ETAS ES595.1 Network Module

User Guide

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Contents

1   About this Document

1.1   Classification of Safety Messages

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

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

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

> ⚠ **CAUTION**
>
> indicates a hazardous situation of low risk which may result in minor or moder-ate injury if not avoided.

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

1.2   Presentation of Instructions

The target to be achieved is defined in the heading. The necessary steps for his are in a step-by-step guide:

Target definition

1. Step 1
2. Step 2
3. Step 3
> Result

1.3   Typographical Conventions

Hardware

Bold   Menu commands, buttons, labels of the product
Italic   Emphasis on content and newly introduced terms

1.4   Presentation of Supporting Information

> **NOTE**
>
> Contains additional supporting information.

2   About this Manual

This chapter contains information about the following topics:

- "Scope of Supply" on page 8
- "Additional information" on page 8

2.1   Scope of Supply

Prior to the initial commissioning of the module, please check whether the module was delivered with all required components and cables (see chapter 10.1 on page 73).

Additional cables and adapters can be obtained separately from ETAS. A list of available accessories and their order designation is located in chapter "Cable and Accessoires" on page 74 of this manual or in the ETAS product catalog.

2.2   Additional information

The configuration instructions for the module under INCA can be found in the corresponding software documentation.

3 Basic Safety Notices

This chapter contains information about the following topics:

- "General Safety Information" on page 9
- "Requirements for Users and Duties for Operators" on page 9
- "Intended Use" on page 9

3.1 General Safety Information

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

> **NOTE**
>
> Carefully read the documentation (Product Safety Advice and this User's Guide) that belongs to the product prior to the startup.

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

3.2 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.

General safety at work

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

3.3 Intended Use

Application area of the product

This product was developed and approved for applications in the automotive sector. The module is suitable for use in interiors, in the passenger cell or in the trunk of vehicles. The module is not suitable for installation in the engine compartment and similar environments. For use in other application areas, please contact your ETAS contact partner.

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.

Requirements for 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 requirements on the ambient conditions.
- Do not use the product in a wet or damp environment.
- Do not use the product in potentially explosive atmospheres.

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!
- 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 being followed (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.

Power supply

- 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.
- Use only lab power supplies with double protection to the supply network (with double insulation/reinforced insulation (DI/ RI)).
- The lab power supply must be approved for an operating altitude of 5000 m and for an ambient temperature of up to 70 °C.
- In regular operation of the modules as well as very long standby operation, a discharge of the vehicle battery is possible.

Connection to the power supply

- The power cable must not be connected directly to the vehicle battery or lab power supply, but via a fuse of up to 20 A.
- Ensure that the connections of the lab power supply, the power supply at the module and the vehicle battery are easily accessible!
- Route the power cord in such a way that it is protected against abrasion, damages, deformation and kinking. Do not place any objects on the power cord!

> ⚠ **DANGER**
>
> **Dangerous electrical voltage!**
>
> Connect the power cable only with a suitable vehicle battery or with a suitable lab power supply! The connection to power outlets is not allowed!
>
> To prevent an inadvertent insertion in power outlets, ETAS recommends to equip the power cables with safety banana plugs in areas with power outlets.

Disconnecting from the power supply

The module does not have an operating voltage switch. The module can be de-energized as follows:

- Disconnecting the module from the lab power supply
  - Separating device is the lab plug of the power cord or
  - Separating device is the plug of the power cord at the connection of the module
- Disconnecting the module from the vehicle battery
  - Separating device is the lab plug of the power cord or
  - Separating device is the plug of the power cord at the connection of the module
- Disconnecting the vehicle battery.

Approved cables

- Use exclusively ETAS cables at the connections of the module!
- Adhere to the maximum permissible cable lengths!
- Do not use any damaged cables! Cables may be repaired only by ETAS!
- Never apply force to insert a plug into a socket. Ensure that there is no contamination in and on the connection, that the plug fits the socket, and that you correctly aligned the plugs with the connection.

Requirements for the location

- Position the module or the module stack on a smooth, level and solid underground.
- The module or the module stack must always be securely fastened.

