

ES5095.1 Break-Out-Panel (80-CH)
User's Guide



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1 Introduction

This chapter features information on the following subjects:

- "Properties" on page 5
- "Basic Safety Notices" on page 6
- "Requirements for Users and Duties for Operators" on page 7
- "Intended Use" on page 7
- "Identifications on the Product" on page 10
- "CE Mark" on page 10
- "RoHS Conformity" on page 10
- "Product Return and Recycling" on page 11
- "About this User's Guide" on page 11

1.1 Properties

The ES5095.1 Break-Out-Panel is a break-out panel that enables the measurement, interruption and manipulation of signals to the ETAS LABCAR.

Features at a Glance

- 80 channels (separate ground connection (GND) per channel)
- Maximum permissible voltage: 60 V DC
- Maximum permissible current: 10 A
- Pin diameter of short-circuit bars: 4 mm

The two figures below show the ES5095.1 Break-Out-Panel in the front and rear view:

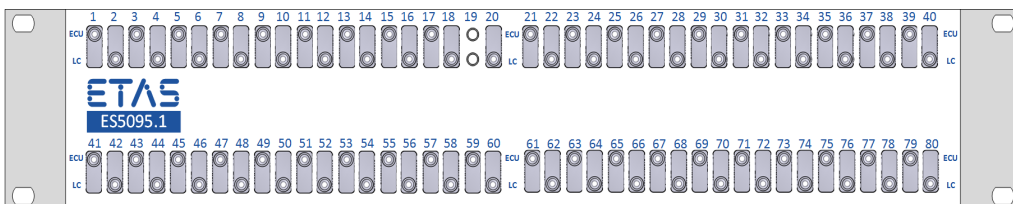


Fig. 1-1 Front View

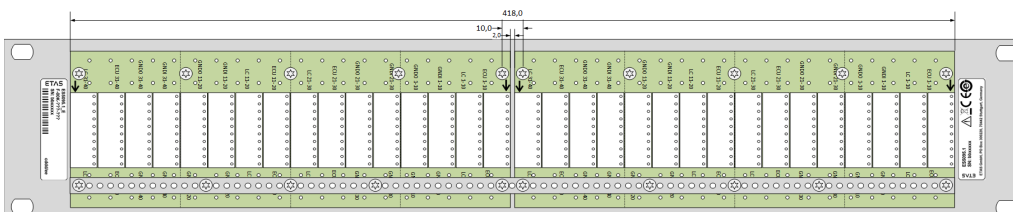


Fig. 1-2 Rear View

The functional units of the ES5095.1 Break-Out-Panel (BoP) are illustrated schematically in the following block diagram:

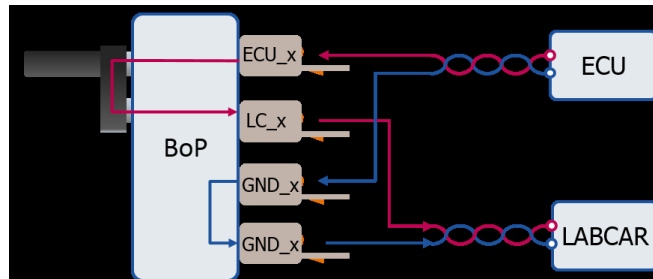


Fig. 1-3 Block Diagram

The signals are routed from the electronic control unit (ECU) via the short circuit bridge to the ETAS LABCAR (see Fig. 1-3, red wire). The control unit (ECU) is connected via channel connection ECU_x and the ETAS LABCAR is connected via channel connection LC_x. Each signal is assigned a ground line (GND_x). This is not routed via a short circuit bar and therefore cannot be interrupted or connected by the user (see Fig. 1-3, blue wire).

For more information on how to connect an ECU and an ETAS LABCAR, see Chapter "Connection Options" on page 18.

1.2 Basic Safety Notices

Please observe the following safety notices to avoid health issues or damage to the device.

1.2.1 Identification of Safety Notices

The safety notices contained in this manual are marked with the general danger symbol shown below:



The safety notices shown below are used alongside this symbol. They point out extremely important information. Please read this information carefully.



