

ETAS ES134.1

Interface Extension Module



User Guide

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1 Safety Notices

This chapter contains information about the following topics:

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Refer to the following safety instructions and the technical documentation available to download from the ETAS website www.etas.com. Keep the information provided in a safe place.

Failure to comply with the safety instructions may lead to the risk of damage to life and limb or property. The ETAS Group and its representatives shall not be liable for any damage or injury caused by improper operation or use of the product.

Only use the product if you have read and understood the information concerning safe operation and have the required qualifications and training for this product. If you have questions about safe operation, contact ETAS:

- Technical Support: www.etas.com/hotlines
- Regional ETAS Contact Partner: www.etas.com/contact

The product is only approved for the applications described in the technical documentation. When using and operating this product, all applicable regulations and laws must be observed.

ETAS products, made available as beta versions or prototypes of firmware, hardware and/or software, are to be used exclusively for testing and evaluation purposes. These products may not have sufficient technical documentation and not fulfill all requirements regarding quality and accuracy for market-released series products. The product performance may therefore differ from the product description. Only use the product under controlled testing and evaluation conditions. Do not use data and results from beta versions without prior and separate verification and validation and do not share them with third parties.

Before commissioning, check whether a Known Issue Report (KIR) is available for the current product version: www.etas.com/kir (Password: KETASIR). Note the information given in the report.

Program codes or program control sequences that are created or changed via ETAS products, as well as all types of data obtained through the use of ETAS products, must be checked for their reliability and suitability prior to use or distribution.

Only use these codes or sequences in public areas (e.g. in road traffic) if you have ensured that the application and product settings are safe through testing in self-contained and designated testing environments and circuits.

This ETAS product allows you to influence safety-relevant systems or data (e.g. in motor vehicles, vehicle components and test benches). In the event of a malfunction or a hazardous situation, it must be possible to put the system into a safe state (e.g. emergency stop or emergency operation).

1.1 Intended Use

The product was developed and approved for applications in the automotive sector. Only operate the product as per its specifications. If the product is used in any other way, product safety is no longer ensured.

The interface modules are designed for the following applications:

- Detecting signals from ETK and ECU interfaces, as well as from vehicle buses
- Flash programming of ECUs

Application Areas


- The product is approved for use in the following areas:
 - Interior
 - Passenger compartment
 - Trunk
- Do not operate the product in a wet or damp environment.
- Do not operate the product in potentially explosive atmospheres.


Technical Condition

The product is designed in accordance with state-of-the-art technology. Only operate the product and its accessories if they are in perfect working order. Shut down a damaged product immediately. Do not open or alter the product. Only ETAS may make changes to the product.

1.2 Classification of Safety Messages

The safety messages warn of dangers that can lead to personal injury or damage to property:

 DANGER
DANGER indicates a hazardous situation with a high risk of death or serious injury if not avoided.

 WARNING
WARNING indicates a hazardous situation of medium risk, which could result in death or serious injury if not avoided.



CAUTION

CAUTION indicates a hazardous situation of low risk, which may result in minor or moderate injury if not avoided.

NOTICE

NOTICE indicates a situation, which may result in damage to property if not avoided.

1.3

Assembly

Only install, connect, disconnect and cable ETAS products and components when they are de-energized.

Assembly location

Install the product on a smooth, level and firm surface.

NOTICE

Damage to the electronics due to potential equalization

The cables' shield may be connected to the housing, the ground or the ground for the product's power supply. If there are different ground potentials in the test setup, equalizing currents can flow between the products via the cables' shield. Take account of different electric potentials in your test setup and take appropriate measures to prevent equalizing currents.

Securing the Product

The housing must not be damaged while securing the product.



WARNING

Risk of injury due to inadequate fastening

- Secure the product so that it does not move uncontrollably.
- Only use carrier systems and fastening materials that can accommodate the static and dynamic forces of the product and are suitable for the ambient conditions.

Ventilation

- Protect the product against direct solar radiation and other sources of heat.
- Ensure that there is sufficient air circulation for efficient heat exchange.

1.4

Operation

Only operate the product with the latest firmware. You can find information about updating the firmware in the user manual.