Fixing the modules on a carrier system

- When selecting the carrier system, observe the static and dynamic forces that could be created by the module or the module stack on the carrier system.

Requirements on the ventilation

- Keep the module away from heat sources and protect it against direct exposure to the sun.
- The free space above and behind the module must be selected so that sufficient air circulation is ensured.

Assembling (interconnecting) the modules

- Prior to assembling (interconnecting) or separating a module stack, the modules must be disconnected from the supply voltage or they have to be in the standby operating mode.

Transport

- Stack and connect the modules only at the location of the startup!
- Do not transport the modules at the cable of the module or any other cables.

Maintenance

The product is maintenance-free.

Repair

If an ETAS hardware product should require a repair, return the product to ETAS.

Cleaning the module housing

- Use a dry or lightly moistened, soft, lint-free cloth for cleaning the module housing.
- Do not user any sprays, solvents or abrasive cleaners which could damage the housing.
- Ensure that no moisture enters the housing. Never spray cleaning agents directly onto the module.

Ambient conditions

The housing and the connectors of the module as well as the plug connectors of the cables meet the degree of protection IP30.

Opening the module

> ⚠ **CAUTION**
>
> **Damage to the module and loss of properties based on IP30!**
>
> Do not open or change the module housing!
>
> Work on the module housing may only be performed by ETAS.

Potential equalization

> ⚠ **CAUTION**
>
> **Potential equalization in the vehicle is possible via the shield of the connecting cables of the modules!**
>
> Install the modules only at locations with the same electrical potential or isolate the modules from the installation location.

Cabling

For detailed information about cabling, see the User's Guide of the module.

4   Hardware Description

This chapter provides you with an overview of the ES595.1 with information on the housing, serial number, ports and LEDs.

4.1   Overview

The ES59x line is a range of powerful ECU and bus interface modules. The ES59x modules have an upstream Ethernet interface that guarantees data exchange with the host PC or with a Drive Recorder.

The ES595.1 module has a downstream Ethernet interfaces that can be connected with ES59x, ES600, measurement and interface modules.

Fig. 4-1   View of the Device

Individual measurement, calibration and rapid prototyping modules are easy to combine with ES59x line modules. ECUs that have an XETK, or ECUs that have their own Ethernet interface can be connected directly with an ES595.1 module and communicate with INCA via Ethernet. The ES595.1 has the ECU interfaces ETK, CAN, LIN and FlexRay.

If necessary, systems can be cascaded using ES59x nodes. The Ethernet switch guarantees the time-synchronous sampling of all measurement channels – even in sizeable module networks.

The ES595.1 module and the relevant cables are intended for use in the lab, on the test bench and in the passenger cell of vehicles.

4.2   Features

Overview of the major features of the ES595.1:

- Ethernet switch with a 10/100 Mbit/s data rate:
  - One host port (upstream)
  - One portfor compatible modules (downstream)
  - Can be cascaded up to 15 modules
  - Automatic standby function
  - Precise synchronization of all connected modules and their measurement channels
- ETK interface

- – Measure and calibration applications
- Two independent CAN interfaces:
    - – CAN High Speed (max. 1 MBaud) or CAN Low Speed
    - – CAN IP Controller
    - – CAN protocols CAN V2.0a (Standard Identifier with 11-bit) and CAN V2.0b (Extended Identifier with 29-bit)
    - – Baud rate can be configured by software
- Two independent LIN interfaces:
    - – LIN specification LIN V2.1
    - – Operating mode Slave (monitoring)
- One FlexRay node with two FlexRay channels which can be used redundantly:
    - – BOSCH E-Ray IP Module based FlexRay Communication Controller, compatible with the FlexRay Protocol Specification V2.1
    - – Support of future FlexRay versions with firmware update
    - – The FlexRay node is configured in the calibration software, e.g. in INCA by importing a FIBEX file
- One internal FlexRay node with two FlexRay channels:
    - – Usage exclusively as an internal FlexRay node
    - – BOSCH E-Ray IP Module based FlexRay Communication Controller, compatible with the FlexRay Protocol Specification V2.1
    - – The FlexRay node is configured in the calibration software, e.g. in INCA

Additional features of the module:

- Module suitable for use in automotive applications; suitable for use in the development environment and in the vehicle on test drives.
    - – Channels galvanically isolated from each other, from the device ground and from the supply voltage
    - – Not sensitive to environmental conditions (temperature, EMC)
    - – Wide supply voltage range
    - – High mechanical stability and durability
- Part of the ETAS Tool Suite

For the complete technical data of the ES595.1, refer to the chapter "Technical Data" on page 45.