CAUTION!

Indicates a hazard with low risk of minor or moderate physical injury or damage to property if not avoided.



WARNING!

Indicates a possible danger with moderate risk of death or (serious) physical injury if not avoided.



DANGER!

Indicates an immediate danger with a high risk of death or serious physical injury if not avoided.

1.2.2 Scope of Supply

Prior to the initial commissioning of the product, please check whether the module was delivered with all required components (see chapter 2.3 on page 14).

1.2.3 General Safety Information

Please observe the ETAS product safety notices ("ETAS Safety Advice") and the following safety notices to avoid health issues or damage to the device.

Note

Read the documentation supplied with the product (Product Safety Advice and this user manual) prior to starting up the product.

ETAS GmbH does not assume any liability for damages resulting from improper handling, unintended use or non-observance of the safety precautions.

1.2.4 Connecting/Disconnecting Devices

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

- Do not apply any voltages to the ES5095.1 connections that do not correspond to the specifications of the respective connection. The exact specification of the I/O hardware is located in the manuals of the corresponding boards.
- Do not connect or disconnect any devices while the ETAS LABCAR or external devices are switched on. First, switch off the ETAS LABCAR by shutting down the real-time PC and activating the on/off switch on the rear and unplugging the power cable.
- When plugging in connectors, ensure that they are inserted straight and no pins are bent.

1.2.5 Requirements for Users and Duties for Operators

The product may be assembled, operated and maintained only if you have the necessary qualification and experience for this product. Improper use or use by a user without sufficient qualification can lead to damages or injuries to one's health or damages to property. The system integrator is responsible for the safety of systems that use the product.

General Safety at Work

The existing regulations for work safety and accident prevention must be followed. All applicable regulations and laws regarding operation must be strictly adhered to when using this product.

1.2.6 Intended Use

The ES5095.1 Break-Out-Panel is a break-out panel that enables the measurement, interruption and manipulation of signals to the ETAS LABCAR.

The ES5095.1 Break-Out-Panel must only be installed in and operated from a 19" rack.

The purpose of the ES5095.1 Break-Out-Panel is:

- Use in industrial lab facilities or workplaces

- Hardware interface for ECUs in a hardware-in-the-loop test system

The ES5095.1 is not intended for use:

- Within a vehicle on the road
- As part of a life support system
- In applications where misuse can lead to injuries or damages
- In environments in which conditions prevail that fall outside the specified ranges: See "Ambient Conditions" on page 22
- With signal conditioning that falls outside the specified ranges: See "Technical Data, Standards and Order Data" on page 21

Requirements for Operation

The following requirements are necessary for safe operation:

- Use the product only according to the specifications in the corresponding User's Guide. With any deviating operation, the product safety is no longer ensured.
- Observe the regulations applicable at the operating location concerning electrical safety as well as the laws and regulations concerning work safety!
- Observe the requirements for the ambient conditions.
- Do not use the product in a wet or damp environment.
- Do not use the product in potentially explosive atmospheres.
- Keep the surfaces of the product clean and dry.

Requirements for the Technical State of the Product

The product is designed in accordance with state-of-the-art technology and recognized safety rules. The product may be operated only in a technically flawless condition and according to the intended purpose and with regard to safety and dangers as stated in the respective product documentation. If the product is not used according to its intended purpose, the protection of the product may be impaired.

Electrical Safety and Power Supply

- Observe the regulations applicable at the operating location concerning electrical safety, as well as the laws and regulations regarding safety at work.
- Connect only current circuits with safety extra-low voltage in accordance with EN 61140 (degree of protection III) to the connections of the module.
- Ensure that the connection and setting values are adhered to (see the information in the chapter "Technical Data").
- Do not apply any voltages to the connections of the module that do not correspond to the specifications of the respective connection.