If the firmware update is not completed successfully, try it again. If a new firmware update is not possible and the product is not functional, send the product to ETAS.



WARNING

Risk due to undefined vehicle behavior during an ECU reset

If you operate the product in combination with ETKs, the ECU must not be reset in an uncontrolled manner.

- Only make changes when the vehicle is stationary (e.g. changes to the test setup, changes to the ETK configuration, software updates).

1.5 Electrical Connection

Electrical Safety and Power Supply

- Only connect the product to electric circuits with safety extra-low voltage in accordance with IEC 61140 (devices of class III) within the voltage limits for accessible parts as per IEC 61010-1.
- Observe the connection and setting values ("Electrical Data" on page 22).
- The power supply for the product must be safely disconnected 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)).
- The power supply must be suitable for use according to the ambient conditions for the product.
- It is possible to discharge the vehicle battery in regular operation and long standby operation.
- Central load-dump protection is required for operation.

Connection to the Power Supply

The product is powered via an ETAS module in the test setup.

To de-energize the Product

1. Disconnect the product from the power supply in one of the following ways:
 - Switch off the laboratory power supply for the test setup.
 - Disconnect the test setup's connection to the vehicle battery.
 - Disconnect the product from the ETAS module supplying the power.
2. Disconnect the product from all interfaces.

1.6 Cables and Accessories

Cables

- Only use ETAS cables, cables recommended by ETAS or other cables certified for the application.
- Route the cables such that they are protected against abrasion, damage, deformation and kinking.

- Do not place any objects on the cables.
- Do not use any damaged cables.
- The connector and connection must not be dirty.
- The connector and connection must be compatible.
- Correctly align the connector with the connection.
- Do not connect the connector and connection by force.

For detailed information about cables, see the user manual for the product.

Accessories

Use ETAS accessories, accessories recommended by ETAS or other accessories certified for the application. For detailed information about accessories, see the product's user manual.

1.7 Transport

- Only transport the product individually.
- Remove all connected cables before transportation.
- Do not transport the product by the connected cables.

1.8 Maintenance

The product is maintenance-free.

Cleaning

- Only clean the product when it is de-energized.
- Do not use cleaning agents that could harm the product.
- Do not apply cleaning agents directly onto the product.
- Use a dry or slightly dampened, soft, lint-free cloth.
- Make sure that no moisture enters the product.

1.9 Repairs

If repairs are required, send the product to ETAS.

1.10 Shipment and Packaging

You can find the return form and information about this process on the ETAS website: www.etas.com/en/support/hw_return_form.php.

2 Hardware Description

This chapter contains information about the following topics:

- Overview 10
- Design 11
- Updating the Firmware 13
- LIN Interface 13
- Multi-Client Support 14

2.1 Overview

2.1.1 Description

The Interface Extension Module ES134.1 is equipped with two LIN bus interfaces for connection to the LIN bus of a vehicle or an ECU and with a Lemo connector for connection of the following products:

- ES523.1
- ES592.1
- ES593-D
- ES595.1
- ES600.2
- ES88x
- ES89x

2.1.2 Scope of Application

The ES134.1 can be used for the following tasks:

- Recording and capturing of communication data as well as calibration of ECUs via the LIN bus interface
- ECU diagnostics via the LIN bus interface

2.1.3 Properties

The most important properties at a glance:

- Two independent LIN interfaces
- Targeted for ECU measurement
- Multi-Client Support
- Synchronization of the measuring channels with INCA
- No external power supply necessary
- Adaptable to ambient conditions (temperature, EMC)
- High level of mechanical stability and robustness

Complete technical data for the ES134.1 Interface Extension Module can be found in chapter 17.

2.2 Design

2.2.1 Connections ES134.1



Fig. 2-1 Connections ES134.1

Fig. 2-1	Connection	Description
1	LEMO 1B	Combined connection for power supply and 10/100 BASE-T Ethernet (IEEE 802.3) via connected ETAS module (e.g. ES5xx and ES8xx)
2	DSUB	Two independent LIN channels

2.2.2 LEDs

The ES134.1 is equipped with 5 LEDs for displaying the module's operating state, as well as for displaying the function of the two LIN connections LIN 1 and LIN 2.



