- Connection scenario with DS1007 PPC Processor Board
- Connection scenario with DS4121

Connection scenario with the MicroAutoBox II/III

The connection scenario depends on the board revision of your MicroAutoBox II/III.

MicroAutoBox III The MicroAutoBox III provides an internal Ethernet switch.

The following illustration shows the connection scenario for parallel measurement, ECU calibration, and ECU interfacing via the DCI-GSI2 when the MicroAutoBox III is used as the dSPACE real-time system:

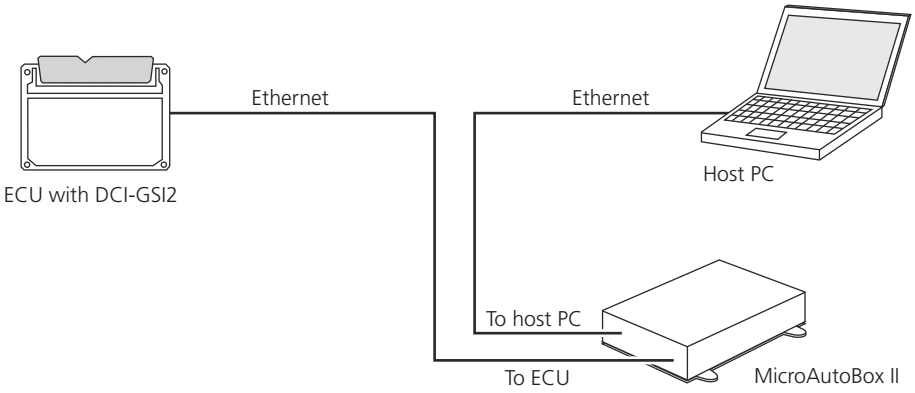


Note

To perform simultaneous calibration and ECU interfacing, select Configuration 4 for the internal Ethernet switch of the MicroAutoBox III. This configuration sets the internal Ethernet switch to the unmanaged mode. All switch ports are switched to each other, except WLAN. The wired host communication is not separated from the I/O Ethernet communication. For more information, refer to How to Configure the Internal Ethernet Switch (MicroAutoBox III Hardware Installation and Configuration 🕮) and CONFIGURATION - Ethernet Board Configuration Page (MicroAutoBox III Hardware Installation and Configuration 🕮).

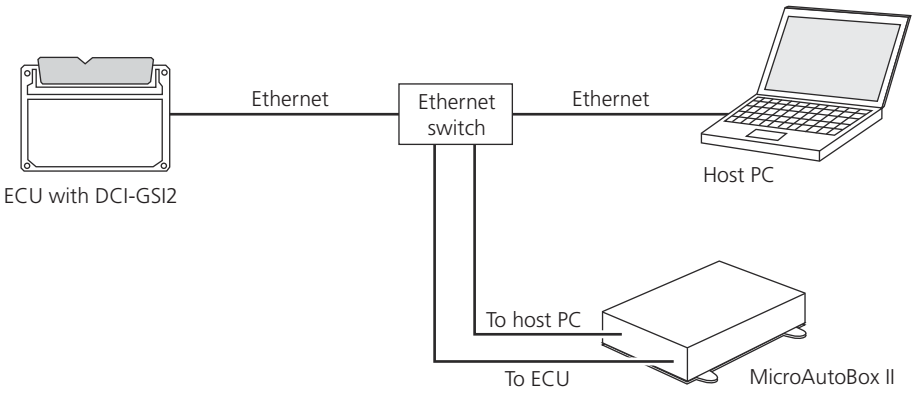
MicroAutoBox II as of board revision DS1401-25 The MicroAutoBox II as of board revision DS1401-25 provides an internal Ethernet switch.

The following illustration shows the connection scenario for parallel measurement, ECU calibration and ECU interfacing via the DCI-GSI2 when the MicroAutoBox II with board revision DS1401-25 or later is used as the dSPACE real-time system:



MicroAutoBox II up to board revision DS1401-23 The MicroAutoBox II up to board revision DS1401-23 does not provides an internal Ethernet switch. As a consequence, you have to use an *external* Ethernet switch.

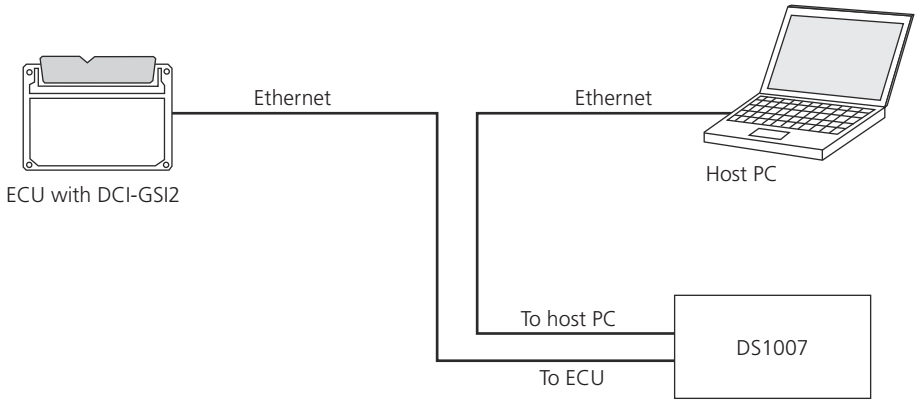
The following illustration shows the connection scenario for parallel measurement, ECU calibration and ECU interfacing via the DCI-GSI2 when the MicroAutoBox II with board revision DS1401-23 or earlier is used as the dSPACE real-time system:



Connection scenario with DS1007 PPC Processor Board

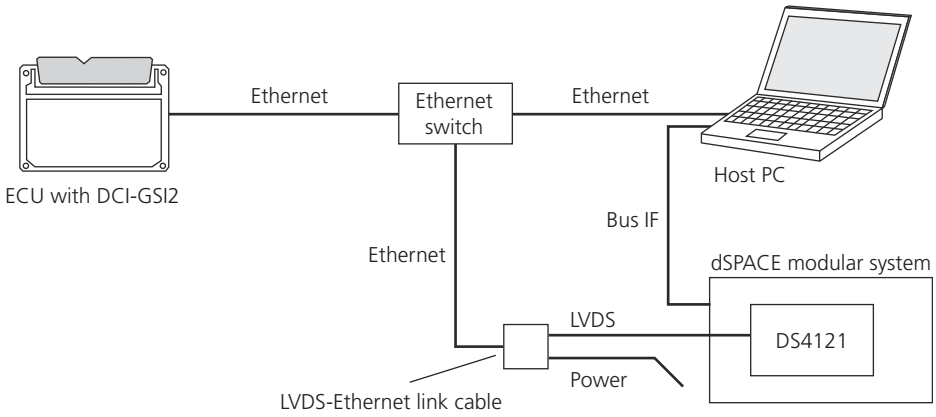
The DS1007 PPC Processor Board with Ethernet I/O interface provides an *internal* Ethernet switch.

The following illustration shows the connection scenario for parallel measurement, ECU calibration and ECU interfacing via the DCI-GSI2 when a DS1007 board is used as the dSPACE real-time system:



Connection scenario with DS4121

The following illustration shows the connection scenario for parallel measurement, ECU calibration and ECU interfacing via the DCI-GSI2 when a dSPACE modular system with DS4121 is used as the dSPACE real-time system:



Related topics

HowTos

How to Connect a DCI-GSI2 to an ECU 35

Connecting an ECU with CCP or XCP on CAN

Introduction

The ECU with CCP or the ECU with XCP on CAN must be connected to the host PC via CAN.

Where to go from here

Information in this section

Warning About Using a DCI-CAN2

Introduction

Note the following warning when using a DCI-CAN2.

Danger potential

Connecting a DCI-CAN2 to a CAN bus can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use a DCI-CAN2, and who have been informed of the dangers and possible consequences, are permitted to use the DCI-CAN2.

Before integrating the DCI-CAN2 and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

The DCI-CAN2 is designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to the DCI-CAN2, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to a DCI-CAN2, the DCI-CAN2 and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.

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.

Warning About Using a DCI-CAN/LIN1

Introduction

Note the following warning when using a DCI-CAN/LIN1.

Danger potential

Connecting a DCI-CAN/LIN1 to a CAN and/or LIN bus can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use a DCI-CAN/LIN1, and who have been informed of the dangers and possible consequences, are permitted to use the DCI-CAN/LIN1.

Before integrating the DCI-CAN/LIN1 and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

The DCI-CAN/LIN1 is designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to the DCI-CAN/LIN1, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to a DCI-CAN/LIN1, the DCI-CAN/LIN1 and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.

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.

How to Connect an ECU with CCP or an ECU with XCP on CAN to the Host PC

Objective

The ECU with CCP or the ECU with XCP on CAN must be connected to the host PC via CAN.

Basics

An ECU with CCP or XCP on CAN can communicate with the host PC via a CAN interface.

Preconditions

- Since the ECU is connected via CAN bus, you must connect the CAN bus to the host PC. Refer to How to Connect the DCI-CAN2 or DCI-CAN/LIN1 on page 107. For instructions on installing a Vector CAN or Kvaser CAN interface, refer to the interface's documentation.
- You need the following items:
  - CAN cables to connect the ECU to your CAN interface.
  - You might need additional CAN terminators.

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware.
Refer to:
- Warning About Using a DCI-CAN2 on page 43
- Warning About Using a DCI-CAN/LIN1 on page 44

Method

To connect an ECU with CCP or an ECU with XCP on CAN to the host PC

1 Connect the CAN connector of your ECU to your CAN interface or to an existing CAN bus that is connected to your CAN interface.

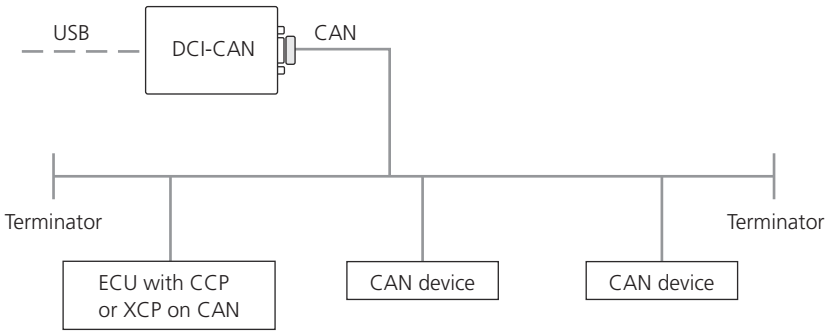
Interface Module	CAN Connector Pinout
DCI-CAN2	Refer to Connector Pinout on page 142.
DCI-CAN/LIN1	Refer to Connector Pinout on page 146.

Tip

The pinout is also printed on the housing of the DCI-CAN2 and the DCI-CAN/LIN1.

Result

The following illustration shows the resulting setup when the DCI-CAN2 is used:



Next steps

ControlDesk can access an ECU with CCP or XCP on CAN only if the corresponding CCP or XCP on CAN device is configured correctly. Refer to:

- How to Configure a CCP Device (ControlDesk Platform Management 🕮)
- How to Configure an XCP on CAN Device (ControlDesk Platform Management 🕮)

Related topics

References

DCI-CAN/LIN1 Data Sheet 144
DCI-CAN2 Data Sheet 140

Connecting an ECU with XCP on Ethernet

Introduction

The ECU with XCP on Ethernet must be connected to the host PC via Ethernet.

Where to go from here

Information in this section

Warning About Connecting an ECU with XCP on Ethernet 47
To avoid risk of injury and/or damage, read and ensure compliance with the warnings stated.

How to Connect an ECU with XCP on Ethernet (UDP/IP) to the Host PC 48
An ECU with XCP on Ethernet (UDP/IP) can be connected to the host PC via Ethernet network cable.

Warning About Connecting an ECU with XCP on Ethernet

Introduction	Note the following warning when connecting an ECU with XCP on Ethernet.
Danger potential	*Connecting an ECU with XCP on Ethernet can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use a dSPACE ECU interface, and who have been informed of the dangers and possible consequences, are permitted to use a dSPACE ECU interface.*

Before connecting an ECU with XCP on Ethernet and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

Standard Ethernet network cables are designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied via the standard Ethernet network cable used, even in the event of electrical faults.

If there is a risk of hazardous voltages, for example, when connecting an engine ECU which typically generates transient hazardous voltages for ignition, one of the following measures must be taken **to avoid the risk of serious injury or death due to electrical shock**:

- The ECU with XCP on Ethernet and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.
- dSPACE provides dedicated interface cables to ensure an electrically safe connection to the host PC for systems featuring voltages up to 300 V DC/AC_{RMS} , or 600 V_{peak}: The HSL_PATCH_300V Galvanically Isolated PC Connection Cable must be used for connecting the ECU to the host PC. Instead of this crossed-over patch cable, you can use a connection via fiber-optic cable.

  The ECU and the devices connected to it must be in a separate test area. When the above-mentioned cables are used, the host PC can be located outside the test area.

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.

How to Connect an ECU with XCP on Ethernet (UDP/IP) to the Host PC

Objective

The ECU with XCP on Ethernet (UDP/IP) can be connected to the host PC via an Ethernet interface.

Basics

An ECU with XCP on Ethernet can communicate with the host PC via an Ethernet interface.

XCP on Ethernet-based DAQ modules

ControlDesk supports XCP on Ethernet-based measurement modules. You can access them via the XCP on Ethernet device. For this reason, connecting an XCP on Ethernet-based DAQ modules to the host PC is like connecting an ECU with XCP on Ethernet.

Preconditions

- Before connecting dSPACE ECU interface hardware to the host PC, you must install ControlDesk.
- The host PC must have an Ethernet network interface card and be switched on to allow the initialization of the Ethernet driver software.
- You need a standard Ethernet network cable or the HSL_PATCH_300V Galvanically Isolated PC Connection Cable provided by dSPACE to connect the ECU to your PC's Ethernet interface.

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Connecting an ECU with XCP on Ethernet on page 47.

Method

To connect an ECU with XCP on Ethernet (UDP/IP) to the host PC

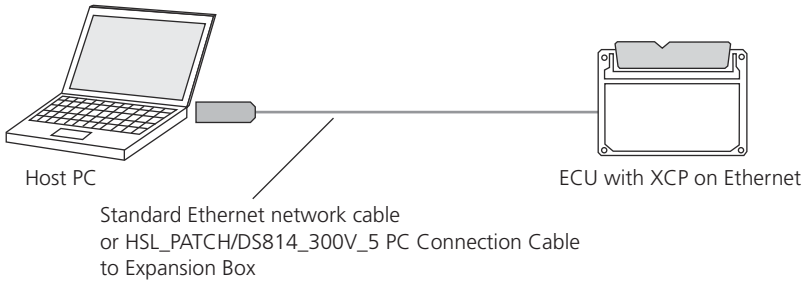
1 Connect the Ethernet connector of the ECU with XCP on Ethernet to the Ethernet interface of your host PC using the Ethernet network cable.

Windows initializes the appropriate driver software for that particular Ethernet port.

Result

You have now connected an ECU with XCP on Ethernet (UDP/IP) to the host PC.

The following illustration shows the resulting setup:



Next steps

ControlDesk can access an ECU with XCP on Ethernet only if the corresponding XCP on Ethernet device is configured correctly. Refer to How to Configure an XCP on Ethernet Device (ControlDesk Platform Management 🕮).

Related topics

References

HSL_PATCH_300V Galvanically Isolated PC Connection Cable..... 159

Connecting ECUs for ECU Diagnostics

Introduction

dSPACE provides interfaces that allow you to connect one or more ECUs to your host PC for ECU diagnostics purposes.

Where to go from here

Information in this section

Warning About Using a DCI-CAN2

Introduction

Note the following warning when using a DCI-CAN2.

Danger potential

Connecting a DCI-CAN2 to a CAN bus can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use a DCI-CAN2, and who have been informed of the dangers and possible consequences, are permitted to use the DCI-CAN2.

Before integrating the DCI-CAN2 and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

The DCI-CAN2 is designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to the DCI-CAN2, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to a DCI-CAN2, the DCI-CAN2 and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.

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.

Warning About Using a DCI-CAN/LIN1

Introduction

Note the following warning when using a DCI-CAN/LIN1.

Danger potential

Connecting a DCI-CAN/LIN1 to a CAN and/or LIN bus can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use a DCI-CAN/LIN1, and who have been informed of the dangers and possible consequences, are permitted to use the DCI-CAN/LIN1.

Before integrating the DCI-CAN/LIN1 and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

The DCI-CAN/LIN1 is designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to the DCI-CAN/LIN1, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to a DCI-CAN/LIN1, the DCI-CAN/LIN1 and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.

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.

Warning About Using a DCI-KLine1

Introduction

Note the following warning when using a DCI-KLine1.

Danger potential

Connecting a DCI-KLine1 to an ECU can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use a DCI-KLine1, and who have been informed of the dangers and possible consequences, are permitted to use the DCI-KLine1.

Before integrating the DCI-KLine1 and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

The DCI-KLine1 is designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to a dSPACE ECU interface, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to a DCI-KLine1, the DCI-KLine1 and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.

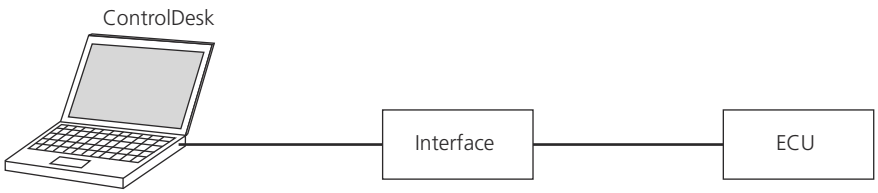
Liability

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.

Connection Scenarios for ECU Diagnostics

Possible connection scenarios

The following illustration shows the principle of connecting an ECU to the host PC, using dSPACE ECU interfaces:



Scenario for ECU diagnostics

Details on the individual connection scenarios for ECU diagnostics are listed in the following table.

Connection Between Host PC and Interface	Interface Module	Connection Between Interface and ECU	ECU ...
USB	DCI-CAN2 or DCI-CAN/LIN1[1), 2)]	CAN	... With implemented diagnostic protocol[3)]
USB	DCI-KLine1[4)]	K-Line	... With implemented diagnostic protocol[3)]
Ethernet	– (not required)	Ethernet	... With implemented diagnostic protocol[3)]

1) Further interface modules are supported. For an overview, refer to Supported CAN Interfaces (ControlDesk Platform Management 🕮).
2) For ECU diagnostics access via CAN, you can use the same CAN interface (DCI-CAN2 or DCI-CAN/LIN1) as used for measurement and calibration with CCP or XCP on CAN.
3) For a list of the supported diagnostic protocols, refer to Basics of ECU Diagnostics with ControlDesk (ControlDesk ECU Diagnostics 🕮).
4) Further interface modules are supported. For an overview, refer to Supported K-Line Interfaces (ControlDesk Platform Management 🕮).

Related topics

Basics

Basics on Accessing an ECU (ControlDesk Platform Management 🕮)

How to Connect an ECU with Implemented Diagnostic Protocol via CAN

Objective

For ECU diagnostics access via CAN, the ECU with implemented diagnostic protocol must be connected to the host PC via CAN.

Basics

For ECU diagnostics via CAN, the ECU with implemented diagnostic protocol can communicate with the host PC via a CAN interface.

Preconditions

- Since the ECU is connected via CAN bus, you must connect the CAN bus to the host PC. Refer to How to Connect the DCI-CAN2 or DCI-CAN/LIN1 on page 107. For instructions on installing a Vector CAN or Kvaser CAN interface, refer to the interface´s documentation.
- You need the following items:
  - CAN cables to connect the ECU to your CAN interface.
  - You might need additional CAN terminators.

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware.
Refer to:

- Warning About Using a DCI-CAN2 on page 43
- Warning About Using a DCI-CAN/LIN1 on page 44

Method

To connect an ECU with implemented CAN-based diagnostic protocol

1 Connect the CAN connector of your ECU to your CAN interface or to an existing CAN bus that is connected to your CAN interface.

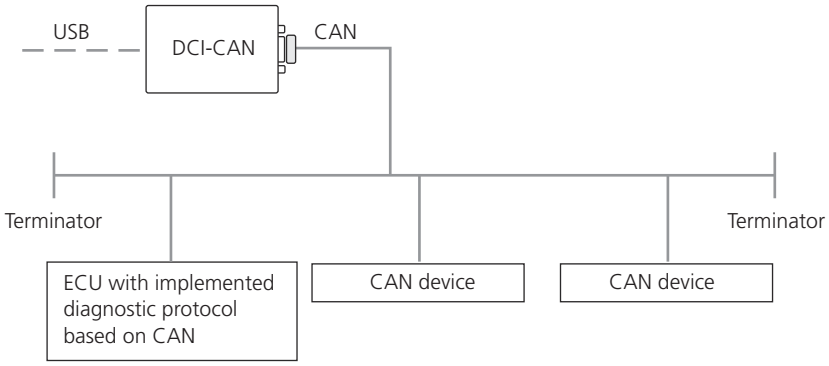
Interface Module	CAN Connector Pinout
DCI-CAN2	Refer to Connector Pinout on page 142.
DCI-CAN/LIN1	Refer to Connector Pinout on page 146.

Tip

The pinout is also printed on the housing of the DCI-CAN2 and the DCI-CAN/LIN1.

Result

The following illustration shows the resulting setup when the DCI-CAN2 is used:



Next steps

ControlDesk can access an ECU with implemented diagnostic protocol only if the corresponding ECU Diagnostics device is configured correctly. Refer to How to Configure an ECU Diagnostics Device (ControlDesk Platform Management 🕮).

Related topics

References

How to Connect an ECU with Implemented Diagnostic Protocol via K-Line

Objective

For ECU diagnostics and ECU flash programming access via K-Line, the ECU with implemented diagnostic protocol must be connected to the host PC via K-Line.

Basics

For ECU diagnostics or ECU flash programming via K-Line, the ECU with implemented K-Line-based diagnostic protocol communicates with the host PC via the DCI-KLine1. The DCI-KLine1 forwards the messages and data from and to the host PC via USB.

Supported diagnostic protocols The DCI-KLine1 can be used for ECU diagnostics according to KWP2000 on K-Line (ISO 14230).

Restrictions

- The DCI-KLine1 can be used only in connection with ControlDesk's ECU Diagnostics Module.
- You can connect one ECU to the host PC with the DCI-KLine1 (point-to-point connection). This allows communication between ControlDesk and one ECU at a time.
- Do not extend the USB cable of the DCI-KLine1 to a total of more than 5 m.

