ES5300.1-A Housing

User's Guide

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1 Introduction

This chapter contains information on the following topics:

- "Basic Safety Instructions" on page 7
- "Identifications on the Product" on page 15
- "CE Marking" on page 15
- "KC Mark" on page 15
- "RoHS Conformity" on page 16
- "Taking the Product Back and Recycling" on page 16
- "Materials Subject to Declaration" on page 16
- "About This Manual" on page 17

1.1 Basic Safety Instructions

Please adhere to the safety instructions in this manuals to avoid injury to yourself and others as well as damage to the device.

1.1.1 Labeling of Safety Instructions

The safety instructions contained in this manual are shown with the standard danger symbol shown below:

The following safety instructions are used. They provide extremely important information. Please read this information carefully.

CAUTION!

indicates a low-risk danger which could result in minor or less serious injury or damage if not avoided.

WARNING!

indicates a possible medium-risk danger which could lead to serious or even fatal injuries if not avoided.

DANGER!

indicates a high-risk, immediate danger which could lead to serious or even fatal injuries if not avoided.

1.1.2 General Safety Information

Please read the product safety advice as well as the following safety instructions to avoid injury to yourself and others as well as damage to the device.

Note

Please read the documentation accompanying the product (product safety advice and this User's Guide) carefully before using the product.

ETAS GmbH cannot be made liable for damage which is caused by incorrect use and handling and not adhering to the safety instructions.

1.1.3 Requirements for Users and Duties for Operators

Only install, operate and maintain the products if you have the required qualifications for and experience with them.
Incorrect operation or operation by users without sufficient qualifications may lead to injuries, death or property damage.

Note

The system integrator is responsible for the safety of systems that use the products.

General Safety at Work

The existing regulations for safety at work and accident prevention must be followed. When using these products, all applicable regulations and laws concerning their operation must be observed.

1.1.4 Intended Use

ES5300.1-A Housing

The ES5300.1-A Housing is a system housing for building a hardware-in-the-loop (HiL) test system. The ES5300-based hardware-in-the-loop test system consists of:

- A real-time PC which is part of the ES5300.1-A Housing
- Digital and analog interfaces to the ECU which can be integrated into the ES5300.1-A Housing as PCI Express, SPI or I^2C-based boards
- Load simulation for connecting to ECU output stages which can be integrated into the ES5300.1-A Housing in the form of SPI or I^2C based boards
- Battery node simulation (e.g. K15, K30, …) for connecting to the ECU which can be integrated into the ES5300.1-A Housing in the form of SPI or I^2C based boards
  - The simulation of the vehicle battery itself is not a component part of the ES5300.1-A Housing and cannot be integrated here.

The ES5300.1-A Housing must always be installed in the ETAS housing (ES4015.2 Housing 9U) intended for this purpose or a 19" rack system, and must not be operated as a stand-alone unit.

The whole ES5300-based HiL system consists of a real-time computer, which is part of the ES5300.1-A Housing, and one or more plug-in boards. The plug-in boards provide the connected ECU with analog and/or digital interfaces, as well as the simulation of loads and battery nodes.

ES5370.1 Carrier Board PCI Express x16 socket, GEN1/2 x1 Link

The ES5370.1 is a plug-in board for the ES5300 system housing. The ES5370.1 must only ever be used in the ETAS ES5300 system housing intended for this purpose and must not be operated as a stand-alone unit.

The ES5370.1 is a carrier board that is designed for accommodating the ES5340.1, ES5340.2 and ES5335.1 PCI Express boards and third party hardware that has been approved by ETAS for the ES5370.1.

The intended use of the products is as follows:

- Use as a component in industrial lab equipment or at industrial workplaces
- Use as a hardware interface for ECUs in a hardware-in-the-loop test system
- Use in conjunction with ETAS software that supports the ES5300.1-A Housing and the ES5300.1-B Housing
- Use as an interface in conjunction with software programs that operate the standardized, documented and open APIs from ETAS software products

The products are **not** intended for the following:

- Use within on-road vehicles
- Use as part of a life support system
- Use as part of a medical application
- Applications in which misuse may result in injury or damage
- Use in environments in which conditions prevail that fall outside the specified ranges (see "Environmental Conditions" on page 70)
- Use with signal conditioning that falls outside the specified ranges

Requirements for the Technical State of the Products

The products reflect the state of the art and comply with recognized safety rules. The products must only be operated in a technically flawless state, in accordance with their intended purpose and in a safety-conscious and hazard-aware manner under consideration of the documentation regarding each product. If the products are not used in accordance with their intended purpose, their product safety may be impaired.

In order to operate the ES5300.1-A Housing and the ES5300.1-B Housing safely, you must observe the section "Safety Instructions" on page 39.

Requirements for Operation

- Only use the products in accordance with the specifications in the corresponding User's Guides. If the products are used in any other way, product safety is no longer ensured.
- Do not use the products in a wet or damp environment.
- Do not use the products in potentially explosive atmospheres.
- Keep the surfaces of the products clean and dry.

1.1.5 Transport and Installation

Transport

CAUTION!

The ES5300.1-A Housing weighs at least 20.5 kg. Only lift or carry the transport box or the housing with two people.

CAUTION!

The ES5300.1-A Housing and the ES5300.1-B Housing together weigh at least 30 kg. Only lift and carry the transport box or the housing with two persons or using a lifting device.

Installation

CAUTION!

Danger of falling parts!
The rail guides on the 19" rack system must be specified for double the total weight (A Housing or B Housing + fitted plug-in boards). Only use rail guides that are designed to hold at least 100 kg per pair. If the rail guides are designed for too light a weight, they could bend or break.

CAUTION!

In order to prevent damage to the plug-in boards and the LABCAR housing, and thereby also avoid damage to property or health, observe the installation instructions and information contained in the relevant User's Guides.

CAUTION!

Some components of the ES5370.1 Carrier Board may be damaged or destroyed by electrostatic discharges. Leave the plug-in board in its transport packaging until it is installed. Only remove, configure and install the product at a workplace that is protected against electrostatic discharges.

Requirements for the Installation Location

WARNING!

This is class A equipment. This equipment can cause radio interference in residential areas. Should that be the case, the operator may be requested to institute reasonable measures.

Callibration

CAUTION!

If cards (e.g. for startup or calibration) are unlocked but not completely removed from the housing, they must be pulled out far enough that the distance between the respective card and the backplane of the housing is at least 1 cm.
Otherwise, contacts may be established between the cards and lead to their destruction.

Ventilation

When operating the ES5300.1-A Housing and the ES5300.1-B Housing in its casing, please observe the following points:

- The enclosure and particularly the ventilation openings must have a distance to walls or objects in the environment of at least 15 cm.
- Leave the enclosure open at the rear.

When operating the ES5300.1-A Housing and the ES5300.1-B Housing in the 19" rack, please observe the following points:

- The ventilation openings must have a distance to walls or objects in the environment of at least 15 cm. Keep a distance of at least 44.5 mm (1 RU) from the next module at the top and bottom.
- The ambient temperature in the rack must not exceed the maximum value of 40 °C/104 °F.

CAUTION!

The six right-hand slots (above the PC power supply unit) are cooled by one fan only. Do not insert any boards with high heat development into these slots.

CAUTION!

The air circulation inside the ES5300.1-A Housing and the ES5300.1-B Housing can be ensured only if all free slots are covered with front plates. Otherwise, it may lead to overtemperatures and trip the overtemperature protection of the ES5300.1-A or the ES5300.1-B. For this reason, install front plates in all free slots!

1.1.6 Electrical Safety and Power Supply

Observe the regulations applicable at the operating location concerning electrical safety as well as the laws and regulations concerning work safety!

Safety Concept:

The power supply unit of the ES5300.1-A has safety features that protect against short-circuiting, overload, overvoltage and overcurrent. In addition, it is fitted with an internal safety fuse; however, this cannot be replaced by the user.

WARNING!

Fire hazard!
Only use fuses for the ES5370.1 Carrier Board that comply with the specification in the ES5300.1-A User's Guide. Never bridge defective fuses!

Grounding/Grounding Contact

DANGER!

Risk of electric shock!

- The grounding of the overall system is implemented via the PE conductor of the power supply cord. If no proper grounding via the PE conductor is available, housing components that can be touched could be live. For this reason, it must be ensured that the power cable features correctly connected grounding contacts! If this cannot be ensured, connect a ground to the PE terminal on the rear housing side of the ES5300.1-A in addition.

- The PE star point for the ES5300.1-A / ES5300.1-B Housing is in the drawer in the ES5300.1-A Housing. The PE star point must be secured using 0.8 Nm torque. If the PE star point is connected too loosely, there is no guarantee that grounding will provide reliable protection.

Failure to observe these instructions can lead to serious or fatal injury.

For additional information see also "Grounding/Protective Contact" on page 40.

To check the connections of the PE conductors after assembling ES5300.1-A and ES5300.1-B:

1. After assembling both housings, check the electrical connections of all PE conductors between the star point and the PE contacts on the interior of the front doors on the ES5300.1-A Housing and the ES5300.1-B Housing.
2. Check the mechanical connections and the installation of all PE conductors (visual check).
3. Document the results of your check.

Power Supply Cord

The respective requirements for the power supply cord, which vary according to regional differences in the power supply, and the ETAS order number can be found in the ES5300.1-A User's Guide. To avoid injuries and damage to hardware, please only use the power supply cord specified here (see "Power Cables" on page 37).

Use only primary power cables in accordance with IEC 60320 with C13 plug at one end and non-locking plug approved according to national safety standards at the other end. Plug and cable must be rated for at least 250 VAC/10 A or 125 VAC/15 A.

Power Supply to the ES5370.1

The product is powered by the ES5300.1-A Housing or the ES5300.1-B Housing via the PCIe Backplane Connector.

Supply Voltage Disconnect Device

The switch next to the power supply plug on the ES5300.1-A acts as a supply voltage disconnect device for the ES5300.1-A and the ES5300.1-B.

Disconnect the ES5300.1-A Housing from the supply during a thunderstorm or install corresponding protective devices!

The power supply cord must be easy to access. It must not be longer than 3 m.

De-Energizing the ES5370.1

Switch off the ES5300.1-A Housing, the ES5300.1-B Housing and external power supplies, and unplug the power plug and other connectors attached to the plug-in board. Wait at least three minutes before removing the plug-in board.

Connecting Cables

WARNING!

Fire hazard!
Use only approved cables for creating cable assemblies (e.g. for connecting the ECU and external loads). The cables used must, in particular, be suitable for the currents, voltages and temperatures which occur and must be flameretardant in accordance with one of the following standards
IEC 60332-1-2, IEC 60332-2-2, UL 2556/UL1581VW-1!

Insulation Requirements for Lab Power Supplies to Circuits Connected to the HiL System:

- The power supply to live circuitry must be safely isolated from the supply voltage. For example, use a car battery or a suitable lab power supply.
- Only use lab power supplies with dual protection for the supply network (with double/reinforced insulation (DI/RI)). This requirement is met by lab power supplies that comply with IEC/EN 60950 or IEC/EN 61010.
- The lab power supply must be approved for use at a height of 2000 m and in ambient temperatures of up to 40 °C.

Connecting/Disconnecting Devices

To avoid injuries and hardware damages, please observe the following precautionary measures:

- Do not apply any voltages to the ports of the ES5300.1-A Housing or the ES5300.1-B Housing that do not comply with the specifications of the port in question. The exact specification of the I/O hardware is located in the User's Guides of the corresponding plug-in boards.
- Do not connect or disconnect any devices while the ES5300.1-A Housing, the ES5300.1-B Housing or connected devices are switched on.
  First, switch off the ES5300.1-A Housing by shutting down the real-time PC and by activating the On/Off switch at the rear and unplug the power cable.
- When plugging in connectors, ensure that they are inserted straight and no pins are bent.

Opening the Housing

The ES5300.1-A Housing must only be opened by qualified technical personnel!

DANGER!

Risk of electric shock!
The ES5300.1-A Housing and the ES5300.1-B Housing must only be opened by qualified technical personnel. If the ES5300.1-A Housing and the ES5300.1-B Housing are not completely disconnected from the supply system, there is a risk of electric shock.
Break the connection to the supply system by switching it off and removing the power cable – wait at least three minutes until all of the components (e.g. power supply unit, capacitors) have been discharged.

1.1.7 Cleaning

ES5300.1-A and ES5300.1-B

Before cleaning any parts of the housing, disconnect the power cable. Clean the device only with a dry cloth. Do not use any cleaning agents or solvents!
Clean the filter of the rear ventilation opening on the ES5300.1-A once per year (see "Removing and Cleaning the Filter Mat" on page 59).

ES5370.1

The product is not expected to require cleaning.

1.1.8 Maintenance

The products do not require any separate maintenance by the user.

1.1.9 Repairs

If an ETAS hardware product needs to be repaired, return the product to ETAS.

If the power supply unit of the ES5300.1-A is defective, you can remove the drawer of the real-time PC (see "Opening/Removing the Real-Time PC Drawer" in the ES5300.1-A User's Guide) and send it to ETAS to be repaired.

CAUTION!

In order to avoid damage to property and personal injury, the drawer must only be removed by ETAS-trained specialist personnel. You must observe the safety instructions in the section "Before You Start" on page 39.

1.2 Identifications on the Product

The following symbols are used for identifying the product:

Symbol	Description
	Before using the product, carefully read the user's guide!
CE	Identification for CE (see "CE Marking" on page 15)
KC	Marking for KCC conformity (see "KC Mark" on page 15
	Identification for China RoHS (see "RoHS Conformity" on page 16)
	Identification for WEEE directive (see "Taking the Product Back and Recycling" on page 16)

Observe the information in chapter "Technical Data" on page 67.

1.2.1 CE Marking

ETAS confirms that the product meets the product-specific applicable European Directives with the CE marking affixed to the product or its packaging. The CE Declaration of Conformity for the product is available upon request.

1.2.2 KC Mark

With the KC mark attached to the product and its packaging, ETAS confirms that the product has been registered in accordance with the product-specific KCC guidelines of the Republic of Korea.

1.2.3 RoHS Conformity

European Union

The EU Directive 2011/65/EU limits the use of certain dangerous materials for electrical and electronic devices (RoHS conformity).

ETAS confirms that the product corresponds to this directive which is applicable in the European Union.

China

ETAS confirms that the product meets the product-specific applicable guidelines of the China RoHS (Management Methods for Controlling Pollution Caused by Electronic Information Products Regulation) applicable in China with the China RoHS marking affixed to the product or its packaging.

The concluding chapter "ETAS Contacts" gives you information about the international ETAS sales and service branch offices.

1.3 Taking the Product Back and Recycling

The European Union has passed a directive called Waste Electrical and Electronic Equipment, or WEEE for short, to ensure that systems are set up throughout the EU for the collection, treatment and recycling of electronic waste.

This ensures that the devices are recycled in a resource-saving way representing no danger to health or the environment.

Fig. 1-1 WEEE Symbol

The WEEE symbol on the product or its packaging shows that the product must not be disposed of as residual garbage.

The user is obliged to collect the old devices separately and return them to the WEEE take-back system for recycling.

The WEEE Directive concerns all ETAS devices but not external cables or batteries.

For more information on the ETAS GmbH Recycling Program, contact the ETAS sales and service locations (see "ETAS Contact Addresses" on page 73).

1.4 Materials Subject to Declaration

Some products from ETAS GmbH (e.g. modules, boards, cables) use components with materials that are subject to declaration in accordance with the REACH regulation (EC) no.1907/2006.
Detailed information is located in the ETAS download center in the customer information "REACH Declaration" < www.etas.com/Reach >. This information is continuously being updated.