Fig. 2-2 LED layout of the ES134.1

LIN 1

LED code	Display	State
ON OFF	Off	Communication at LIN 1 interface interrupted
ON OFF	Flashing yellow	Communication at LIN 1 interface
ON OFF	Flashing red	Communication error at LIN 1 interface

BUSY

LED code	Display	State
ON OFF	Off	No synchronization
ON OFF	Flashing blue	The module is synchronized.

ON

LED code	Display	State
ON OFF	Off	The module is switched off.
ON OFF	Flashing green	The module is on standby.
ON OFF	Lit green	The module is switched on.

ER

LED code	Display	State
ON OFF	Off	No error
ON OFF	Flashing red	Firmware update is being performed. Do not disconnect the module from the power supply.
ON OFF	Lit red	The boot process was not successful or the module encountered a software error. Restart the module.

LIN 2

LED code	Display	State
ON OFF	Off	Communication at LIN 2 interface interrupted
ON OFF	Flashing yellow	Communication at LIN 2 interface
ON OFF	Flashing red	Communication error at LIN 2 interface

2.3 Updating the Firmware

The firmware for the product can be updated using the ETAS "Hardware Service Pack" (HSP) service software. You can find the software in the Download Center on the ETAS website: www.etas.com

2.4 LIN Interface

The LIN interface is electrically isolated from the other interfaces of the module and also protected against overload or misuse.

2.4.1 Operating Modes

The four clients of the LIN interfaces (see chapter "Multi-Client Support" on page 14) can either be operated in the LIN master operating mode or in the LIN slave operating mode. The following configurations are possible:

- Client 1: LIN master or LIN slave and
- Client 2 - 4: LIN slave

The operating mode is selected in the application software.

2.4.2 Feature

The LIN applications supported by the module are listed in an overview in chapter 5.11.3 on page 31.

2.4.3 Voltage Supply on the LIN Bus

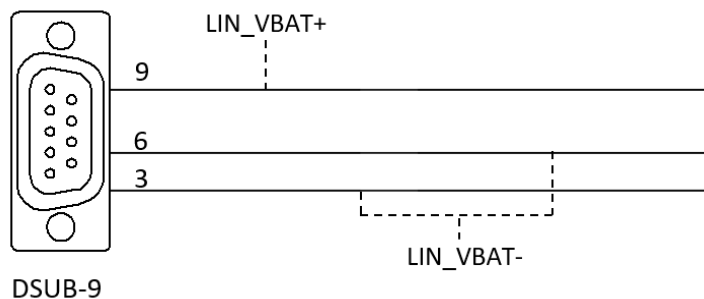


Fig. 2-1 Voltage supply on the LIN bus (pin assignment on the CBCF100 cable)

12 V LIN systems

In 12 V LIN systems, the LIN nodes of the ES134.1 module can either be supplied externally by the LIN bus or internally by the module with the LIN reference voltage V_{BAT} .

24 V LIN systems

In 24 V LIN systems, the LIN node of the ES134.1 module can only be supplied externally by the LIN bus with the LIN reference voltage V_{BAT} .

Supplying external LIN nodes

The module is not designed for the supply of external nodes on the LIN bus.

Selecting the voltage supply

An internal pull-up resistance can be switched to the LIN interface of the module as master resistance. Switching of the master resistance of the LIN interface can be configured in the application software.

Recommendation

To maintain the reference level (and thereby identical switching thresholds) at the individual nodes on the LIN bus, the LIN transceivers (physical layer) of all nodes on the bus should be operated with the same voltage.

We therefore recommend powering all nodes on the LIN bus with the external voltage that also powers the other bus participants (LIN V_{BAT} , see Fig. 2-1 on page 13).

At the same time, this ensures compliance with safe switching thresholds in each operating state of the LIN system (e.g. during vehicle cold starts).

If there is no access or no possibility of using the LIN V_{BAT} voltage as reference and supply voltage, the LIN transceivers of the dedicated LIN node of the ES134.1 can be supplied by a switchable internal voltage source of the module.