Preconditions

- Before connecting dSPACE ECU interface hardware to the host PC, you must install ControlDesk.
- The host PC must be switched on to allow the initialization of the USB driver software.

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware.
Refer to Warning About Using a DCI-KLine1 on page 53.

Method

To connect an ECU with implemented K-Line-based diagnostic protocol

1. Connect the USB connector of the DCI-KLine1 to a free USB port of your host PC.

   Windows initializes the appropriate driver software for that particular USB port.

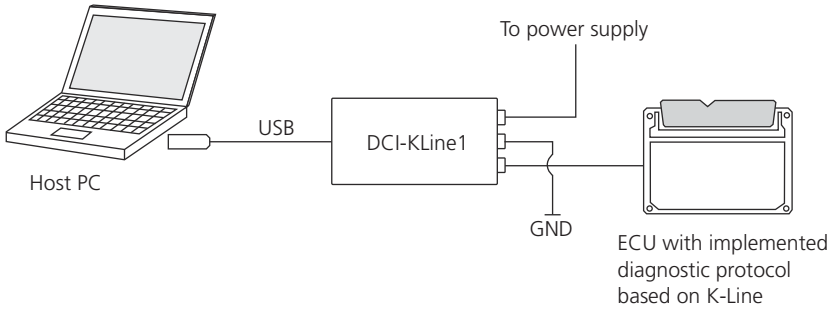
   If the LED of the DCI-KLine1 changes from yellow to red, USB is initialized.
2. Connect the external power supply (VBAT) and the power supply ground (GND) to the DCI-KLine1.

   If the LED is lit green, VBAT is on.
3. Connect the K-Line connector of the DCI-KLine1 to the K-Line.

Result

You have connected the ECU with implemented ECU diagnostic protocol to the host PC via K-Line.

The following illustration shows the resulting setup when the DCI-KLine1 is used:



Next steps

ControlDesk can access an ECU with implemented diagnostic protocol only if the ECU Diagnostics device is configured correctly. Refer to How to Configure an ECU Diagnostics Device (ControlDesk Platform Management 🕮).

Related topics

References

Connecting ECUs for External ECU Interfacing

Where to go from here

Information in this section

Basics on Connecting ECUs for External ECU Interfacing

Introduction

If you want to perform external ECU interfacing, you must connect the ECU to be interfaced to the host PC.

Connection Scenarios for External ECU Interfacing

Introduction

ECU interfacing comprises methods and tools to read and/or write individual functions and variables of an ECU application. ECU interfacing methods can be used to perform, for example, ECU function bypassing during which an existing ECU function is replaced by running a new function. For details on external ECU interfacing, refer to Basics on ECU Interfacing (ECU Interfacing Overview 🕮).

External ECU interfacing means that, for example, bypassing functions are executed externally on a dSPACE real-time system such as the MicroAutoBox II/III.

Supported dSPACE hardware platforms

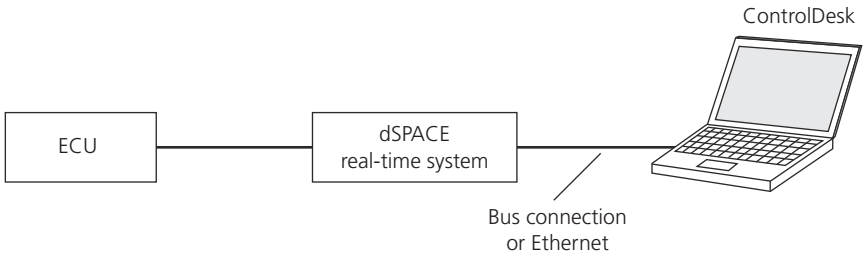
You can perform external ECU interfacing on the following dSPACE real-time systems:

- dSPACE modular systems with DS4121
- dSPACE modular systems with DS4302, DS2202, DS2210 or DS2211
- dSPACE modular systems with DS4501 or DS4505
- MicroAutoBox II/III

- DS1007 PPC Processor Board
- SCALEXIO

Possible connection scenarios for external ECU interfacing

The following illustration shows the principle of connecting an ECU to the dSPACE real-time system for external ECU interfacing:



The following table lists details on the individual connection scenarios for external ECU interfacing using dSPACE real-time hardware.

ECU Type	Connection Between ECU and dSPACE Real-Time System	dSPACE Real-Time System	Instructions
Connection via the On-Chip Debug Interface or via an External Memory Bus of the ECU Microcontroller			
ECU with POD ECU interfacing requires ECU code modifications[1].	Via POD: Debug interface — POD — LVDS	MicroAutoBox II – all variants	How to Connect a MicroAutoBox II to an ECU with POD on page 80
		dSPACE modular system with DS4121	How to Connect a DS4121 to an ECU with POD on page 65
ECU with DCI-GSI2 ECU interfacing is possible with and without ECU code modifications[1].	Via DCI-GSI2[2]: Debug interface — DCI-GSI2 — Ethernet	MicroAutoBox II – all variants	How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 on page 82
		MicroAutoBox III	How to Connect a MicroAutoBox III to an ECU with DCI-GSI2 on page 93
		dSPACE modular system with DS4121	How to Connect a DS4121 to an ECU with DCI-GSI2 on page 67
		DS1007 PPC Processor Board	How to Connect a DS1007 to an ECU with DCI-GSI2 on page 74
		SCALEXIO	How to Connect a SCALEXIO System to an ECU with DCI-GSI2 on page 100
Connection via a Communication Interface			
ECU with CCP	Via CAN	MicroAutoBox II - all variants	How to Connect a MicroAutoBox II to an ECU with CCP or to an ECU with XCP on CAN on page 88
		dSPACE modular system with dSPACE CAN board (DS2202, DS2210, DS2211, DS4302)	How to Connect a dSPACE CAN Board to an ECU with CCP or to an ECU with XCP on CAN on page 71

ECU Type	Connection Between ECU and dSPACE Real-Time System	dSPACE Real-Time System	Instructions
ECU with XCP on CAN	Via CAN	MicroAutoBox II - all variants	How to Connect a MicroAutoBox II to an ECU with CCP or to an ECU with XCP on CAN on page 88
		MicroAutoBox III	How to Connect a MicroAutoBox III to an ECU with XCP on CAN on page 96
		dSPACE modular system with dSPACE CAN board (DS2202, DS2210, DS2211, DS4302)	How to Connect a dSPACE CAN Board to an ECU with CCP or to an ECU with XCP on CAN on page 71
		SCALEXIO	How to Connect a SCALEXIO System to an ECU with XCP on CAN on page 103
ECU with XCP on Ethernet (UDP/IP)	Via Ethernet	MicroAutoBox II - all variants	How to Connect a MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP) on page 85
		MicroAutoBox III	How to Connect a MicroAutoBox III to an ECU with XCP on Ethernet (UDP/IP) on page 95
		dSPACE modular system with DS4121	How to Connect a DS4121 to an ECU with XCP on Ethernet (UDP/IP) on page 69
		DS1007 PPC Processor Board	The bracket of the DS1007 PPC Processor Board provides Ethernet I/O connectors. You can connect an ECU with XCP on Ethernet to the DS1007 using a standard Ethernet cable. Refer to Board Overview (PHS Bus System Hardware Reference).
		SCALEXIO	How to Connect a SCALEXIO System to an ECU with XCP on Ethernet (UDP/IP) on page 102
ECU with XCP on FlexRay	Via FlexRay	MicroAutoBox II 1401/1507, 1401/1511/1514, or 1401/1513/1514 with FlexRay modules	How to Connect a MicroAutoBox II to an ECU with XCP on FlexRay on page 89
		dSPACE modular system with DS4501 or DS4505 with FlexRay modules	How to Connect a DS4501 or DS4505 to an ECU with XCP on FlexRay on page 72

[1] Code modifications via dSPACE Calibration and Bypassing Service or code patches.
[2] Can be used for simultaneous calibration and ECU interfacing of the same ECU.

Possible connection scenario for on-target ECU interfacing

The following illustration shows the principle of connecting an ECU for on-target ECU interfacing in which no external dSPACE real-time system is required.

– Flash programming tool
  (e.g., dSPACE ECU Flash Programming Tool)
– Measurement and calibration tool
  (e.g., ControlDesk)

The connection between the host PC and the ECU is application-specific. For example, you can use CCP, XCP on CAN, or a DCI-GSI2 to establish communication between the host PC and the ECU.

As a preparatory step for performing on-target ECU interfacing, you have to program the ECU flash memory with the on-target ECU interfacing application. You can do so with the dSPACE ECU Flash Programming tool (refer to the ECU Flash Programming 🕮 document) or with any other flash programming tool.

Related topics

Basics

Basics on Connecting the ECU (ECU Interfacing Overview 🕮)
Basics on ECU Interfacing (ECU Interfacing Overview 🕮)

Connecting a dSPACE Modular System

Introduction

For performing external ECU interfacing, the modular system must be connected to the ECU.

Where to go from here

Information in this section

Warning About Using a dSPACE Modular System

Introduction

Note the following warning when using a dSPACE Modular System.

Danger potential

Connecting a dSPACE Modular System to an electronic control unit can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use a dSPACE Modular System, and who have been informed of the dangers and possible consequences, are permitted to use a dSPACE Modular System.

Before integrating a dSPACE Modular System and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

dSPACE Modular Systems are designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to the dSPACE Modular System, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to a dSPACE Modular System, for example, when it is connected to an engine ECU which typically generates transient hazardous voltages for ignition, one of the following measures must be taken **to avoid the risk of serious injury or death due to electrical shock**:

- The dSPACE Modular System and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.
- dSPACE provides dedicated interface cables to ensure an electrically safe connection to the host PC for systems featuring voltages up to 300 V DC/AC_{RMS} , or 600 V_{peak}: The HSL_PATCH_300V Galvanically Isolated PC Connection Cable must be used for connecting a dSPACE Modular System to the host PC. Instead of this crossed-over patch cable, you can use a connection via fiber-optic cable.

  The dSPACE Modular System and the devices connected to it must be within a separate test area. When the above-mentioned cables are used, the host PC can be located outside the test area.

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.

Supported dSPACE Modular Systems

Overview

You can use dSPACE modular systems with one of the following I/O boards for external ECU interfacing:

I/O Board	Refer to
DS2202 HIL I/O Board	How to Connect a dSPACE CAN Board to an ECU with CCP or to an ECU with XCP on CAN on page 71
DS2210 HIL I/O Board	How to Connect a dSPACE CAN Board to an ECU with CCP or to an ECU with XCP on CAN on page 71
DS2211 HIL I/O Board	How to Connect a dSPACE CAN Board to an ECU with CCP or to an ECU with XCP on CAN on page 71
DS4121 ECU Interface Board	▪ How to Connect a DS4121 to an ECU with POD on page 65 ▪ How to Connect a DS4121 to an ECU with DCI-GSI2 on page 67 ▪ How to Connect a DS4121 to an ECU with XCP on Ethernet (UDP/IP) on page 69
DS4302 CAN Interface Board	How to Connect a dSPACE CAN Board to an ECU with CCP or to an ECU with XCP on CAN on page 71
DS4501 IP Carrier Board	How to Connect a DS4501 or DS4505 to an ECU with XCP on FlexRay on page 72.
DS4505 Interface Board	How to Connect a DS4501 or DS4505 to an ECU with XCP on FlexRay on page 72.

Related topics

HowTos

How to Connect a DS4121 to an ECU with POD

Objective

You can connect a dSPACE modular system with DS4121 ECU Interface Board to two ECUs for external ECU interfacing. The DS4121 provides two independent communication channels. A custom-designed plug-on-device (POD) adapts the signals between the ECU and the dSPACE modular system.

Basics

The DS4121 allows communication between up to two ECUs and a dSPACE processor board. The POD adapts the ECU signals to the DS4121. Function

arguments are transmitted from the ECU to the dSPACE processor board, and the function results are returned to the ECU.

LVDS connection A POD can be connected to the DS4121 via a low-voltage differential signaling (LVDS) connection. The LVDS connection provides galvanic isolation of the LVDS signals, so the signals from the POD are ground-isolated from the dSPACE modular system.

Power supply Normally, a POD does not need an external power supply, but is connected to the vehicle power supply within the ECU. However, in some cases it may be necessary to connect an external power supply.

Restrictions

- You must use only the cables provided by dSPACE to connect dSPACE modular systems.
- The cable length between the POD and the DS4121 must not exceed 5 m using LVDS connection cable (twisted pair CAT5-STP copper cable).

  Using longer cables degrades signal quality and may lead to incorrect results. If you need a longer LVDS connection, inquire at dSPACE support.

Preconditions

- The dSPACE modular system must be switched off.
- You need the following items:
  - LVDS_CAB2 LVDS Link Cable, LVDS_CAB3 LVDS Link Cable, or LVDS_CAB15 LVDS Link Cable
  - (optional – according to whether an LVDS plug adapter is available) LVDS adapter cable
  - (optional – depending on the POD) Dedicated power supply cable

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a dSPACE Modular System on page 63.

Method

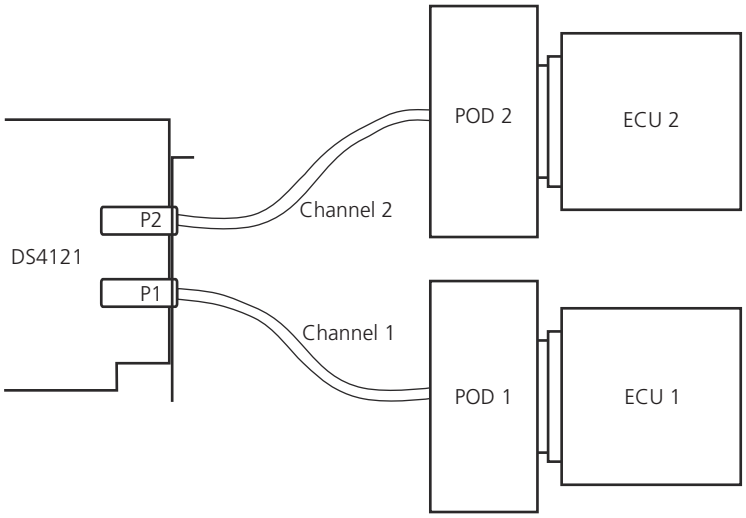
To connect the DS4121 to an ECU with POD

1. If your POD needs an external power supply, connect it to the power supply.
2. Connect the POD to a free LEMO interface connector of the DS4121 with the LVDS_CAB2 LVDS Link Cable, LVDS_CAB3 LVDS Link Cable, or LVDS_CAB15 LVDS Link Cable.

Result

You have connected a DS4121 to an ECU with POD.

The following illustration shows the resulting setup:



Next steps

You can connect the dSPACE modular system to the host PC. For instructions, refer to:

- DS1006 Hardware Installation and Configuration Guide
- DS1007 Hardware Installation and Configuration Guide

Related topics

References

How to Connect a DS4121 to an ECU with DCI-GSI2

Objective

You can connect a dSPACE modular system with a DS4121 ECU Interface Board to an ECU with DCI-GSI2 for external ECU interfacing. The DCI-GSI2 adapts the signals between the ECU and the dSPACE modular system.

Basics

The DS4121 provides two LVDS interfaces. You can establish a connection between an LVDS interface of the DS4121 and an ECU with DCI-GSI2 via an LVDS-Ethernet link cable.

Simultaneous calibration and ECU interfacing If you want to perform measurement, ECU calibration, and ECU interfacing in parallel, the host PC (used to access the ECU for ECU calibration and measurement) and the dSPACE real-time system (used to access the ECU for ECU interfacing) must be connected to the DCI-GSI2 via an Ethernet switch. Refer to Connecting an ECU with DCI-GSI2 for Simultaneous Calibration and ECU Interfacing on page 39.

Restrictions

You must use only the cables provided by dSPACE to connect dSPACE real-time hardware.

Preconditions

- The dSPACE modular system must be switched off.
- The DCI-GSI2 must be connected to the ECU. For instructions on connecting the DCI-GSI2 to the ECU, refer to How to Connect a DCI-GSI2 to an ECU on page 35.
- One of the following Ethernet connection cables:
  - ETH_CAB1 Ethernet Connection Cable
  - ETH_CAB2 Ethernet Connection Cable
  - ETH_CAB4 Ethernet Connection Cable
  - ETH_CAB5 Ethernet Connection Cable
- LVDS_CAB14 LVDS-Ethernet Link Cable
- PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation (optional – depends on the DCI-GSI2)

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a dSPACE Modular System on page 63.

Method

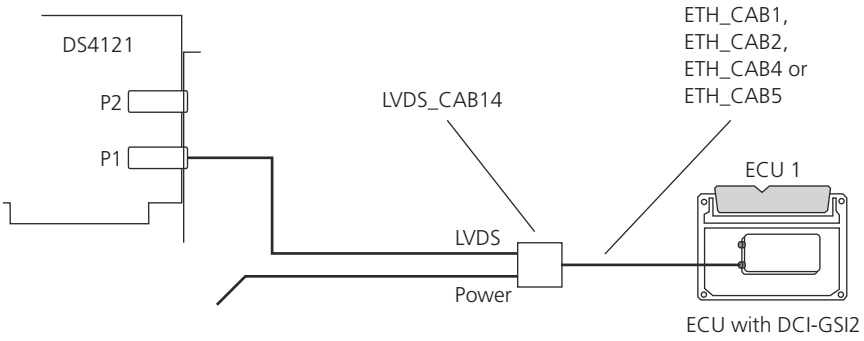
To connect the DS4121 to an ECU with DCI-GSI2

1. If your DCI-GSI2 needs an external power supply, connect it to the power supply using the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation.
2. Connect the Ethernet connector of the DCI-GSI2 to a free LEMO interface connector of the DS4121 using the LVDS_CAB14 LVDS-Ethernet Link Cable and one of the following cables:
   - ETH_CAB1 Ethernet Connection Cable
   - ETH_CAB2 Ethernet Connection Cable
   - ETH_CAB4 Ethernet Connection Cable
   - ETH_CAB5 Ethernet Connection Cable
3. Connect the power cable of the LVDS-Ethernet link cable to a 12 V power supply.

Result

You have connected a DS4121 to an ECU with DCI-GSI2.

The following illustration shows the resulting setup:



Next steps

- You can connect the dSPACE modular system to the host PC. For instructions, refer to:
  - DS1006 Hardware Installation and Configuration Guide 🕮
  - DS1007 Hardware Installation and Configuration Guide 🕮
- ControlDesk can access a dSPACE modular system only if the corresponding platform/device is configured correctly. Refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

Basics

Connecting an ECU with DCI-GSI2 for Simultaneous Calibration and ECU Interfacing..... 39

References

Connection Cables..... 150
DS4121 Data Sheet (PHS Bus System Hardware Reference 🕮)
ETH_CAB1 Ethernet Connection Cable..... 151
ETH_CAB2 Ethernet Connection Cable..... 152
ETH_CAB4 Ethernet Connection Cable..... 155
ETH_CAB5 Ethernet Connection Cable..... 156
LVDS_CAB14 LVDS-Ethernet Link Cable..... 165
PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation..... 168

How to Connect a DS4121 to an ECU with XCP on Ethernet (UDP/IP)

Objective

You can connect a dSPACE modular system with a DS4121 ECU Interface Board to ECUs with XCP on Ethernet [?] for external ECU interfacing via UDP/IP. Data is transferred between the ECU and the dSPACE modular system via UDP/IP.

Basics

The ECU requires an Ethernet connection with UDP/IP support to establish communication with the real-time system. The ECU and the DS4121 are connected via LVDS-Ethernet link cable, which transmits the required function arguments from the ECU to the DS4121 and returns the function result to the ECU. The DS4121 provides two LVDS interfaces for communication between ECUs and a dSPACE processor board.

Restrictions

- You must use only cables provided by dSPACE to connect dSPACE real-time hardware.
- In the instructions below, it is assumed that the ECU provides an RJ45 connector. If the ECU does not provide an RJ45 connector, contact dSPACE for more information on a matching cable.

Preconditions

- The dSPACE modular system must be switched off.
- You need the following items:
  - LVDS_CAB14 LVDS-Ethernet Link Cable
  - Standard Ethernet network cable

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a dSPACE Modular System on page 63.

Method

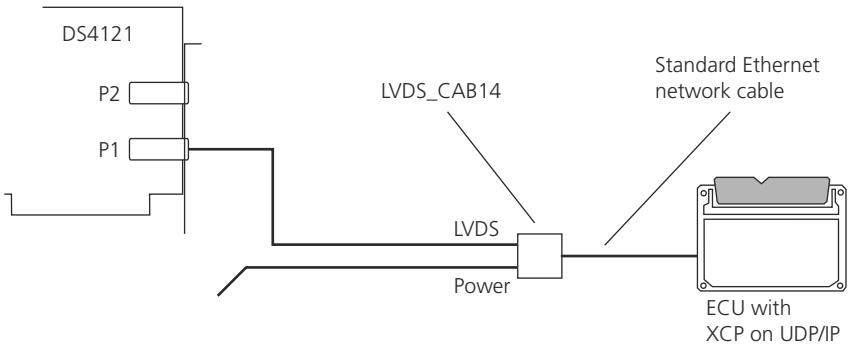
To connect the DS4121 to an ECU with XCP on Ethernet (UDP/IP)

1. Connect the Ethernet connector of the ECU with XCP on UDP/IP to a free LEMO interface connector of the DS4121 using the LVDS_CAB14 LVDS-Ethernet Link Cable and the standard Ethernet network cable.
2. Connect the power cable of the link cable to a 12 V power supply.

Result

You have connected a DS4121 to an ECU with XCP on Ethernet (UDP/IP).

The following illustration shows the resulting setup:



Next steps

- You can connect the dSPACE modular system to the host PC. For instructions, refer to:
  - DS1006 Hardware Installation and Configuration Guide 🕮
  - DS1007 Hardware Installation and Configuration Guide 🕮
- ControlDesk can access a dSPACE modular system only if the corresponding platform/device is configured correctly. Refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

References

Connection Cables 150
DS4121 Data Sheet (PHS Bus System Hardware Reference 🕮)
LVDS_CAB14 LVDS-Ethernet Link Cable 165

How to Connect a dSPACE CAN Board to an ECU with CCP or to an ECU with XCP on CAN

Objective

You can connect a dSPACE modular system with dSPACE CAN board (DS4302, DS2202, DS2210 or DS2211) to an ECU with implemented XCP service (e.g., the dSPACE XCP Service) or CCP service for external ECU interfacing. Data is transferred between the ECU and the dSPACE modular system via CAN bus.