1.5 About This Manual

This manual consists of the following chapters:

- "Introduction" on page 7

  This chapter
- "Features and Functions" on page 19

  This chapter contains an overview of the features and functions of the components of the ES5300.1-A Housing.
- "Configuration and Operation" on page 39

  This chapter contains information on connecting, configuring and operating the ES5300.1-A Housing.
- "Pin Assignment and Connections" on page 61

  This chapter describes the various connections of the ES5300.1-A Housing.
- "Technical Data" on page 67

  This chapter contains the technical data on the ES5300.1-A Housing.

1.5.1 Using This Manual

Representation of Information

All activities to be carried out by the user are shown in what we call a "Use-Case" format, i.e. the target to be achieved is defined briefly in the title and the individual steps necessary to achieve this target are then listed. The information is displayed as follows:

Target definition

Any introductory information...

1. Step 1

   Possibly an explanation of step 1...
2. Step 2

   Possibly an explanation of step 2...

Any concluding remarks...

Concrete example:

To create a new file

If you want to create a new file, no other file may be open.

1. Select **File** → **New**.

   The "Create file" dialog box appears.
2. Enter a name for the file in the "File name" field.

   The file name must not exceed 8 characters.
3. Click **OK**.

The new file is created and saved under the name specified. You can now work with the file.

Typographic Conventions

The following typographic conventions are used:

Select **File** → **Open**.	Menu commands are shown in boldface/ blue.
Click **OK**.	Buttons are shown in boldface/blue.
Press <ENTER>.	Keyboard commands are shown in angled brackets in block capitals.
The "Open File" dialog box appears.	Names of program windows, dialog boxes, fields etc. are shown in quotation marks.
Select the file `setup.exe`.	Text in drop-down lists, program code, as well as path and file names are shown in the `Courier` font.
A conversion between the file types logical and arithmetic is *not* possible.	Content markings and newly introduced terms are shown in *italics*

Important notes for the user are shown as follows:

Note

Important note for the user.

2 Features and Functions

This chapter contains an overview of the features and functions of the components of the ES5300.1-A Housing.

In particular these are:

- "Overview" on page 20
- "Front Panel" on page 21
  - "Connection Modules for the Breakout Box" on page 22
  - "Control Panel" on page 22
- "Backplane" on page 23
  - "Supported Interfaces" on page 23
  - "Backplane Connectors" on page 24
  - "Connections between the Backplane and the Real-Time PC" on page 25
- "Slots for I/O Boards" on page 26
  - "Supported PCI Express Boards" on page 27
  - "PCI Express Carrier Board" on page 28
  - "Integrating Housings with VMEbus Boards" on page 29
- "Real-Time PC" on page 30
  - "Mainboard" on page 30
  - "LAN Ports" on page 30
  - "Hard Disk" on page 32
  - "Expansion Slots" on page 32
  - "CMOS Battery" on page 33
  - "Power Supply Unit" on page 34
- "Fans" on page 35
- "Power Supply" on page 35
  - "Specifications" on page 36
  - "Fuse Concept" on page 36

2.1 Overview

The following figures show different views of the ES5300.1-A Housing.

Fig. 2-1 Front (Top) and Rear View (Bottom) of the ES5300.1-A Housing

The housing basically consists of:

- The drawer of the Real-Time PC, the ports and slots of which can be accessed from the back (bottom 3 U[1]) – see "Real-Time PC" on page 30.
- Above this is the integrated fan unit (1 U) – see "Fans" on page 35.
- The top 4 U are intended for the 16 slots (and the corresponding backplane) into which the boards are inserted from the back – see "Slots for I/O Boards" on page 26 and "Backplane" on page 23.
- On the front, you will find the ports for the signals of the I/O boards and a control panel – see "Front Panel" on page 21.

2.2 Front Panel

On the front panel of the ES5300.1-A Housing, there are five slots for the customer-specific ports of the internal boards to the ECU or a breakout box (top) and the control panel for the Real-Time PC (bottom left).

Fig. 2-2 The Front Panel of the ES5300.1-A Housing

The front panel can be opened once the three screws at the top edge have been loosened (see page 54).

1. U = height unit (44.45 mm)

2.2.1 Connection Modules for the Breakout Box

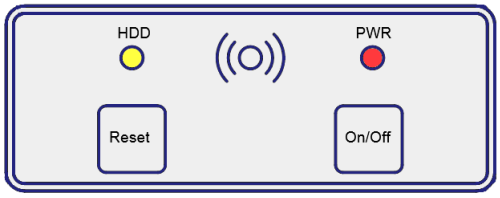
ETAS establishes the ports for connecting the installed boards to the ECU or an intermediary breakout box according to the individual project.

WARNING!

Fire hazard!
Use only approved cables for creating cable assemblies (e.g. for connecting the ECU and external loads). The cables used must, in particular, be suitable for the currents, voltages and temperatures which occur and must be flameretardant in accordance with one of the following standards
IEC 60332-1-2, IEC 60332-2-2, UL 2556/UL1581VW-1!

2.2.2 Control Panel

The control panel of the Real-Time PC is at the bottom left.



The buttons and LEDs have the following function/meaning:

- On/Off

  Powering on/booting the Real-Time PC.

  Note

  Before powering on the Real-Time PC, the power supply of the ES5300.1-A Housing (on the back at the bottom right) must be switched on. The green LED next to the switch will then light up.

- Reset

  The Real-Time PC is reset.

- PWR

  Lights up when the Real-Time PC is running

- HDD

  Shows the activity of the hard disk

There is a small loudspeaker between the two LEDs.

2.3 Backplane

The PCI Express-based backplane of the ES5300.1-A has 16 identical slots which are connected with the Real-Time PC via an PCI Express interface. Each of these slots supports the following bus interfaces.

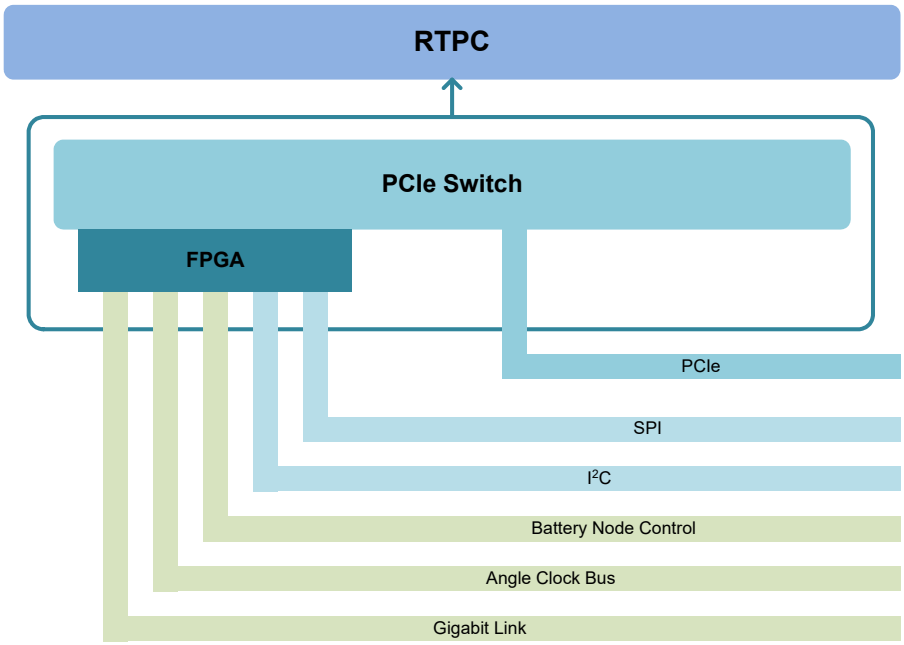


Fig. 2-3 Backplane Architecture

2.3.1 Supported Interfaces

The individual slots of the ES5300.1-A are connected with a GEN2 x4 PCI Express slot of the Real-Time PC using a PCI Express switch. A standard PCI Express x4 cord is used for the connection.

- **PCI Express GEN2 x1**
  - GEN2 x1 interface (uses x16 connector)
  - Switch Latency ~200 ns
- **SPI Bus**
  - Signals: 2 CS, MISO, MOSI, CLK
    Max. 10 MHz clock
  - Single-ended 3.3 V logic
  - Single Master
    Dedicated SPI master for every slot
- **I^2C Bus**
  - Signals: SMBCLK, SMBDAT
    Max. 400 kHz clock
  - Single-ended 3.3V logic
  - Single Master
    One master entity for all 16 slots

- **Battery node control**

  Six battery nodes [BN5..0] per slot can be controlled with the signals for battery node control. The battery node signals [BN5..0] are switched synchronously for all slots.

- **Angle clock bus**

  For synchronization between different ETAS boards and ES5300 housings.

Note

The maximum number of angle clock bus participants is 32! If ES5370.1 Carrier Boards are used, the maximum number is 7!

- **Gigabit-Link**

  The connection of master and slave board using the Gigabit-Link makes it possible for the master board to address inputs and outputs of a slave board with the typically low latencies (< 1 µs).

- The Gigabit-Link is always possible between pairs of neighboring boards (0-1, 2-3, …, 15-16). The master board is inserted into the odd slot and the slave board into the even slot.

2.3.2 Backplane Connectors

The pin assignment of the backplane connectors is detailed in the section "Backplane Connectors" on page 61.

2.3.3 Connections between the Backplane and the Real-Time PC

The backplane and Real-Time PC are connected using a PCI Express adapter (ES5305.1 PCI Express GEN2 x4 Cable Adapter for ES5300 Housing), which is inserted into an x4 PCI Express slot of the Real-Time PC and connected with the ES5300.1-A backplane using a standard-PCI Express cable.

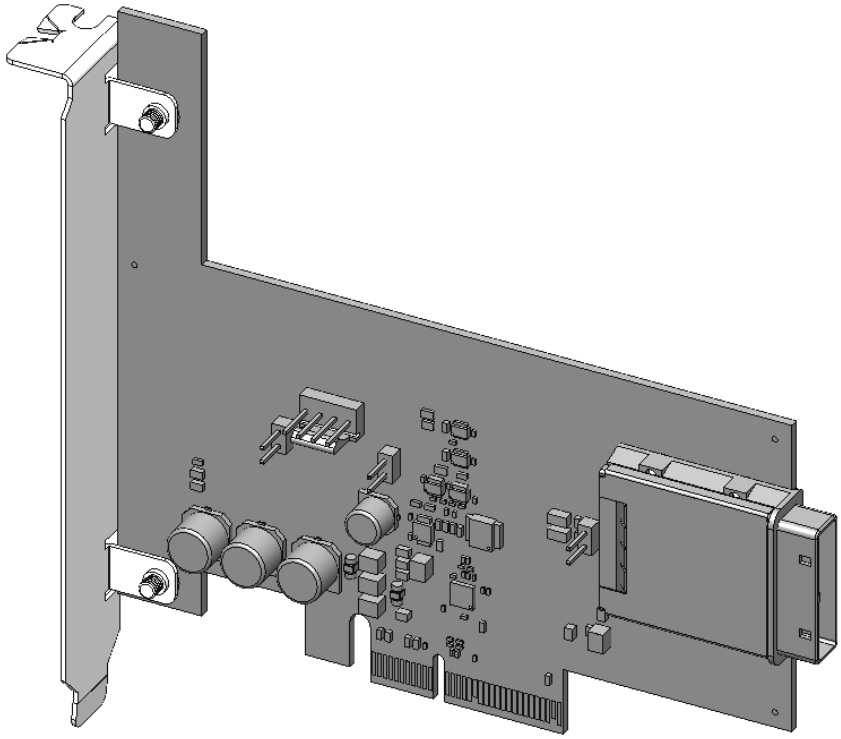


Fig. 2-4 ES5305.1 PCI Express GEN2 x4 Cable Adapter for ES5300 Housing

Note

The ports and jumpers are for internal purposes and cannot be used by the customer. The board does not need to be configured!

Note

One ES5305 each is required for the control via PCIe for the ES5300.1-A Housing and the ES5300.1-B Housing. For this purpose, 2 PCIe slots on the RTPC main board are each occupied with an ES5305.

2.4 Slots for I/O Boards

In the top part (4 U) of the ES5300.1-A Housing, there are 16 slots for accommodating various boards for signal I/O, load emulation and serial buses (see "Supported Interfaces" on page 23). Some of the boards can be inserted directly; others have to be assembled on adapters.

The slots can be accessed from the back of the device. Slot 0 is located on the left, slot 15 is located on the right.

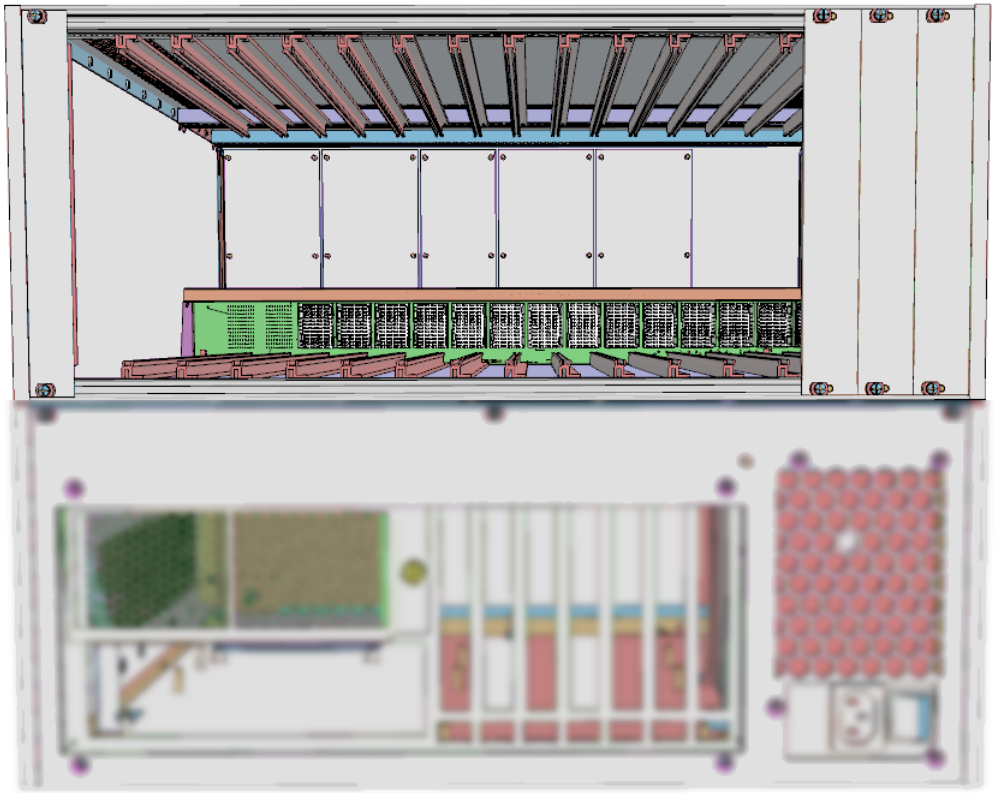


Fig. 2-5 The Slots for the Adapters

CAUTION!

The six right-hand slots (above the PC power supply unit) are cooled by one fan only. Do not insert any boards with high heat development into these slots.

CAUTION!

The air circulation inside the ES5300.1-A Housing and the ES5300.1-B Housing can be ensured only if all free slots are covered with front plates. Otherwise, it may lead to overtemperatures and trip the overtemperature protection of the ES5300.1-A or the ES5300.1-B. For this reason, install front plates in all free slots!