4.3   Housing

Standard housing with interfaces on the front and rear of the device is used for the ES595.1. The sturdy metal housing of the ES595.1 has nonskid plastic feet.

It can be easily screwed onto a carrier system for installation in a vehicle or in the lab. The housings of this device family can also quickly and easily be connected to one another (see the chapter 6.1 on page 28).

The ES595.1 is intended for use in the lab, on the test bench and in the passenger cell of vehicles.

4.4   Interfaces

4.4.1   Front Panel

The following interfaces are on the front panel of the ES595.1:

- HOST (Ethernet, SYNC-IN)
- ETH1 (Ethernet, SYNC-OUT)
- ETK (1 x ETK)
- CAN1/LIN1 (1 x CAN und 1 x LIN)
- CAN2/LIN2 (1 x CAN und 1 x LIN)
- FLX1/FLX2
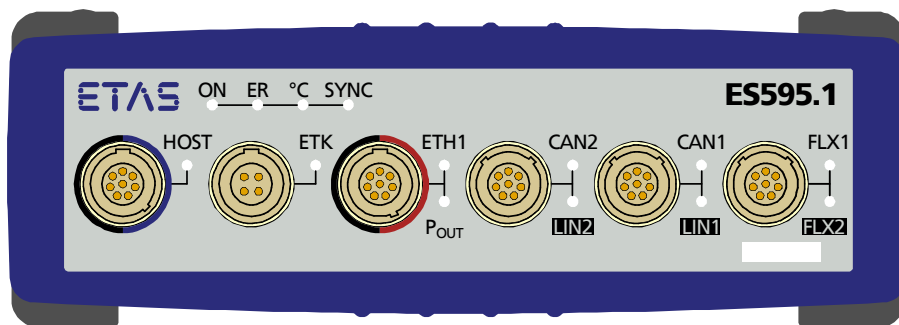
Fig. 4-2   Front Panel

4.4.2   Back Panel

The interface 7-29V (power supply) is on the back panel of the ES595.1.

Fig. 4-3   Back Panel

4.5   LEDs

4.5.1   Flash Codes

The ES595.1 is equipped with LEDs, which indicate the operational state of the module, as well as with LEDs which display the function of individual interfaces. The following flash codes are used for the LEDs:
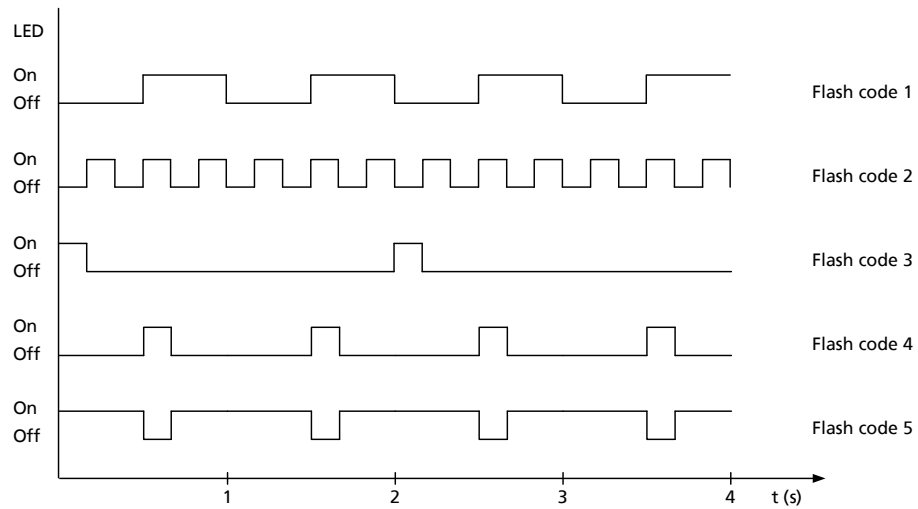
Fig. 4-4   Flash Codes

4.5.2   Operational State of the Module

Four LEDs can be found top left on the front panel of the ES595.1(see Fig. 4-2 on page 16). They indicate operational, error and synchronization states.