Preconditions

- The dSPACE modular system must be switched off.
- You need CAN cables to connect the ECU to the CAN board.

Method

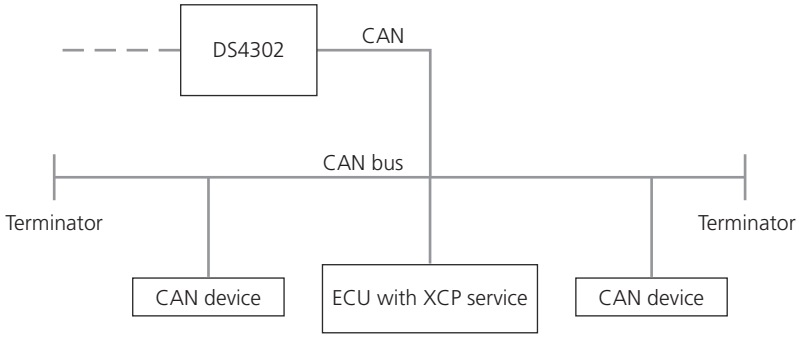
To connect the dSPACE CAN board to an ECU with CCP or to an ECU with XCP on CAN

1 Connect the CAN connector of the ECU to the interface connector of the CAN board or to a CAN bus that is connected to the interface connector of the CAN board.

Result

You have connected a dSPACE CAN board to an ECU with CCP or to an ECU with XCP on CAN.

The following illustration shows the resulting setup for a DS4302 board:



Next steps

- You can connect the dSPACE modular system to the host PC. For instructions, refer to:
  - DS1006 Hardware Installation and Configuration Guide 🕮
  - DS1007 Hardware Installation and Configuration Guide 🕮
- ControlDesk can access a dSPACE modular system only if the corresponding platform/device is configured correctly. Refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

References

DS2202 Data Sheet (PHS Bus System Hardware Reference 🕮)
DS2210 Data Sheet (PHS Bus System Hardware Reference 🕮)
DS2211 Data Sheet (PHS Bus System Hardware Reference 🕮)
DS4302 Data Sheet (as of DS4302-05) (PHS Bus System Hardware Reference 🕮)
DS4302 Data Sheet (up to DS4302-04) (PHS Bus System Hardware Reference 🕮)

How to Connect a DS4501 or DS4505 to an ECU with XCP on FlexRay

Objective

You can connect a dSPACE modular system with a DS4501 IP Carrier Board or DS4505 Interface Board equipped with FlexRay communication modules to an

ECU with XCP on FlexRay (for example, the dSPACE XCP Service) for external ECU interfacing. Data is transferred between the ECU and the dSPACE modular system via FlexRay bus.

Basics

The DS4501 and DS4505 provide up to four FlexRay communication modules.

Preconditions

- The DS4501 or DS4505 must be equipped with FlexRay communication modules. For information on the supported FlexRay modules, refer to Connecting Real-Time Systems to the FlexRay Bus (FlexRay Configuration Features).
- The dSPACE modular system must be switched off.
- You need FlexRay cables to connect the ECU to the DS4501 or DS4505.

Method

To connect the DS4501 or DS4505 with FlexRay communication modules to an ECU with XCP on FlexRay

1 Connect the FlexRay connectors of the ECU to the Module I/O connector of the DS4501 or the bus connector of the DS4505, or to a FlexRay bus that is connected to the interface connector of the DS4501 or DS4505.

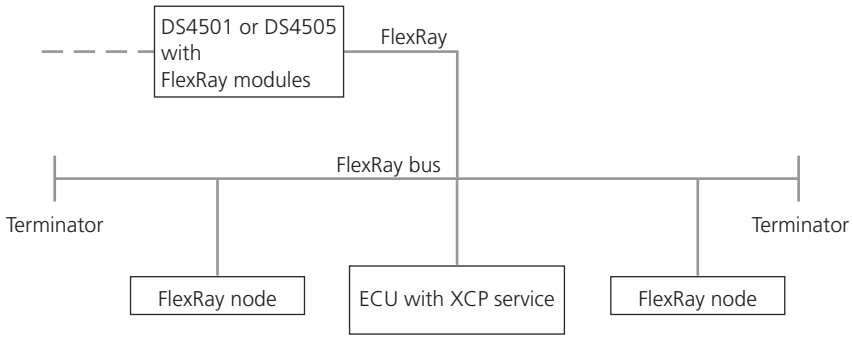
The mapping of I/O signals depends on the module type which is mounted on the DS4501 or DS4505. For information on the connector and the pinout, refer to the hardware-related information of the specific board:

- DS4501, see: DS4501 IP Carrier Board (PHS Bus System Hardware Reference)
- DS4505, see: Bus Connector (P3) (PHS Bus System Hardware Reference)

Result

You have connected a DS4501 or DS4505 with FlexRay modules to an ECU with XCP on FlexRay.

The following illustration shows the resulting setup:



Next steps

- You can connect the dSPACE modular system to the host PC. For instructions, refer to:
  - DS1006 Hardware Installation and Configuration Guide
  - DS1007 Hardware Installation and Configuration Guide
- ControlDesk can access a dSPACE modular system only if the corresponding platform/device is configured correctly. Refer to Basics of Handling Platforms (ControlDesk Platform Management).

Related topics

Basics

DS4501 IP Carrier Board (PHS Bus System Hardware Reference)

References

DS4505 Interface Board (PHS Bus System Hardware Reference)

How to Connect a DS1007 to an ECU with DCI-GSI2

Objective

You can connect a DS1007 PPC Processor Board to an ECU with DCI-GSI2 for external ECU interfacing. Data transfer between the ECU and the DS1007 PPC Processor Board is done via UDP/IP.

Restrictions

You must use only the cables provided by dSPACE to connect dSPACE ECU interfaces. The dSPACE cables have a wider temperature range, higher mechanical strength, and robust, self-latching, keyed connectors. If you use other cables or extend the cables, dSPACE ECU interfaces might not work.

Preconditions

- Before connecting dSPACE ECU interface hardware to the host PC, you must install ControlDesk.
- One of the following Ethernet connection cables:
  - ETH_CAB1 Ethernet Connection Cable
  - ETH_CAB2 Ethernet Connection Cable
  - ETH_CAB4 Ethernet Connection Cable
  - ETH_CAB5 Ethernet Connection Cable
- PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation (optional – depends on the DCI-GSI2)

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a DCI-GSI2 on page 24.

Method

To connect a DS1007 to an ECU with DCI-GSI2

1. If your DCI-GSI2 needs an external power supply, connect it to the power supply using the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation.
2. Connect the Ethernet connector of the DCI-GSI2 to an Ethernet I/O connector of the DS1007 PPC Processor Board.

   Use one of the following cables:

   - ETH_CAB1 Ethernet Connection Cable
   - ETH_CAB2 Ethernet Connection Cable
   - ETH_CAB4 Ethernet Connection Cable
   - ETH_CAB5 Ethernet Connection Cable

Result

You connected a DS1007 PPC Processor Board to the ECU with DCI-GSI2.

Next steps

- You can connect the DS1007 PPC Processor Board to the host PC. For instructions, refer to Basics on the Connection to the Host PC (DS1007 Hardware Installation and Configuration Guide 🕮).
- ControlDesk can access the DS1007 PPC Processor Board only if it is configured correctly. For instructions, refer to Basics on the DS1007 PPC Processor Board Platform (ControlDesk Platform Management 🕮).

Related topics

Basics

Connection Scenarios for External ECU Interfacing 59

References

ETH_CAB1 Ethernet Connection Cable 151
ETH_CAB2 Ethernet Connection Cable 152
ETH_CAB4 Ethernet Connection Cable 155
ETH_CAB5 Ethernet Connection Cable 156
PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation 168

How to Switch on a dSPACE Modular System

Objective

When switching on a modular system, you must proceed in the correct order.

Precondition

The connecting/disconnecting of devices to the dSPACE modular system is completed.

Method

To switch on a dSPACE modular system

1. Turn on the expansion box.
2. Turn on the host PC.

Result

The dSPACE modular system is running and you can work with it.

Related topics

HowTos

How to Switch off a dSPACE Modular System....76

How to Switch off a dSPACE Modular System

Objective

When switching off a modular system, you must proceed in the correct order.

Method

To switch off a dSPACE modular system

1. Turn off all external devices connected to the modular system.
2. Shut down the host PC and turn it off.

   Note

   Do not switch off a connected expansion box while the host PC is still running. This might lead to unpredictable errors.

3. Turn off the expansion box.

Result

The dSPACE modular system is switched off.

Related topics

HowTos

How to Switch on a dSPACE Modular System 76

Connecting a MicroAutoBox II

Introduction

To use a MicroAutoBox II for external ECU interfacing, you can connect it to the ECU in different ways.

Where to go from here

Information in this section

Warning About Using a MicroAutoBox II

Introduction

Note the following warning when using the MicroAutoBox II.

Danger potential

Connecting a MicroAutoBox II to an electronic control unit can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use the MicroAutoBox II, and who have been informed of the dangers and possible consequences, are permitted to use the MicroAutoBox II.

Before integrating the MicroAutoBox II and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

The MicroAutoBox II is designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to the MicroAutoBox II, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to the MicroAutoBox II, for example, when it is connected to an engine ECU which typically generates transient hazardous voltages for ignition, one of the following measures must be taken **to avoid the risk of serious injury or death due to electrical shock**:

- The MicroAutoBox II and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.
- dSPACE provides dedicated interface cables to ensure an electrically safe connection to the host PC for systems featuring voltages up to 300 V DC/AC_{RMS} , or 600 V_{peak}.
  - To connect the MicroAutoBox II to the host PC: ETH_CAB2
  The MicroAutoBox II and the devices connected to it must be within a separate test area. When the above-mentioned cable is used, the host PC can be located outside the test area.

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.

MicroAutoBox II Variants and Their Connection to the ECU

Overview

The following table shows the way you can connect the ECU depending on the MicroAutoBox II variant.

Connection via	MicroAutoBox II				
	1401/1507	1401/1511	1401/1513	1401/1511/1514	1401/1513/1514
POD	✓	✓	✓	✓	✓
DCI-GSI2[1)]	✓	✓	✓	✓	✓
UDP/IP[2)]	✓	✓	✓	✓	✓
CAN[3)]	✓	✓	✓	✓	✓
FlexRay[4)]	✓	–	–	✓	✓

1) Refer to How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 on page 82.
2) Refer to How to Connect a MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP) on page 85.
3) Refer to How to Connect a MicroAutoBox II to an ECU with CCP or to an ECU with XCP on CAN on page 88.
4) Refer to How to Connect a MicroAutoBox II to an ECU with XCP on FlexRay on page 89.

Related topics

HowTos

How to Connect a MicroAutoBox II to an ECU with POD

Objective

You can connect a MicroAutoBox II to an ECU for external ECU interfacing. A custom-designed plug-on-device (POD) adapts the signals between the ECU and the MicroAutoBox II.

Basics

MicroAutoBox II provides one or more channels for communicating with the ECU via an LVDS connection. The ECU and the MicroAutoBox II are connected via a POD, which transmits the required function arguments from the ECU to the MicroAutoBox II and returns the function result to the ECU.

LVDS connection A POD can be connected to the MicroAutoBox II via a low-voltage differential signaling (LVDS) connection. The LVDS connection provides galvanic isolation to avoid ground loops. The following table shows the connectors of the MicroAutoBox II variants for LVDS:

MicroAutoBox II Variant	Number of ECU Channels	Connector (LEMO)
MicroAutoBox II 1401/1507	3	ECU interface connector (ECU CH1 ... CH3)
MicroAutoBox II 1401/1511	2	ECU interface connector
MicroAutoBox II 1401/1511/1514	2	ECU interface connector
MicroAutoBox II 1401/1513	2	ECU interface connector
MicroAutoBox II 1401/1513/1514	2	ECU interface connector

Power supply Normally, a POD does not need an external power supply, but is connected to the vehicle power supply within the ECU. However, in some cases it may be necessary to connect an external power supply.

Restrictions

- You must use only cables provided by dSPACE to connect dSPACE real-time hardware.
- The cable length between the POD and the MicroAutoBox II must not exceed 5 m using LVDS connection cable (twisted pair CAT5-STP copper cable).

  Using longer cables degrades signal quality and may lead to incorrect results. If you need a longer LVDS connection, inquire at dSPACE support.

Preconditions

- The power of the MicroAutoBox II must be turned off.
- The POD must be connected to the ECU.
- You need the following items:
  - One of the following LVDS cables:
    - LVDS_CAB2 LVDS Link Cable
    - LVDS_CAB3 LVDS Link Cable
    - LVDS_CAB15 LVDS Link Cable
  - LVDS adapter cable (optional, according to whether an LVDS plug adapter is available)
  - Dedicated power supply cable (optional – depending on the POD)

Potential danger

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a MicroAutoBox II on page 78.

Method

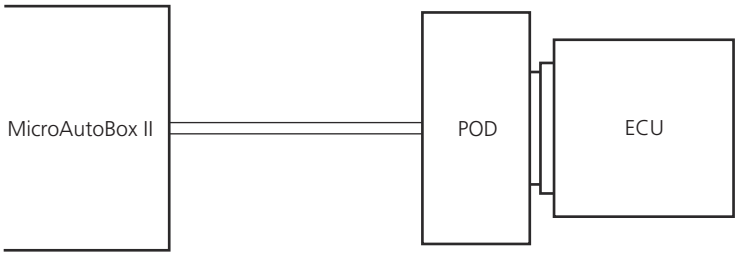
To connect the MicroAutoBox II to an ECU with POD

1. If your POD needs an external power supply, connect it to the power supply.
2. Use one of the following cables to connect the LVDS connector of the POD to the MicroAutoBox II:
   - LVDS_CAB2 LVDS Link Cable
   - LVDS_CAB3 LVDS Link Cable
   - LVDS_CAB15 LVDS Link Cable

Result

You have connected the MicroAutoBox II to an ECU with POD.

The following illustration shows the resulting setup:



For information on the locations of the connectors and the complete pinout, refer to the data sheet of the specific MicroAutoBox II. See MicroAutoBox II Hardware Reference 🕮.

Next steps

- You can connect the MicroAutoBox II to the host PC. For instructions, refer to Connecting the MicroAutoBox II to the Host PC via Ethernet (MicroAutoBox II Hardware Installation and Configuration Guide 🕮).
- To experiment with the MicroAutoBox II, use ControlDesk. For instructions, refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

References

Connection Cables 150
Data Sheet MicroAutoBox II 1401/1507 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1511 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1511/1514 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1513/1514 (MicroAutoBox II Hardware Reference 🕮)
LVDS_CAB15 LVDS Link Cable 166
LVDS_CAB2 LVDS Link Cable 164
LVDS_CAB3 LVDS Link Cable 165

How to Connect a MicroAutoBox II to an ECU with DCI-GSI2

Objective

To perform external ECU interfacing, you can connect the MicroAutoBox II to an ECU with DCI-GSI2. The DCI-GSI2 adapts the signals between the ECU and the MicroAutoBox II.

You have to establish an Ethernet connection between the MicroAutoBox II and the DCI-GSI2.

Basics

There are two ways to connect the MicroAutoBox II to an ECU with DCI-GSI2:

Using the MicroAutoBox II Ethernet connector At the front of the MicroAutoBox II, there is an Ethernet I/O connector.

Using the MicroAutoBox II LVDS connector The MicroAutoBox II provides one or more channels for communicating with the ECU via an LVDS connection. The following table shows the connectors of the MicroAutoBox II variants for LVDS:

MicroAutoBox II Variant	Number of ECU Channels	Connector (LEMO)
MicroAutoBox II 1401/1507	3	ECU interface connector (ECU CH1 ... CH3)
MicroAutoBox II 1401/1511	2	ECU interface connector
MicroAutoBox II 1401/1511/1514	2	ECU interface connector
MicroAutoBox II 1401/1513	2	ECU interface connector
MicroAutoBox II 1401/1513/1514	2	ECU interface connector

Restrictions

You must use only cables provided by dSPACE to connect dSPACE real-time hardware.

Preconditions

- The MicroAutoBox II must not be connected to the power supply.
- The DCI-GSI2 must be connected to the ECU. For instructions on connecting the DCI-GSI2 to the ECU, refer to How to Connect a DCI-GSI2 to an ECU on page 35.
- If you use the MicroAutoBox II Ethernet connector, you need the following items:
  - One of the following Ethernet connection cables:
    - ETH_CAB3 Ethernet Connection Cable
    - ETH_CAB6 Ethernet Connection Cable
    - ETH_CAB7 Ethernet Connection Cable
  - PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation (optional – depends on the DCI-GSI2)
- If you use the MicroAutoBox II LVDS connector, you need the following items:
  - LVDS_CAB14 LVDS-Ethernet Link Cable
  - One of the following Ethernet connection cables:
    - ETH_CAB1 Ethernet Connection Cable
    - ETH_CAB2 Ethernet Connection Cable
    - ETH_CAB4 Ethernet Connection Cable
    - ETH_CAB5 Ethernet Connection Cable
  - PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation (optional – depends on the DCI-GSI2)

Potential danger

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a MicroAutoBox II on page 78.

Possible methods

There are two ways to connect a MicroAutoBox II to an ECU with DCI-GSI2:

- Using the Ethernet connector. Refer to Method 1.
- Using the LVDS connector. Refer to Method 2.

Method 1

To connect the MicroAutoBox II to an ECU with DCI-GSI2 using the MicroAutoBox II Ethernet connector

1. If your DCI-GSI2 needs an external power supply, connect it to the power supply using the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation.
2. Connect the Ethernet connector of the DCI-GSI2 to the Ethernet connector of the MicroAutoBox II with one of the following cables:
   - ETH_CAB3 Ethernet Connection Cable
   - ETH_CAB6 Ethernet Connection Cable
   - ETH_CAB7 Ethernet Connection Cable

Method 2

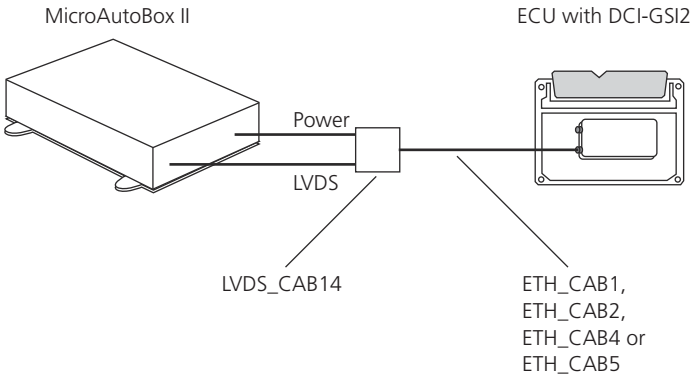
To connect the MicroAutoBox II to an ECU with DCI-GSI2 using the MicroAutoBox II LVDS connector

1. If your DCI-GSI2 needs an external power supply, connect it to the power supply using the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation.
2. To connect the LVDS connector of the MicroAutoBox II to the Ethernet connector of the DCI-GSI2, use the LVDS_CAB14 LVDS-Ethernet Link Cable and one of the following cables:
   - ETH_CAB1 Ethernet Connection Cable
   - ETH_CAB2 Ethernet Connection Cable
   - ETH_CAB4 Ethernet Connection Cable
   - ETH_CAB5 Ethernet Connection Cable
3. Connect the power cable of the LVDS-Ethernet link cable to the power supply provided by the MicroAutoBox II.

Result

You connected a MicroAutoBox II to an ECU with DCI-GSI2.

The following illustration shows the resulting setup if the MicroAutoBox II LVDS connector is used:



Next steps

- You can connect the MicroAutoBox II to the host PC. For instructions, refer to Connecting the MicroAutoBox II to the Host PC via Ethernet (MicroAutoBox II Hardware Installation and Configuration 🕮).
- To experiment with the MicroAutoBox II, use ControlDesk. For instructions, refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

Basics

Connecting an ECU with DCI-GSI2 for Simultaneous Calibration and ECU Interfacing..... 39

References

Data Sheet MicroAutoBox II 1401/1507 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1511 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1511/1514 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1513 (MicroAutoBox II Hardware Reference 🕮)
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ETH_CAB4 Ethernet Connection Cable..... 155
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ETH_CAB6 Ethernet Connection Cable..... 157
ETH_CAB7 Ethernet Connection Cable..... 158
LVDS_CAB14 LVDS-Ethernet Link Cable..... 165
PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation..... 168

How to Connect a MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP)

Objective

To perform external ECU interfacing, you can connect the MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP).

Basics

There are two ways to connect a MicroAutoBox II to an ECU with UDP/IP:

Using the MicroAutoBox II Ethernet connector At the front of the MicroAutoBox II, there is an Ethernet I/O connector.

Using the MicroAutoBox II LVDS connector The MicroAutoBox II provides one or more channels for communicating with the ECU via an LVDS connection. The following table shows the connectors of the MicroAutoBox II variants for LVDS:

MicroAutoBox II Variant	Number of ECU Channels	Connector (LEMO)
MicroAutoBox II 1401/1507	3	ECU interface connector (ECU CH1 ... CH3)
MicroAutoBox II 1401/1511	2	ECU interface connector
MicroAutoBox II 1401/1511/1514	2	ECU interface connector

MicroAutoBox II Variant	Number of ECU Channels	Connector (LEMO)
MicroAutoBox II 1401/1513	2	ECU interface connector
MicroAutoBox II 1401/1513/1514	2	ECU interface connector

Restrictions

- You must use only cables provided by dSPACE to connect dSPACE real-time hardware.
- In the instructions below, it is assumed that the ECU provides an RJ45 connector. If the ECU does not provide an RJ45 connector, contact dSPACE for more information on a matching cable.

Preconditions

- The MicroAutoBox II must not be connected to the power supply.
- If you use the MicroAutoBox II Ethernet connector, you need one of the following Ethernet connection cables:
  - ETH_CAB1 Ethernet Connection Cable
  - ETH_CAB2 Ethernet Connection Cable
  - ETH_CAB4 Ethernet Connection Cable
  - ETH_CAB5 Ethernet Connection Cable
- If you use the MicroAutoBox II LVDS connector, you need the following items:
  - LVDS_CAB14 LVDS-Ethernet Link Cable
  - Standard Ethernet network cable

Potential danger

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a MicroAutoBox II on page 78.