2.4.1 Supported PCI Express Boards

The following PCI Express boards by ETAS are supported. Other boards are added at regular intervals:

- ES5321.1/ ES5321.1 PWM I/O Board
- ES5335.1 Arbitrary Signal Generator PCIe Board
- ES5338.1 Wheel Speed Sensor Simulation Board
- ES5340.1/.2-M Electric Drive Simulation Board
- ES5340.2-ICE Internal Combustion Application Board
- ES5340.1-S Electric Drive Slave Board (Multi I/O)
- ES5350.1 Analog Board
- ES5352.1 Signal Conditioning Board
- ES5370.1 Carrier Board PCI Express x16 socket, GEN1/2 x1 Link
- ES5371.1 Carrier Board for ES4435 Load Boards
- ES5372.1 Carrier Board for ES4455 Load Boards
- ES5372.1-B 1 Slot Carrier Board for ES4455.2 and ES4456.2
- ES5385.1 Carrier Board for Resistor Cascade
- ES5392.1 High Current Switch Board
- ES5398.1 Fault Insertion Board (40-CH)
- ES5436.1 Current Source Load Board (48-CH)
- ES545X.1 Load Carrier Boards (4 -CH)

The ES5340.x boards and the ES5335.1 board must be used with the ES5370.1 Carrier Board or installed directly into the mainboard of the RTPC.

The following boards for bus communication are supported by LABCAR-OPERATOR and COSYM and can either be used with the ES5370.1 Carrier Board or be installed directly into the mainboard (Exception: Elektrobit EB5100/EB5200 PCIe FlexRay, see note below):

- Elektrobit EB5100/EB5200 PCIe FlexRay
- IXXAT CAN-IB600/PCIe (CAN und CAN-FD)
- IXXAT CAN-IB200/PCIe (CAN und LIN)
- IXXAT CAN-IB640/PCIe (CAN, CAN-FD und LIN)

Furthermore, boards can be used that correspond to the PCI Express specification and can be operated with a Gen 1/Gen 2 x1 link.

Note

Elektrobit EB5100/EB5200 PCIe FlexRay is only supported if installed into the ES5370.1 adapter. The board is not supported if it is directly installed into the mainboard.

Note

The following boards are not supported by the ES5300.1-A/B Housing even if the boards are plugged directly into the mainboard:
IXXAT iPC-I XC16/PCI
IXXAT iPC-I XC16/PCIe

Note

Contact ETAS Support or ETAS Sales for a detailed list of boards that can be used (see "ETAS Contact Addresses" on page 73).

2.4.2 PCI Express Carrier Board

The Carrier Board (ES5370.1 Carrier Board PCI Express x16 socket, GEN1/2 x1 Link) is 5 HP wide (height 4 U) and can accommodate boards of maximum length in accordance with PCI Express specifications (312 mm).

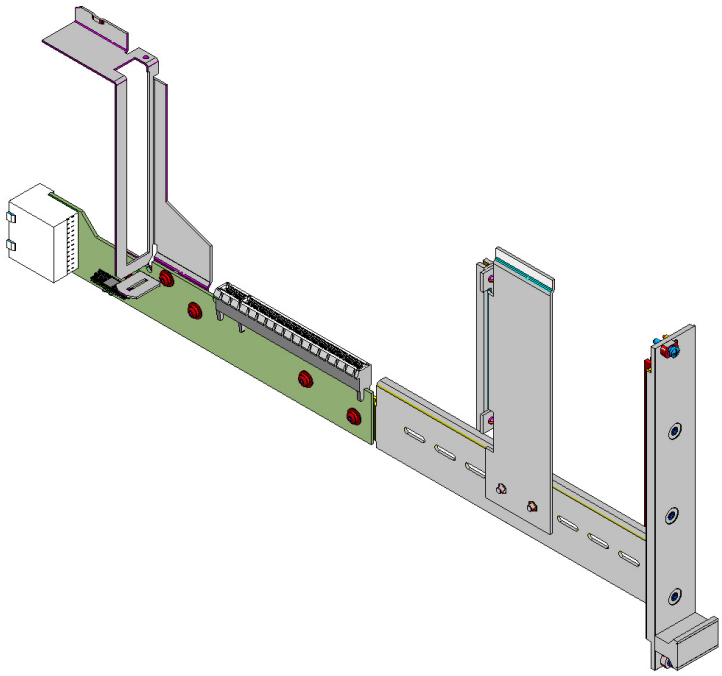


Fig. 2-6 ES5370.1 Carrier Board PCI Express x16 socket, GEN1/2 x1 Link

Refer to the section "Installing Boards" on page 46 for details of how to install a board in the carrier board.

Note

The maximum permissible voltages and currents of a PCI Express board installed in the carrier board must correspond to PCI Express specifications!

Fuses

There are two fuses on the ES5370.1 Carrier Board for the protection of the PCI Express supply voltage of 3.3 V (FU100) and 12 V (FU101).

These are specified as follows:

3 A slow-blow, Type: Littlefuse 154T SLO-BLO®, part number 154 003T

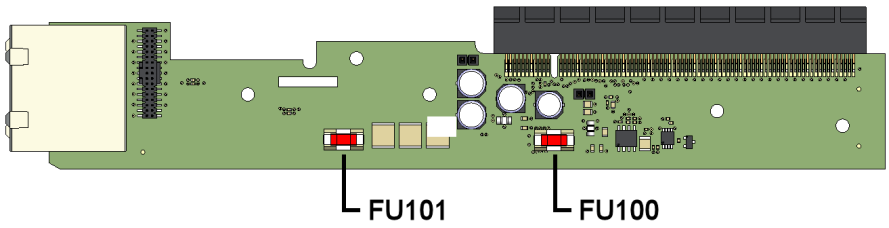


Fig. 2-7 Position of the Fuses on the ES5370.1 Carrier Board

WARNING!

Fire hazard!
Only use fuses for the ES5370.1 Carrier Board that comply with the specification in the ES5300.1-A User's Guide. Never bridge defective fuses!

2.4.3 Integrating Housings with VMEbus Boards

Via the Ethernet interface "ETH1" (see "LAN Ports" on page 30), housings with VMEbus boards (ES4100 etc.) can also be integrated into the system.

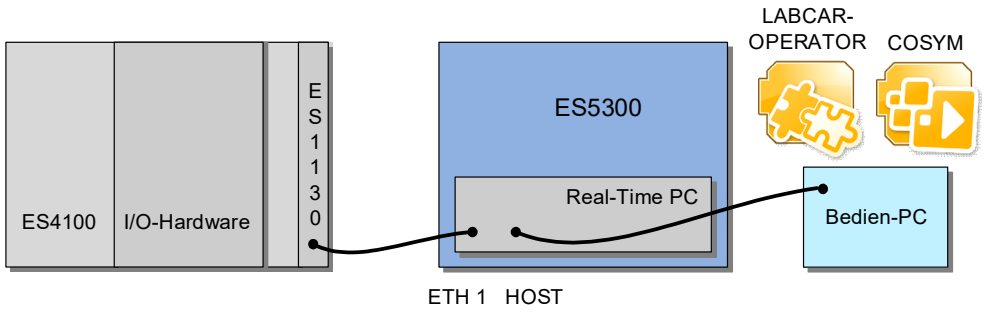


Fig. 2-8 Connection of Housings with VMEbus Boards to ETH1

Note

For connecting other ES4100 housings or other ETAS devices (e.g. ES4440, ES4408, …), the TP_4LAN_3U (LABCAR RTPC 3U 4-Port Ethernet adapter, F-00K-106-345) can be used.

2.5 Real-Time PC

The following pages describe the components of the Real-Time PC in the ES5300.1-A Housing. The Real-Time PC is below the slots and, like them, can be accessed from the back.

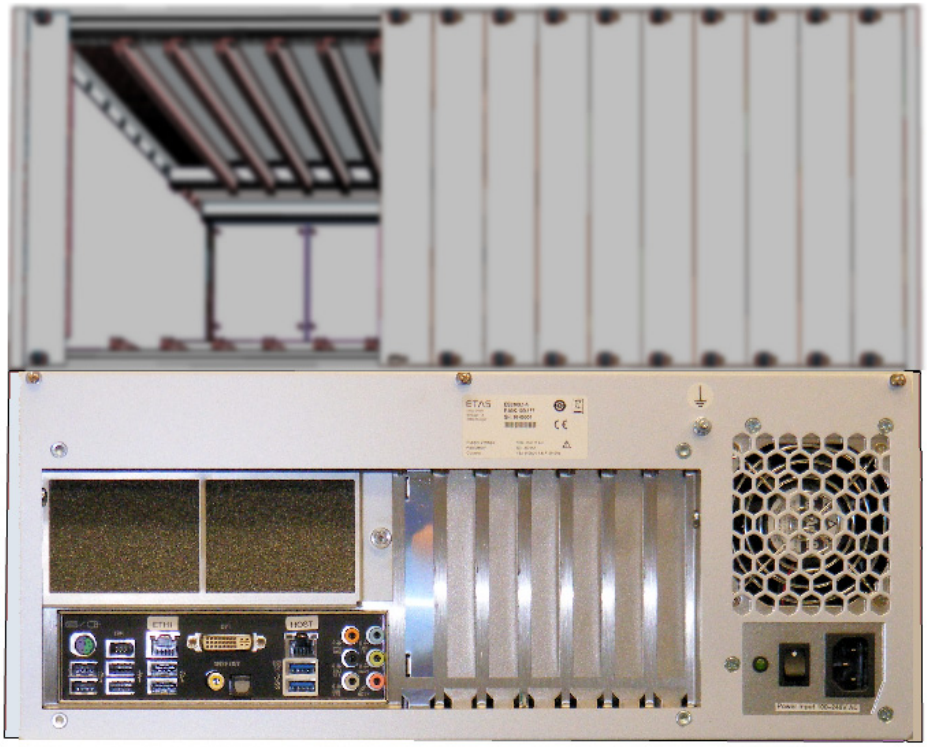


Fig. 2-9 The Real-Time PC Drawer (Bottom)

2.5.1 Mainboard

The mainboard of the Real-Time PC is either an ATX mainboard of type "ASUS® P8C WS" or an ATX mainboard of type "FUJITSU® D3348-B". The corresponding printed manual is part of the delivery scope.

2.5.2 LAN Ports

The connector panel for all peripheral devices is on the back of the Real-Time PC. The board features two Intel 82574 Gigabit Ethernet LAN adapters with the following ports:

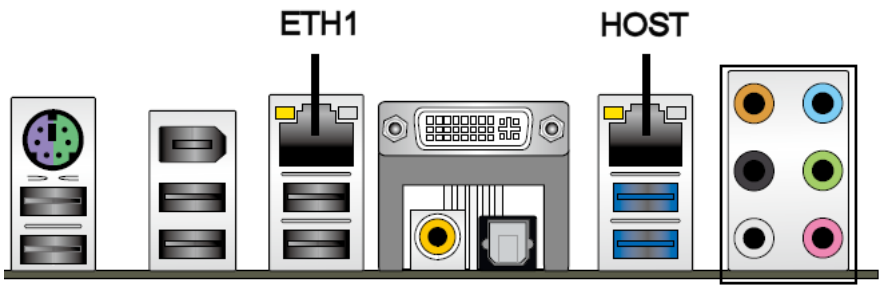


Fig. 2-10 The LAN Ports "ETH1" and "HOST" of the ASUS® P8C WS Mainboard

The LAN-Ports "ETH1" and "HOST" of the FUJITSU® D3348-B Mainboard

- **HOST**

  For connecting the user PC with the LABCAR-OPERATOR software or with the COSYM software.

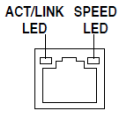
- **ETH1**

  For connecting other hardware (ES4100 via ES1130, ES4440, etc.).

Note

A 2 m long patch cable RJ45 CAT 7 (for connecting the user PC) is part of the delivery scope. If you connect a different Ethernet cable, please observe the maximum permissible length of 30 m!

The LEDs at the LAN ports of the ASUS® P8C WS mainboard indicate the following operating states:

Activity/Link LED			Speed LED	
Status	**Description**		**Status**	**Description**
Off	No connection		Off	10 Mbps connection
Orange	Connected		Orange	100 Mbps connection
Flashing	Data active		Green	1 Gbps connection

Tab. 2-1 LED Display of LAN Ports of the ASUS® P8C WS Mainboard

The LEDs at the LAN ports of the FUJITSU® D3348-B mainboard indicate the following operating states:

Left LED			Right LED	
Status	**Description**		**Status**	**Description**
Green	Connected		Off	10 Mbps connection
Flashing green	LAN connection active		Green	100 Mbps connection
			Yellow	1000 Mbps connection

Tab. 2-2 LED Display of LAN Ports of the FUJITSU® D3348-B Mainboard

2.5.3 Hard Disk

The mass storage device used is a 2.5" SATA hard disk with 500 GB capacity specially designed to cater to round-the-clock operation.

2.5.4 Expansion Slots

There are six expansion slots on the ASUS® P8C WS mainboard and seven expansion slots on the FUJITSU® D3348-B mainboard. One is used for the PCI Express-Adapter (ES5305.1 PCI Express GEN2 x4 Cable Adapter for ES5300 Housing) for x4 connection of backplane and Real-Time PC. All the others are available for further peripheral devices (e.g. for network boards for connecting an ES4440, serial interfaces, etc.).