This internal supply voltage is not routed outside via the LIN plug connector.

2.5 Multi-Client Support

The LIN channel of the ES134.1 module can support four clients at the same time (application tools):

- On the LIN channel, simultaneous access is for example possible using an application tool (e.g. INCA) and a bus analysis tool (e.g. BUSMASTER).

In total, each ES134.1 module connected to the PC can serve two (different) clients or application tools.

3 Commissioning

This chapter contains information about the following topics:

- Cabling 15
- Operation 16

Securing the Product



WARNING

Risk of injury due to inadequate fastening

- Secure the product so that it does not move uncontrollably.
- Only use carrier systems and fastening materials that can accommodate the static and dynamic forces of the product and are suitable for the ambient conditions.

3.1 Cabling

NOTICE

Damage to the electronics due to potential equalization

The cables' shield may be connected to the housing, the ground or the ground for the product's power supply. If there are different ground potentials in the test setup, equalizing currents can flow between the products via the cables' shield. Take account of different electric potentials in your test setup and take appropriate measures to prevent equalizing currents.



NOTE

Ensure that the test setup is EMC-compliant. A test setup that uses shielded and unshielded components at the same time can lead to impairment of the signal quality and is not recommended by ETAS.

The ES134.1 is a two-channel LIN module with an Ethernet connection and is intended for the measurement, calibration, diagnostics. The power is supplied via the connected ETAS product.

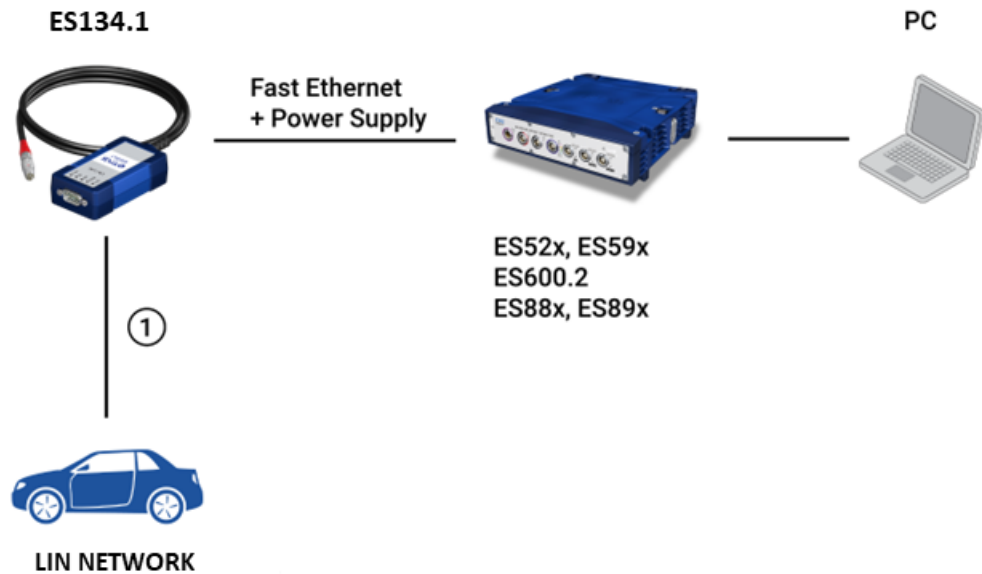



Fig. 3-1 Cabling ES134.1

Cables in Fig. 3-1	Function	Short name
1	LIN and FlexRay interface Y-cable	CBCF100.1-0m3
	CAN, LIN and FlexRay interface cable, DSUB-DSUB	CBH500-2


3.2 Operation

 **WARNING**

Risk due to undefined vehicle behavior during an ECU reset

If you operate the product in combination with ETKs, the ECU must not be reset in an uncontrolled manner.

- Only make changes when the vehicle is stationary (e.g. changes to the test setup, changes to the ETK configuration, software updates).

 **NOTE**

If the ES134.1 is used as slave device, configure the ES134.1 like the master device of the LIN bus (e.g. LIN speed, LIN version etc.).