Possible methods

There are two ways to connect a MicroAutoBox II to an ECU with UDP/IP:

- Using the MicroAutoBox II Ethernet connector. Refer to Method 1.
- Using the MicroAutoBox II LVDS connector. Refer to Method 2.

Method 1

To connect a MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP) using the MicroAutoBox II Ethernet connector

1 Connect the Ethernet I/O connector of the MicroAutoBox II to the ECU via one of the following cables:
   - ETH_CAB1 Ethernet Connection Cable
   - ETH_CAB2 Ethernet Connection Cable
   - ETH_CAB4 Ethernet Connection Cable
   - ETH_CAB5 Ethernet Connection Cable

The MicroAutoBox II Embedded PC also provides two RJ45 Ethernet connectors on its front panel. You can use a standard Ethernet cable to connect an ECU.

Method 2

To connect a MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP) using the MicroAutoBox II LVDS connector

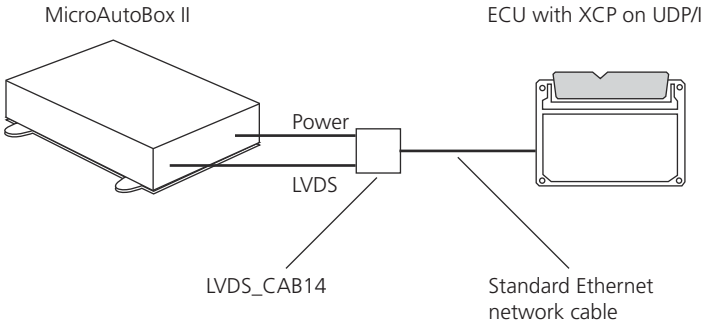
1. Connect the ECU interface connector of the MicroAutoBox II to the Ethernet connector of the ECU via the LVDS_CAB14 LVDS-Ethernet Link Cable and a standard Ethernet network cable.
2. Connect the power cable of the LVDS-Ethernet link cable to the power supply provided by the MicroAutoBox II.

   For information on the locations of the connectors and their complete pinout, refer to the data sheet of the specific MicroAutoBox II. Refer to MicroAutoBox II Hardware Reference 🕮.

Result

You connected the MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP).

The following illustration shows the resulting setup if the MicroAutoBox II LVDS connector is used:



Next steps

- You can connect the MicroAutoBox II to the host PC. For instructions, refer to Connecting the MicroAutoBox II to the Host PC via Ethernet (MicroAutoBox II Hardware Installation and Configuration Guide 🕮).
- To experiment with the MicroAutoBox II, use ControlDesk. For instructions, refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

References

Data Sheet MicroAutoBox II 1401/1507 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1511 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1511/1514 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1513 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1513/1514 (MicroAutoBox II Hardware Reference 🕮)
LVDS_CAB14 LVDS-Ethernet Link Cable..... 165

How to Connect a MicroAutoBox II to an ECU with CCP or to an ECU with XCP on CAN

Objective

To perform external ECU interfacing, you can connect a MicroAutoBox II to an ECU with CCP or to an ECU with XCP on CAN.

Preconditions

- The power of the MicroAutoBox II must be turned off.
- You need the following items:
  - CAN cables to connect the ECU to the MicroAutoBox II.

Method

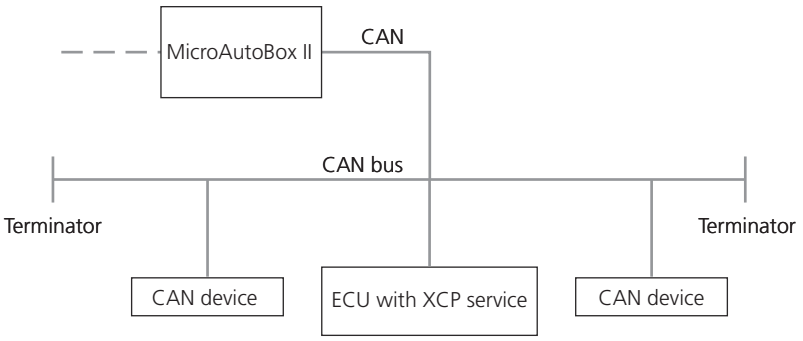
To connect the MicroAutoBox II to an ECU with CCP or to an ECU with XCP on CAN

1 Connect the CAN connector of the ECU to a free CAN connector of the MicroAutoBox II or to a CAN bus that is connected to the MicroAutoBox II.

Result

You have connected the MicroAutoBox II to an ECU with CCP or to an ECU with XCP on CAN.

The following illustration shows the resulting setup:



Next steps

- You can connect the MicroAutoBox II to the host PC. For instructions, refer to Connecting the MicroAutoBox II to the Host PC via Ethernet (MicroAutoBox II Hardware Installation and Configuration Guide 🕮).
- To experiment with the MicroAutoBox II, use ControlDesk. For instructions, refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

References

Data Sheet MicroAutoBox II 1401/1507 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1511 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1511/1514 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1513 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1513/1514 (MicroAutoBox II Hardware Reference 🕮)

How to Connect a MicroAutoBox II to an ECU with XCP on FlexRay

Objective

You can connect a MicroAutoBox II equipped with FlexRay modules to an ECU with XCP on FlexRay for external ECU interfacing. Data transfer between the ECU and the MicroAutoBox II is via FlexRay bus.

Preconditions

- The MicroAutoBox II must be equipped with FlexRay modules. For information on the supported FlexRay modules, refer to Supported FlexRay IP Modules (MicroAutoBox II Hardware Installation and Configuration Guide 🕮).
- The power of the MicroAutoBox II must be turned off.
- You need the following items:
  - FlexRay cables to connect the ECU to the MicroAutoBox II

Method

To connect the MicroAutoBox II to an ECU with XCP on FlexRay

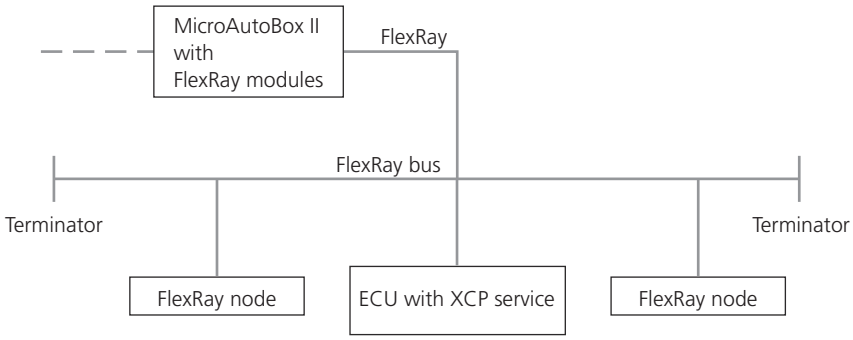
1 Connect the FlexRay connectors of the ECU to the Sub-D I/O connector of the MicroAutoBox II or to a FlexRay bus that is connected to the MicroAutoBox II.

For information on the connector and the pinout, refer to the data sheet of the specific MicroAutoBox II.

Result

You have connected the MicroAutoBox II to an ECU with XCP on FlexRay.

The following illustration shows the resulting setup:



Next steps

- You can connect the MicroAutoBox II to the host PC. For instructions, refer to Connecting the MicroAutoBox II to the Host PC via Ethernet (MicroAutoBox II Hardware Installation and Configuration Guide 🕮).
- To experiment with the MicroAutoBox II, use ControlDesk. For instructions, refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

References

Data Sheet DS4340 FlexRay Interface Module (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1511/1514 (MicroAutoBox II Hardware Reference 🕮)
Data Sheet MicroAutoBox II 1401/1513/1514 (MicroAutoBox II Hardware Reference 🕮)

Connecting a MicroAutoBox III

Introduction

To use a MicroAutoBox III for external ECU interfacing, you can connect it to the ECU in different ways.

Where to go from here

Information in this section

Warning About Using a MicroAutoBox III

Introduction	Note the following warning when using a MicroAutoBox III.
Potential danger	*Connecting a MicroAutoBox III to an electronic control unit can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use the MicroAutoBox III, and who have been informed of the dangers and possible consequences, are permitted to use the MicroAutoBox III.*

Before integrating a MicroAutoBox III and starting operation, carefully read the warnings in this document.

⚠ WARNING

Risk of serious injury or death due to electrical shock

The MicroAutoBox III is designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. Hazardous voltages constitute a risk of serious injury or even death.

Make sure that your system provides appropriate safety mechanisms so that no hazardous voltages are applied to the MicroAutoBox III, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to the MicroAutoBox III, for example, when the MicroAutoBox III is connected to an engine ECU, which typically generates transient hazardous voltages for ignition, one of the following measures must be taken **to avoid the risk of serious injury or death due to electrical shock**:

- The MicroAutoBox III and all devices connected to it must be in a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.
- dSPACE provides dedicated interface cables to ensure an electrically safe connection to the host PC for systems working with voltages up to 300 V DC/AC_{RMS} , or 600 V_{peak}.
  - To connect the MicroAutoBox III to the host PC: ETH_CAB2

  The MicroAutoBox III and the devices connected to it must be in a separate test area. When you use the above-mentioned cable, the host PC can be located outside the test area.

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.

MicroAutoBox III Boards and Modules and Their Connection to the ECU

Overview

The following table shows the way you can connect the ECU depending on the MicroAutoBox III board/module.

Connection via	MicroAutoBox III Board/Module			
	DS1403	DS1511	DS1513	DS1514 + DS4342
DCI-GSI2[1)]	✓	–	–	–
UDP/IP[2)]	✓	–	–	–
CAN[3)]	–	✓	✓	✓

1) Refer to How to Connect a MicroAutoBox III to an ECU with DCI-GSI2 on page 93.
2) Refer to How to Connect a MicroAutoBox III to an ECU with XCP on Ethernet (UDP/IP) on page 95.
3) Refer to How to Connect a MicroAutoBox III to an ECU with XCP on CAN on page 96.

Related topics

HowTos

How to Connect a MicroAutoBox III to an ECU with DCI-GSI2

Objective

To perform external ECU interfacing, you can connect the MicroAutoBox III to an ECU with DCI-GSI2. The DCI-GSI2 adapts the signals between the ECU and the MicroAutoBox III.

You have to establish an Ethernet connection between the MicroAutoBox III and the DCI-GSI2.

Restrictions

You must use only cables provided by dSPACE to connect dSPACE real-time hardware.

Preconditions

- The MicroAutoBox III must not be connected to the power supply.
- The DCI-GSI2 must be connected to the ECU. For instructions on connecting the DCI-GSI2 to the ECU, refer to How to Connect a DCI-GSI2 to an ECU on page 35.
- One of the following Ethernet connection cables:
  - ETH_CAB3 Ethernet Connection Cable
  - ETH_CAB6 Ethernet Connection Cable
  - ETH_CAB7 Ethernet Connection Cable
- PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation (optional – depends on the DCI-GSI2)

Potential danger

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a MicroAutoBox III on page 91.

Method

To connect the MicroAutoBox III to an ECU with DCI-GSI2

1. If your DCI-GSI2 needs an external power supply, connect it to the power supply using the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation.
2. Connect the Ethernet connector of the DCI-GSI2 to the Ethernet connector of the MicroAutoBox III with one of the following cables:
   - ETH_CAB3 Ethernet Connection Cable
   - ETH_CAB6 Ethernet Connection Cable
   - ETH_CAB7 Ethernet Connection Cable

Result

You connected the MicroAutoBox III to an ECU with DCI-GSI2.

Next steps

- You can connect the MicroAutoBox III to the host PC. For instructions, refer to Connecting a MicroAutoBox III to the Host PC (MicroAutoBox III Hardware Installation and Configuration 🕮).
- To experiment with the MicroAutoBox III, use ControlDesk. For instructions, refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

Basics

Connecting an ECU with DCI-GSI2 for Simultaneous Calibration and ECU Interfacing..... 39

References

ETH_CAB3 Ethernet Connection Cable..... 154
ETH_CAB6 Ethernet Connection Cable..... 157
ETH_CAB7 Ethernet Connection Cable..... 158
Ethernet Characteristics (MicroAutoBox III Hardware Installation and Configuration 🕮)
PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation..... 168

How to Connect a MicroAutoBox III to an ECU with XCP on Ethernet (UDP/IP)

Objective

To perform external ECU interfacing, you can connect the MicroAutoBox III to an ECU with XCP on Ethernet (UDP/IP).

Restrictions

- You must use only cables provided by dSPACE to connect dSPACE real-time hardware.
- In the instructions below, it is assumed that the ECU provides an RJ45 connector. If the ECU does not provide an RJ45 connector, contact dSPACE for more information on a matching cable.

Preconditions

- The MicroAutoBox III must not be connected to the power supply.
- You need one of the following Ethernet connection cables:
  - ETH_CAB1 Ethernet Connection Cable
  - ETH_CAB2 Ethernet Connection Cable
  - ETH_CAB4 Ethernet Connection Cable
  - ETH_CAB5 Ethernet Connection Cable

Potential danger

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a MicroAutoBox III on page 91.

Method

To connect the MicroAutoBox III to an ECU with XCP on Ethernet (UDP/IP)

1 Connect an Ethernet I/O connector of the MicroAutoBox III to the ECU with one of the following cables:
   - ETH_CAB1 Ethernet Connection Cable
   - ETH_CAB2 Ethernet Connection Cable
   - ETH_CAB4 Ethernet Connection Cable
   - ETH_CAB5 Ethernet Connection Cable

Result

You connected the MicroAutoBox III to an ECU with XCP on Ethernet (UDP/IP).

Next steps

- You can connect the MicroAutoBox III to the host PC. For instructions, refer to Connecting a MicroAutoBox III to the Host PC (MicroAutoBox III Hardware Installation and Configuration 🕮).
- To experiment with the MicroAutoBox III, use ControlDesk. For instructions, refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

References

Ethernet Characteristics (MicroAutoBox III Hardware Installation and Configuration 🕮)

How to Connect a MicroAutoBox III to an ECU with XCP on CAN

Objective

You can connect the MicroAutoBox III to an ECU with XCP on CAN, for example, the dSPACE XCP Service, for external ECU interfacing. Data transfer between the ECU and the MicroAutoBox III is performed on a CAN bus.

Preconditions

- The MicroAutoBox III must not be connected to the power supply.
- You need the following items:
  - CAN cables to connect the ECU to the MicroAutoBox III.

Method

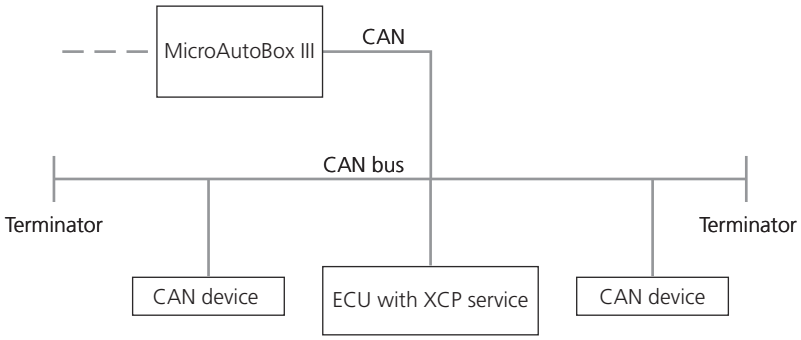
To connect the MicroAutoBox III to an ECU with XCP on CAN

1 Connect the CAN connector of the ECU to the MicroAutoBox III or to a CAN bus that is connected to the MicroAutoBox III.

Result

You connected the MicroAutoBox III to an ECU with XCP on CAN.

The following illustration shows the resulting setup:



Next steps

- You can connect the MicroAutoBox III to the host PC. For instructions, refer to Connecting a MicroAutoBox III to the Host PC (MicroAutoBox III Hardware Installation and Configuration 🕮).
- To experiment with the MicroAutoBox III, use ControlDesk. For instructions, refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

Related topics

References

DS1511 Multi-I/O Board Data Sheet (MicroAutoBox III Hardware Installation and Configuration 🕮)
DS1513 Multi-I/O Board Data Sheet (MicroAutoBox III Hardware Installation and Configuration 🕮)
DS4342 CAN FD Interface Module Data Sheet (MicroAutoBox III Hardware Installation and Configuration 🕮)

Connecting a SCALEXIO System

Introduction

You can connect a SCALEXIO system to an ECU for ECU interfacing purposes.

Where to go from here

Information in this section

How to Connect a SCALEXIO System to an ECU with XCP on Ethernet (UDP/IP)..... 102
For external ECU interfacing, you can connect a SCALEXIO system to an ECU with XCP on Ethernet (UDP/IP).

How to Connect a SCALEXIO System to an ECU with XCP on CAN..... 103
For external ECU interfacing, you can connect a SCALEXIO system to an ECU with XCP on CAN.

Safety Precautions for Working with a SCALEXIO System

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.
- It is recommended not to use a battery simulation power supply unit exceeding a maximum output current of 80 A. Output currents greater than 80 A can cause unsafe operating conditions or damage the SCALEXIO hardware. Contact dSPACE if you want to use a battery simulation power supply unit providing output currents greater than 80 A.
- 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 opening the enclosure, switch the power supplies of the host PC and the SCALEXIO system off and unplug the power cord(s). Wait at least five minutes to allow all components to discharge. Some of the components, for example, power supply capacitors, can carry residual voltage.
- The On/Off switch or button at the front of the SCALEXIO system does not disconnect the system from the power source. For complete disconnection, unplug all the power cords from the sockets.
- 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 electrical error simulation or 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 your hardware 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.

Performing SCALEXIO relay maintenance

Ensure that no supply voltage might damage connected ECUs or sensitive loads during SCALEXIO relay maintenance of a SCALEXIO rack:

- You must switch off or disconnect all external power supply voltages from the SCALEXIO system.
- You must disconnect all ECUs and sensitive loads from the SCALEXIO system if you use a system without a SCALEXIO battery simulation controller.

- In a SCALEXIO system with a SCALEXIO battery simulation controller, such as the DS2907 Battery Simulation Controller or the onboard controller of the DS2680 I/O Unit, the power supply voltages are switched off automatically when relay cleaning is being performed. However, if you do not disconnect all ECUs and sensitive loads from the SCALEXIO system, you perform SCALEXIO relay maintenance at your own risk.

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.

Related topics

Basics

Safety Precautions for Connecting a SCALEXIO System (SCALEXIO Hardware Installation and Configuration 🕮)
Safety Precautions for Simulating Electrical Errors with a SCALEXIO System (SCALEXIO Hardware Installation and Configuration 🕮)
Safety Precautions for Using Inductive Loads (SCALEXIO Hardware Installation and Configuration 🕮)

How to Connect a SCALEXIO System to an ECU with DCI-GSI2

Objective

You can connect a SCALEXIO system to an ECU with DCI-GSI2 for external ECU interfacing. Data transfer between the ECU and the SCALEXIO system is done via UDP/IP.

Restrictions

You must use only the cables provided by dSPACE to connect dSPACE ECU interfaces. The dSPACE cables have a wider temperature range, higher mechanical strength, and robust, self-latching, keyed connectors. If you use other cables or extend the cables, dSPACE ECU interfaces might not work.

Preconditions

- Before connecting dSPACE ECU interface hardware to the host PC, you must install ControlDesk.

- One of the following Ethernet connection cables:
  - ETH_CAB1 Ethernet Connection Cable
  - ETH_CAB2 Ethernet Connection Cable
  - ETH_CAB4 Ethernet Connection Cable
  - ETH_CAB5 Ethernet Connection Cable
- PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation (optional – depends on the DCI-GSI2)

Danger potential

⚠ WARNING

Risk of electrical shock and/or damage to the hardware. Refer to Warning About Using a DCI-GSI2 on page 24.

Method

To connect a SCALEXIO system to an ECU with DCI-GSI2

1. If your DCI-GSI2 needs an external power supply, connect it to the power supply using the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation.
2. Connect the Ethernet connector of the DCI-GSI2 to one of the following Ethernet interfaces of your SCALEXIO system:
   - An unused Ethernet connector of your SCALEXIO system
   - DS633x (if available in your SCALEXIO system)

   Use one of the following cables:
   - ETH_CAB1 Ethernet Connection Cable
   - ETH_CAB2 Ethernet Connection Cable
   - ETH_CAB4 Ethernet Connection Cable
   - ETH_CAB5 Ethernet Connection Cable

Result

You connected a SCALEXIO system to an ECU with DCI-GSI2.

Next steps

- You can connect the SCALEXIO system to the host PC. For instructions, refer to Connecting a SCALEXIO System to a Host PC (SCALEXIO – Hardware and Software Overview 🕮).
- ControlDesk can access the SCALEXIO system only if it is configured correctly. For instructions, refer to SCALEXIO Platform Configuration (ControlDesk Platform Management 🕮).

Related topics

Basics

References

How to Connect a SCALEXIO System to an ECU with XCP on Ethernet (UDP/IP)

Objective

You can connect a SCALEXIO system to an ECU with XCP on Ethernet (UDP/IP) for external ECU interfacing. Data transfer between the ECU and the SCALEXIO system is done via UDP/IP.

Preconditions

In the instructions below, it is assumed that the ECU provides an RJ45 connector. If the ECU does not provide an RJ45 connector, contact dSPACE for more information on a matching cable.

Method

To connect a SCALEXIO system to an ECU with XCP on Ethernet (UDP/IP)

1. Connect the Ethernet (RJ45) connector of the ECU with XCP on Ethernet to one of the following Ethernet interfaces of your SCALEXIO system:
   - An unused Ethernet connector of your SCALEXIO system
   - DS633x (if available in your SCALEXIO system)

   You can use a standard Ethernet cable.

Result

You have connected a SCALEXIO system to an ECU with XCP on Ethernet (UDP/IP).

Next steps

- You can connect the SCALEXIO system to the host PC. For instructions, refer to Connecting a SCALEXIO System to a Host PC (SCALEXIO – Hardware and Software Overview 🕮).
- ControlDesk can access the SCALEXIO system only if it is configured correctly. For instructions, refer to SCALEXIO Platform Configuration (ControlDesk Platform Management 🕮).

Related topics

Basics

Connection Scenarios for External ECU Interfacing 59

How to Connect a SCALEXIO System to an ECU with XCP on CAN

Objective

You can connect a SCALEXIO system to an ECU with XCP on CAN (for example, the dSPACE XCP Service) for external ECU interfacing. Data transfer between the ECU and the SCALEXIO system is via CAN bus.

Preconditions

- The power of the SCALEXIO system must be turned off.
- You need the following items:
  - CAN cables to connect the ECU to the SCALEXIO system.