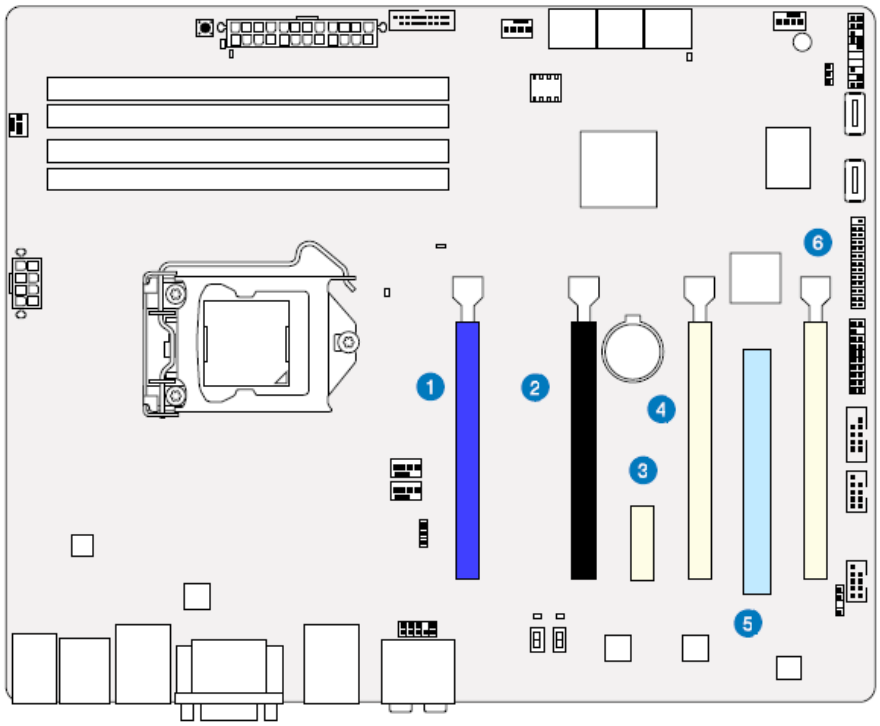


Fig. 2-11 Expansion Slots on the of the ASUS® P8C WS Mainboard

The slots on the ASUS® P8C WS mainboard are specified as follows:

Slot	Description
1 (blue)	PCIe 3.0 x16_1 (Single x16 mode or Dual x8/x8 mode)
2 (black)	PCIe 3.0 x16_2 (x8 mode)
3 (white)	PCIe 2.0 x1
4 (white)	PCIe 2.0 x16_3 (x4 mode)
5 (pale blue)	PCI 5 V 32 bit
6 (white)	PCIe 2.0 x16_4 (x4 mode) (occupied by the PCI Express adapter)

Tab. 2-3 The Slots of the Real-Time PC on the ASUS® P8C WS Mainboard

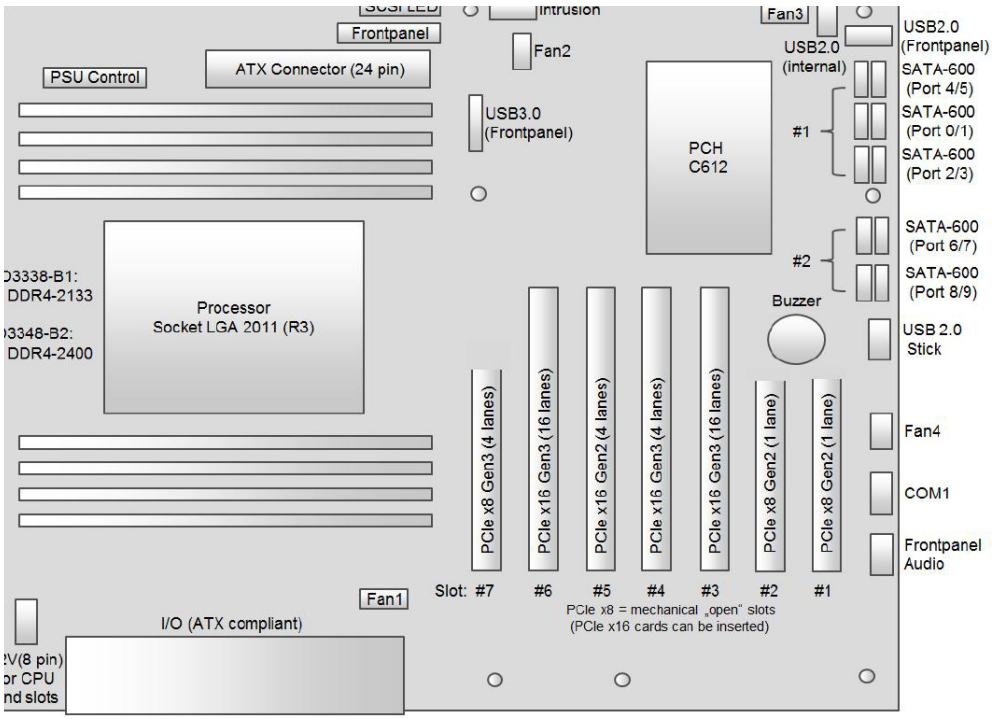


Abb. 2-12 Expansion Slots on the FUJITSU® D3348-B Mainboard

The slots on the FUJITSU® D3348-B mainboard are specified as follows:

Slot	Description
1	PCIe x8 Gen2 (1 lane)
2	PCIe x8 Gen2 (1 lane)
3	PCIe x16 Gen3 (16 lanes)
4	PCIe x16 Gen3 (4 lanes)
5	PCIe x16 Gen2 (4 lanes)
6	PCIe x16 Gen3 (16 lanes)
7	PCIe x8 Gen3 (4 lanes)

Tab. 2-4 The Slots of the Real-Time PC on the FUJITSU® D3348-B Mainboards

2.5.5 CMOS Battery

In order to permanently save the system information, a battery is installed on both, the FUJITSU® D3348-B mainboard and the ASUS® P8C WS mainboard, to provide the CMOS-memory with a current.

Mainboard	Batterietype	Position
ASUS® P8C WS	CR2032	Between slots 2 and 4
FUJITSU® D3348-B	CR2032	Next to slots 5 and 6

Tab. 2-5 Battery Types on the Mainboards

Please observe the following when the battery has to be replaced:

Note

In accordance with EU Directive 2006/66/EC, batteries and battery packs which are no longer required must be collected separately and recycled.
Batteries and battery packs which are no longer required must not be disposed of as normal household waste, but must be returned to the special collection points and made available for recycling.

2.5.6 Power Supply Unit

The power supply unit is used to supply power to, on the one hand, the Real-Time PC and, on the other, the backplane and thus the boards present in the slots.

For details on power supply, please refer to the section "Power Supply" on page 35.

Note

If the power supply unit is faulty, you can remove the Real-Time PC drawer (see "Opening/Removing the Real-Time PC Drawer" on page 53) and send it back to ETAS to be repaired.

DANGER!

Risk of electric shock!
The ES5300.1-A Housing and the ES5300.1-B Housing must only be opened by qualified technical personnel. If the ES5300.1-A Housing and the ES5300.1-B Housing are not completely disconnected from the supply system, there is a risk of electric shock.
Break the connection to the supply system by switching it off and removing the power cable – wait at least three minutes until all of the components (e.g. power supply unit, capacitors) have been discharged.

2.6 Fans

The fan unit of the ES5300.1-A Housing consists of five individual fans and is located between the board slots and the Real-Time PC drawer.

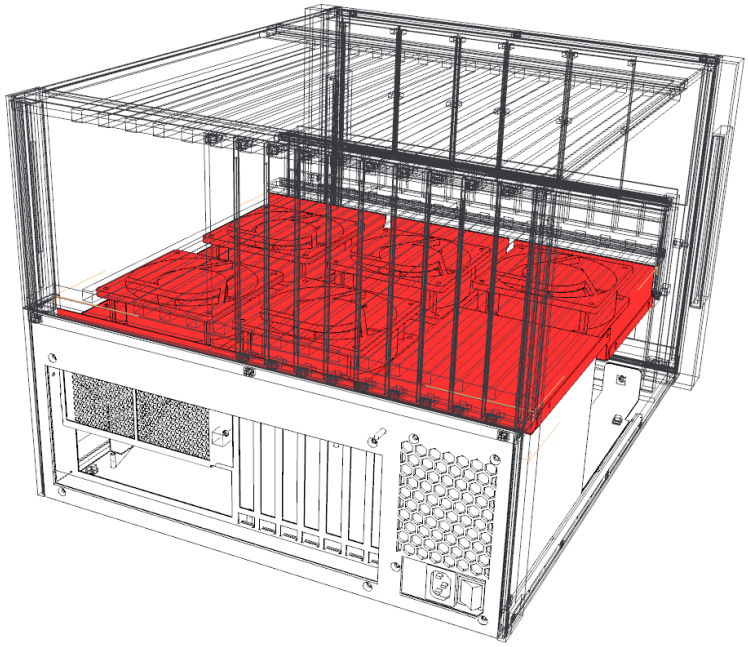


Fig. 2-13 The Fan Unit of the ES5300.1-A Housing (Red)

For the technical details of the fan unit, please refer to the section "Fan Unit" on page 70.

CAUTION!

*The six red slots (above the PC power supply unit) are cooled by just **one** fan. Do not use any boards that build up a lot of heat!*

Monitoring the Temperature and Controlling the Fan

When booting the Real-Time PC, the fans run at a speed of 1000 rpm for a while. Then the speed is regulated automatically. The fans cannot be switched off.

2.7 Power Supply

Power is supplied to the Real-Time PC and the slots (backplane) by the Real-Time PC power supply unit. A high-performing power supply unit with an ETAS-specific wiring harness is used.

Each backplane is connected to the power supply through a Molex connector pair (see Fig. 2-14). The cable strands of the backplanes for the ES5300.1-A and ES5300.1-B Housings are prefabricated with the counterplugs.

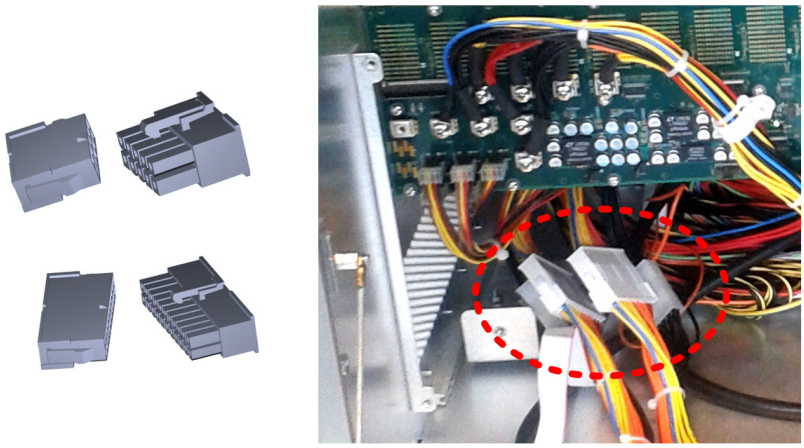


Fig. 2-14 Molex connector pairs in the RTPC drawer for power supply of the backplanes

The ES5300.1-A Housing is delivered readily wired with the backplane connected. In case you want to mount an ES5300.1-B Housing please refer to the ES5300.1-B User's Guide.

2.7.1 Specifications

Refer to the chapter listing the technical data for specifications of the power supply unit (see "Power Supply Unit/Power Supply" on page 69). The line occupancy is described in "Power Supply Connectors" on page 63.

2.7.2 Fuse Concept

The power supply unit features a number of functions to protect against shorts, overload, overvoltage and excess current. Furthermore it has an internal fuse which, however, cannot be exchanged by the user.

Note

If the power supply unit is defective, the "Real-Time PC" component can be removed (see "Opening/Removing the Real-Time PC Drawer" on page 53).

DANGER!

Risk of electric shock!
The ES5300.1-A Housing and the ES5300.1-B Housing must only be opened by qualified technical personnel. If the ES5300.1-A Housing and the ES5300.1-B Housing are not completely disconnected from the supply system, there is a risk of electric shock.
Break the connection to the supply system by switching it off and removing the power cable – wait at least three minutes until all of the components (e.g. power supply unit, capacitors) have been discharged.

2.7.3 Power Cables

Due to regional differences in the power supply, ETAS does not supply power cord cables with the ES5300.1-A Housing. The following table contains details of the relevant requirements and the ETAS order numbers.

Region	Description	Order Number
General	AC supply cable with IEC 60320 C13 plug on one end and a non-locking plug approved by the national safety standards (with earth contacts) on the other end. Plugs and cable must be rated for min. 250 VAC/10 A or 125 VAC/15 A.	-
China	AC supply cable China for various ETAS devices with PRC/3 and IEC 60320 C13 plug. Rated for 250 VAC/10 A, 2.50 m length	F-04A-109-512
Europe / Korea	AC supply cable for Europe and Korea for various ETAS devices with CEE7/7 and IEC_60320 C13 plug. Rated for 250 VAC/10 A, 2.50 m length	F-04A-109-513
India	AC supply cable India for various ETAS devices with IS 1293 (D) and IEC 60320 C13 plug. Rated for 250 VAC/10 A, 2.50 m length	F-04A-109-514
Japan	AC supply cable Japan for various ETAS devices with JIS C 8303 and IEC 60320 (C)13V plug. Rated for 125 VAC/15 A, 2.50 m length	F-04A-109-515
North America	AC supply cable North America for various ETAS devices with NEMA 5/15 - IEC 60320 C13M plug. Rated for 125 VAC/15 A, 2.50 m length	F-04A- 109-445
United Kingdom	Power cord cable UK for various ETAS devices with BS 1363/A and IEC 60320 C13 plug. Rated for 250 VAC/10 A, 2.50 m length	F-04A-109-516

3 Configuration and Operation

This chapter contains information on connecting, configuring and operating the ES5300.1-A Housing.

The topics focused on are:

- "Before You Start" on page 39
  - "Safety Instructions" on page 39
- "Preparing the Connections" on page 43
  - "Installing Connection Modules" on page 43
  - "Opening the Cable Duct" on page 43
  - "Cable Routing" on page 45
- "Installing Boards" on page 46
  - "Preparations" on page 46
  - "Attaching the PCI Express Board on the ES5370.1 Carrier Board" on page 46
  - "Angle Clock Bus Connection between ES5370.1 Carrier Board and ES5340.1 / ES5340.2" on page 48
  - "Gigabit Link between Master and Slave Board in an ES5370.1" on page 49
  - "Inserting the ES5370.1 Carrier Board into a Slot" on page 50
- "User PC" on page 51
  - "Connecting the User PC" on page 51
  - "Configuring RTIO" on page 51
- "Powering on the ES5300.1-A" on page 52
- "Opening/Removing the Real-Time PC Drawer" on page 53
- "Removing and Cleaning the Filter Mat" on page 59
  - "Removing and Cleaning the Filter Mat" on page 59

3.1 Before You Start

Before you start the setup process, read chapter "Basic Safety Instructions" on page 7 and the following sections carefully, and in particular, observe all tips and warnings.

3.1.1 Safety Instructions

The following sections describe the safety instructions you must observe when setting up and operating the ES5300.1-A Housing.

1.1.1 "Labeling of Safety Instructions" on page 7

1.1.2 "General Safety Information" on page 7

1.1.3 "Requirements for Users and Duties for Operators" on page 8

1.1.4 "Intended Use" on page 8"

1.1.5 "Transport and Installation" on page 10

1.1.6 "Electrical Safety and Power Supply" on page 11

1.1.7 "Cleaning" on page 14

1.1.8 "Maintenance" on page 14

1.1.9 "Repairs" on page 14

For safety precautions concerning earthing, pictures that explain the position of the PE contacts and the PE wiring are added in this section.

Grounding/Protective Contact

The entire system is grounded using the protective ground conductor of the power cord cable. Avoid the risk of electrocution when touching the housing by ensuring that the power supply used has correctly connected protective contacts.

DANGER!

Risk of electric shock!

- The grounding of the overall system is implemented via the PE conductor of the power supply cord. If no proper grounding via the PE conductor is available, housing components that can be touched could be live. For this reason, it must be ensured that the power cable features correctly connected grounding contacts! If this cannot be ensured, connect a ground to the PE terminal on the rear housing side of the ES5300.1-A in addition.

- The PE star point for the ES5300.1-A / ES5300.1-B Housing is in the drawer in the ES5300.1-A Housing. The PE star point must be secured using 0.8 Nm torque. If the PE star point is connected too loosely, there is no guarantee that grounding will provide reliable protection.

Failure to observe these instructions can lead to serious or fatal injury.

To check the connections of the PE conductors after assembling ES5300.1-A and ES5300.1-B:

1. After assembling both housings, check the electrical connections of all PE conductors between the star point and the PE contacts on the interior of the front doors on the ES5300.1-A Housing and the ES5300.1-B Housing.
2. Check the mechanical connections and the installation of all PE conductors (visual check).
3. Document the results of your check.

A block diagram for the wiring of the PE connections of the ES5300.1-A Housing and ES5300.1-B Housing is shown in Fig. 3-1.

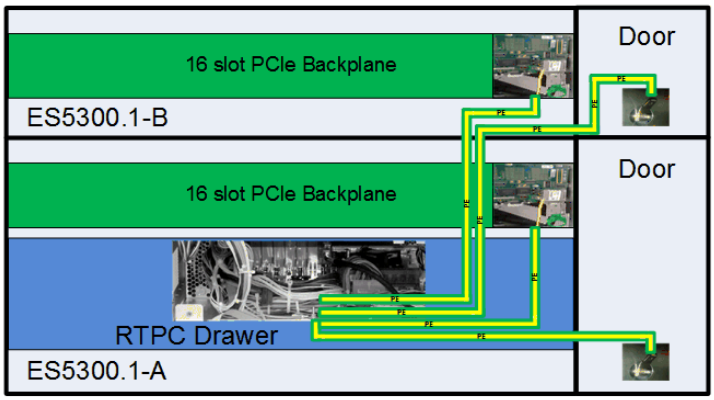


Fig. 3-1 block diagram for the wiring of the PE terminal.