- **ON**: power supply and operational state
- **ER**: error states or firmware update
- **°C**: temperature inside the housing
- **SYNC**: synchronization function of the module (master or slave) and the synchronization state

LED	Display	Operational State
ON	Green	The module is powered on.
	Green, flashing (Flash code 3)	The module is on "Standby", the power consumption is minimal. The module needs a wakeup event to enter the normal operation mode.
	Off	The module is not powered.
ER	Red	Module is currently booting or booting was unsuccessful.
	Red, flashing (Flash code 1)	Internal device software error, core file created.
	Red, flashing (Flash code 2)	Firmware update is being executed.
	Off	No error

LED	Display	Operational State
°C	Red	Temperature inside the housing has exceeded the critical level and the module powered down; the module is powered on again if the temperature inside the housing has reached the normal operational range
	Red (Flash code 2)	Temperature inside the housing has reached a critical level. The module does not shut down any functionality.
	Off	Temperature inside the housing is in normal operational range.
SYNC	Blue, flashing (Flash code 4), fully bright	The module is a synchronization master; the module is not synchronized externally
	Blue, flashing (Flash code 5), semi and fully bright alternately	The module is a synchronization slave; the module is synchronized externally at the HOST or at the ETH1 port
	Off	No synchronization

4.5.3 Functional State of Individual Interfaces

LEDs assigned to the interfaces of the module can be found on the front panel of the device (see Fig. 4-2 on page 16). If the ES595.1 is powered on (operational state "On") they indicate the following functional states at the assigned interfaces:

HOST Interface

An LED **HOST** is assigned to the interface HOST.

LED	Display	Functional State
HOST	Yellow, flashing	Communication at the interface HOST
	Off	Communication interrupted

ETK Interface

An LED **ETK** is assigned to the interface ETK.

LED	Display	Functional State
ETK	Yellow, flashing	Communication at the interface ETK
	Off	Communication interrupted

ETH1 Interface

An LED **ETH1** and an LED **POUT** are assigned to the interface ETH1.

LED	Display	Functional State
ETH1	Yellow, flashing	Communication at the interface ETH1
	Off	Communication interrupted

LED	Display	Functional State
POUT	Green	Power supply output at the interface ETH1 is switched on
	Red	Overload by connected module at the power supply output at the interface ETH1
	Off	Power supply output at the interface ETH1 is switched off

CAN2/LIN2 Interface

An LED **CAN2** is assigned to the interface CAN2 and an LED **LIN2** is assigned to the interface LIN2.

LED	Display	Functional State
CAN2	Yellow, flashing	Communication at the interface CAN2
	Off	Communication interrupted
LIN2	Yellow, flashing	Communication at the interface LIN2
	Off	Communication interrupted

CAN1/LIN1 Interface

An LED **CAN1** is assigned to the interface CAN1 and an LED **LIN1** is assigned to the interface LIN1.

LED	Display	Functional State
CAN1	Yellow, flashing	Communication at the interface CAN1
	Off	Communication interrupted
LIN1	Yellow, flashing	Communication at the interface LIN1
	Off	Communication interrupted

FLX1/FLX2 Interface

Each FlexRay channel is assigned a LED which displays the functional state of the FlexRay node (LEDs **FLX1** and **FLX2**).

LED FLX1	LED FLX2	Functional State
Off	Off	FlexRay node inactive (FlexRay controller not configured)
Yellow, flashing	Off	FlexRay channel A active, waiting for synchroniziation
Yellow	Off	FlexRay channel A active, synchronized, ready to exchange data
Off	Yellow, flashing	FlexRay channel B active, waiting for synchroniziation
Off	Yellow	FlexRay channel B active, synchronized, ready to exchange data
Yellow, flashing	Yellow, flashing	FlexRay node active (channel A and channel B), waiting for synchroniziation
Yellow	Yellow	FlexRay node active (channel A and channel B), synchronized, ready to exchange data

5   Functional Description

This chapter describes the block diagram, power supply, Ethernet switch, module network, time synchronization, ECU interfaces and the firmware update.