Method

To connect the SCALEXIO system to an ECU with XCP on CAN

1 Connect the CAN connector of the ECU to a free CAN connector of the SCALEXIO system or to a CAN bus that is connected to the SCALEXIO system.

Result

You have connected the SCALEXIO system to an ECU with XCP on CAN.

Next steps

- You can connect the SCALEXIO system to the host PC. For instructions, refer to Connecting a SCALEXIO System to a Host PC (SCALEXIO – Hardware and Software Overview).
- ControlDesk can access the SCALEXIO system only if it is configured correctly. For instructions, refer to SCALEXIO Platform Configuration (ControlDesk Platform Management).

Connecting PC-Based Interfaces for Bus Monitoring

Introduction

dSPACE provides PC-based interfaces that allow you to perform bus monitoring.

Where to go from here

Information in this section

Warning About Using a DCI-CAN2

Introduction

Note the following warning when using a DCI-CAN2.

Danger potential

Connecting a DCI-CAN2 to a CAN bus can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use a DCI-CAN2, and who have been informed of the dangers and possible consequences, are permitted to use the DCI-CAN2.

Before integrating the DCI-CAN2 and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

The DCI-CAN2 is designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to the DCI-CAN2, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to a DCI-CAN2, the DCI-CAN2 and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.

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.

Warning About Using a DCI-CAN/LIN1

Introduction

Note the following warning when using a DCI-CAN/LIN1.

Danger potential

Connecting a DCI-CAN/LIN1 to a CAN and/or LIN bus can affect system behavior. This can lead to unexpected or critical situations, or even constitute a risk of death. Therefore, only persons who are qualified to use a DCI-CAN/LIN1, and who have been informed of the dangers and possible consequences, are permitted to use the DCI-CAN/LIN1.

Before integrating the DCI-CAN/LIN1 and starting operation, read the warnings in this document carefully.

⚠ WARNING

Risk of serious injury or death due to electrical shock

The DCI-CAN/LIN1 is designed to be connected to devices that do not transmit hazardous voltages. According to the EN 61010 standard, a voltage higher than 33 V_{RMS}/ 46.7 V_{PEAK} AC and 70 V DC is classified as hazardous. It constitutes a risk of serious injury or even death.

Make sure that your system provides safety provisions so that no hazardous voltages are applied to the DCI-CAN/LIN1, even in the event of electrical faults.

If there is a risk of hazardous voltages being applied to a DCI-CAN/LIN1, the DCI-CAN/LIN1 and all devices connected to it must be within a separate test area according to the locally valid safety standards for the installation and operation of electrical test equipment.

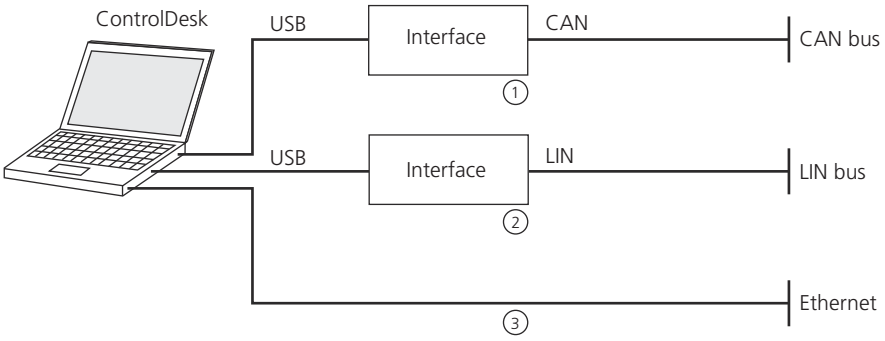
Liability

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.

Basics on Connecting PC-Based Interfaces for Bus Monitoring

Possible connection scenarios

The following illustration shows possible connection scenarios for bus monitoring using PC-based interfaces:



[1](CAN bus connection) DCI-CAN2 or DCI-CAN/LIN1
For an overview of supported PC-based CAN interfaces, refer to Supported CAN Interfaces (ControlDesk Platform Management 🕮).
[2](LIN bus connection) DCI-CAN/LIN1
For an overview of supported PC-based LIN interfaces, refer to Supported LIN Interfaces (ControlDesk Platform Management 🕮).
[3](Ethernet connection)
For an overview of supported PC-based Ethernet interfaces, refer to Supported Ethernet Interfaces (ControlDesk Platform Management 🕮).

Device configuration in ControlDesk

ControlDesk can access a communication bus only if the relevant bus monitoring device is configured correctly. For instructions, refer to Bus Device Configuration (ControlDesk Platform Management 🕮).

Related topics

Basics

Bus Device Configuration (ControlDesk Platform Management 🕮)
Dependencies Regarding Monitoring, Logging, and Filtering Bus Communication (ControlDesk Bus Navigator 🕮)
Supported CAN Interfaces (ControlDesk Platform Management 🕮)
Supported Ethernet Interfaces (ControlDesk Platform Management 🕮)
Supported LIN Interfaces (ControlDesk Platform Management 🕮)

How to Connect the DCI-CAN2 or DCI-CAN/LIN1

Objective

Connection to CAN To connect your host PC to CAN via USB:

- The DCI-CAN2 can be used to connect one CAN bus.
- The DCI-CAN/LIN1 can be used to connect up to two CAN buses.

Connection to LIN To connect your host PC to LIN via USB:

- The DCI-CAN/LIN1 can be used to connect up to two LIN buses.

Basics

The DCI-CAN2 and the DCI-CAN/LIN1 are internally optoisolated to avoid ground loops.

Restrictions

- Do not extend the USB cable of the DCI-CAN2 or DCI-CAN/LIN1.
- The CAN connectors of the DCI-CAN2 and DCI-CAN/LIN1 are not terminated, so you must provide the correct CAN bus termination yourself.

Preconditions

- Before connecting dSPACE ECU interface hardware to the host PC, you must install ControlDesk.
- The host PC must be switched on to allow the initialization of the USB driver software.

Danger potential

⚠ WARNING

Risk of electric shock and/or damage to the hardware.
Refer to:
- Warning About Using a DCI-CAN2 on page 104
- Warning About Using a DCI-CAN/LIN1 on page 105

Method

To connect the DCI-CAN2 or DCI-CAN/LIN1

1 Connect the USB connector of the DCI-CAN2, or DCI-CAN/LIN1 to a free USB port of your host PC.

Windows initializes the appropriate driver software for that particular USB port.

2 Connect CAN devices to the DCI-CAN2 or DCI-CAN/LIN1. Connect LIN devices to the DCI-CAN/LIN1.

Interface Module	Connector Pinout
DCI-CAN2	Refer to Connector Pinout on page 142
DCI-CAN/LIN1	Refer to Connector Pinout on page 146

Tip

The pinout is also printed on the housing of the DCI-CAN2 and DCI-CAN/LIN1.

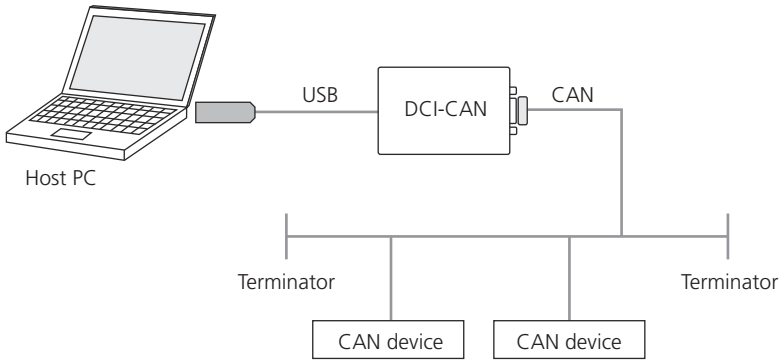
3 Check the status LED(s) of the interface module.

Interface Module	Status LED
DCI-CAN2	Status LED of the DCI-CAN2 on page 142
DCI-CAN/LIN1	Status LEDs of the DCI-CAN/LIN1 on page 147

Result

You have connected the DCI-CAN2 or DCI-CAN/LIN1 to the host PC.

The following illustration shows the resulting setup when the DCI-CAN2 is used:



Next steps

You can now connect the following hardware:

- ECU with CCP or XCP on CAN (refer to How to Connect an ECU with CCP or an ECU with XCP on CAN to the Host PC on page 45)
- Any CAN bus

Related topics

References

Setting up the Ethernet Connection Between a DCI-GSI2 and the Host PC

Introduction

You must connect a DCI-GSI2 to the host PC via Ethernet.

Where to go from here

Information in this section

Overview of Setting up the Ethernet Connection Between a DCI-GSI2 and the Host PC

Overview of Setting up the Ethernet Connection Between a DCI-GSI2 and the Host PC

Ways to connect a DCI-GSI2 to the host PC

The connection between the host PC and the DCI-GSI2 is based on the Ethernet TCP/IP and UDP/IP protocols.

There are two ways to connect a DCI-GSI2 to the host PC:

- *Peer-to-peer connection (P2P)*

  The DCI-GSI2 is connected to an Ethernet network interface card of the host PC. Neither the DCI-GSI2 nor the Ethernet network interface card is connected to any other network.

  Refer to Setting up a Peer-to-Peer Connection on page 116.
- *Integration in an existing network*

  The DCI-GSI2 becomes part of an existing network, for example, a local area network.

  Refer to Integrating a DCI-GSI2 into a Network on page 118.

Tip

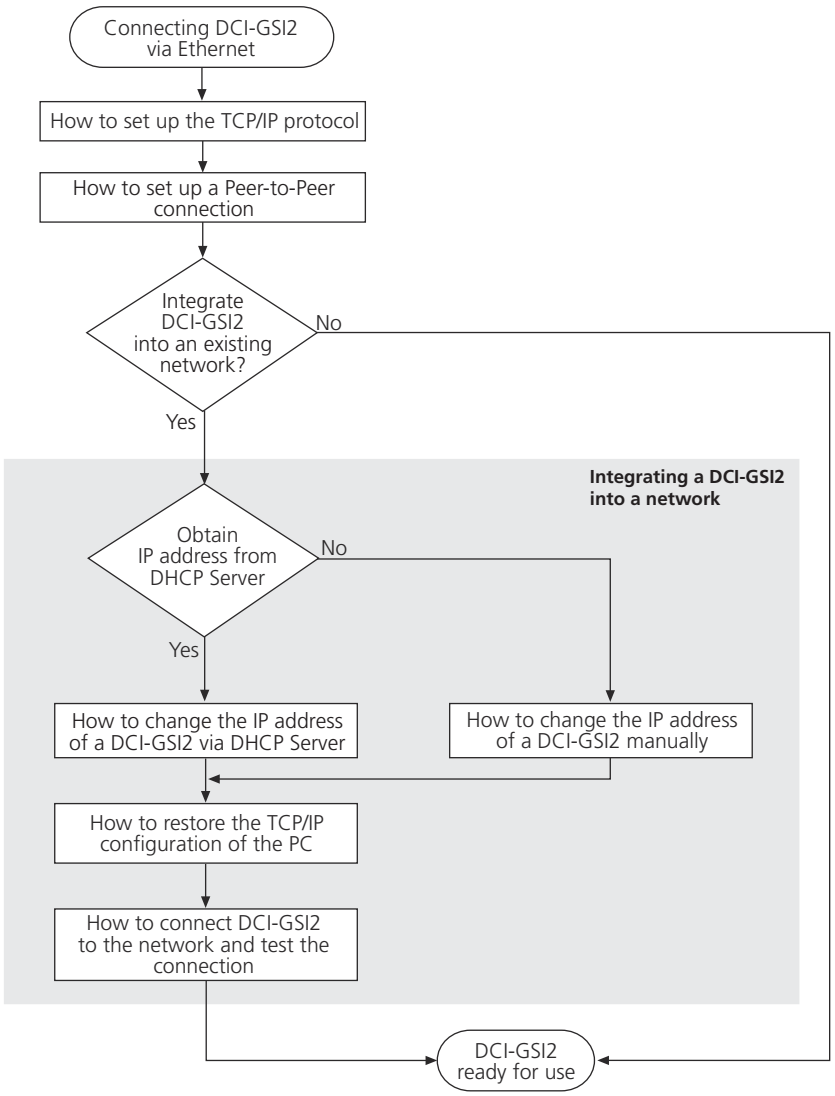
If you connect the DCI-GSI2 to a dSPACE real-time system, for example, to a MicroAutoBox III, you do not have to set up the Ethernet connection between the DCI-GSI2 and the host PC to which the dSPACE real-time system is connected.
In this case, you do not have to change the default IP address of the DCI-GSI2.

Tip

The DCI-GSI2 is equipped with an *Ethernet* LED that indicates the status of the Ethernet connection. Refer to Status LEDs on page 134.

Setup procedure

To connect the DCI-GSI2 via Ethernet, follow the instructions given in the flow chart below. The boxes in the flow chart refer to the following sections and topics.



Related topics

Basics

Integrating a DCI-GSI2 into a Network 118
Status LEDs 134

HowTos

Setting up a Peer-to-Peer Connection 116

Preparing the TCP/IP Configuration of the Host PC's Network Adapter

How to Set up the TCP/IP Protocol of the Host PC Network Adapter

Objective

Before you can connect the DCI-GSI2 to the host PC via Ethernet, you have to set up the TCP/IP protocol of the network adapter of your host PC.

Precondition

Note

Setting up the TCP/IP configuration requires administrator rights.

Previous TCP/IP configuration

During this procedure, write down the previous TCP/IP configuration for later restoration.

Method

To set up the TCP/IP protocol of the host PC network adapter

1. Click the Windows Start button and select Settings – Network & Internet – Network and Sharing Center.
   The Network and Sharing Center dialog opens.
2. In View your active networks, select Ethernet.
   The Ethernet Status dialog opens.
3. In the Ethernet Status dialog, click Properties.
   The Ethernet Properties dialog opens.
4. Select Internet Protocol Version 4 (TCP/IPv4), and click Properties.
   The Internet Protocol 4 (TCP/IPv4) Properties dialog opens.
5. From the Internet Protocol 4 (TCP/IPv4) Properties dialog, write down all the configured values and options so that you can restore them later.
6. In the Internet Protocol 4 (TCP/IPv4) Properties dialog, select Use the following IP address.
   In the IP address edit field, enter a value in the range:
   - **`192.168.140.3`** ... **`192.168.140.9`**, or
   - **`192.168.140.11`** ... **`192.168.140.254`**

Note

dSPACE hardware uses the following default IP addresses. Do not use them to configure the network adapter of your host PC.

dSPACE Hardware	Default IP Address
DCI-GSI2	`192.168.140.2`
MicroAutoBox II	`192.168.140.1`
MicroAutoBox III	`192.168.140.10`

7 In the **Subnet Mask** edit field, enter the value `255.255.255.0`.

8 Click **OK** to close the **Internet Protocol 4 (TCP/IPv4) Properties** dialog.

9 Click **Close** to close the **Ethernet Properties** dialog.

10 Click **Close** to close the **Ethernet Status** dialog.

11 If prompted, confirm to restart the host PC.

Next steps

Proceed with:

- How to Set up a Peer-to-Peer Connection Between the Host PC and a DCI-GSI2 on page 116

  – or –

- Integrating a DCI-GSI2 into a Network on page 118

Solving problems

Tip

If a problem occurs when you set up the TCP/IP protocol, see Problems When Setting Up the TCP/IP Protocol on page 175.

Related topics

Basics

Overview of Setting up the Ethernet Connection Between a DCI-GSI2 and the Host PC 112

Setting up a Peer-to-Peer Connection

How to Set up a Peer-to-Peer Connection Between the Host PC and a DCI-GSI2

Objective

A peer-to-peer connection means that the host PC and the DCI-GSI2 are directly connected by a network cable.

Note

You should carry out this step even if you want to integrate the DCI-GSI2 into an existing network.

Limitation

If you want to use a peer-to-peer connection permanently, the DHCP server connection must always be deactivated (default setting for the DCI-GSI2: DHCP server connection = off). For instructions on deactivating a DHCP server connection, refer to How to Change the IP Address of a DCI-GSI2 via DHCP Server on page 120.

Method

To set up a peer-to-peer connection between the host PC and a DCI-GSI2

1. If the host PC is already part of an existing network, switch it off, and disconnect it from the network.
2. Connect the DCI-GSI2 to the host PC.
3. Turn on the host PC and power the DCI-GSI2.

   The connection between the host PC and the DCI-GSI2 can now be tested.
4. Open a Command Prompt window (DOS window): For example, from the **Start** menu, choose **Run**, enter **`cmd`** and click **OK**.
5. Enter the command: **`ping 192.168.140.2`**, which is the default IP address of the DCI-GSI2.

   Note

   It is assumed that the default IP address is active.

If the following message appears, the peer-to-peer connection is ready for use (the values vary on different computers and networks):

```
Pinging 192.168.140.2 with 32 bytes of data:
Reply from 192.168.140.2: bytes=32 time<10ms TTL=32
Reply from 192.168.140.2: bytes=32 time<10ms TTL=32
Reply from 192.168.140.2: bytes=32 time<10ms TTL=32
Reply from 192.168.140.2: bytes=32 time<10ms TTL=32
```

Result

You have set up and tested a peer-to-peer connection between the host PC and the DCI-GSI2.

Next steps

- If the DCI-GSI2 is used *only in a peer-to-peer connection*, the network setup is now complete.
- If the DCI-GSI2 is to be *used in an existing network*, the IP address of the DCI-GSI2 must comply with the conventions of the network. You may have to change its IP address (192.168.140.2) after setting up a peer-to-peer connection between the host PC and the DCI-GSI2.

  Proceed with Workflow for Integrating a DCI-GSI2 in a Network on page 118.

Related topics

Basics

Integrating a DCI-GSI2 into a Network

Where to go from here

Information in this section

Workflow for Integrating a DCI-GSI2 in a Network

Workflow

The following steps show the workflow for integrating a DCI-GSI2 into a network:

1. A temporary peer-to-peer connection is useful to check the connection between the host PC and the DCI-GSI2. Refer to How to Set up a Peer-to-Peer Connection Between the Host PC and a DCI-GSI2 on page 116.
2. Carry out one of the following steps:
   - The default IP address of the DCI-GSI2 must be changed to comply with the IP addresses used in the network. Refer to How to Change the IP Address of a DCI-GSI2 Manually on page 119.

     OR:
   - You can also get an IP address for the DCI-GSI2 from a DHCP server. Refer to How to Change the IP Address of a DCI-GSI2 via DHCP Server on page 120.

3. After you have changed the IP address of the DCI-GSI2, you can restore the previous IP address of the host PC. Refer to How to Restore the TCP/IP Configuration of the PC on page 122.
4. Finally, carry out the steps in How to Connect a DCI-GSI2 to the Network and Test the Connection on page 123.

Related topics

HowTos

How to Change the IP Address of a DCI-GSI2 Manually

Objective

You must change the default IP address of a DCI-GSI2 (192.168.140.2) to comply with the IP addresses used in your network.

To change the IP address, use the DCI Configuration Tool.

Required information

To change the IP address of the DCI-GSI2 manually, you need the serial number of the DCI-GSI2.

The serial number is on the printed circuit board of the DCI-GSI2 and on a label on the DCI-GSI2 enclosure.

Preconditions

The DCI Configuration Tool is installed.

Method

To change the IP address of a DCI-GSI2 manually

1. Contact your network administrator to obtain an unused IP address that you can use for the DCI-GSI2.
2. Click the Windows **Start** button and select **dSPACE DCI-GSI Configuration Package <x.y> – dSPACE DCI Configuration Tool <x.y>**.

   The DCI Configuration Tool starts.
3. In the **Select a Device** dialog, click **Work Offline**.

   The DCI Configuration Tool opens the **Select an Interface** dialog.
4. Click **Cancel** to close the **Select an Interface** dialog.
5. From the **Device** menu of the DCI Configuration Tool, select **Set Network Configuration**.

The DCI Configuration Tool opens the **Set Network Configuration** dialog.

6 In the **Device serial number** edit field, enter the serial number of the DCI-GSI2.

The serial number is on the printed circuit board of the DCI-GSI2 and on a label on the DCI-GSI2 enclosure.

7 Click **disabled** as the **DHCP enabled** setting.

8 Enter the following values:

- IP address
- Subnet mask
- Gateway address

The address format is **x.x.x.x**, where x must be in the range 0 ... 255.

9 Click **OK** to close the **Set Network Configuration** dialog.

The DCI Configuration Tool sets the new IP address and restarts the DCI-GSI2. The new address is valid after a restart of the DCI-GSI2.

Result

You changed the IP address of a DCI-GSI2.

Next step

Proceed with How to Restore the TCP/IP Configuration of the PC on page 122.

Related topics

Basics

Workflow for Integrating a DCI-GSI2 in a Network 118

How to Change the IP Address of a DCI-GSI2 via DHCP Server

Objective

You can change the IP address of a DCI-GSI2 automatically via DHCP server. A DHCP server manages the network configuration centrally.

To activate the connection to the DHCP server, use the DCI Configuration Tool.

Required information

To change the IP address via DHCP server, you need the serial number of the DCI-GSI2.

The serial number is on the printed circuit board of the DCI-GSI2 and on a label on the DCI-GSI2 enclosure.

Precondition

- It is recommended that your network administrator configures the DHCP server to always map the same IP address to a DCI-GSI2, for example, using the DCI-GSI2's MAC address.
- The DCI Configuration Tool is installed.

Method

To change the IP address of a DCI-GSI2 via DHCP server

1. Click the Windows Start button and select dSPACE DCI-GSI Configuration Package <x.y> – dSPACE DCI Configuration Tool <x.y>.

   The DCI Configuration Tool starts.
2. In the Select a Device dialog, click Work Offline.

   The DCI Configuration Tool opens the Select an Interface dialog.
3. Click Cancel to close the Select an Interface dialog.
4. From the Device menu of the DCI Configuration Tool, select Set Network Configuration.

   The DCI Configuration Tool opens the Set Network Configuration dialog.
5. In the Device serial number edit field, enter the serial number of the DCI-GSI2.

   The serial number is on the printed circuit board of the DCI-GSI2 and on a label on the DCI-GSI2 enclosure.
6. Click enabled as the DHCP enabled setting.
7. Click OK to close the Set Network Configuration dialog.

   The DCI Configuration Tool activates the DHCP server connection and gets the IP address from the server. The new address is valid after restarting the DCI-GSI2.