The ES5300.1-B Housing is delivered with PE connection for connecting to the PE star point (yellow-green cable) and must be connected with the PE star point in the RTPC drawer of the ES5300.1-A Housing (see Fig. 3-2).

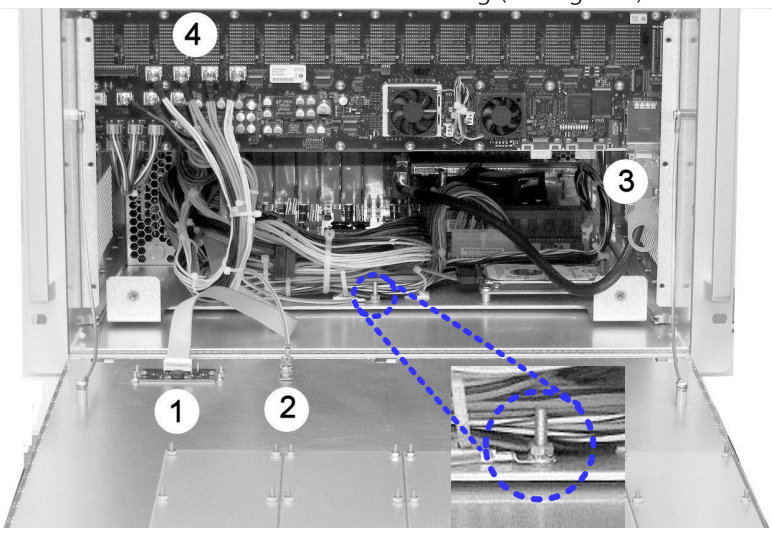


Fig. 3-2 PE star point in the RTPC drawer of the ES5300.1-A Housing

An additional cable for connecting the front door to the PE contact is included. A PE contact is located on the inside of the front door of the ES5300.1-A Housing and the ES5300.1-B Housing (see Fig. 3-3).

Fig. 3-3 PE contact on the inside of the front door of the ES5300.1-A Housing and the ES5300.1-B Housing

The PE terminal of the housing is shown in the following picture.

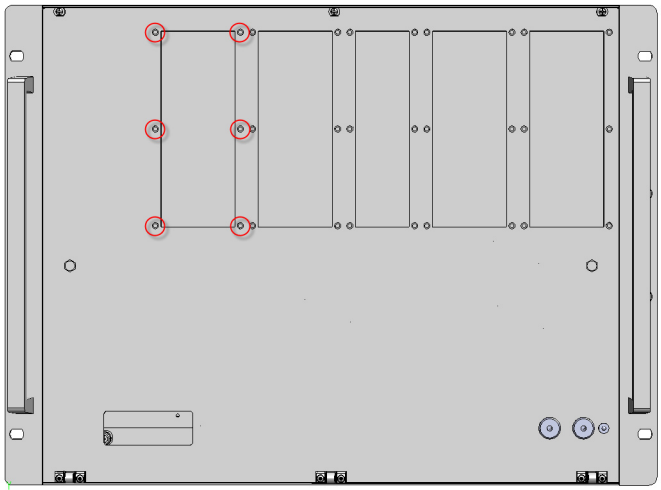
3.2 Preparing the Connections

The installed boards can either be connected using special connectors on the front panel (modules) or the connecting cables are led through to a breakout box etc. via the cable duct (front third of the housing cover).

3.2.1 Installing Connection Modules

To install connection modules, proceed as follows:

1. Untighten six nuts (5.5 hexagonal nut) on the dummy boards (on the back of the front panel) and remove them.



2. Install the connection module and re-attach the nuts.

Note

The delivery scope also includes two holding frames for modules.

3.2.2 Opening the Cable Duct

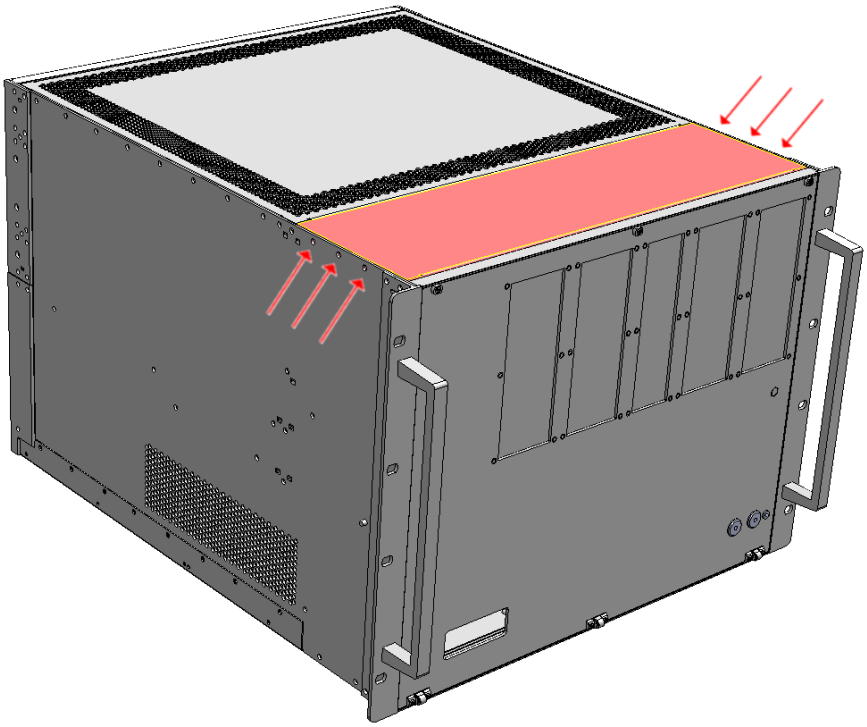
If you want to lead the connecting cables through the cable duct, you must remove the cable duct cover.

DANGER!

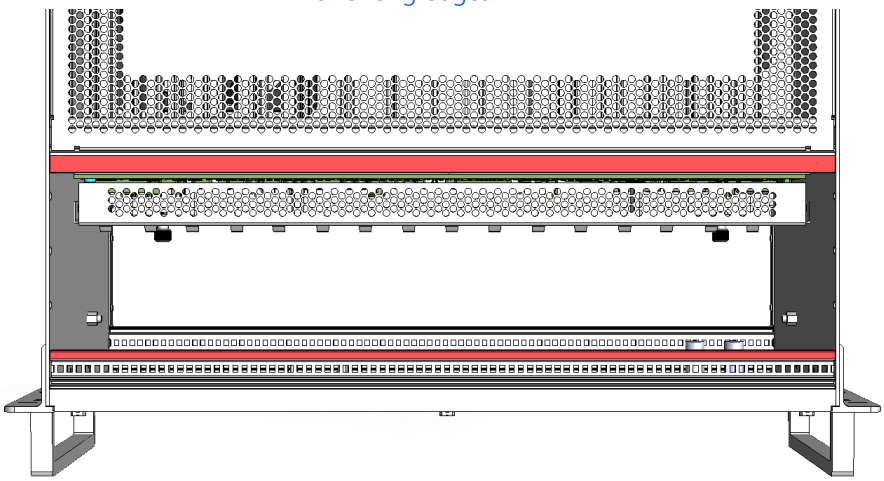
Risk of electric shock!
The ES5300.1-A Housing and the ES5300.1-B Housing must only be opened by qualified technical personnel. If the ES5300.1-A Housing and the ES5300.1-B Housing are not completely disconnected from the supply system, there is a risk of electric shock.
Break the connection to the supply system by switching it off and removing the power cable – wait at least three minutes until all of the components (e.g. power supply unit, capacitors) have been discharged.

To open the cable duct

1. Untighten the six screws (Torx T20) holding the cover in place (see figure) and remove it.

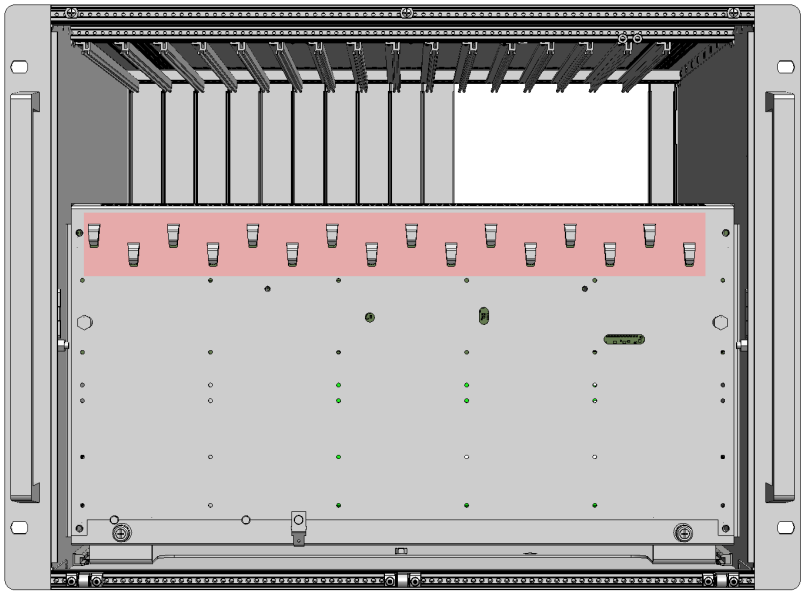


2. Attach the edge protection profiles provided to the two long edges.



3.2.3 Cable Routing

The backplane cover features 16 eyes to ensure connecting cables are routed safely. Cables can be fixed in these eyes using cable ties.



CAUTION!

If the cables are not routed properly, they may be damaged when the front panel is opened and closed. This can lead to a short which in turn can lead to the electronic components being damaged or even destroyed.
Route the cables in such a way that the front panel can be opened easily and that no cables can be jammed when the front panel is closed!

WARNING!

Fire hazard!
Use only approved cables for creating cable assemblies (e.g. for connecting the ECU and external loads). The cables used must, in particular, be suitable for the currents, voltages and temperatures which occur and must be flameretardant in accordance with one of the following standards
IEC 60332-1-2, IEC 60332-2-2, UL 2556/UL1581VW-1!

3.3 Installing Boards

This section describes how to install boards (on the carrier board) in the ES5300.1-A.

3.3.1 Preparations

Before you start, ensure you have ESD-compliant conditions at your workplace.

CAUTION!

The boards of the ES5300.1-A Housing may be damaged or even destroyed by static discharge. Boards should only be taken from their package, configured and installed at a working place that is protected against static discharge. Avoid touching the connections of the board or conductors on it.

CAUTION!

Do not install an adapter while the ES5300.1-A Housing is powered on.
First power off the ES5300.1-A Housing by shutting down the Real-Time PC and by pressing the on/off switch on the back of the device.

CAUTION!

If cards (e.g. for startup or calibration) are unlocked but not completely removed from the housing, they must be pulled out far enough that the distance between the respective card and the backplane of the housing is at least 1 cm.
Otherwise, contacts may be established between the cards and lead to their destruction.

1. Shut down the Real-Time PC and disconnect the power supply to the ES5300.1-A by switching it off on the back of the device.
2. Wait a few minutes until the components (capacitors etc.) have discharged.

3.3.2 Attaching the PCI Express Board on the ES5370.1 Carrier Board

1. Insert the PCI Express board as you would into a normal PCI Express slot (see Fig. 3-4 on page 47).
2. Insert the board's PCI Express connector into the carrier board socket (**1**).
3. When doing so, make sure that the board's bottom slot bracket is correctly positioned in the right slot (**1a**).
4. Use the screw to attach the board's top slot bracket to the carrier board's holding plate (**2**).
5. Mount the device that fixes the board at the other end into the right slits (**3**). The screws are "Torx T8" screws.

6. Slide the holding device toward the board until it is held securely (**3**) and then screw it tightly to the carrier board (**4**).

Note

Please ensure that the components at the edge of the board do not suffer mechanical stress when mounting and fixing the board!

The ES5370.1 Carrier Board can now be inserted into a slot on the ES5300.1-A.

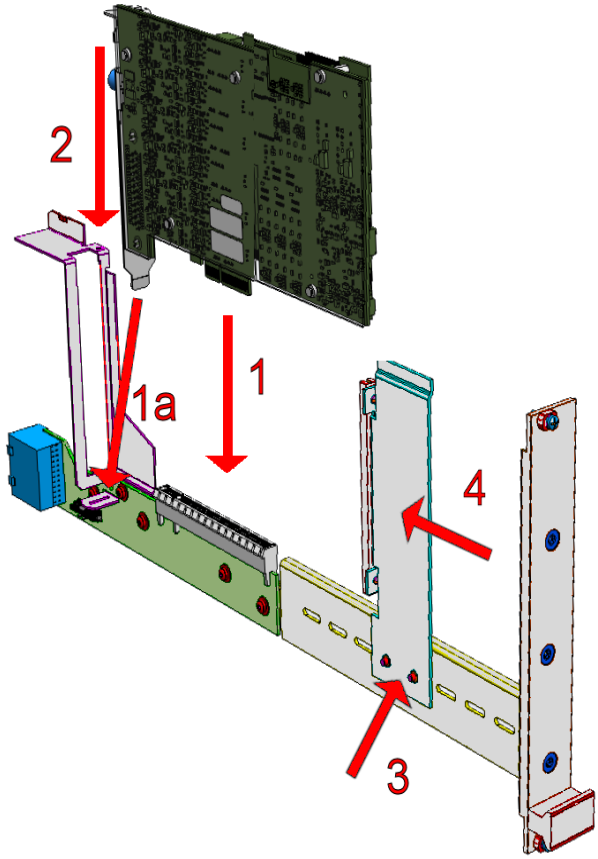


Fig. 3-4 Installing a PCI Express Board in the ES5370.1 Carrier Board (see Text)

3.3.3 Angle Clock Bus Connection between ES5370.1 Carrier Board and ES5340.1 / ES5340.2

If fitting the ES5370.1 Carrier Board with an ES5340.1 or an ES5340.2 the boards must be connected with the angle clock bus ribbon cable.

The correct connection for the angle clock bus ribbon cable and the terminating plug is shown in Fig. 3-5 and Fig. 3-6.

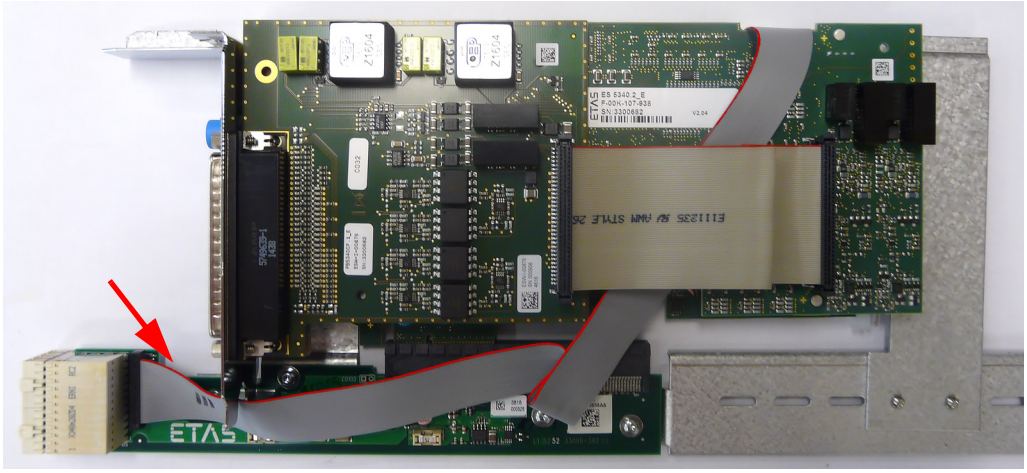


Fig. 3-5 Angle Clock Bus Ribbon Cable: Connection ES5370.1 (Connector at Lower Left) with an ES5340 (Connector at Upper Right).