5.1   Block Diagram
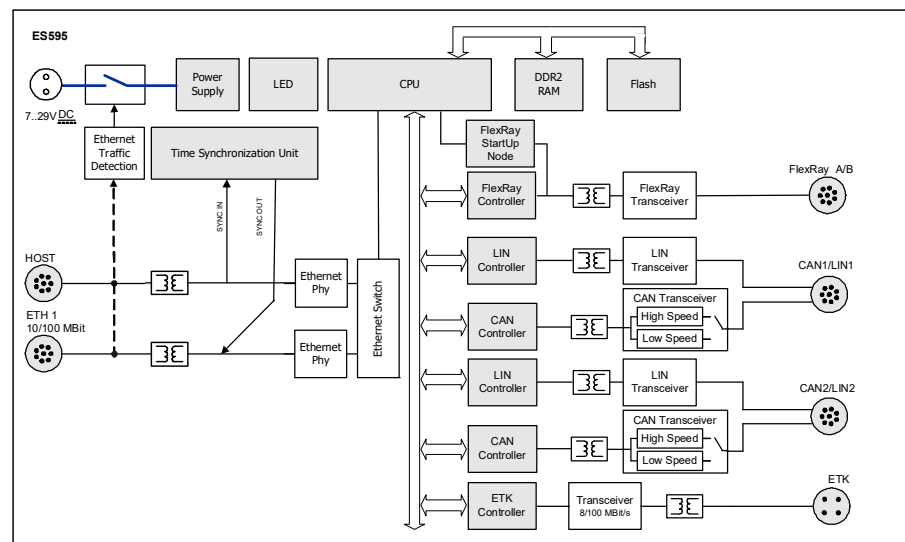
Fig. 5-1   Block Diagram

To fulfill the operation demands in the vehicle, the interfaces of the ES595.1 are each routed to an Lemo socket.

5.2   Power Supply (7-29V DC)

The power supply interface (7-29V DC) is routed to a 2-pin connector (Lemo socket) on the back panel of the module. Power is supplied to the module via an external power supply or vehicle battery.

> **NOTE**
>
> The ES595.1 must be physically disconnected from all supply voltages so the module is not supplied with power.

When the ES595.1 is connected to the operating voltage and there is an Ethernet connection at HOST, the module boots. If there is no Ethernet connection, the module changes to "Standby."

5.3   Ethernet Switch

The integrated Ethernet switch is used for the connection of the ES595.1 module and other measurement or interface modules to a user PC. Data from the connected modules is acquired synchronously (ETAS device synchronization, see chapter 5.5 on page 22). The Ethernet switch can be cascaded with other network modules so that you can create larger blocks of measurement and interface modules.

The switch is equipped with Ethernet interfaces in accordance with the standard 10/100BaseT that can be operated with either 10 or 100 MBit/s, half or full duplex. The switchover takes place automatically.

All switch interfaces are galvanically isolated from each other and from the power supply.

5.3.1 Host Port (HOST)

The upstream Ethernet interface HOST combines the ES595.1 module with the user PC or with a downstream Ethernet interface of a further module. This interface allows the ETAS software tools access to the connected modules.

Compatible Modules

A list of compatible modules can be found in chapter 8.9.2 on page 50.

5.3.2 Ethernet Ports ((ETH1)

The downstream Ethernet interface ETH1 connects the ES595.1 module to other ES600 modules, measurement, calibration and rapid prototyping modules. ECUs that have an XETK or their own Ethernet interface can be connected directly with a ES595.1 module and communicate with the calibration software via XCP-on-Ethernet.

Power Supply of connected Modules

The ES595.1 module can additionally power ES4xx modules, ES6xx modules or XETKs via the Ethernet connection cable. Take a note of the maximum output current at the Ethernet ports when the modules are cascaded.

Other modules connected via Ethernet cable must be wired separately to the power supply.

Compatible Modules

A list of compatible modules can be found in chapter 8.9.3 on page 52.