4 Technical Data









This chapter contains information about the following topics:

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- RoHS Conformity 18
- Declarable Substances 19
- CE Conformity 19
- UKCA Conformity 19
- KCC Conformity 19
- CMIM conformity 19
- Product Return and Recycling 20
- Use of Open Source Software 20
- System Requirements 20
- Terminal Assignment 21
- Electrical Data 22

4.1 General Data

4.1.1 Identification on the Product

The following symbols are used for identifying the product:

Symbol	Description
	Please read the user manual before starting up the product.
SN: xxxxxxx	Serial number (seven digits)
F 00K xxx xxx	Order number (chapter 6 on page 26)
x-xx V 	Operating voltage range DC
xxx mA	Max. current consumption
	Marking for RoHs conformity (chapter 4.2 on page 18)
	Marking for CE conformity (chapter 4.4 on page 19)
	Marking for UKCA conformity (chapter 4.5 on page 19)
	Marking for KCC conformity (chapter 4.6 on page 19)
	Marking for CMIM conformity (Chapter 4.7 on page 19)
	Marking for WEEE (chapter 4.8 on page 20)

4.1.2 Norms and Standards

The Interface Extension Module complies with the following standards and norms:

Standard	Test
IEC 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use
IEC 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements

4.1.3 Ambient Conditions

Operating temperature range	-40 °C to +60 °C -40 °F to +140 °F
Storage temperature range (without packaging)	-40 °C to +85 °C -40 °F to +185 °F
Max. relative humidity (non-condensing)	95%
Max. altitude	5000 m / 16400 ft.
Degree of contamination (IEC 60664-1, IEC 61010-1)	2
Protection rating (when closed)	IP42

4.1.4 Mechanical Data

Dimensions

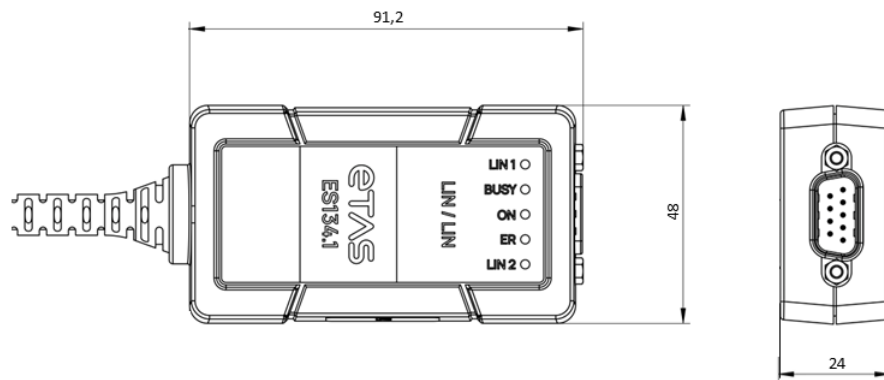


Fig. 4-1 Dimensions without cable

Dimensions (H x W x D)	92 x 48 x 24 mm 3.62 x 1.89 x 0.94 in
Dimensions (H x W x D) with cable	1592 x 48 x 24 mm 62.68 x 1.89 x 0.94 in
Weight with cable	0.18 kg / 0.4 lb

4.2 RoHS Conformity

4.2.1 European Union

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

This product does not contain any of the prohibited substances listed in EU Directive 2011/65/EU and does not exceed the maximum authorized concentrations specified. There are currently no equivalent alternative substances for individual electronic components used in our products. We are therefore making use of exemptions 7.a-I, 7.c-I and 6.c (for accessory cables) in Annex III of this Directive. ETAS confirms that the product meets this directive applicable in the European Union.

4.2.2 China RoHS

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.

4.3 Declarable Substances

European Union

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 updated.

4.4 CE Conformity

With the CE mark attached to the product or its packaging, ETAS confirms that the product corresponds to the applicable, product-specific Directives of the European Union.

The CE Declaration of Conformity for the product is available upon request.

4.5 UKCA Conformity

With the UKCA mark attached to the product or its packaging, ETAS confirms that the product meets the applicable, product-specific British standards and directives.