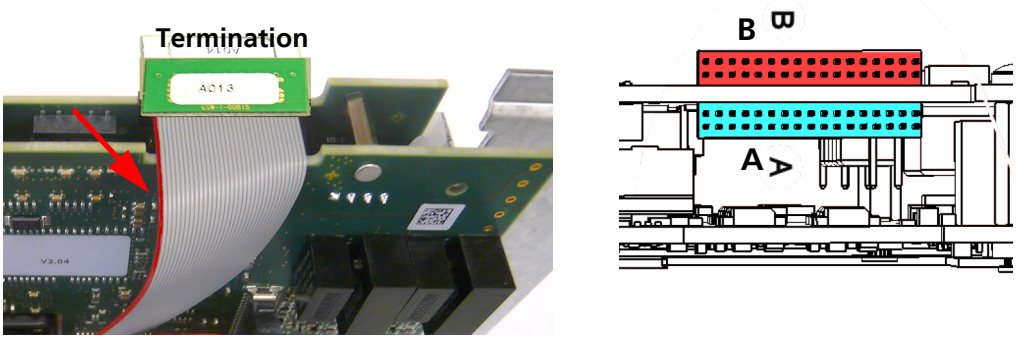


Fig. 3-6 Connecting Angle Clock Bus Ribbon Cable and Terminating Plug (Green) to the ES5340
A: Connector for Angle Clock Bus Ribbon Cablel
B: Connector for Terminating Plug.

Note

Observe the correct orientation of the angle clock bus ribbon cable's red marking when connecting. (see red arrow in Fig. 3-5 and Fig. 3-6).

CAUTION!

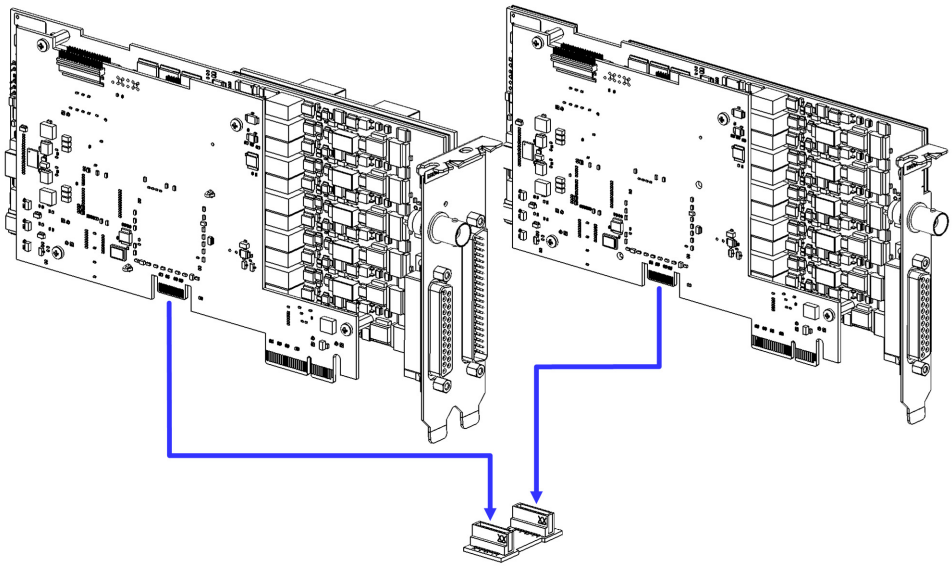
The board for the termination must cover connector A when plugged into connector B (see Fig. 3-6). If the board for the termination is turned by 180^0 it can be damaged during fitting and removing the ES5370.1 Carrier Board or neighboring boards.

3.3.4 Gigabit Link between Master and Slave Board in an ES5370.1

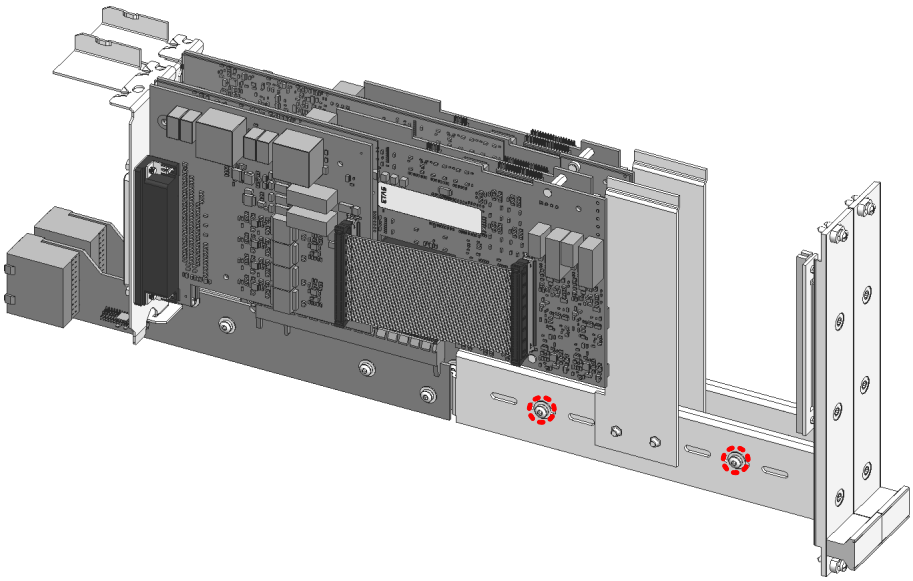
For PCI express boards, which are fitted into the ES5370.1 Carrier Board, a gigabit link through the backplane is not possible.
For example, if you want to connect an ES5340.2 master board with an ES5340.2 slave board, you need the gigabit link bridge.

Installation by the example of an ES5340.2 master/slave configuration into two ES5370.1 Carrier Boards

1. Insert the ES5340.2 master board and the ES5340.2 slave board each into an ES5370.1 Carrier Board.
2. For each combination, connect the angle clock bus ribbon cable and apply the termination. You can find a description in "Angle Clock Bus Connection between ES5370.1 Carrier Board and ES5340.1 / ES5340.2" on page 48.
3. Connect the two ES5340.2 boards with the gigabit link bridge.



4. Fit the two supplied spacing bolts between the two ES5370.1 Carrier Boards. The spacing bolts are marked in red.



CAUTION!

Danger of destroying the boards
It is absolutely necessary to connect the two ES5370.1 Carrier Boards with the red marked spacing bolts.
If the spacing bolts are not used, there is a risk of shearing or destroying the ES5340.2 when installing or removing the combination into or from the ES5300.1-A Housing.

5. Install the connected ES5370.1 Carrier Boards into the ES5300.1-A Housing (see chapter 3.3.5)

3.3.5 Inserting the ES5370.1 Carrier Board into a Slot

CAUTION!

Sliding in boards that are broader than the width of the slot (4 HP) can result in a collision with adjacent boards or any cover plates that have been used. This could cause the boards due to be installed to be damaged or even destroyed.
Ensure that the board on the carrier board either complies with the maximum permissible width of 4 HP or that the adjacent slot is empty and there are no cover plates which could hinder the drawer!

1. Insert the carrier board (handle on the front panel must be pointing down!) into both the top and bottom rail of the slot and slide it in slightly.
2. If necessary, attach the connectors on the front panel of the PCI Express board before the adapter is completely inserted.

3. Carefully slide the carrier board in until the board's connector is in the backplane's socket.

Note

When sliding in the board, please be careful with any cables in the slide-in area – if necessary, pull the cables into the front door area.

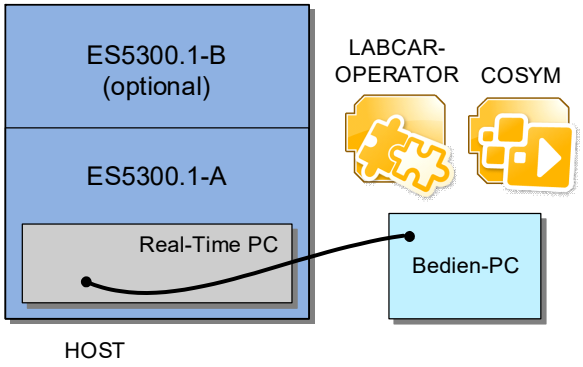
4. Attach the carrier board by tightly screwing on the front panel.

3.4 User PC

The user PC (not part of the delivery scope of the ES5300.1-A Housing) contains the LABCAR-OPERATOR software or the COSYM software with which the projects are created and run – furthermore, the Real-Time PC can be configured and controlled on the user PC via a web interface.

3.4.1 Connecting the User PC

1. Connect the user PC to the Real-Time PC of the ES5300.1-A at the Ethernet port "HOST".



2. Once the Real-Time PC has been booted, its availability can be tested using a `ping` (see "To test the availability of the Real-Time PC" on page 52).

3.4.2 Configuring RTIO

If necessary, the boards in the ES5300.1-A are configured with the RTIO Editor. For more information, please refer to the LABCAR-RTC User's Guide, which is part of the documentation package of LABCAR-OPERATOR. For COSYM, you find information in the RTIO Editor User's Guide, which is part of the documentation package of COSYM.

Note

The ES5300.1-A Housing is supported as of LABCAR-OPERATOR V5.2.1 and as of COSYM V2.1.

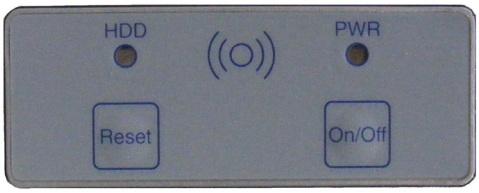
3.5 Powering on the ES5300.1-A

To switch on and boot the Real-Time PC

1. Switch on the power supply (on the back at the bottom right).

The green LED lights up.

2. Power on the Real-Time PC using **On/Off**.



The Real-Time PC starts up.

Note

Please refer to the ETAS-RTPC - User's Guide for information on how to configure and operate LABCAR-RTPC or COSYM-RTPC, respectively.

Once the PC has booted, you will hear a succession of notes in ascending order.

To test the availability of the Real-Time PC

1. Toggle to the host.
2. Select **Run** from the Start menu.
3. Enter "cmd".

   The prompt opens.
4. Enter the following:

   `ping 192.168.40.14`

```
U:\>ping 192.168.40.14

Ping wird ausgeführt für 192.168.40.14 mit 32 Bytes Daten:

Antwort von 192.168.40.14: Bytes=32 Zeit=4ms TTL=64
Antwort von 192.168.40.14: Bytes=32 Zeit<10ms TTL=64
Antwort von 192.168.40.14: Bytes=32 Zeit<10ms TTL=64
Antwort von 192.168.40.14: Bytes=32 Zeit<10ms TTL=64

Ping-Statistik für 192.168.40.14:
    Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0 (0% Verlust),
Ca. Zeitangaben in Millisek.:
    Minimum = 0ms, Maximum =  4ms, Mittelwert =  1ms
```

5. Alternatively, you can open the web interface in your browser (http://192.168.40.14).

3.6 Opening/Removing the Real-Time PC Drawer

Open the Real-Time PC to install hardware in it – if the power supply unit is faulty, the Real-Time PC can be removed relatively eas by hand and sent in to ETAS to be repaired.

To avoid injury and damage, the device must only be removed by specialist, qualified personnel already trained in this procedure by ETAS! Please ensure you adhere to the safety instructions detailed in section 3.1 on page 39 at all times.

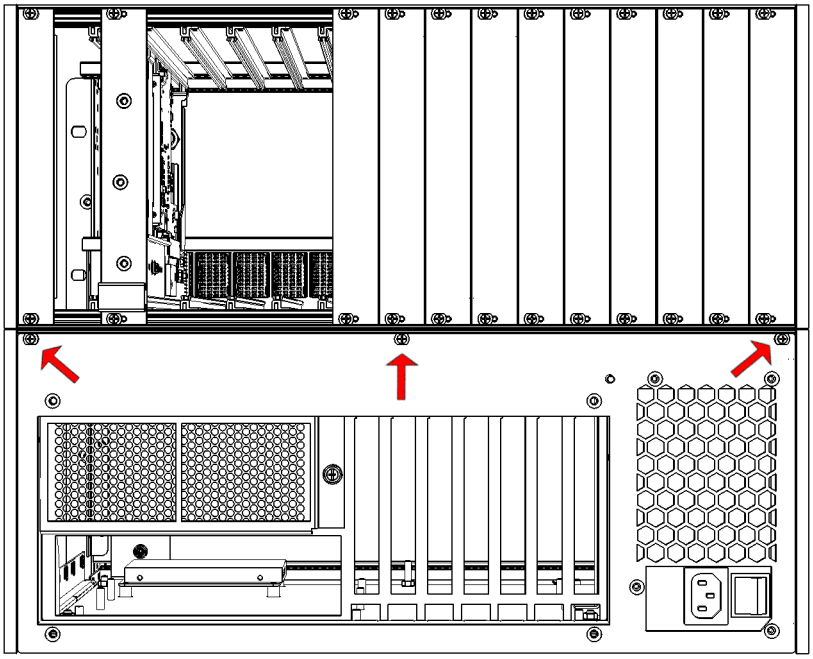
DANGER!

Risk of electric shock!
The ES5300.1-A Housing and the ES5300.1-B Housing must only be opened by qualified technical personnel. If the ES5300.1-A Housing and the ES5300.1-B Housing are not completely disconnected from the supply system, there is a risk of electric shock.
Break the connection to the supply system by switching it off and removing the power cable – wait at least three minutes until all of the components (e.g. power supply unit, capacitors) have been discharged.

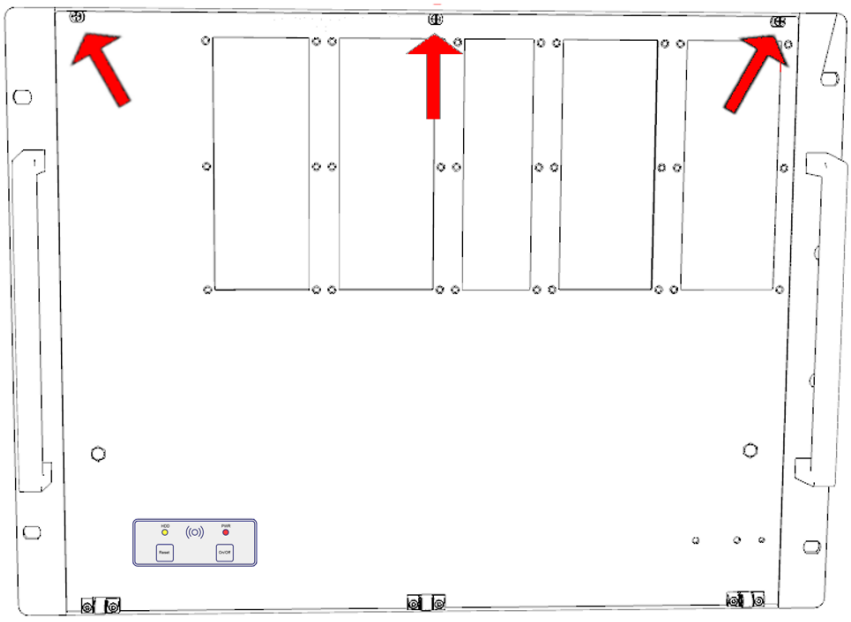
To open the Real-Time PC drawer

1. Use the switch on the front panel to shut down the Real-Time PC.
2. Switch off the power supply using the switch on the power supply unit (at the bottom right on the back of the device).
3. Remove the power cord.
4. Remove all cords attached to boards in the slots of the Real-Time PC, such as the Ethernet cable for connecting the user PC.