5.3.3 Power-Saving Feature

Energy consumption must be as low as possible when used in the vehicle because the measuring equipment is powered by a battery. This is why the ES595.1 module at the Ethernet interfaces is equipped with a link signal detector for an automatic power-saving feature.

The ES595.1 and modules connected to it automatically switch to "Standby" if no Ethernet link signals are received for a particular length of time or the host computer is powered off or disconnected. As soon as Ethernet link signals are received or the host computer is active once more, the system automatically switches to "On" ("Wake Up" function).

> **NOTE**
>
> The automatic powering-on of the ES595.1 via the Ethernet wake-up is possible at any of the Ethernet ports.

The "Wake Up" function can be configured in the web interface of the ES595.1 (see chapter 6.4 on page 34).

> **NOTE**
>
> The Ethernet adapter of the connected PC has to be configured accordingly for it to be able to send link pulses.

5.4   Module Network

The ES595.1 module provides one downstream Ethernet interface for further modules. Large blocks of measurement and interfaces modules can be created as the modules can be cascaded.

5.5   Time Synchronization

The modules provide a global clock pulse to compare the measurement channels in a module network.

Modules connected to the HOST interface can synchronize the ES595.1 (SYNC-IN). If no synchronization signal is received at the HOST interface, the ES595.1 acts as master module for synchronization.

The time synchronization unit of the ES595.1 master synchronizes the connected modules via the Ethernet lines. The synchronization signal is relayed to connected modules at the ETH1 interface (SYNC-OUT). The slave modules adapt to the clock pulse specified by the master module.

The periodic synchronization signal is superimposed onto the Ethernet signals without affecting data transfer. This excludes the possibility of a phase shift between the individual measure signals, even when measurements are taken from different modules.

The data of all connected modules of the ES4xx, ES51x and ES6xx lines is acquired synchronously (ETAS device synchronization).

5.6   ETK Interface (ETK)

The ES595.1 has one ETK interface which is routed to a 4-pin ETK connector (Lemo socket) on the front panel. The interface is galvanically isolated from the other interfaces of the ES595.1.

The ETK interface of the ES595.1 supports the ECU application via the emulator test probe (ETK).

> **NOTE**
>
> Please note that the ES595.1 does not support all connected ETK types (see chapter 8.9.4 on page 52). Take a look at the ETAS website for detailed information on the ETKs supported by the ES595.1.

5.6.1   Initialization

If an ETK type supported by the ES595.1 is connected to the ETK interface it is recognized automatically. The ETK interface is automatically initialized.

If an ETK type which is not supported by the ES595.1 is connected to the ETK interface the overall system behaves, as if no ETK is connected. No specific error message is generated.

5.6.2   Operating Modes

In addition to single transfer for application with the ETK, the ES595.1 supports data transfer in block mode. The ES595.1 module usually works in block mode; single mode is supported for compatibility reasons.

The following table lists the features of the individual operating modes for the ETK interface.

	Operating Mode of the ETK Interface		
	Basic	Compatibility	Advanced
No. of variables	29/45/45	Extended	Configurable
Rate	3	3	16
ETK Speed	8 Mbit/s	8/100 Mbit/s	100 Mbit/s
ETK Transfer	Single	Block	Block
AML Version	V1.0 or higher	V1.0 or higher	V1.2 or higher

"Basic" Operating Mode

When using the "Basic" operating mode, older projects are supported without any change. All ETK interface hardware can be used.

"Compatibility" Operating Mode

An important feature of the "Compatibility" operating mode is block transfer. The block transfer between the ETK and the ES595.1 is activated automatically. This means the following advantages:

- Extended number of variables per measure rate
- Considerably faster download times for code and data to the ECU
- Considerably improved transfer times for rapid prototyping rates.

"Advanced" Mode

The "Advanced" operating mode provides a number of other possibilities. The 100 Mbit/s Block ETK protocol results in increased ETK interface performance. The most important advantages in comparison to the "Compatibility" operating mode are:

- 16 rates for measuring
- possibility to configure the number of variables per measure rate

5.7   CAN Interface (CAN1/LIN1, CAN2/LIN2)

The ES595.1 has two CAN interfaces. One each of the CAN interfaces is routed to the two 8-pin CAN1/LIN1 and CAN2/LIN2 connectors (Lemo socket) on the front panel.