The UKCA Declaration of Conformity for the product is available upon request.

4.6 KCC Conformity

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

4.7 CMIM conformity

With the CMIM mark attached to the product or its packaging, ETAS confirms that the product corresponds to the product-specific, applicable directives of the Kingdom of Morocco.

The CMIM Declaration of Conformity for the product is available upon request.

4.8 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. 4-2 WEEE symbol

The WEEE symbol (see Fig. 4-2) 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 7 on page 27).

4.9 Use of Open Source Software

The product uses open source software (OSS). This software is installed in the product at the time of delivery and does not have to be installed or updated by the user. Reference must be made to the use of the software in order to fulfill OSS licensing terms. Additional information is available in the document "OSS Attributions List" on the ETAS website www.ETAS.com.

4.10 System Requirements

For the configuration of the product as well as the control and data acquisition, you need ETAS software in the following versions:

INCA	starting with Version 7.5.3
HSP	starting with Version 14.3.0

4.11 Terminal Assignment

 **NOTE**
 All connections are shown with view of the module interfaces.

4.11.1 Terminal Assignment of Cables

LEMO connector (male)

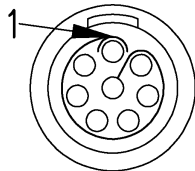


Fig. 4-3 Terminal assignment of LEMO connector

Pin	Signal
1	UBATTP1
2	UBATTP2
3	UBATTM
4	RX_D2+
5	TX_D1-
6	RX_D2-
7	UBATTM
8	TX_D1+
Housing	GND

4.11.2 Terminal Assignment of LIN interface

DSUB (male)

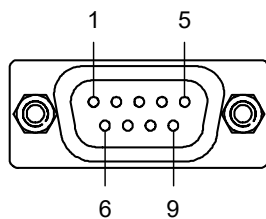


Fig. 4-4 ES134.1 DSUB connection

Pin	Signal
1	Not connected
2	Not connected
3	VBAT-
4	Not connected
5	Not connected
6	VBAT-

Pin	Signal
7	LIN 1
8	LIN 2
9	VBAT+

4.12 Electrical Data

Operating voltage range	6 V to 32 V DC
Max. current consumption	0.5 A
Current consumption (standby)	approx. 0.5 mA (at 12 V DC)
Maximum voltage to ground or to all accessible parts (e.g. ECU housing, vehicle chassis)	60 V DC / 30 V AC
Overvoltage category (mains supply, IEC 60664-1)	II

LIN Interface

LIN	Two interfaces, isolated from the host connector
Standard	Compliant to LIN 2.0, LIN 2.1, LIN 2.2, LIN 2.2 A, and ISO/DIS 17987-4.2
Controller	LIN core (FPGA)
Transceiver (physical layer)	TLIN1029
LIN reference voltage V_{BAT}	12 V LIN systems: V_{BAT} internal from the module or external from the LIN bus, can be selected in the application software ¹⁾ 24 V LIN systems: Only V_{BAT} external from the LIN bus
Operating modes	Master or slave, can be selected in the application software ²⁾
Clients per LIN channel	Max. 4
Clients and operating modes	Client 1: Master or slave, Client 2 - 4: Slave
Clients and LIN standard	Client 1: Compliant to LIN 2.0, LIN 2.1, LIN 2.2, LIN 2.2 A, and ISO/DIS 17987-4.2 Client 2 - 4: Compatible with the LIN standard used by Client 1
Electrical isolation	Interface separated from the other interfaces

¹⁾: Selection of internal LIN V_{BAT} by INCA currently in preparation

²⁾: Support for master operating mode by INCA currently in preparation



NOTE

Multi-client simulation scenarios:
Turn on the LIN bus and configure all slave applications and PID responses before starting LIN communication.

5 Cables and Accessories

This chapter contains information about the following accessories:

- CBCF100 Cable 24
- CBH500 Cable 25

5.1 CBCF100 Cable



Fig. 5-1 CBCF100 cable

Y-cable for connecting a second LIN channel.