Grounding / Protective Contact

To avoid danger due to insufficient grounding, please observe the following safety measure:

**DANGER!**

If there is no appropriate and correct grounding, exposed parts of the module can be current-carrying. This can lead to serious injury or even death! Be sure to verify that the module is correctly grounded, according to IEC 61010-1!

De-energizing the module

The module does not have a supply voltage switch. It can be de-energized by disconnecting the cables from all signal inputs.

Approved cables

- Adhere to the maximum permissible cable lengths.
- Do not use any damaged cables.
- Never apply force to insert a plug into a socket.
- Ensure that there is no contamination in and on the socket, that the plug fits the socket, and that you correctly aligned the plugs with the socket.

Requirements for the installation location

Observe "Ambient Conditions" on page 22.

Requirements for the ventilation

There are no special requirements for the ventilation of the product.

Transport

To avoid damages to the hardware from electrostatic discharge, please observe the following precautionary measures:

**CAUTION!**

Some components of the ES5095.1 may be damaged or destroyed by electrostatic discharges. Leave the ES5095.1 in its transport packaging until installation. The ES5095.1 must only be removed from the transport packaging, configured and installed at a workplace that is secured against electrostatic discharges. Avoid any contact with the connections of the ES5095.1 or with conductor paths on the card.

Maintenance

There is no need for the maintenance of the product.

Repair

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





Cleaning the module

- Use a dry, soft, lint-free cloth to clean the module front panel.

- Do not use any sprays, solvents or abrasive cleaners which could damage the product.
- Ensure that no moisture enters the product. Never spray cleaning agents directly onto the product.

1.3 Identifications on the Product

The Following Symbols are Used for Product Labeling:

Symbol	Description
	The User's Guide must be read prior to the startup of the product
	Marking for CE conformity (see "CE Mark" on page 10)
	Marking for China RoHS, see chapter (see "RoHS Conformity" on page 10)
	Marking for conformity with WEEE directive (see "Product Return and Recycling" on page 11)

Please observe the information in the chapter "Technical Data" on page 21.

1.3.1 CE Mark

With the CE mark attached to the product or its packaging, ETAS confirms that the product corresponds to the product-specific, applicable European Directives. The CE Declaration of Conformity for the product is available upon request.

1.3.2 RoHS Conformity

European Union

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

ETAS confirms that the product meets this directive applicable in the European Union.

China

With the China RoHS identification attached to the product or its packaging, ETAS confirms that the product meets the guidelines of the "China RoHS" (Management Methods for Controlling Pollution Caused by Electronic Information Products Regulation) applicable in the People's Republic of China.

1.4 Product Return and Recycling

The European Union (EU) released the Directive for Waste Electrical and Electronic Equipment - WEEE to ensure the setup of systems for collecting, treating and recycling electronic waste in all countries of the EU.

This ensures that the devices are recycled in a resource-friendly way that does not represent any risk to personal health and the environment.



Fig. 1-4 WEEE Symbol

The WEEE symbol on the product or its packaging identifies that the product may not be disposed of together with the remaining trash.

The user is obligated to separately collect old devices and provide them to the WEEE return system for recycling.

The WEEE Directive applies to all ETAS devices, but not to external cables or batteries.

Additional information about the recycling program of ETAS GmbH is available from the ETAS sales and service locations (see "ETAS Contact Addresses" on page 23).

1.5 About this User's Guide

This User's Guide contains the following chapters:

- "Introduction" on page 5
- "Design and Installation" on page 13
- "Connections and Connectors" on page 15
- "Technical Data, Standards and Order Data" on page 21
- "ETAS Contact Addresses" on page 23

2 Design and Installation

2.1 Design

The ES5095.1 Break-Out-Panel (see Fig. 2-1) consists of a front panel to which two PCBs are attached. The short circuit bars are attached to the front panel from the front.

The perforated rail attached to the rear is used for mechanical strain relief of the cables. It is also used to support cable shielding and contributes to the mechanical stability of the complete assembly.

Note

The perforated rail improves the mechanical stability of the ES5095.1 and therefore should not be removed.