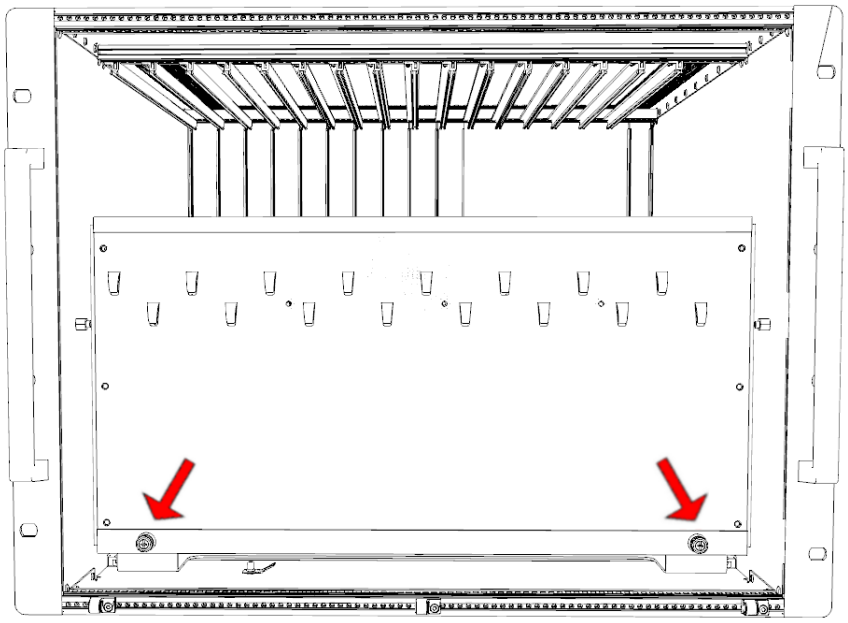
5. Take out the three screws at the top of the drawer (back).



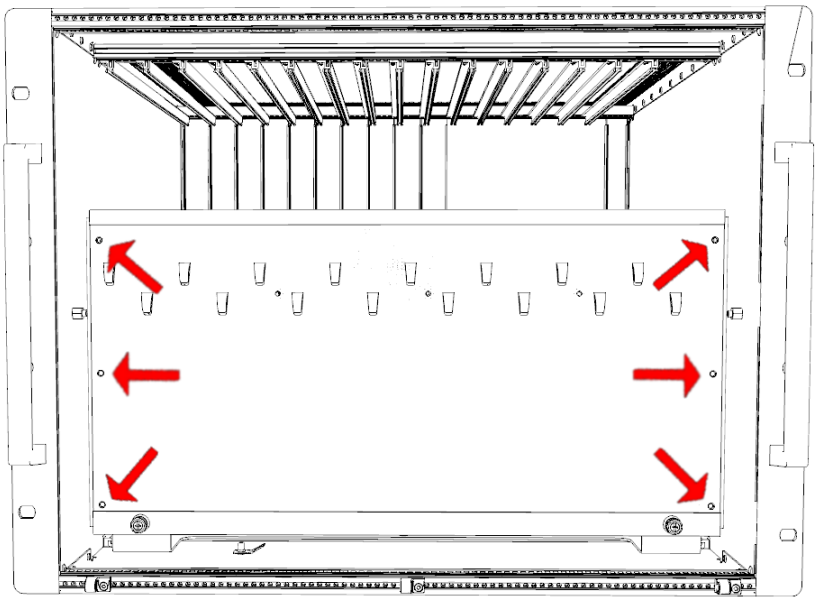
6. Unscrew the screws that hold the front panel in place and lift it up.



7. Unscrew the two knurled screws that hold the drawer in place.



8. Now unscrew the 6 Torx screws (T20) that hold the backplane cover in place and remove it carefully. To do so, the cover must be pulled out tilted to the front above the points where the door is attached.



The Real-Time PC can now be pulled out until it locks.

Note

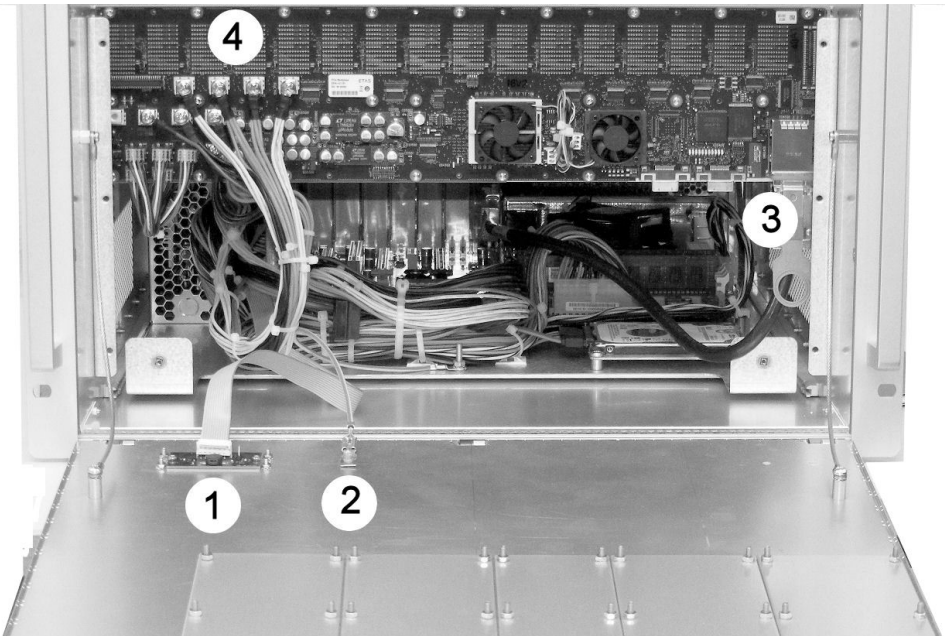
Make sure that the cables do not suffer mechanical stress when you pull out and push in the Real-Time PC!

Note

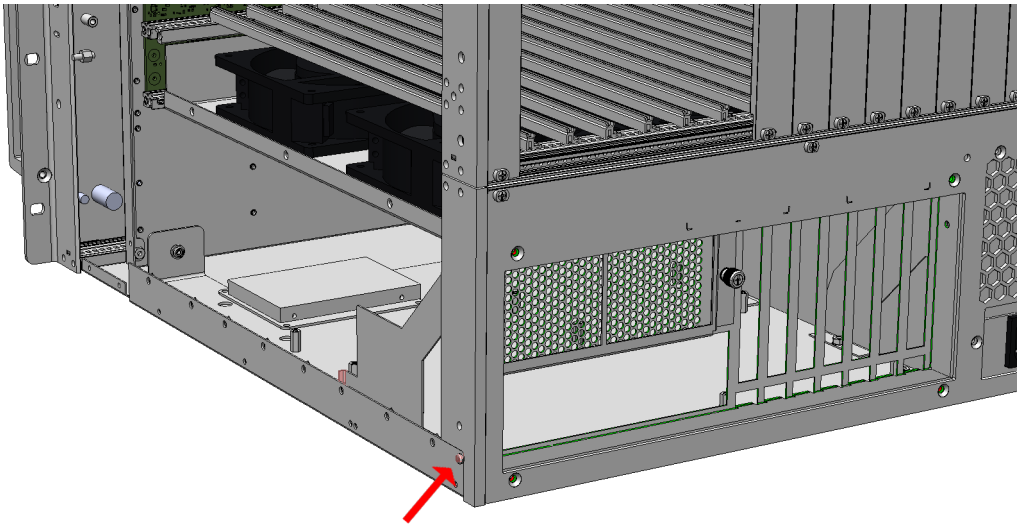
Make sure that the Real-Time PC, when partially removed, does not hang freely, but is always supported!

To completely remove the Real-Time PC drawer

1. Disconnect the following:
   - Connectors for control panel/display field (**1**)
   - PE contact from the Real-Time PC to the front panel (**2**)
   - PCI Express connection cable (**3**)
   - Cables of the backplane power supply (**4**)



2. Remove the screw that is limiting you pulling it out any further (see figure).



To re-install the Real-Time PC

Re-installation of the Real-Time PC is done in the opposite order.

3. Please ensure that the power supply (see "Backplane Power Supply Connectors" on page 65) and all other connections - in particular the protective contact connection of the door, see "Grounding/Protective Contact" on page 40 - are once again connected to the backplane correctly!
   Observe the following section "Grounding/Grounding Contact".

Grounding/Grounding Contact

DANGER!

Risk of electric shock!

- The grounding of the overall system is implemented via the PE conductor of the power supply cord. If no proper grounding via the PE conductor is available, housing components that can be touched could be live. For this reason, it must be ensured that the power cable features correctly connected grounding contacts! If this cannot be ensured, connect a ground to the PE terminal on the rear housing side of the ES5300.1-A in addition.

- The PE star point for the ES5300.1-A / ES5300.1-B Housing is in the drawer in the ES5300.1-A Housing. The PE star point must be secured using 0.8 Nm torque. If the PE star point is connected too loosely, there is no guarantee that grounding will provide reliable protection.

Failure to observe these instructions can lead to serious or fatal injury.

For additional information see also "Grounding/Protective Contact" on page 40.

To check the connections of the PE conductors after assembling ES5300.1-A and ES5300.1-B:

1. After assembling both housings, check the electrical connections of all PE conductors between the star point and the PE contacts on the interior of the front doors on the ES5300.1-A Housing and the ES5300.1-B Housing.
2. Check the mechanical connections and the installation of all PE conductors (visual check).
3. Document the results of your check.

3.7 Removing and Cleaning the Filter Mat

On the back of the ES5300.1-A (to the left of the slots of the Real-Time PC), there is a ventilation grid with a filter mat. This can be taken out to clean once the holding frame has been removed (see Fig. 3-7).

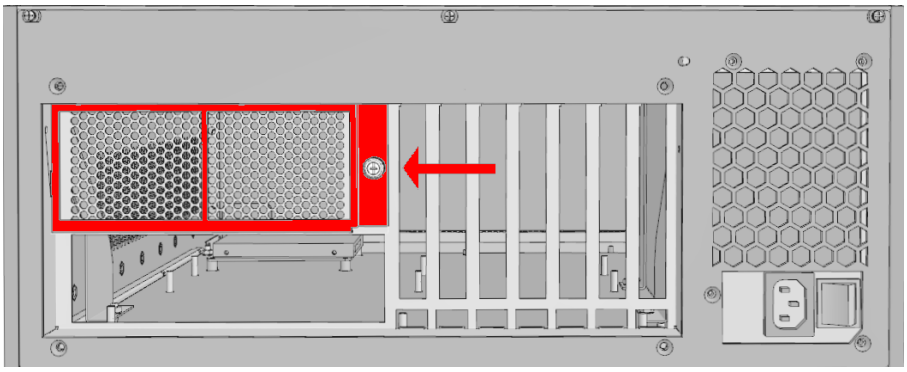


Fig. 3-7 Holding Frame for Filter Mat

Note

Clean this filter mat once a year!

4 Pin Assignment and Connections

This chapter describes the various connections of the ES5300.1-A Housing.

- "Backplane Connectors" on page 61
- "Power Supply Connectors" on page 63
- "Real-Time PC Connectors" on page 66

WARNING!

Fire hazard!
Use only approved cables for creating cable assemblies (e.g. for connecting the ECU and external loads). The cables used must, in particular, be suitable for the currents, voltages and temperatures which occur and must be flameretardant in accordance with one of the following standards
IEC 60332-1-2, IEC 60332-2-2, UL 2556/UL1581VW-1!

4.1 Backplane Connectors

The 16 backplane connectors are specified as follows:

Type: ERNI ERMet ZD Vertical Male Connector 4 Pair (4-12) (Part Number 973096)

Mating connector: ERNI ERMet ZD Right Angle Female Connector Pair (4-12) (Part Number 973099)

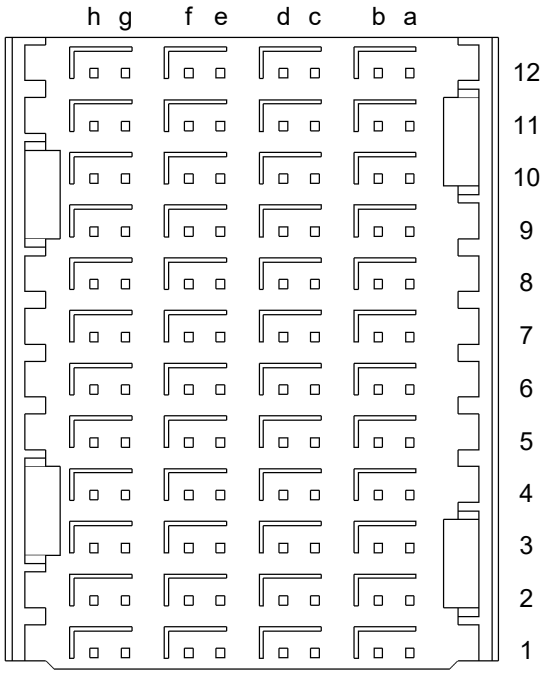


Fig. 4-1 Connectors on the Backplane (Plug-In Side)

The pin assignment is as follows:

	h	g	f	e	d	c	b	a
12	GBLI_TX_n_0	GBLI_TX_p_0	GBLI_RX_n_0	GBLI_RX_p_0	M_LVDS_n_7	M_LVDS_p_7	BN_5	BN_4
12-Shield	GND		GND		GND		GND	
11	GBLI_TX_n_1	GBLI_TX_p_1	GBLI_RX_n_1	GBLI_RX_p_1	M_LVDS_n_6	M_LVDS_p_6	SPI_CS_B_n	SPI_CS_A_n
11-Shield	GND		GND		GND		GND	
10	GBLI_TX_n_2	GBLI_TX_p_2	GBLI_RX_n_2	GBLI_RX_p_2	M_LVDS_n_5	M_LVDS_p_5	SPI_MOSI	SPI_CLK
10-Shield	GND		GND		GND		GND	
9	GBLI_TX_n_3	GBLI_TX_p_3	GBLI_RX_n_3	GBLI_RX_p_3	M_LVDS_n_4	M_LVDS_p_4	PCIE_WAKEn	SPI_MISO
9-Shield	GND		GND		GND		GND	
8	GBLI_PRESENT_n	GEO_ADDR_4	PCIE_REFCLK_n	PCIE_REFCLK_p	M_LVDS_n_3	M_LVDS_p_3	n.c.	n.c.
8-Shield	GND		GND		GND		GND	
7	PCIE_RX_n_0	PCIE_RX_p_0	PCIE_TX_n_0	PCIE_TX_p_0	M_LVDS_n_2	M_LVDS_p_2	n.c.	n.c.
7-Shield	GND		GND		GND		GND	
6	Ass. internally	Ass. internally	Ass. internally	Ass. internally	M_LVDS_n_1	M_LVDS_p_1	PCIE_JTAG_TCK	PCIE_JTAG_TDI
6-Shield	GND		GND		GND		GND	
5	Ass. internally	Ass. internally	Ass. internally	Ass. internally	M_LVDS_n_0	M_LVDS_p_0	PCIE_JTAG_TDO	PCIE_JTAG_TMS
5-Shield	GND		GND		GND		GND	
4	Ass. internally	Ass. internally	Ass. internally	Ass. internally	GEO_ADDR_1	GEO_ADDR_0	BN_3	BN_2
4-Shield	GND		GND		GND		GND	
3	VCC24	VCC24	GEO_ADDR_3	GEO_ADDR_2	PCIE_SMBDAT	PCIE_SMBCLK	BN_1	BN_0
3-Shield	GND		GND		GND		GND	
2	VSS12	VSS12	VCC3_3	VCC5	PCIE_PERSTn	PCIE_PRSNT1n	PCIE_PRSNT2n_X4	PCIE_PRSNT2n_X1
2-Shield	VCC3_3		VCC3_3		VCC3_3		VCC3_3	
1	VCC3_3	VCC3_3	VCC5	VCC5	VCC12	VCC12	VCC12	VCC12
1-Shield	VCC12		VCC12		VCC12		VCC12	

4.2 Power Supply Connectors

The power supply unit supplies power to the Real-Time PC on the one hand and the backplane, and thus all boards in the slots, on the other.