Tip

To deactivate the DHCP server connection:

1. Open the Select an Interface dialog.
2. In the Device serial number edit field, enter the serial number of the DCI-GSI2.
3. Click disabled as the DHCP enabled setting.
4. Click OK to close the Set Network Configuration dialog.

Result

You changed the IP address of a DCI-GSI2 via DHCP server.

Fallback if DHCP server connection cannot be established

The DCI-GSI2 supports a fallback mechanism if the connection to the DHCP server cannot be established. In this case, the DCI-GSI2 uses a fallback IP address that you have to specify.

You can specify the fallback IP address and activate the connection to the DHCP server in one step:

1. Open the **Select an Interface** dialog.
2. In the **Device serial number** edit field, enter the serial number of the DCI-GSI2.
3. Click **enabled** as the **DHCP enabled** setting.
4. Enter the fallback IP address.
5. Click **OK** to close the **Set Network Configuration** dialog.

Next step

Proceed with How to Restore the TCP/IP Configuration of the PC on page 122.

Related topics

Basics

Workflow for Integrating a DCI-GSI2 in a Network 118

How to Restore the TCP/IP Configuration of the PC

Objective

After you have changed the IP address of the DCI-GSI2 to integrate it in a network, you can restore the previous IP address of the host PC.

Precondition

To restore the TCP/IP configuration of the host PC, you need the values and options which you wrote down when setting up the TCP/IP protocol (see How to Set up the TCP/IP Protocol of the Host PC Network Adapter on page 114).

Method

To restore the TCP/IP configuration of the host PC

1. Click the Windows **Start** button and select **Settings – Network & Internet – Network and Sharing Center**.
   The **Network and Sharing Center** dialog opens.
2. In **View your active networks**, select **Ethernet**.
   The **Ethernet Status** dialog opens.
3. Click **Properties**.
   The **Ethernet Properties** dialog opens.
4. Select **Internet Protocol Version 4 (TCP/IPv4)**, and click **Properties**.
   The **Internet Protocol (TCP/IP) Properties** dialog opens.
5. Enter all the configured values and options you wrote down before.
6. Click **OK** to close the **Internet Protocol (TCP/IP) Properties** dialog.
7. Click **Close** to close the **Ehternet Properties** dialog.

8 Click **Close** to close the **Ethernet Status** dialog.

9 If prompted, confirm to restart the host PC.

Next steps

Proceed with How to Connect a DCI-GSI2 to the Network and Test the Connection on page 123.

Related topics

Basics

Workflow for Integrating a DCI-GSI2 in a Network 118

How to Connect a DCI-GSI2 to the Network and Test the Connection

Objective

After connecting a DCI-GSI2 to the Ethernet interface of the host PC, you should check the Ethernet connection.

Method

To connect a DCI-GSI2 to the network and test the connection

1 Turn off the DCI-GSI2.

2 Connect the DCI-GSI2 and the host PC to the network.

3 Turn on the DCI-GSI2.

The connection between the host PC and DCI-GSI2 can now be tested.

4 Open a Command Prompt window (DOS window): For example, from the **Start** menu, select **Run**, enter **cmd** and click **OK**.

5 Enter the command:

ping <IP address of DCI-GSI2>.

Result

If the following message appears, the network connection is ready for use (the values vary on different computers and networks). The IP address 10.1.202.178 serves as an example.

```
Pinging 10.1.202.178 with 32 bytes of data:
Reply from 10.1.202.178: bytes=32 time<10ms TTL=32
Reply from 10.1.202.178: bytes=32 time<10ms TTL=32
Reply from 10.1.202.178: bytes=32 time<10ms TTL=32
Reply from 10.1.202.178: bytes=32 time<10ms TTL=32
```

Tip

As an alternative to using the `ping` command, you can test the connection also via the DCI Configuration Tool: The connection is ok if the DCI Configuration Tool displays the DCI-GSI2 on the **Select a Device** dialog when scanning the network for connected DCI-GSI2 devices.

The network setup is now complete.

Solving problems

Tip

If a problem occurs when you integrate a DCI-GSI2 in a network, see Problems When Connecting the DCI-GSI2 via Ethernet on page 174.

Related topics

Basics

Checking the Hardware Connection

Introduction

After you connect the hardware, you should check whether your system works correctly. The check is done is several steps.

Where to go from here

Information in this section

How to Check the USB Connections to dSPACE ECU Interfaces

Objective

After connecting dSPACE ECU interfaces to the USB ports of the host PC, you should check the USB connections.

Method

To check the USB connections to dSPACE ECU interfaces

1. From the Windows Control Panel, open the System item. Change to the Hardware page and open the Device Manager.
2. Expand the Universal Serial Bus controllers node.
3. Check whether the subnodes list all the connected USB devices, for example, DCI-CAN2.

Result

If everything is OK with the USB connections, the Windows Device Manager lists all the connected USB devices without "!" or "?" symbols.

How to Check the Connection to dSPACE Real-Time Hardware Using ControlDesk

Objective

After connecting dSPACE real-time hardware to the ControlDesk PC, you should check the connection using ControlDesk.

Restrictions

Make sure you are logged on with the same rights as the actual calibration engineer. If the calibration engineer does not have administrator rights, you should not have them either when carrying out the check.

Preconditions

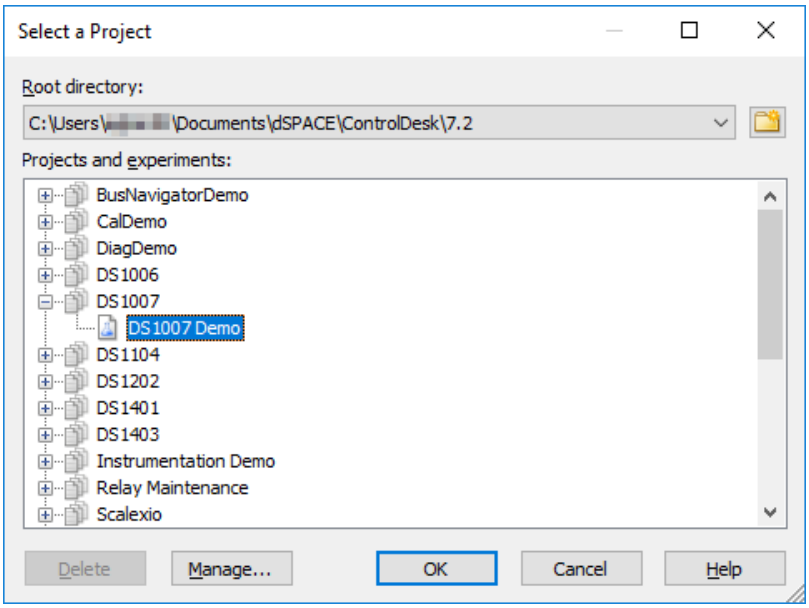
The dSPACE real-time hardware must be powered and connected to the host PC.

Method

To check the connection to dSPACE real-time hardware using ControlDesk

1 Start ControlDesk.

2 On the File ribbon, select Open – Project + Experiment.
The Select a Project dialog opens:



3 Select the experiment that corresponds to your real-time hardware.
The experiment opens.

4 Configure the real-time hardware. For instructions, refer to Basics of Handling Platforms (ControlDesk Platform Management 🕮).

5 On the **Home** ribbon, click **Status Control – Start Measuring**.

Result

If the various instruments in ControlDesk start measuring, the real-time hardware is installed correctly. You should also check the **Message Viewer** for error messages.

Disconnecting the Hardware

Where to go from here

Information in this section

How to Disconnect dSPACE ECU Interfaces from the Host PC

Objective

Disconnecting dSPACE ECU interfaces consists in disconnecting USB devices, Ethernet devices and CAN bus members.

Method

To disconnect dSPACE ECU interfaces from the host PC

1. Close ControlDesk.
2. For USB devices:
   - Unplug the unwanted USB.
3. For the DCI-GSI2:
   - Disconnect the unwanted Ethernet connection.
4. Switch off the power supplies of all the members of the CAN bus if you want to unplug CAN bus members.
5. Unplug the unwanted CAN bus members.

   After that you can switch on the power supplies of the remaining CAN bus members again.

Result

You have disconnected the dSPACE ECU interfaces from the host PC and CAN bus.

Next steps

After the hardware is disconnected, you can remove the software from your host PC.

How to Disconnect dSPACE Real-Time Hardware from the Host PC

Objective

The way in which dSPACE real-time hardware is disconnected varies according to the Link Board you use.

Method

To disconnect dSPACE real-time hardware from the host PC

1. Close ControlDesk.
2. For the MicroAutoBox II/III:
   - Disconnect the Ethernet connection.
3. For a modular system:
   - If the system is installed in an expansion box connected to the host PC via a bus interface, disconnect the DS817 Link Board, or unplug the DS815 from the host PC.
   - If the system is installed in an expansion box connected to the host PC via Ethernet, disconnect the network cable of the expansion box from the host PC or the local area network.

Result

You have disconnected the dSPACE real-time hardware from the host PC.

Next steps

- You can remove the DS817 Link Board from the host PC.

  For instructions, refer to How to Remove Hardware from the Host PC (DS1006 Hardware Installation and Configuration Guide 🕮).
- After the hardware is disconnected, you can remove the software from your host PC.

Data Sheets

Where to go from here

Information in this section

DCI-GSI2 Data Sheet

Introduction

The DCI-GSI2 data sheet provides the technical data of the DCI-GSI2 and the dimension drawings.

Where to go from here

Information in this section

Technical Specifications of the DCI-GSI2

Technical data

The following table summarizes the technical specifications of the DCI-GSI2:

Parameter	Specification[1)]
General	▪ Microcontroller RAM of 128 MB ▪ Flash memory of 32 MB ▪ ECU RAM mirror of 400 kB ▪ Tool interface for connecting an additional tool (optional)
Host interface	▪ Ethernet (100 Mbit/s, 1 Gbit/s) ▪ Time synchronization: IEEE802.1AS protocol with 1 µs accuracy[2)]

ECU interface and ECU microcontroller families	▪ JTAG/OCDS:
	  ▪ Infineon TriCore
	▪ JTAG/Nexus:
	  ▪ Freescale/NXP MPC55xx
	  ▪ Freescale/NXP MPC56xx
	  ▪ Freescale/NXP MPC57xx
	  ▪ STMicroelectronics SPC56xx
	  ▪ STMicroelectronics SPC57xx
	  ▪ STMicroelectronics SPC58xx

Parameter		Specification[1)]
		▪ Renesas RH850 ▪ Renesas V850E2 ▪ DAP/DAP2: ▪ Infineon TriCore ▪ Infineon XC2000 ▪ NBD: ▪ Renesas RH850 ▪ Renesas V850E/V850E1 ▪ Renesas M32R ▪ Renesas SH2/SH2A/SH4A ▪ JTAG/H-UDI: ▪ Renesas SH2A/SH4A ▪ JTAG/ARM: ▪ Texas Instruments TMS570 ▪ Cypress MB9DF ▪ Toshiba TMPV770 For further support, contact dSPACE.
Electrical characteristics	Power supply	▪ Range: 4.3 V … 30 V (38 V transient) ▪ Protected against reverse battery up to -32 V
	Power consumption	▪ 4 W typ. at room temperature and 1 Gbit/s Ethernet. Using 100 Mbit/s Ethernet instead of 1 Gbit/s saves about 0.7 W. ▪ 30 mW typ. in standby mode
Mechanical characteristics	Connectors	▪ Bus connectors: ▪ Two connectors to interface individual connector adapters. ▪ Various connector adapters are available from dSPACE. Some adapters also have a tool connector for connecting an additional tool, for example, a debugger. ▪ Ethernet connector: ▪ 8-pin connector for connection to the host PC and/or to a dSPACE real-time system[3)] ▪ Power connectors[4)]: ▪ 2-pin LEMO power connector on the DCI-GSI2 enclosure for connection to an external power supply via the PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation ▪ Internal power connector within the DCI-GSI2 for connection to the vehicle power supply within the ECU via the internal power supply cable
	Enclosure	There are different variants of aluminum boxes (to be ordered separately): ▪ Enclosure for *in-vehicle use*. Refer to DCI-GSI2 with enclosure for use in a vehicle on page 136. ▪ Enclosure for *laboratory use*. Refer to DCI-GSI2 with enclosure for use in a laboratory on page 137.

Parameter		Specification[1]
		▪ dSPACE also provides enclosures for *in-vehicle use* complying with the IP66 protection classification. Contact dSPACE for details.
	Physical size (with enclosure)	Refer to ▪ DCI-GSI2 with enclosure for use in a vehicle on page 136 ▪ DCI-GSI2 with enclosure for use in a laboratory on page 137
	Weight (without connector adapter)	▪ Approx. 220 g (0.49 lb.) with enclosure for in-vehicle use ▪ Approx. 174 g (0.06 lb.) with enclosure for laboratory use
Environmental	Operating temperature	–40 … +85 °C (–40 … +185 °F)
	Storage temperature	–65 … +125 °C (–85 … +257 °F)

[1] Unless stated otherwise, the specifications are valid only if the dSPACE hardware is correctly powered, switched on, and ready for operation.
[2] Accuracy of 1 µs only with 1 Gbit/s Ethernet.
[3] For details, refer to Connecting an ECU with DCI-GSI2 for Simultaneous Calibration and ECU Interfacing on page 39.
[4] Only one power connector can be used at the same time.

Related topics

Basics

Status LEDs 134

References

Certifications of the DCI-GSI2 138
DCI-GSI2 Dimension Drawings 136

Status LEDs

Introduction

The DCI-GSI2 is equipped with three status LEDs.

Location

For the location of the status LEDs, refer to DCI-GSI2 Dimension Drawings on page 136.

LED description

The following table provides a description of the status LEDs:

LED	Status	Description
Ethernet	Off	Ethernet link not established
	Flashing (yellow)	Waiting for a response from a DHCP server
	Lit (yellow)	No response from the DHCP server; the DCI-GSI2's fallback IP address is used instead
	Lit (green)	Ethernet connection established
	Flashing sporadically (green)	Data is being sent or received via Ethernet
	Flashing sporadically (red)	Error in data transmission via Ethernet
	Lit (red)	Error in Ethernet connection
ECU	Off	ECU off
	Lit (red)	ECU in reset
	Lit (yellow)	ECU on, but currently no ECU connection established
	Lit (green)	ECU on and ECU connection established
	Flashing sporadically (green)	Data is being transmitted via the ECU interface (serial interface/data trace interface)
	Flashing sporadically (red)	Error in data transmission via ECU interface
Status	Off	No power
	Lit (green)	Power on, firmware is running
	Flashing (green)	Measurement or ECU interfacing is running
	Flashing quickly (green)	Firmware update is running
	Flashing quickly (yellow)	The 'identify device' action has been triggered by the host tool.
	Flashing (red)	Firmware error

Related topics

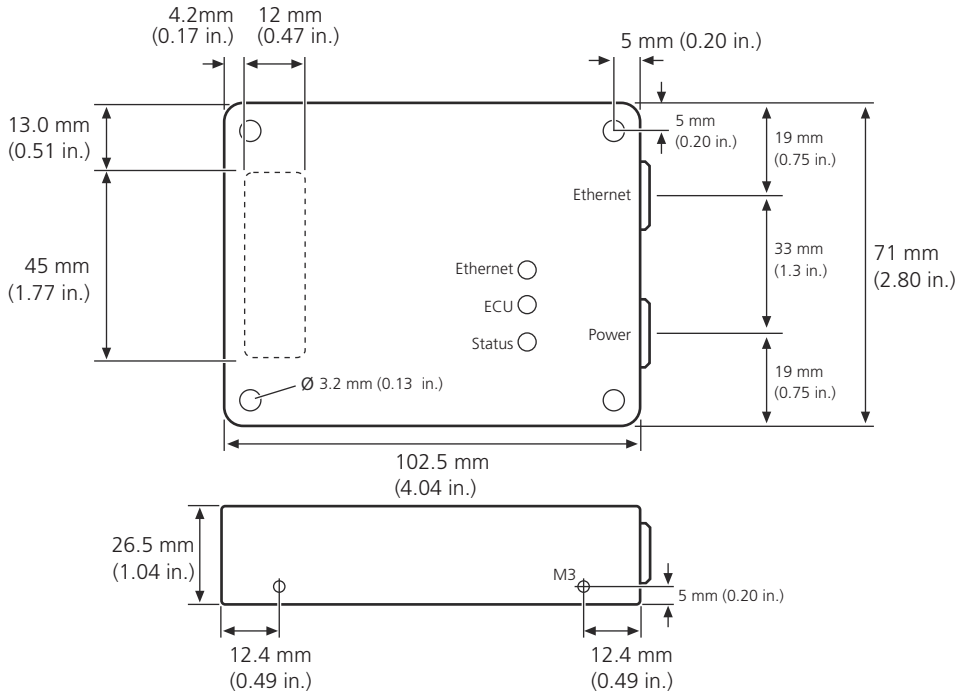
References

DCI-GSI2 Dimension Drawings 136
Technical Specifications of the DCI-GSI2 132

DCI-GSI2 Dimension Drawings

DCI-GSI2 with enclosure for use in a vehicle

The following illustration shows the physical dimensions of a DCI-GSI2's enclosure for in-vehicle use (DCI_GSI2_ENC1):



The DCI-GSI2's enclosure for in-vehicle use has holes for mounting the DCI-GSI2 on an ECU.

Connector adapter A connector adapter for attaching the DCI-GSI2 to the ECU is integrated in the DCI-GSI2's enclosure. The enclosure also contains two LEMO connectors for the physical connection of the host PC and/or the RCP system and an external power supply to the DCI-GSI2.

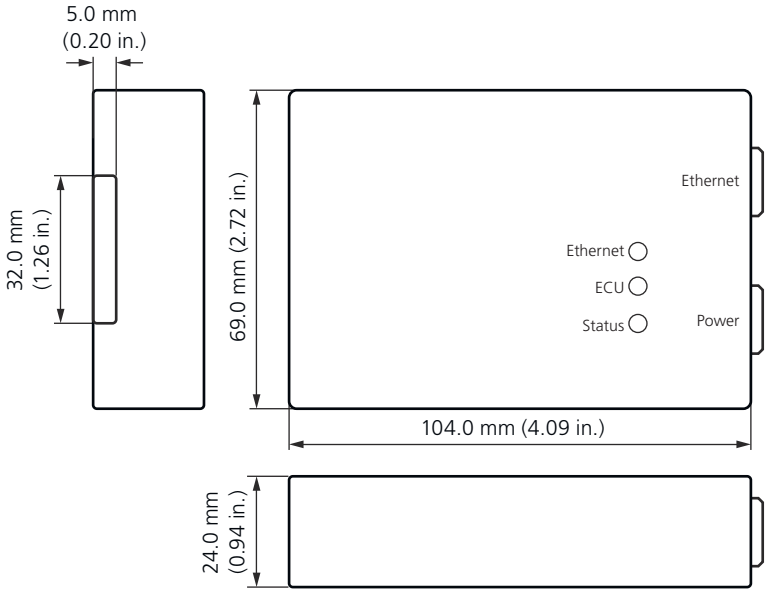
Power supply If the DCI-GSI2's enclosure for in-vehicle use is used, the DCI-GSI2 can alternatively have an internal power supply via a separate power supply cable (also provided by dSPACE). When this cable is used, the power of the DCI-GSI2 is supplied directly by the ECU, and the external power supply LEMO connector in the DCI-GSI2's enclosure is inactive.

Note

- The enclosure is not part of the DCI-GSI2, and has to be ordered separately.
- You can also order a custom enclosure for your DCI-GSI2.

DCI-GSI2 with enclosure for use in a laboratory

The following illustration shows the physical dimensions of a DCI-GSI2's enclosure for laboratory use (DCI_GSI2_ENC2):



The DCI-GSI2's enclosure for laboratory use does not have holes for mounting on an ECU.

Connector adapter A connector adapter for attaching the DCI-GSI2 to the ECU is integrated in the enclosure. The enclosure also contains two LEMO connectors for the physical connection of the host PC and/or the RCP system and an external power supply to the DCI-GSI2.

Note

- The enclosure is not part of the DCI-GSI2, and has to be ordered separately.
- You can also order a custom enclosure for your DCI-GSI2.

Related topics

Basics

Status LEDs 134

References

Technical Specifications of the DCI-GSI2 132

Certifications of the DCI-GSI2

CE compliance

The DCI-GSI2 meets the requirements of European Directive 2014/30/EU (Electromagnetic Compatibility Directive) for CE marking.

Vibration and shock tests

To verify the reliability of DCI-GSI2 under realistic operating conditions, it was exposed to vibration and shock tests. During the tests, DCI-GSI2 executed a program without any failures.

Applied standards

The characteristics of DCI-GSI2 were tested according to the standards shown in the following table:

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
Vibration	ISO 16750-3:2007 / 4.1.2.4 Test IV	Test conditions: Broad band noise, 4h per axis, RMS-acceleration 27,8 m/s^2
	DO-160F.8 / B1 Test conditions	Test conditions: Broad band noise, 4h per axis, based on DO160F Section 8, Category B1
	ISO 16750-3:2007 / 4.1.2.7 Test VII	Test conditions: Broad band noise, 2h per axis, RMS-acceleration 61,7 m/s^2
	DO-160F.8 / C Test conditions	Test conditions: Broad band noise, 2h per axis, based on DO160F Section 8, Category C
	EN 60068-2-6	Test conditions: ▪ Swept sine, 1 octave per minute, 3-axis test ▪ 5 ... 2000 Hz, up to 5 g, 2 sweeps per axis ▪ Operating
Shock	ISO 16750-3:2007 / 4.2.2.	▪ Linear shock (1/2 sine pulse), 6-axis ▪ 500 m/s^2, 6 ms, 10 pulses per axis ▪ Operating
	RTCA / DO-160F Section 7 Test 7.2 Category A Test type R	Operational shocks test (standard): ▪ Saw-tooth wave, 6-axis ▪ 200 m/s^2, 11 ms, 10 pulses per axis ▪ Operating
	RTCA / DO-160F Section 7 Test 7.2 Category D Test type R	Operational shocks test (low frequency): ▪ Saw-tooth wave, 6-axis ▪ 200 m/s^2, 20 ms, 10 pulses per axis ▪ Operating

[1)] Tested with an ECU 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.

Related topics

References

DCI-CAN2 Data Sheet

Introduction

The data sheet provides the technical data of the DCI-CAN2 and the connector pinout.