10-pin picoMAX pin strips are located on the back of the PCB. Corresponding picoMAX female multipoint connectors can be connected to these (see Chapter "Connectors" on page 15).

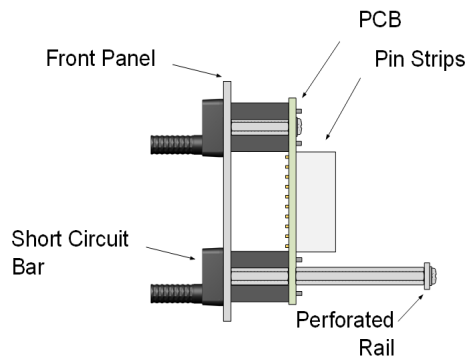


Fig. 2-1 Side View

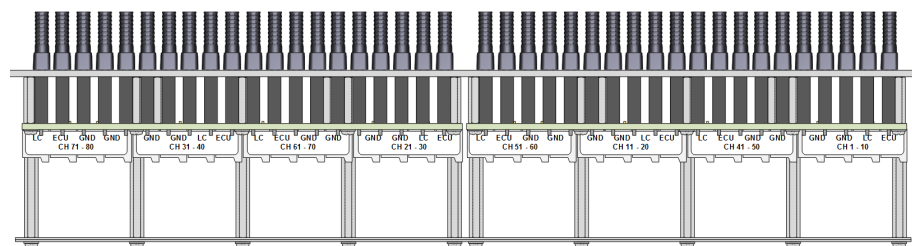


Fig. 2-2 Top View

2.2 Installation

**CAUTION!**

Some components of the ES5095.1 may be damaged or destroyed by electrostatic discharges. Leave the break-out panel in its transport packaging until installation. The ES5095.1 must only be removed from the transport packaging, configured and installed at a workplace that is secured against electrostatic discharges. Avoid any contact with the connections of the ES5095.1 or with conductor paths on the card.

**CAUTION!**

Do not install the ES5095.1 while the ETAS LABCAR is switched on. First, switch off the ES5300.1-A housing or the ES5300.1-B housing by shutting down the real-time PC and by activating the On/Off switch at the rear.

**WARNING!**

Danger of overheating and fire caused by exceeding the specified values. Make sure that the product is only operated in the specified range.

The ES5095.1 is provided for assembly in a 19" rack.

The cables must be secured to the perforated rail on the back of the ES5095.1 for strain relief. If necessary, cable shielding can be fitted on top of this. The perforated rail has an electrical connection to the housing ground.

The installation of the ES5095.1 may be performed only by trained personnel in an ESD-safe area.

2.3 Scope of Supply

The scope of delivery of the ES5095.1 Break-Out-Panel includes the assembly described in Chapter 2.1, including the short circuit bar.

The bolts and cage nuts for assembly in a 19" rack as well as the picoMAX female multipoint connectors are not included in the scope of delivery.

3 Connections and Connectors

3.1 Connectors

The ES5095.1 is connected using the picoMAX connector system. The technical data and order data for the connectors are listed below:

Pin Strip on the PCB

Type	picoMAX 3.5 pin strip with straight solder pins Order no. 2091-1410
Manufacturer	WAGO

Female Multipoint Connector

Type	1.) picoMAX 3.5 female multipoint connector with conductor terminal Order no. 2091-1130
	2.) picoMAX 3.5 female multipoint connector with conductor terminal, with handle plate Order no. 2091-1110
	3.) picoMAX 3.5 female multipoint connector with conductor terminal, with handle plate and release catch ETAS order no. F-04A-111-047 WAGO order no. 2091-1110/002-000
Manufacturer	WAGO
Scope of supply	No

Short Circuit Bar

Type	Short circuit bar Order no. KURZ 8454 / 11-4 IG MB / ETAS / Ni / SW
Manufacturer	Schützinger
Scope of supply	yes

3.2 Pin Assignment

The connectors on the rear of the ES5095.1 make it possible to connect to an electronic control unit (ECU) or to the ETAS LABCAR.

The pin assignment is illustrated in Fig. 3-1. The figure shows the maximum possible pin assignment.