To avoid injuries and damage to hardware, please only use the power supply cord specified in the chapter "Power Cables" on page 37).

4.2.1 Wiring Harness

Fig. 4-2 shows the power supply unit connectors – the power supply "Backplane 1" is connected, lines for supplying a second backplane also exist.The ES5300.1-A Housing and the ES5300.1-B Housing are delivered with pre-manufactured and connected wires.

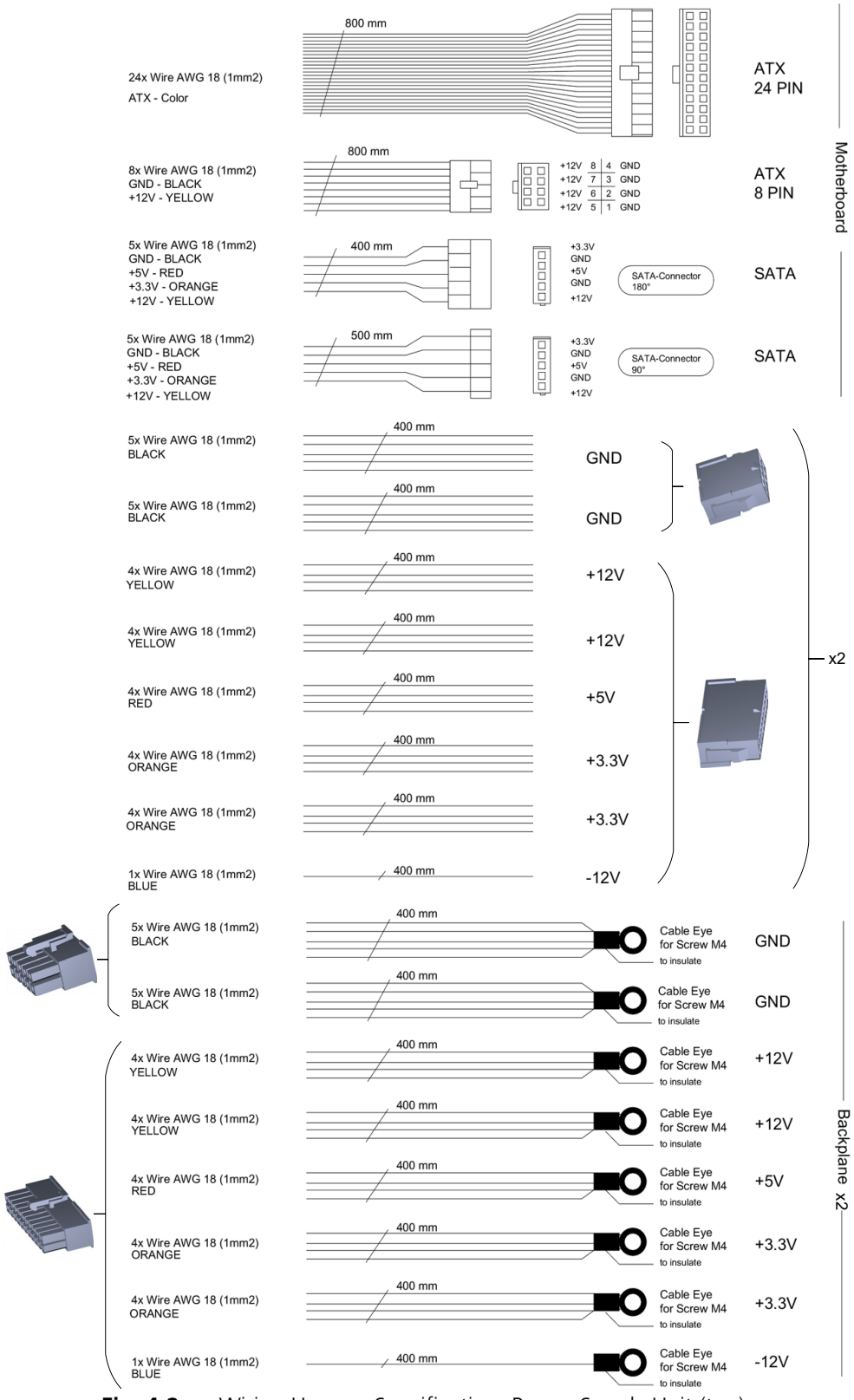


Fig. 4-2 Wiring Harness Specification: Power Supply Unit (top) and backplane (bottom)

4.2.2 Backplane Power Supply Connectors

Once the front panel has been opened and the protective cover removed (see "Opening/Removing the Real-Time PC Drawer" on page 53), the user has free access to the back of the backplane.

In particular, this makes the power supply unit voltage connectors visible (left).

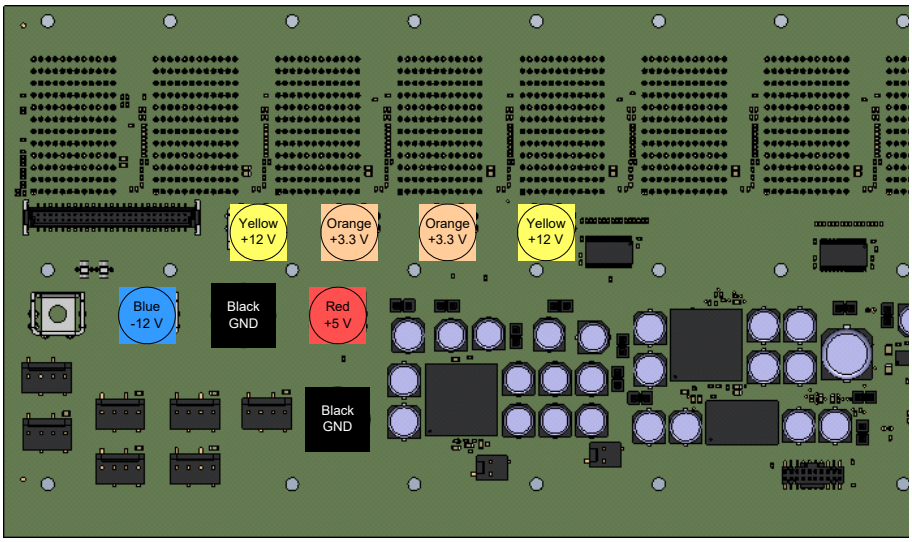


Fig. 4-3 Backplane Voltage Connectors

4.3 Real-Time PC Connectors

The following figures show the supported Real-Time PC connectors.

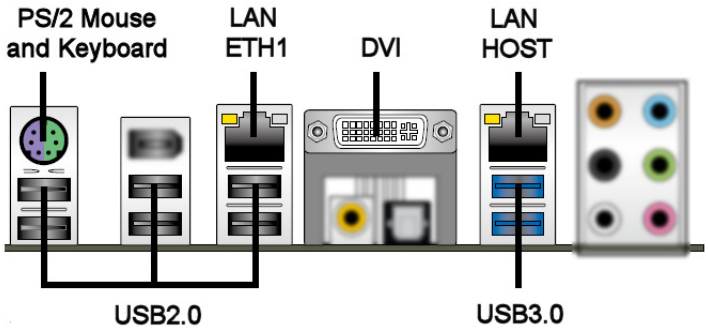


Fig. 4-4 ASUS® P8C WS Mainboard

Note

Connectors for FireWire, SIPDIF and Audio are not supported!

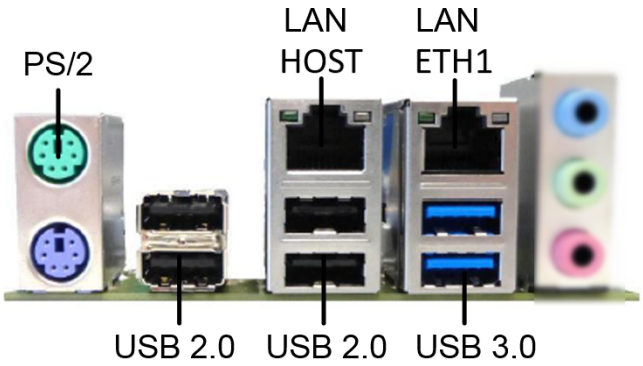


Fig. 4-5 FUJITSU® D3348-B Mainboard

Note

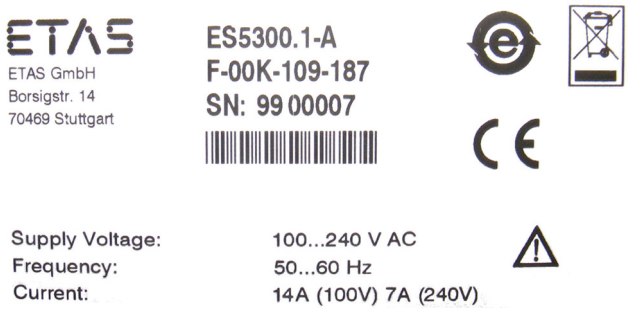
Connectors for Audio are not supported!
There is no DVI connection available. In case a DVI connection is necessary, please insert a separate graphic card. ETAS recommends a MatroX G550 graphic card.

5 Technical Data

This chapter contains the technical data on the ES5300.1-A Housing.

Labeling of the Product

The nameplate is on the rear of the device.



It contains the following information:

- ETAS logo
- Product name
- Type part number
- Serial number
- Barcode for serial number
- Permissible input voltage range
- Permissible input voltage frequency
- Max. current consumption (with the corresponding input voltage)
- China RoHS
- WEEE Symbol
- CE marking
- A warning symbol that indicates that the User's Guide must be read before operating and opening the ES5300.1-A!

Mechanical Data

Mechanical structure	19" chassis for incorporation into rack
Slots	16 slots in grids of 5 HP
Width	19"(482.6 mm)
Height	8 U (= 355.6 mm)
Depth	540 mm
Weight ES5300.1-A (slots empty)	20.5 kg / 46 lbs
Weight ES5300.1-A with ES5300.1-B (slots empty)	30.0 kg / 66 lbs
Suitable for continuous operation	Yes

Real-Time PC

ASUS® P8C WS-Mainboard:

Processor	Intel Core i7-3770 @ 3.4 GHz
Memory	2 x 2048 MB DDR3
Hard disk	500 GB SATA
Network	2 x Intel 82574L Gigabit Network Connection
Slots	- 1 x PCIe 3.0 x16_1 (Single: x16 mode / Dual: x8/x8 mode) - 1 x PCIe 3.0 x16_2 (x8 mode) - 1 x PCIe 2.0 x1 - 1 x PCIe 2.0 x16_3 (x4 mode) - 1 x PCI 5 V 32 bit - 1 x PCIe 2.0 x16_4 (x4 mode)
Ports	1 x PS/2 keyboard/mouse 1 x S/PDIF Out (optical and coaxial) - not supported 6 x USB2.0/1.1 2 x USB3.0/2.0 1 x IEEE 1394a - not supported 2 x LAN 1 x DVI-I 6 x audio - not supported

FUJITSU® D3348-B-Mainboard:

Processor	Intel® Xeon E5-1620 V3 @ 3,6 GHz
Memory	1 x 8 GB DDR4
Hard disk	500 GB SATA
Network	LAN – 10/100/1000 ethernet controller
Slots	- 1 x PCIe x8 Gen2 (1 lane) - 1 x PCIe x8 Gen2 (1 lane) - 1 x PCIe x16 Gen3 (16 lanes) - 1 x PCIe x16 Gen3 (4 lanes) - 1 x PCIe x16 Gen2 (4 lanes) - 1 x PCIe x16 Gen3 (16 lanes) - 1 x PCIe x8 Gen3 (4 lanes)
Ports	- 2 x PS/2 keyboard/mouse - 2 x LAN - 4 x USB2.0/1.1 - 2 x USB3.0/2.0 - 3 x audio - not supported

Power Supply Unit/Power Supply

Input voltage	100 - 240 V AC
Input frequency	50/60 Hz
Maximum current consumption	14 A (100 V AC) / 7 A (240 V AC)
Switch-on current	20 A (115 V AC) / 40 A (230 V AC)
Maximum performance	1000 W DC
Efficiency	82…87%, 230 V AC
Connector	3-pin rubber connector Type IEC 60320 C14
Fuse protection	Internal
Output voltages and currents (power supply unit)	+3.3 V DC, min. 1 A, max. 25 A +5 V DC, min. 1 A, max. 25 A +12 V DC, min. 1 A, max. 50 A +12 V DC, min. 1 A, max. 50 A -12 V DC, min. 0 A, max. 0.8 A +5 V_{sb}DC, min. 0.1 A, max. 3.5 A

Fan Unit

No. of fans	5
Max. volumetric current/fan	3.68 m^3/min (129.94 CFM)
Min. speed	1000 rpm
Max. speed	4100 rpm

Environmental Conditions

Environment	Only use inside closed and dry rooms
Pollution degree	2
Permissible ambient temperature during operation	5 °C to 40 °C (41 °F to 104 °F)
Permissible storage temperature	-20 °C to +65 °C (-4 °F to 149 °F)
Relative humidity	0 to 95% (non-condensing)
Implementation altitude	Max. 2000 m / 6500 ft

5.1 Fulfilled Standards and Norms

The ES5300.1-A Housing complies with the following standards and norms:

Standard	**Testing**
IEC 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements (industrial environments)
iEC 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

The module is designed only for use in industrial environments in accordance with IEC 61326-1. When using the module outside of industrial environments avoid possible radio disturbances by additional shielding measures!

WARNING!

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

6 Ordering Data

The ordering data for the ES5300.1-A Housing are as follows:

Order name	Short name	Order number
ES5300.1-A Housing	ES5300.1-A	F-00K-109-187
ES5370.1 Carrier Board PCI Express x16 socket, GEN1/2 x1 Link	ES5370.1	F-00K-109-190
ES5305.1 PCI Express GEN2 x4 Cable Adapter for ES5300 Housing	ES5305.1	F-00K-109-189

The scope of delivery for ES5300.1-A Housing is as follows:

Scope of delivery	Number of pieces	Order number
ES5300.1-A Housing	1	See table above
ES5370.1 Carrier Board PCI Express x16 socket, GEN1/2 x1 Link	1	See table above
ES5305.1 PCI Express GEN2 x4 Cable Adapter for ES5300 Housing	1	See table above
Manual für Hauptplatine	1	

7 ETAS Contact Addresses

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ETAS GmbH

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70469 Stuttgart Fax: +49 711 3423-2106

Germany WWW: www.etas.com

ETAS Subsidiaries and Technical Support

For details of your local sales office as well as your local technical support team and product hotlines, take a look at the ETAS website:

ETAS subsidiaries	WWW:	www.etas.com/en/contact.php
ETAS technical support	WWW:	www.etas.com/en/hotlines.php

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