Where to go from here

Information in this section

Technical Specifications of the DCI-CAN2

Technical data

The following table summarizes the technical specifications of the DCI-CAN2:

Parameter		**Specification**[1)]

General		▪ CAN FD 1.0 (compatible with CAN 2.0 A/B)
		▪ Transmission standards:
		  ▪ CAN FD
		  ▪ ISO11898-2 (high-speed CAN)
		▪ Bit rates:
		  ▪ 40 kbit/s … 1 Mbit/s (CAN)
		  ▪ 40 kbit/s … 8 Mbit/s[2)] (CAN FD)
		▪ Time stamp resolution:
		  1 µs
		▪ Transceiver:
		  NXP TJA1044GT

Host interface		USB 2.0 (compatible with USB 1.1 and USB 3.0)
Software configuration		Via: ▪ ControlDesk ▪ dSPACE CAN API
Electrical characteristics	Power supply	Power is supplied to the DCI-CAN2 via USB: ▪ +5 V DC

Parameter		Specification[1]
		▪ < 170 mA
	Supplying external devices	Power can be supplied by the DCI-CAN2 via pin 1 of the Sub-D connector: ▪ +5 V DC ▪ < 50 mA
	Termination	No termination of the CAN connector
	Galvanic isolation	Up to 500 V (connector maximum)
Mechanical characteristics	Chassis	Aluminum box
	Connectors	▪ 9-pin, male Sub-D connector for connection to CAN. For the pin assignment, refer to Connector Pinout on page 142. ▪ USB connector (plug type A) with 0.75 m (29.5 in.) cable for connection to the host PC
	Physical size (height x width x depth)	75 mm x 43 mm x 22 mm
	Weight	Approx. 68 g (0.15 lb.)
Environmental	Operating temperature	–40 … +85 °C (–40 … +185 °F)
	Storage and transport temperature	–40 … +100 °C (–40 … +212 °F)
	Relative humidity	15 … 90%, not condensing
Ingress protection (IEC 60529)		IP 20
Electromagnetic compatibility		▪ EN 55024: 2011-09 ▪ EN 55022: 2011-12 ▪ EC directive 2014/30/EU

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

[2] The maximum bit rate for CAN FD depends on the environment (cable harness, topology, and interferences).

Related topics

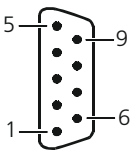
References

Connector Pinout 142
Status LED of the DCI-CAN2 142

Connector Pinout

Pinout of the CAN connector of the DCI-CAN2

The following table shows the pinout of a 9-pin, male Sub-D connector for connection to CAN according to CiA-DS 102-1:

CAN Connector	Pin	Signal	Pin	Signal
	5	Not connected		
	4	Not connected	9	Not connected
	3	CAN-GND	8	Not connected
	2	CAN-L	7	CAN-H
	1	+5 V_OUT[1)]	6	CAN-GND

Note

Do not feed any voltage to this pin.

[1)] Power supply for the device connected to this CAN connector. Referenced to CAN-GND and isolated from USB-GND.

Tip

You can also find the pinout as an imprint on the underside of the DCI-CAN2.

Related topics

References

Status LED of the DCI-CAN2 142
Technical Specifications of the DCI-CAN2 140

Status LED of the DCI-CAN2

Introduction

The DCI-CAN2 is equipped with one status LED.

LED description

The following table provides a description of the status LED:

Status	Description
Green (lit)	Connection to operating system driver is established.
Green (slowly blinking)	Software application is connected to the interface.

Status	Description
Green (quickly blinking)	CAN data is being transmitted.
Red (blinking)	Error during CAN data transmission.
Orange (quickly blinking)	Identification of an interface when multiple interfaces are connected.

Related topics

References

Connector Pinout 142
Technical Specifications of the DCI-CAN2 140

DCI-CAN/LIN1 Data Sheet

Introduction

This data sheet provides the technical data of the DCI-CAN/LIN1 and the connector pinout.

Where to go from here

Information in this section

Technical Specifications of the DCI-CAN/LIN1

Technical data

The following table summarizes the technical specifications of the DCI-CAN/LIN1:

Parameter	Specification[1)]

CAN	▪ CAN FD 1.0 (compatible with CAN 2.0 A/B)
	▪ Transmission standards:
	  ▪ CAN FD
	  ▪ ISO11898-2 (high-speed CAN)
	▪ Bit rates:
	  ▪ 40 kbit/s … 1 Mbit/s (CAN)
	  ▪ 40 kbit/s … 8 Mbit/s[2)] (CAN FD)
	▪ Time stamp resolution:
	  1 µs
	▪ Transceiver:
	  NXP TJA1044GT

LIN	▪ Specification:
	  LIN specification 2.1
	▪ Bit rates:
	  1 … 20 kbit/s
	▪ Time stamp resolution:
	  1 µs
	▪ Transceiver:
	  NXP TJA1021/20

Parameter		Specification[1)]
Host interface		USB 2.0 (compatible with USB 1.1 and USB 3.0)
Software configuration		Via: ▪ ControlDesk ▪ dSPACE CAN API

Electrical characteristics	Power supply	Power is supplied to the DCI-CAN/LIN1:
		▪ Via USB:
		  ▪ +5 V DC
		  ▪ max. 200 mA
		▪ Via pin 9 of the Sub-D connectors:
		  ▪ 8 ... 18 V DC. The voltage is required for LIN operation.

	Supplying external devices	Power can be supplied by the DCI-CAN/LIN1 via pin 1 of the Sub-D connector: ▪ +5 V DC ▪ < 50 mA
	Termination	No termination of the CAN connector
	Galvanic isolation	The DCI-CAN/LIN1 has integrated galvanic isolation: ▪ CAN: Up to 500 V against USB and LIN. Each CAN connection is isolated separately. ▪ LIN: Up to 500 V against USB and CAN. Both LIN connections have a common ground. **Note** The LIN connections are not galvanically isolated against each other.
Mechanical characteristics	Chassis	Aluminum box
	Connectors	▪ Two 9-pin, male Sub-D connectors for connection to CAN and LIN. For the pin assignment, refer to Connector Pinout on page 146. ▪ USB connector (plug type A) with 1.5 m (59 in.) cable for connection to the host PC
	Physical size (height x width x depth)	24 mm x 71.5 mm x 114 mm
	Weight	Approx. 220 g
Environmental	Operating temperature	–40 … +85 °C (–40 … +185 °F)
	Storage and transport temperature	–40 … +100 °C (–40 … +212 °F)
	Relative humidity	15 … 90%, not condensing
Ingress protection (IEC 60529)		IP 20
Electromagnetic compatibility		▪ EN 55024: 2011-09

Parameter	Specification[1)]
	▪ EN 55022: 2011-12 ▪ EC directive 2014/30/EU

1) Unless stated otherwise, the specifications are valid only if the dSPACE hardware is correctly powered, switched on, and ready for operation.
2) The maximum bit rate for CAN FD depends on the environment (cable harness, topology and interferences).

Related topics

References

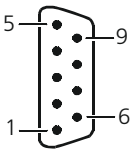
Connector Pinout 146
Status LEDs of the DCI-CAN/LIN1 147

Connector Pinout

Pinout of the Sub-D connectors of the DCI-CAN/LIN1

The following table shows the pinout of the two 9-pin, male Sub-D connectors.

The pinout for connection to CAN corresponds to CiA-DS 102-1.

Connector	Pin	Signal	Pin	Signal
	5	LIN-GND		
	4	LIN	9	VBAT_LIN[1)]
	3	CAN-GND	8	Not connected
	2	CAN-L	7	CAN-H
	1	+5 V_OUT[2)]	6	LIN-GND

Note

Do not feed any voltage to this pin.

1) Supply voltage input (8 ... 18 V DC). Required for LIN operation.
2) Power supply for the device connected to this connector; 5 V, max. 50 mA. Connected to the power supply of the host PC and not fused separately. A DC/DC converter is interconnected.

Tip

You can also find the pinout as an imprint on the underside of the DCI-CAN/LIN1.

Related topics

References

Status LEDs of the DCI-CAN/LIN1 147
Technical Specifications of the DCI-CAN/LIN1 144

Status LEDs of the DCI-CAN/LIN1

Introduction

The DCI-CAN/LIN1 is equipped with several status LEDs.

LED description

The following table provides a description of the status LEDs:

LED	Status	Description
USB	Green (lit)	USB 2.0 connection to the host PC is established.
	Green (blinking)	Data is being transmitted via the USB 2.0 connection.
	Orange (lit)	▪ USB 1.1 connection to the host PC is established. or ▪ The DCI-CAN/LIN1 is in suspend mode (only if the voltage is supplied via USB, e.g., when the host PC is in standby mode).
	Orange (blinking)	Data is being transmitted via the USB 1.1 connection.
CAN1/2	Green (lit)	CAN interface is initialized. Connection to operating system driver is established.
	Green (slowly blinking)	Software application is connected to the CAN interface.
	Green (quickly blinking)	CAN data is being transmitted.
	Red (quickly blinking)	Error during CAN data transmission.
LIN1/2	Green (lit)	Connection to operating system driver is established.
	Green (slowly blinking)	LIN interface is initialized with a valid bit rate. Software application is connected to the LIN interface.
	Green (quickly blinking)	LIN data is being transmitted.

Related topics

References

Connector Pinout 146
Technical Specifications of the DCI-CAN/LIN1 144

DCI-KLine1 Data Sheet

Introduction

The data sheet summarizes the technical data of the DCI-KLine1.

Technical Specifications of the DCI-KLine1

Technical data

The following table summarizes the technical specifications of the DCI-KLine1:

Parameter		**Specification**[1)]
General		▪ Support of fast initialization on K-Line via hardware-generated wake-up pattern (WuP) ▪ Baud rate range: 183 … 115,200 baud[2)] for communication Provides the standard PC baud rates according to ISO 14230 (9.6 kBd, 19.2 kBd, 38.4 kBd, 57.6 kBd, 115.2 kBd) and other specific baud rates. ▪ FT232BM USB-to-serial converter
Host interface		USB 1.1 (compatible with USB 2.0) dSPACE does not guarantee compatibility with USB 3.0.
Software configuration		Via ControlDesk
Electrical characteristics	Power supply	Power is supplied by the ECU or the vehicle. ▪ Voltage range: 4 V … 40 V ▪ Overvoltage protection: ±60 V, including all possible wrong wirings of K-Line, GND, and VBAT
	Power consumption	▪ < 100 mA (from USB) ▪ 40 mA max. (from VBAT) ▪ Approx. 2 mA (from VBAT, in standby mode)
	Galvanic isolation	Up to 60 V DC (connector maximum) via optoisolation
Mechanical characteristics	Chassis	Aluminum box
	Connectors	▪ 4 mm female connectors for connection to the ECU and power supply: ▪ Red: VBAT ▪ Black: GND ▪ Green: K-Line ▪ A-type USB connector with 1.5 m (59 in.) cable for connection to the host PC
	Status LED	▪ Off: USB not powered/not connected ▪ Lit (yellow): USB not initialized, VBAT on ▪ Lit (red): USB initialized, VBAT off ▪ Lit (green): USB initialized, VBAT on

Parameter		Specification[1)]
		▪ Flashing (green): K-Line traffic
	Physical size (height × width × depth)	16 mm × 55 mm × 84 mm (0.63 in. × 2.16 in. × 3.30 in.)
	Weight	Approx. 150 g (0.33 lb.)
Environmental	Ambient temperature	-40 … +85 °C (-40 … +185 °F)
	Storage temperature	-65 … +125 °C (-85 … +257 °F)
CE compliance		Meets the requirements of applicable European directives for CE marking as follows: ▪ 2014/35/EU (Low-Voltage Directive) ▪ 2014/30/EU (Electromagnetic Compatibility Directive)

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

2) The lower limit is determined by the USB-to-serial converter. The upper limit is determined by the driver circuit and capacitance of K-Line.

Connection Cables

Where to go from here

Information in this section

Ethernet Connection Cables

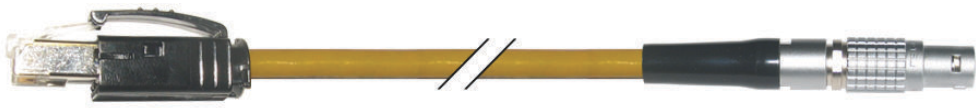
Where to go from here

Information in this section

ETH_CAB1 Ethernet Connection Cable

Technical data

The following table shows the technical specifications of the cable:

Parameter	Specification[1]		
Purpose	To connect a MicroAutoBox II/III/Embedded PC or a DCI-GSI2 to hardware with an RJ45 connector.		
Illustration			
Connector	RJ45 jack		LEMO-1B, 8 pins
Label on the cable	ETH_CAB1		
Length	5 m (197 in.)		
Operating temperature	-40 … +85 °C (-40 … +185 °F)		
Max. transfer rate	1 Gbit/s		

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

Connection scenarios for external ECU interfacing

The cable can be used in the following ECU interfacing connection scenarios:

Connection		Instructions
Between	**And**	
MicroAutoBox II	ECU with XCP on Ethernet (UDP/IP)	How to Connect a MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP) on page 85
	ECU with DCI-GSI2[1]	How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 on page 82
DS4121	ECU with DCI-GSI2[1]	How to Connect a DS4121 to an ECU with DCI-GSI2 on page 67
MicroAutoBox III	ECU with XCP on Ethernet (UDP/IP)	How to Connect a MicroAutoBox III to an ECU with XCP on Ethernet (UDP/IP) on page 95
DCI-GSI2	Host PC	How to Connect an ECU with DCI-GSI2 to the Host PC Directly on page 37
	DS1007	How to Connect a DS1007 to an ECU with DCI-GSI2 on page 74
	SCALEXIO	How to Connect a SCALEXIO System to an ECU with DCI-GSI2 on page 100

[1] This scenario also requires the LVDS_CAB14 LVDS-Ethernet Link Cable.

Related topics

HowTos

How to Connect a DS4121 to an ECU with DCI-GSI2 67

ETH_CAB2 Ethernet Connection Cable

Technical data

Up to revision CB1401C-02-xxx The revision number is written on the cable's label. The following table shows the technical specifications of the galvanically isolated connection cable:

Parameter	**Specification**[1]		
Purpose	To connect a MicroAutoBox II/III or a DCI-GSI2 to hardware with an RJ45 connector electrically safe up to 300 V DC/AC_{RMS} and 600 V_{peak}.		
Illustration			
Connector	RJ45 jack	Galvanic isolation	LEMO-1B, 8 pins
Label on the cable	ETH_CAB2		
Length	4.5 m (177.2 in.)		
Electrical characteristics	Electrically safe up to 300 V DC/AC_{RMS} and 600 V_{peak}[2]		
Operating temperature	-40 … +85 °C (-40 … +185 °F)		
Max. transfer rate	100 Mbit/s [3]		

[1] Unless stated otherwise, the specifications are valid only if the dSPACE hardware is correctly powered, switched on, and ready for operation.
[2] The voltage levels relate to secondary circuits without direct electrical connection to the AC mains.
[3] In exceptional cases, auto-negotiation of connected Gigabit devices (e.g., the host PC) does not lead to a stable Ethernet connection. To solve the problem, manually reduce the Ethernet transfer rate of the host PC to 100 Mbit/s.

As of revision CB1401C-03-xxx The revision number is written on the label of the cable. The following table shows the technical specifications of the galvanically isolated connection cable:

Parameter	Specification[1]		
Purpose	To connect a MicroAutoBox II/III or a DCI-GSI2 to hardware with an RJ45 connector electrically safe up to 300 V DC/AC_{RMS} and 600 V_{peak}.		
Illustration			
Connector	RJ45 jack	Galvanic isolation	LEMO-1B, 8 pins
Label on the cable	ETH_CAB2		
Length	4.5 m (177.2 in.)		
Electrical characteristics	Electrically safe up to 300 V DC/AC_{RMS} and 600 V_{peak}[2]		
Operating temperature	–40 … +85 °C (–40 … +185 °F)		
Max. transfer rate	1 Gbit/s		

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

[2] The voltage levels relate to secondary circuits without direct electrical connection to the AC mains.

Connection scenarios for external ECU interfacing

The cable can be used in the following ECU interfacing connection scenarios:

Connection		Instructions
Between	**And**	
MicroAutoBox II	ECU with XCP on Ethernet (UDP/IP)	How to Connect a MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP) on page 85
	ECU with DCI-GSI2[1]	How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 on page 82
DS4121	ECU with DCI-GSI2[1]	How to Connect a DS4121 to an ECU with DCI-GSI2 on page 67
MicroAutoBox III	ECU with XCP on Ethernet (UDP/IP)	How to Connect a MicroAutoBox III to an ECU with XCP on Ethernet (UDP/IP) on page 95
DCI-GSI2	Host PC	How to Connect an ECU with DCI-GSI2 to the Host PC Directly on page 37
	DS1007	How to Connect a DS1007 to an ECU with DCI-GSI2 on page 74
	SCALEXIO	How to Connect a SCALEXIO System to an ECU with DCI-GSI2 on page 100

[1] This scenario also requires the LVDS_CAB14 LVDS-Ethernet Link Cable.

Related topics

HowTos

ETH_CAB3 Ethernet Connection Cable

Technical data

The following table shows the technical specifications of the cable:

Parameter	Specification[1)]		
Purpose	To connect, for example, a DCI-GSI2 to a MicroAutoBox II/III.		
Illustration			
Connector	LEMO-1B, 8 pins		LEMO-1B, 8 pins
Label on the cable	ETH_CAB3		
Length	5 m (197 in.)		
Operating temperature	-40 … +85 °C (-40 … +185 °F)		
Max. transfer rate	1 Gbit/s		

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

Connection scenarios for external ECU interfacing

The cable can be used in the following ECU interfacing connection scenarios:

Connection		Instructions
Between	And	
MicroAutoBox II	ECU with DCI-GSI2	How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 on page 82
MicroAutoBox III	ECU with DCI-GSI2	How to Connect a MicroAutoBox III to an ECU with DCI-GSI2 on page 93

Related topics

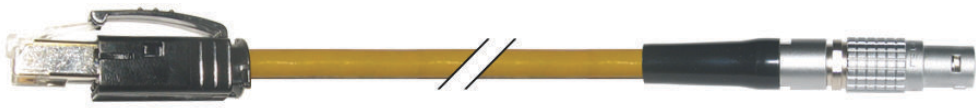
HowTos

How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 82
How to Connect a MicroAutoBox III to an ECU with DCI-GSI2 93

ETH_CAB4 Ethernet Connection Cable

Technical data

The following table shows the technical specifications of the cable:

Parameter	Specification[1]		
Purpose	To connect a MicroAutoBox II/III/Embedded PC or a DCI-GSI2 to hardware with an RJ45 connector.		
Illustration			
Connector	RJ45 jack		LEMO-1B, 8 pins
Label on the cable	ETH_CAB4		
Length	10 m (394 in.)		
Operating temperature	-40 … +85 °C (-40 … +185 °F)		
Max. transfer rate	1 Gbit/s		

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

Connection scenarios for external ECU interfacing

The cable can be used in the following ECU interfacing connection scenarios:

Connection		Instructions
Between	**And**	
MicroAutoBox II	ECU with XCP on Ethernet (UDP/IP)	How to Connect a MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP) on page 85
	ECU with DCI-GSI2[1]	How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 on page 82
DS4121	ECU with DCI-GSI2[1]	How to Connect a DS4121 to an ECU with DCI-GSI2 on page 67
MicroAutoBox III	ECU with XCP on Ethernet (UDP/IP)	How to Connect a MicroAutoBox III to an ECU with XCP on Ethernet (UDP/IP) on page 95
DCI-GSI2	Host PC	How to Connect an ECU with DCI-GSI2 to the Host PC Directly on page 37
	DS1007	How to Connect a DS1007 to an ECU with DCI-GSI2 on page 74
	SCALEXIO	How to Connect a SCALEXIO System to an ECU with DCI-GSI2 on page 100

[1] This scenario also requires the LVDS_CAB14 LVDS-Ethernet Link Cable.

Related topics

HowTos

How to Connect a DS4121 to an ECU with DCI-GSI2 67

ETH_CAB5 Ethernet Connection Cable

Technical data

The following table shows the technical specifications of the cable:

Parameter	Specification[1)]		
Purpose	To connect a MicroAutoBox II/III/Embedded PC or a DCI-GSI2 to hardware with an RJ45 connector.		
Illustration			
Connector	RJ45 jack		LEMO-1B, 8 pins
Label on the cable	ETH_CAB5		
Length	5 m (197 in.)		
Operating temperature	-40 … +150 °C (-40 … +302 °F)		
Max. transfer rate	1 Gbit/s		

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

Connection scenarios for external ECU interfacing

The cable can be used in the following ECU interfacing connection scenarios:

Connection		Instructions
Between	**And**	
MicroAutoBox II	ECU with XCP on Ethernet (UDP/IP)	How to Connect a MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP) on page 85
	ECU with DCI-GSI2[1)]	How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 on page 82
DS4121	ECU with DCI-GSI2[1)]	How to Connect a DS4121 to an ECU with DCI-GSI2 on page 67
MicroAutoBox III	ECU with XCP on Ethernet (UDP/IP)	How to Connect a MicroAutoBox III to an ECU with XCP on Ethernet (UDP/IP) on page 95
DCI-GSI2	Host PC	How to Connect an ECU with DCI-GSI2 to the Host PC Directly on page 37
	DS1007	How to Connect a DS1007 to an ECU with DCI-GSI2 on page 74
	SCALEXIO	How to Connect a SCALEXIO System to an ECU with DCI-GSI2 on page 100

1) This scenario also requires the LVDS_CAB14 LVDS-Ethernet Link Cable.