Note

The x in the connection group designations GND_x, LABCAR_x and ECU_x represents the respective channel. For example, the ground connection for channel 0 is called: GND_0.

Note

The ground connections GND_x of the respective channels are not connected to each other.

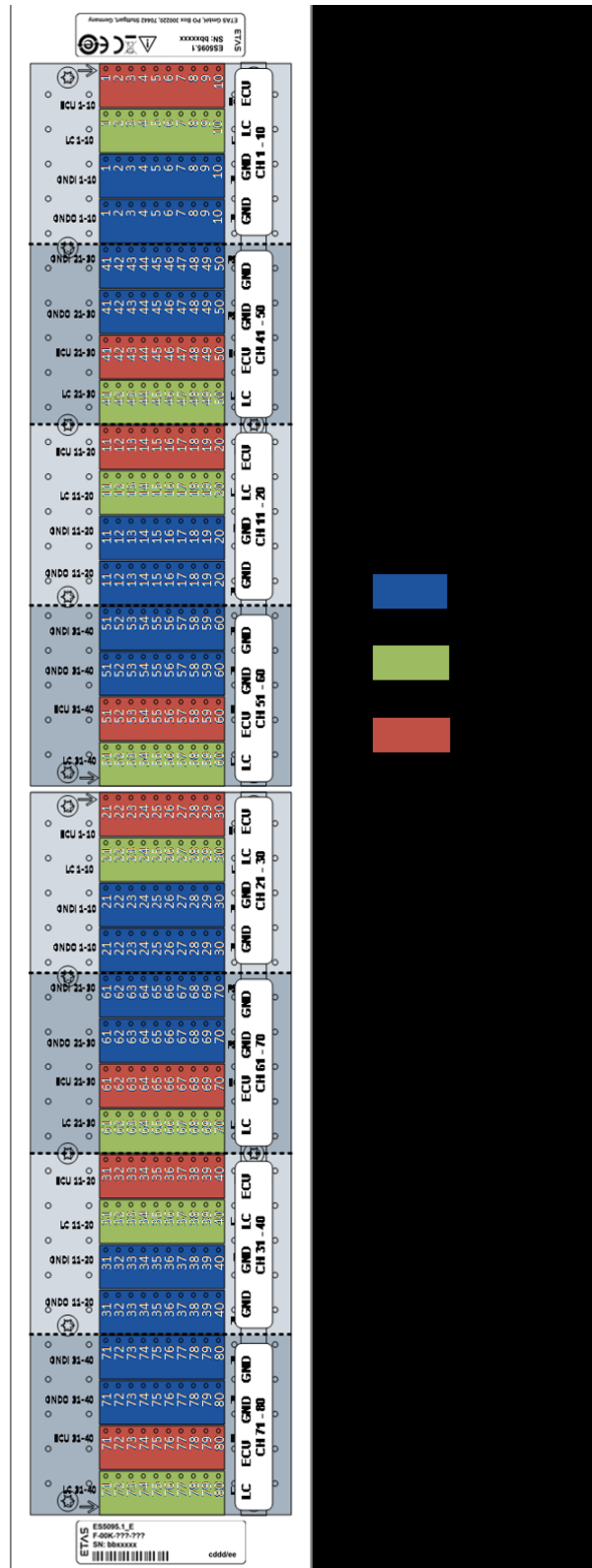


Fig. 3-1 Pin Assignment (Rear)

3.3 Connecting Cable

Use only approved cables for creating cable assemblies (e.g. for connecting the ECU or ETAS LABCAR I/O cards).



CAUTION!

The cables used must be particularly suited for occurring currents, voltages and temperatures and flame-retardant in accordance with one of the following standards IEC60332-1-2, IEC60332-2-2, UL2556/UL1581VW-1!

Note

The signal lines may not exceed a maximum length of 3 m!