CAN1 and CAN2 are complete independent CAN channels with separated connections and CAN controllers. The CAN interfaces produce a simple and direct connection between the ES595.1 and the CAN network.

The interfaces are galvanically isolated from each other and from the other interfaces of the ES595.1.

> **NOTE**
>
> The four interfaces CAN1 and LIN1 (CAN1/LIN1 connector) or CAN2 and LIN2 (CAN2/LIN2 connector) can be configured and used simultaneously and independently of one another.

5.7.1   Operating Modes

The CAN interfaces of the ES595.1 can be operated in High-Speed CAN link (ISO 11898-2) or Low-Speed CAN link (ISO 11898-3). Switching between the two operating modes is controlled by software. The operating mode can be selected individually for each interface.

5.7.2   Feature

You can find a list of CAN applications supported by the ES595.1 in chapter 8.8.2 on page 49.

5.7.3   Bus Terminating Resistor

Low-Speed CAN

In the ES595.1, two relatively high-impedance termination resistors of 2.26 kOhm each (RTH, RTL) are integrated for the Low-Speed CAN link.

This guarantees that, in a terminated CAN network, the ES595.1 does not have a great influence on the sum of the terminations of the overall system. This should, however, be checked regardless particularly with lab networks or with tests in existing networks.

In a Low-Speed CAN network, the individual nodes are typically terminated with 500 Ohm to 6 kOhm. To ensure optimum system conditions, the CAN network should be terminated with around 100 Ohm (parallel connection of all terminations).

For more details on the Low-Speed CAN network, consult the ISO/DIS 11898 "Road vehicles — Controller area network (CAN) — Part 3: Low-Speed, fault-tolerant, medium dependent interface".

> **NOTE**
>
> The bus termination resistors intended for High-Speed CAN can **not** be used in this operating mode!

High-Speed CAN

The High-Speed operating mode of the CAN interface requires the use of bus termination resistors.

In accordance with the CAN specification, a bus termination resistor of 120 Ohm is required at each of the two open ends of the bus. This has to be connected to the cable or to the connector. ETAS supplies cables and termination resistors of 120 Ohm for setting up CAN networks.

5.8   LIN Interface (CAN1/LIN1, CAN2/LIN2)

The ES595.1 has two LIN interfaces. One each of the LIN interfaces is routed to the two 8-pin CAN1/LIN1 and CAN2/LIN2 connectors (Lemo socket) on the front panel.

LIN1 and LIN2 are completely independent LIN interfaces with separate connections and LIN controllers. The LIN interfaces establish a simple and direct connection between the ES595.1 and the LIN network. The interfaces are galvanically isolated from each other and from the other interfaces of the ES595.1 and are also protected against overload and incorrect stress.

> **NOTE**
>
> The four interfaces CAN1 and LIN1 (CAN1/LIN1 connector) or CAN2 and LIN2 (CAN2/LIN2 connector) can be configured and used simultaneously and independently of one another.

5.8.1   Operating Modes

Each of the two LIN interfaces can be configured in the calibration software either as a LIN master or as a LIN slave[1]. Switching between the two operating modes is controlled by the software and can be selected separately for every interface.

5.8.2   Feature

You can find a list of LIN applications supported by the ES595.1 in chapter 8.8.2 on page 49.

5.8.3   Power Supply on the Bus

The LIN nodes of the ES595.1 can either be powered externally by the LIN bus or internally by the module. The type of power supply must be configured in the application software.

To adhere to the reference level (and thus identical thresholds) at the individual nodes of the LIN bus, the LIN transceivers (physical layer) of all bus nodes should be powered with the same voltage. It is recommended that you power off the internal power supplies and operate all nodes of the LIN bus with the external voltage which also powers the other bus users (LIN_UBATT, see Fig. 5-2 on page 26).