Related topics

HowTos

How to Connect a DS4121 to an ECU with DCI-GSI2 67
How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 82
How to Connect an ECU with DCI-GSI2 to the Host PC Directly 37

ETH_CAB6 Ethernet Connection Cable

Technical data

The following table shows the technical specifications of the cable:

Parameter	Specification[1]		
Purpose	To connect, for example, a DCI-GSI2 to a MicroAutoBox II/III.		
Illustration			
Connector	LEMO-1B, 8 pins		LEMO-1B, 8 pins
Label on the cable	ETH_CAB6		
Length	5 m (197 in.)		
Operating temperature	-40 … +150 °C (-40 … +302 °F)		
Max. transfer rate	1 Gbit/s		

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

Connection scenarios for external ECU interfacing

The cable can be used in the following ECU interfacing connection scenarios:

Connection		Instructions
Between	And	
MicroAutoBox II	ECU with DCI-GSI2	How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 on page 82
MicroAutoBox III	ECU with DCI-GSI2	How to Connect a MicroAutoBox III to an ECU with DCI-GSI2 on page 93

Related topics

HowTos

How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 82
How to Connect a MicroAutoBox III to an ECU with DCI-GSI2 93

ETH_CAB7 Ethernet Connection Cable

Technical data

The following table shows the technical specifications of the cable:

Parameter	Specification[1)]		
Purpose	To connect, for example, a DCI-GSI2 to a MicroAutoBox II/III.		
Illustration			
Connector	LEMO-1B, 8 pins		LEMO-1B, 8 pins
Label on the cable	ETH_CAB7		
Length	10 m (394 in.)		
Operating temperature	-40 … +150 °C (-40 … +302 °F)		
Max. transfer rate	1 Gbit/s		

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

Connection scenarios for external ECU interfacing

The cable can be used in the following ECU interfacing connection scenarios:

Connection		Instructions
Between	And	
MicroAutoBox II	ECU with DCI-GSI2	How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 on page 82
MicroAutoBox III	ECU with DCI-GSI2	How to Connect a MicroAutoBox III to an ECU with DCI-GSI2 on page 93

Related topics

HowTos

How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 82
How to Connect a MicroAutoBox III to an ECU with DCI-GSI2 93

HSL_PATCH_300V Galvanically Isolated PC Connection Cable

Technical data

The following table shows the technical specifications of the galvanically isolated connection cable:

Parameter	Specification[1]		
Purpose	To connect the host PC to an ECU with XCP on Ethernet, to MicroLabBox, or to an expansion box (for example, PX10 with DS814 link board, AutoBox with DS1007 PPC Processor Board).		
Illustration			
Connector	RJ45 jack	Galvanic isolation	RJ45 jack
Label on the cable	HSL_PATCH_300V		
Length	4.5 m (177.2 in.)		
Electrical characteristics	Electrically safe up to 300 V DC/AC_{RMS} and 600 V_{peak}[2]		
Operating temperature	-40 … +85 °C (-40 … +185 °F)		
Max. transfer rate	100 Mbit/s [3]		

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

[2] The voltage levels relate to secondary circuits without direct electrical connection to the AC mains.

[3] In exceptional cases, auto-negotiation of connected Gigabit devices (e.g., the host PC) does not lead to a stable Ethernet connection. To solve the problem, manually reduce the Ethernet transfer rate of the host PC to 100 Mbit/s.

Related topics

HowTos

How to Connect an ECU with XCP on Ethernet (UDP/IP) to the Host PC.....48

FlexRay Connection Cables

Where to go from here

Information in this section

FR_CAB1 FlexRay Interface Cable for a MicroAutoBox II.....160
The FR_CAB1 FlexRay Interface Cable can be used to connect FlexRay bus lines to the MicroAutoBox II 1401/1507 if it has DS4340 modules.

FR_CAB1 FlexRay Interface Cable for a MicroAutoBox II

Technical data

The following table shows the technical specifications of the FR_CAB1 FlexRay interface cable:

Parameter	Specification[1]		
Purpose	The FR_CAB1 FlexRay Interface Cable can be used to connect FlexRay bus lines to a MicroAutoBox II 1401/1507 if it has DS4340 modules. To connect FlexRay bus lines to the DS4505 Interface Board, use the FR_CAB2 FlexRay Interface Cable for DS4505 with crimped male contacts.		
Illustration			
Connector	5 crimped female contacts for Sub-D connector	–	Two 9-pin Sub-D connectors, one male, one female
Label on the cable	FR_CAB1		
Length	1 m (39.4 in.)		
Operating temperature	0 … +70 °C (+32 … +158 °F)		

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

The following table shows the assignments of the signals to the connectors of the FlexRay Interface Cable.

Label on the Identification Ring	Color	Signal	Female 9-pin Sub-D Connector	Male 9-pin Sub-D Connector
1	Pink	BP[1)]	7	-
2	Green	BM[1)]	2	-
3	Pink	BP_FT[2)]	-	7
4	Green	BM_FT[2)]	-	2
5	Black	GND	3	3

1) The wires of BP and BM signals are twisted.
2) The wires of BP_FT and BM_FT signals are twisted.

Related topics

References

FR_CAB2 FlexRay Interface Cable for DS4505 161

FR_CAB2 FlexRay Interface Cable for DS4505

Technical data

The following table shows the technical specifications of the FR_CAB2 FlexRay interface cable:

Parameter	Specification[1)]		
Purpose	The FR_CAB2 FlexRay Interface Cable can be used to connect FlexRay bus lines to the DS4505 Interface Board. To connect FlexRay bus lines to a MicroAutoBox II, use the FR_CAB1 FlexRay Interface Cable for a MicroAutoBox II with crimped female contacts.		
Illustration			
Connector	5 crimped male contacts for Sub-D connector	–	Two 9-pin Sub-D connectors, one male, one female
Label on the cable	FR_CAB2		

Parameter	Specification[1)]
Length	1 m (39.4 in.)
Operating temperature	0 … +70 °C (+32 … +158 °F)

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

The following table shows the assignments of the signals to the connectors of the FlexRay Interface Cable.

Label on the Identification Ring	Color	Signal	Female 9-pin Sub-D Connector	Male 9-pin Sub-D Connector
1	Pink	BP[1)]	7	-
2	Green	BM[1)]	2	-
3	Pink	BP_FT[2)]	-	7
4	Green	BM_FT[2)]	-	2
5	Black	GND	3	3

1) The wires of BP and BM signals are twisted.
2) The wires of BP_FT and BM_FT signals are twisted.

Related topics

References

FR_CAB1 FlexRay Interface Cable for a MicroAutoBox II..... 160

FR_CAB3 FlexRay Interface Cable for a MicroAutoBox II/III

Technical data

The following table shows the technical specifications of the FR_CAB3 FlexRay interface cable:

Parameter	Specification [1]		
Purpose	The FR_CAB3 FlexRay Interface Cable can be used to connect FlexRay bus lines to a ZIF I/O connector of a MicroAutoBox II/III.		
Illustration			
Connector	5 crimped contacts for ZIF connector	–	Two 9-pin Sub-D connectors, one male, one female
Label on the cable	FR_CAB3		
Length	1 m (39.4 in.)		
Operating temperature	0 … +70 °C (+32 … +158 °F)		

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

The following table shows the assignments of the signals to the connectors of the FlexRay Interface Cable.

Label on the Identification Ring	Color	Signal	Female 9-pin Sub-D Connector	Male 9-pin Sub-D Connector
1	Pink	BP[1]	7	-
2	Green	BM[1]	2	-
3	Pink	BP_FT[2]	-	7
4	Green	BM_FT[2]	-	2
5	Black	GND	3	3

[1] The wires of BP and BM signals are twisted.
[2] The wires of BP_FT and BM_FT signals are twisted.

LVDS Link Cables

Where to go from here

Information in this section

LVDS_CAB2 LVDS Link Cable

Technical data

The following table shows the technical specifications of the LVDS_CAB2 LVDS link cable:

Parameter	Specification[1)]		
Purpose	To connect two devices with LEMO-1S connectors via LVDS.		
Illustration			
Connector	LEMO-1S, 4 pins (2 male, 2 female)	–	LEMO-1S, 4 pins (2 male, 2 female)
Label on the cable	LVDS_CAB2		
Length	5.0 m (197 in.)		
Operating temperature	–20 … +60 °C (–4 … +140 °F)		

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

Related topics

HowTos

LVDS_CAB3 LVDS Link Cable

Technical data

The following table shows the technical specifications of the LVDS_CAB3 LVDS link cable:

Parameter	Specification[1]		
Purpose	To connect two devices with LEMO-1S connectors via LVDS.		
Illustration			
Connector	LEMO-1S, 4 pins (2 male, 2 female)	–	LEMO-1S, 4 pins (2 male, 2 female)
Label on the cable	LVDS_CAB3		
Length	5.0 m (197 in.)		
Operating temperature	–40 … +150 °C (–40 … +302 °F)		

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

Related topics

HowTos

How to Connect a DS4121 to an ECU with POD 65
How to Connect a MicroAutoBox II to an ECU with POD 80

LVDS_CAB14 LVDS-Ethernet Link Cable

Technical data

The following table shows the technical specifications of the LVDS_CAB14 LVDS-Ethernet link cable:

Parameter	Specification[1]		
Purpose	To connect a DS4121 ECU Interface Board with a device via XCP on Ethernet (UDP/IP).		
Illustration			
Connector	▪ LEMO-1S (LVDS connection) ▪ 2 open, soldered leads (power cable)		RJ45 connector

Parameter	Specification[1)]
Input voltage range	6 V ... 48 V
Label on the cable	LVDS_CAB14
Length	▪ 0.3 m (12 in) (LVDS connection) ▪ 1 m (39 in) (power cable)
Operating temperature	–20 … +60 °C (–4 … +140 °F)

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

The following table shows the pin assignment of the power cable:

Color of wire	Signal
Black	GND
Red	+

Related topics

HowTos

How to Connect a DS4121 to an ECU with DCI-GSI2 67
How to Connect a DS4121 to an ECU with XCP on Ethernet (UDP/IP) 69
How to Connect a MicroAutoBox II to an ECU with DCI-GSI2 82
How to Connect a MicroAutoBox II to an ECU with XCP on Ethernet (UDP/IP) 85

LVDS_CAB15 LVDS Link Cable

Technical data

The following table shows the technical specifications of the LVDS_CAB15 LVDS link cable:

Parameter	Specification[1)]		
Purpose	To connect two devices with LEMO-1S connectors via LVDS.		
Illustration			
Connector	LEMO-1S, 4 pins (2 male, 2 female)	–	LEMO-1S, 4 pins (2 male, 2 female)
Label on the cable	LVDS_CAB15		
Length	5.0 m (197 in.)		
Operating temperature	–40 … +85 °C (–40 … +185 °F)		

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

Related topics

HowTos

How to Connect a DS4121 to an ECU with POD....65
How to Connect a MicroAutoBox II to an ECU with POD....80

Power Supply Cables

Where to go from here

Information in this section

PWR_CAB2 Power Supply Cable....167
To supply power to a Programmable Generic Interface (PGI1).

PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation....168
To supply power to a DCI-GSI2.

PWR_CAB2 Power Supply Cable

Technical data

The following table shows the technical specifications of the PWR_CAB2 power supply cable:

Parameter	Specification[1)]		
Purpose	To supply power to a Programmable Generic Interface (PGI1).		
Illustration			
Connector	LEMO, male, 2 pins (red)		2 open, soldered leads
Label on the cable	PWR_CAB2		
Length	3.0 m (118 in)		
Operating temperature	–50 … +150 °C (–58 … +302 °F)		

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

The following table shows the pin assignment:

Color of wire	Signal
Black	GND
Red	+

PWR_CAB9 Power Supply Cable for DCI-GSI2 with Galvanic Isolation

Technical data

The following table shows the technical specifications of the PWR_CAB9 power supply cable for GSI2 with galvanic isolation (DS864-03):

Parameter	Specification[1)]		
Purpose	To supply power to a DCI-GSI2.		
Illustration			
Connector	LEMO, male, 2 pins (red)	(Galvanic isolation)	2 open, soldered leads
Label on the cable	PWR_CAB9		
Length	3.0 m (118 in) ▪ Primary 0.3 m (12 in) open ended ▪ Secondary 2.7 m (106 in) with LEMO connector		
Operating temperature	▪ Cable: –50 … +150 °C (–58 … +302 °F) ▪ Galvanic Isolation: –40 … +85 °C (–40 … +185 °F)		
Input voltage range	▪ 5 V … 36 V ▪ To facilitate quick start measurements, the cable operates down to below 4 V input voltage once started and output loaded.		
Output voltage	8.5 V typ.		
Output load	8 W max.		
Standby current	2.5 mA typ. at 12V		
Ground difference between converter's primary and secondary circuits	Up to ±25 V with output in regulation (output shuts down when range is exceeded)		
Protection	▪ Overvoltage protection: Switched off at > 36 V ▪ Reverse battery protection up to -40 V ▪ Output short circuit protection with automatic restart ▪ Overtemperature protection with automatic restart		
Start-up time	1.5 ms typ. (with input voltage = 12 V)		

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

The following table shows the pin assignment of the power cable:

Color of wire	Signal
Black	GND
Red	+

Related topics

HowTos

How to Connect a DS4121 to an ECU with POD....65
How to Connect a MicroAutoBox II to an ECU with POD....80

USB Connection Cables

Where to go from here

Information in this section

USB_CAB4 Interface Cable with Optoisolation....170
To connect a RapidPro system used as prototyping ECU (for systems featuring voltages up to 60 V DC and 30 V AC_{RMS}) to the host PC.

USB_CAB5 PC Connection Cable....170
To connect a USB_CAB4 or USB_CAB11 interface cable to a free USB (type A) jack on your host PC.

USB_CAB11 Interface Cable with Optoisolation....171
To connect a RapidPro system used as prototyping ECU (electrically safe up to 300 V DC/AC_{RMS} and 600 V_{peak}) to the host PC.

USB_CAB4 Interface Cable with Optoisolation

Technical data

The following table shows the technical specifications of the USB_CAB4 interface cable with optoisolation (DS861):

Parameter	Specification[1]		
Purpose	To connect a RapidPro system used as prototyping ECU (for systems featuring voltages up to 60 V DC and 30 V AC_{RMS}) to the host PC. [2] **Note** For RapidPro systems: You need the USB_CAB5 cable with its USB plug to connect the RapidPro system to a free USB (type A) jack on your host PC.		
Illustration			
Connector	LEMO-1B, male, 4 pins (blue)	(Optoisolation)	LEMO-1B, male, 4 pins (green)
Label on the cable	USB_CAB4		
Length	3.5 m (138 in)		
Electrical characteristics	For systems featuring voltages up to 60 V DC and 42.4 V AC_{peak}		
Operating temperature	▪ Cable: –50 … +150 °C (–58 … +302 °F) ▪ Optoisolation: –40 … +85 °C (–40 … +185 °F)		

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

[2] For RapidPro systems: If the system is used as a prototyping ECU, the Control Unit must be equipped with the COM module COM-USB-PI 1/1 (DS1607).

USB_CAB5 PC Connection Cable

Technical data

The following table shows the technical specifications of the USB_CAB5 PC connection cable:

Parameter	Specification[1]		
Purpose	To connect a USB_CAB4 or USB_CAB11 interface cable to a free USB (type A) jack on your host PC.		
Illustration			
Connector	USB, 4 pins		LEMO-1B, female, 4 pins (blue)

Parameter	Specification[1]
Label on the cable	USB_CAB5
Length	0.3 m (11.8 in)
Operating temperature	–40 … +85 °C (–40 … +185 °F)

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

Related topics

References

USB_CAB11 Interface Cable with Optoisolation 171
USB_CAB4 Interface Cable with Optoisolation 170

USB_CAB11 Interface Cable with Optoisolation

Technical data

The following table shows the technical specifications of the USB_CAB11 interface cable with optoisolation:

Parameter	Specification[1]		
Purpose	To connect a RapidPro system used as prototyping ECU (electrically safe up to 300 V DC/AC_{RMS} and 600 V_{peak}) to the host PC.[2].		
	Note For RapidPro systems: You need the USB_CAB5 cable with its USB plug to connect the RapidPro system to a free USB (type A) jack on your host PC.		
Illustration			
Connector	LEMO-1B, male, 4 pins (blue)	(Optoisolation)	LEMO-1B, male, 4 pins (green)
Label on the cable	USB_CAB11		
Length	4.0 m (157.5 in)		
Electrical characteristics	Electrically safe up to 300 V DC/AC_{RMS} and 600 V_{peak}[3]		
Operating temperature	▪ Cable (device side): –50 … +150 °C (–58 … +302 °F) ▪ Optoisolation (PC side): –40 … +85 °C (–40 … +185 °F)		

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

Parameter	Specification[1)]

[2)] If the RapidPro system is used as a prototyping ECU, the Control Unit must be equipped with the COM module COM-USB-PI 1/1 (DS1607).

[3)] The voltage levels relate to secondary circuits without direct electrical connection to the AC mains.

Troubleshooting

Where to go from here

Information in this section

Problem with Ethernet Connections

No connection to the host PC due to Ethernet hardware

Description Ethernet hardware (such as cables or switches) that does not support the Gigabit transfer rate of 1 Gbit/s might cause this problem. In exceptional cases, autonegotiation does not lead to a stable Ethernet connection.

Remedy Manually reduce the transfer rate of one Ethernet device (e.g., the host PC) to an Ethernet transfer rate of 100 Mbit/s.

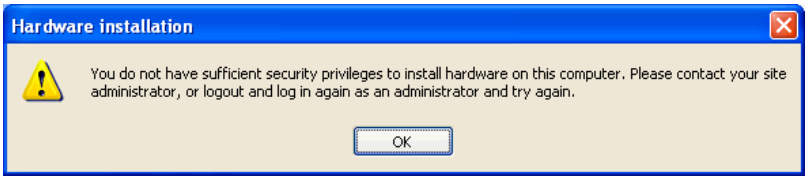
Problems When Connecting dSPACE ECU Interfaces via USB

Problem when connecting dSPACE ECU interfaces via USB

Description The first time you connect USB hardware from dSPACE to a particular USB port of your host PC, the Windows operating system may issue the following dialog if you have no administrator rights:

Solution To work with the connected USB hardware without administrator rights, perform the following steps:

1. Click Cancel.



2. Click OK.

Now you can work with the connected USB hardware without administrator rights.

Problems When Connecting the DCI-GSI2 via Ethernet

Introduction

When you work with a DCI-GSI2, the following problems may occur due to Ethernet problems.

IP address unknown

If you do not know the current IP address of your DCI-GSI2, you can use its serial number to set the IP address to the required one.

For instructions, refer to How to Change the IP Address of a DCI-GSI2 Manually on page 119.

Wrong IP address

The IP addresses of the DCI-GSI2 and network, or the DCI-GSI2 and host PC (for peer-to-peer connection), must adhere to the following rules:

- The network part of the IP address must be identical on both systems. Only the workstation part can differ. For details, refer to a definition of IP address classes.
- The IP address of each node must be unique within the network.
- The IP address must not be one of the reserved loopback addresses from 127.0.0.0 to 127.255.255.255.

Changing connected DCI-GSI2 with an identical IP address

If you replace a connected DCI-GSI2 to a DCI-GSI2 with an identical IP address it can take a few minutes to connect the host PC to this DCI-GSI2. This is caused by invalid Ethernet address cache entries on your host PC.

Error message

Pinging 192.168.140.2 with 32 bytes of data:

Request timed out

This error message can appear when you set up a peer-to-peer connection.

Perform the following checks to solve the problem:

- Check whether the network adapter of the host PC has been installed and configured correctly.
- Check the IP address of the host PC.
- Check whether the DCI-GSI2 is configured to a wrong IP address: see How to Change the IP Address of a DCI-GSI2 Manually on page 119.

Related topics

HowTos

How to Change the IP Address of a DCI-GSI2 Manually..... 119

Problems When Setting Up the TCP/IP Protocol

Troubleshooting

When you check the installation of the TCP/IP protocol with the `ping` command, the following error messages may occur.

Error Message	Reason	Solution
Bad command or file name	The TCP/IP protocol has not been installed properly.	Install the TCP/IP protocol again.

Error Message	Reason	Solution
The name specified is not recognized as an internal or external command, operable program or batch file	The TCP/IP protocol has not been installed properly.	Install the TCP/IP protocol again.
Unable to contact IP driver, error code x found.	The TCP/IP protocol has not been installed properly.	Install the TCP/IP protocol again.
Pinging 127.0.0.1 with x bytes of data: Request timed out	The TCP/IP protocol has not been configured properly.	Check the configuration of the TCP/IP protocol. If you are uncertain, ask your system administrator.

Related topics

HowTos

How to Set up the TCP/IP Protocol of the Host PC Network Adapter..... 114

Getting Further Support

Getting further support

Support Knowledge Base If the information in this section does not help you to solve the problem, check the Support Knowledge Base on our website. See http://www.dspace.com/go/kb.

dSPACE Support If self-help does not help you to solve the problem, contact dSPACE Support and provide information about your dSPACE environment and the problems you have. It is recommended to use the support request form provided on the website at http://www.dspace.com/go/supportrequest. However, you can also send an e-mail or phone us.

Glossary

Introduction

Briefly explains the most important expressions and naming conventions used in the ECU interfaces hardware installation and configuration documentation.

Where to go from here

Information in this section

C

CCP Abbreviation of CAN Calibration Protocol. This protocol can be implemented on electronic control units (ECUs) and allows users to access ECUs with measurement and calibration systems (MCS) such as ControlDesk.

D

DCI-CAN/LIN1 A dSPACE-specific interface between the host PC and the CAN/CAN FD bus and/or LIN bus. The DCI-CAN/LIN1 transfers messages between the CAN-/LIN-based devices and the host PC via the universal serial bus (USB).

DCI-CAN2 A dSPACE-specific interface between the host PC and the CAN bus. The DCI-CAN2 transfers CAN and CAN FD messages between the CAN-based devices and the host PC via the universal serial bus (USB).

DCI-GSI2 A dSPACE-specific interface between the on-chip debug interface of an ECU's microcontroller and the host PC and/or dSPACE real-time hardware. It can be used for ECU calibration, measurement, ECU flash programming and external ECU interfacing such as function bypassing.

DCI-KLine1 Abbreviation of *dSPACE Communication Interface - K-Line Interface*. A dSPACE-specific interface between the host PC and the diagnostics bus via K-Line.

E

ECU Abbreviation of *electronic control unit*.

ECU with CCP An ECU on which a CCP service is implemented.

ECU with DCI-GSI2 An ECU on which a DCI-GSI2 is mounted.

ECU with XCP on CAN An ECU on which an XCP service is implemented. The transport layer is *XCP on CAN*.

ECU with XCP on Ethernet (UDP/IP) An ECU on which an XCP service is implemented. The transport layer is *XCP on Ethernet (UDP/IP)*.

ECU with XCP on FlexRay An ECU on which an XCP service is implemented. The transport layer is *XCP on FlexRay*.

X

XCP Abbreviation of *Universal Measurement and Calibration Protocol*. A protocol that is implemented on electronic control units (ECUs) and provides access to ECUs with measurement and calibration systems (MCS) such as ControlDesk. The "X" stands for the physical layers for communication between the ECU and the MCS, such as CAN (Controller Area Network) and Ethernet.

C

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U

W

X