The permissible conductor data is listed below:

Items	Data
Connection technology	Push-in CAGE CLAMP
Conductor cross-section: Single wire	0.2 to 1.5 mm ²
Conductor cross-section: Fine wire	0.2 to 1.5 mm ²
Conductor cross-section: Fine wire	0.25 to 0.75 mm ² (with end splice with plastic collar)
Conductor cross-section: Fine wire	0.25 to 1.5 mm ² (with end splice without plastic collar)
Conductor (AWG)	24... 14, 14: THHN, THWN
Stripping length	8 to 9 mm/0.31 to 0.35 in.

3.4 Connection Options

The four options for connecting to the ES5095.1 Break-Out-Panel are listed below:

1. Signals with own Ground Line

Signals with their own ground line can be connected as shown in Fig. 3-2:

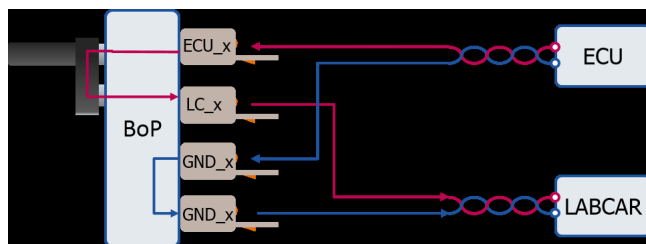


Fig. 3-2 Connecting Signals with own Ground Line

The signal lines of the ECU and the ETAS LABCAR are connected to the ECU_x-channel or LC_x-channel respectively (see Fig. 3-2, red wires). The ground lines of the ECU and the ETAS LABCAR are connected to the GND_x-channel (see

Fig. 3-2, blue wires). When connecting the signal line and the ground line, ensure that both wires remain twisted together until shortly before the ES5095.1.

With this connection option, up to 80 signals, each with their own ground lines, can be connected. 32 picoMAX female multipoint connectors are required.

2. Differential Signals

Differential signals can be connected as shown in Fig. 3-3:

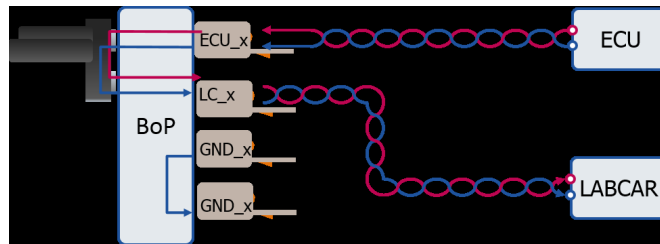


Fig. 3-3 Connecting Differential Signals

The wire pair of the ECU (see Fig. 3-3, red and blue ECU wires) is connected to two adjacent ECU_x-channels. The wire pair of the ETAS LABCAR (see Fig. 3-3, red and blue ETAS LABCAR wires) is connected to two adjacent LC_x-channels. When connecting, ensure that both differential signal lines remain twisted together until shortly before the ES5095.1. The GNC_x-channels remain unused.

With this connection option, up to 40 differential signals can be connected. 16 picoMAX female multipoint connectors are required.

3. Signals without own Ground Line

Signals without their own ground line can be connected as shown in Fig. 3-4:

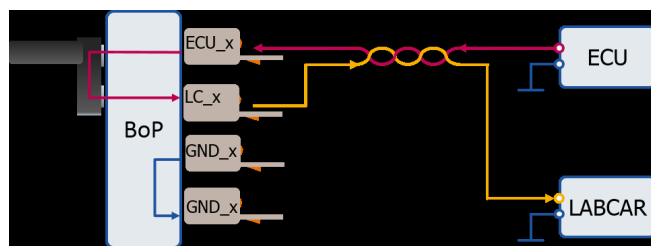


Fig. 3-4 Connecting Signals without own Ground Line

Low-frequency signals with a general ground reference (e.g. UBATT), without their own ground line, can be connected individually to the ECU_x-channels or LC_x-channels. When connecting, ensure that the ECU and LABCAR lines are twisted together over as long a section as possible.

With this connection option, up to 80 signals can be connected. If the GND_x-channels remain completely unused, only 16 picoMAX female multipoint connectors are required.