DSUB connection (female)

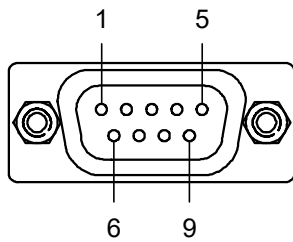


Fig. 5-2 DSUB connection (female) to the ETAS module

Pin	Description
1	Not connected
2	Not connected
3	VBAT-
4	Not connected
5	Not connected
6	VBAT-
7	LIN 1
8	LIN 2
9	VBAT+

DSUB connection (male)

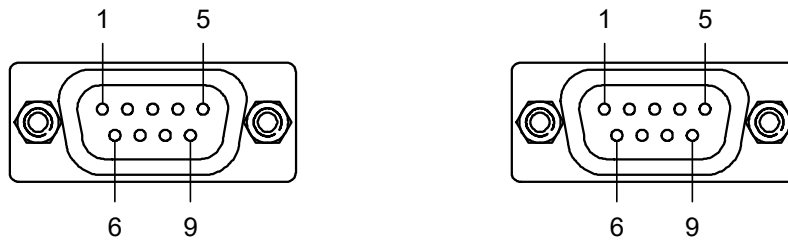
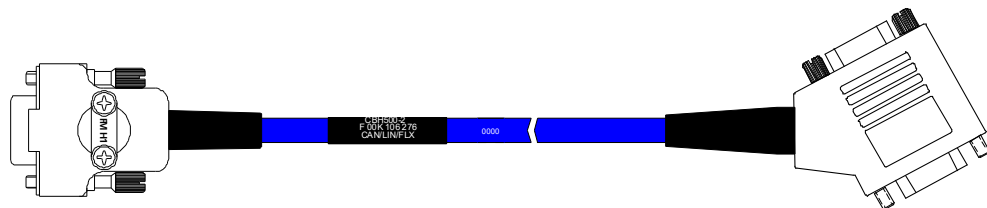


Fig. 5-3 DSUB connection (male) "1" and "2" to the LIN bus

Pin	DSUB connection "1"	DSUB connection "2"
1	Connected to pin 1 on device side	Not connected
2	Not connected	Not connected
3	VBAT-	VBAT-
4	Not connected	Not connected
5	Not connected	Connected to pin 5 on device side
6	VBAT-	VBAT-
7	LIN 1	LIN 2
8	Not connected	Not connected
9	VBAT+	VBAT+

Order designation	Short name	Order number
LIN and FlexRay interface Y-cable, DSUB - 2 x DSUB (9fc-9mc+9mc), 0m3	CBCF100.1-0m3	F 00K 107 939

5.2 CBH500 Cable



NOTE
The CBH500 cable only supports one LIN channel.

Order designation	Short name	Order number
CAN, LIN and FlexRay interface cable, DSUB-DSUB (9fc - 9mc + 9fc), 2 m	CBH500-2	F 00K 106 276

6 Order Information

This chapter contains information about the following topics:

- ES134.1 26
- Accessories 26

6.1 ES134.1

Order name	Short name	Order number
ES134.1 LIN (2 x LIN) interface extension module with LEMO 1B FGC (8mc) Ethernet connection.	ES134.1	F 00K 112 341
Package Contents		
- ES134.1 Interface Extension Module - List "Content of this Package" - CBCF100.1-0m3 - ETAS Safety Advice ES13x - China-RoHS-leaflet_ES4xx_orange_cn		

6.2 Accessories

6.2.1 Cable

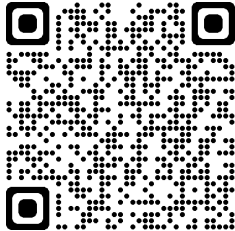
Order name	Short name	Order number
LIN and FlexRay interface Y-cable, DSUB - 2 x DSUB (9fc-9mc+9mc), 0m3	CBCF100.1-0m3	F 00K 107 939
CAN, LIN and FlexRay interface cable, DSUB-DSUB (9fc - 9mc + 9fc), 2 m	CBH500-2	F 00K 106 276

7 Contact Information

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:

www.etas.com/en/hotlines.php



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