4. Signals without own Ground Line, with Failure Injection

Signals without their own ground line, with failure injection, can be connected as shown in Fig. 3-5:

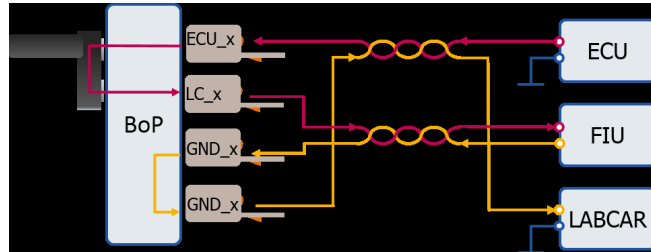


Fig. 3-5 Connection of Signals without own Ground Line, with Failure Injection

Low-frequency signals with a general ground reference (e.g. UBATT), without their own ground line, can be connected directly to the ES5095.1 with a failure injection unit (FIU, e.g. ES5398.1 or ES4440.2). When connecting, ensure that the supply and return lines are twisted together over as long a section as possible.

With this connection option, up to 80 signals can be connected. 32 picoMAX female multipoint connectors are required.

5. Differential Signals with Failure Injection

Differential signals with failure injection can be connected as shown in Fig. 3-6:

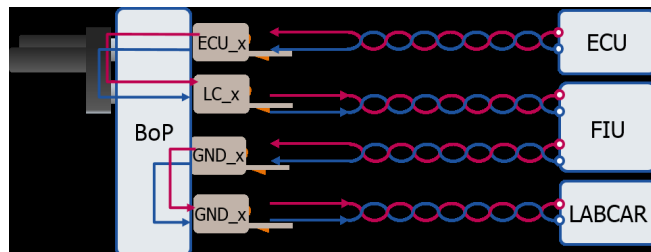


Fig. 3-6 Connection of Differential Signals with Failure Injection

Differential signals can be connected directly to the ES5095.1 with a failure injection unit (FIU, e.g. ES5398.1 or ES4440.2). When connecting, ensure that the two wire pairs are twisted together over the entire cable length.

With this connection option, up to 40 differential signals can be connected. 32 picoMAX female multipoint connectors are required.

4 Technical Data, Standards and Order Data

4.1 Technical Data

Connection Channels

Items	Data
Max. voltage per channel at inputs, between inputs, between inputs and protective conductor	60 V DC
Max. current per channel	10 A
Max. total current (averaged over 60 seconds)	400 A
Line resistance (signal)	10 mΩ to 30 mΩ
Line resistance (GND)	5 mΩ
Parasitic capacitance (signal/housing ground)	20 pF to 160 pF
Max. frequency (analog signals)	100 kHz
Min. rise and fall time (digital signals)	3.2 μs
Pin thickness (short-circuit bars)	4 mm
Pin spacing (short-circuit bars)	11 mm
Max. connection cycles (4 mm sockets)	1000
Max. connection cycles (picoMAX)	25

Physical Parameters

Weight (incl. short circuit bar without PicoMAX female multi-point connectors)	1.75 kg
Height	88.9 mm (2 HU)
Width	482.6 mm (19")
Mounting depth in 19" rack	75 mm

Storage Conditions

Temperature	-20 °C to 85 °C (-4 °F to 185 °F)
Relative humidity	0 to 95% (non-condensing)

Ambient Conditions

Temperature during operation	5 °C to 40 °C (41 °F to 104 °F)
Relative humidity	0 to 95% (non-condensing)
Altitude	-200 m to 2000 m above sea level

4.2 Standards Met

The ES5095.1 meets the following norms and standards:

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

The module is only intended for use in industrial settings in accordance with EN 61326-1. Avoid potential radio interference when using the module outside of the industrial settings with additional shielding measures!

Note

The signal lines may not exceed a maximum length of 3 m!

4.3 Order Data

Order name	Short name	Order number
ES5095.1 Break-Out-Panel	ES5095.1	F-00K-110-991

5 **ETAS Contact Addresses**

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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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