[1.] INCA support in preparation.
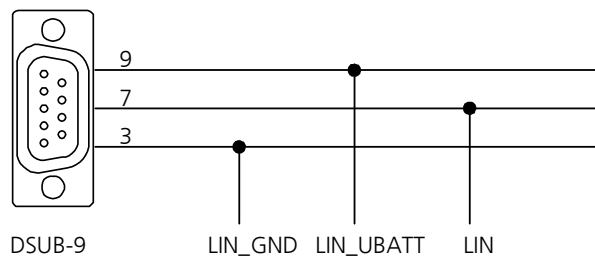
Fig. 5-2   Power Supply at the LIN Bus

If there is no access or no possibility to use the LIN_UBATT voltage as reference and supply voltage, the LIN transceivers of the LIN node of the ES595.1 must be powered by a connectable internal power source of the module[1]. This internal supply voltage is not routed out via the CAN1/LIN1 or CAN2/LIN2 connectors. The ES595.1 is not designed to power external nodes at the LIN bus.

Internal pull-up resistances can be connected to the LIN interfaces of the ES595.1 as master resistances. The connection of the master resistance of the LIN interface can be configured in the application software.[2]

5.9   FlexRay Interface (FLX1, FLX2)

The ES595.1 has one FlexRay interface with two channels which is routed to a 8-pin FLX1/ FLX2 connector (Lemo socket) on the front panel.

FLX1 and FLX2 are complete independent FlexRay channels with separated connections. The FlexRay interfaces produce a simple and direct connection between the ES595.1 and the FlexRay network.

The interfaces are galvanically isolated from each other and from the other interfaces of the ES595.1.

5.9.1   Feature

You can find a list of FlexRay applications supported by the ES595.1 in chapter 8.8.2 on page 49.

5.9.2   Bus Termination Resistor

The FlexRay specification makes it possible to create different bus topologies, such as a passive bus, passive star or active star.

Each of the topologies requires the relevant bus termination. The FlexRay termination designated by the ETAS FlexRay specification is 100 Ohm. To support the creation in FlexRay networks, ETAS provides FlexRay cables with corresponding FlexRay terminations. The termination has to be connected to the cable or to the connector.

[1.] INCA support in preparation.
[2.] INCA support in preparation.

5.9.3 Synchronisation Nodes

After the start of a FlexRay network, the local clocks of all network nodes have to be synchronized. The synchronisation process requires a minimum of two nodes which can send sync frames (synchronisation nodes). The other nodes of the network get synchronized when decoding the sync frames and adjusting their local clocks.

The FlexRay interface of the ES595.1 is equipped with one additional internal synchronisation node. The synchronisation node can exclusively execute synchronisation functions and is internally connected to the FlexRay channels FLX1 and FLX2.

If this synchronisation node sends start-up/sync messages as the second node of the FlexRay network, the FlexRay networks that don't have further synchronisation modules can be started and synchronized with one individual ES595.1 module.

Examples of Application

- Testing/ running of FlexRay ECUs beyond FlexRay networks
- Flashing of ECUs via FlexRay

5.10 Firmware Update

The firmware of the ES595.1 can be updated by the user so that future versions of the module can also be implemented. The firmware is updated on the connected PC using service software "Hardware Service Pack" (HSP).

NOTE

Neither the power supply nor the Ethernet connection can be interrupted during a firmware update!

---

6   Getting Started

The "Getting Started" chapter includes a description of the assembly, application examples, as well as notes on cabling and configuration of the ES595.1.

6.1   Assembly and Locking

6.1.1   General Installation Recommendations

> ⚠️ **CAUTION**
>
> **The module can be damaged or destroyed.**
>
> The modules are only admissible for assembly and operation on components or in locations which guarantee adherence to the technical data of the modules during operation (see chapter 8 on page 45).

6.1.2   Fixing a Module onto a Carrier System

The ES595.1 has a rugged metal housing with nonskid plastic feet. The unit can easily be screwed onto a carrier system for installation in a vehicle or in the lab. The screw thread for attaching your device is already contained in the housing and is easily accessible.

To fasten the ES595.1 housing:

1. Remove the plastic feet from the bottom of the module by pushing a minus screwdriver between the housing bottom and the plastic foot.

2. Lifting off the plastic foot using the screwdriver as a lever.
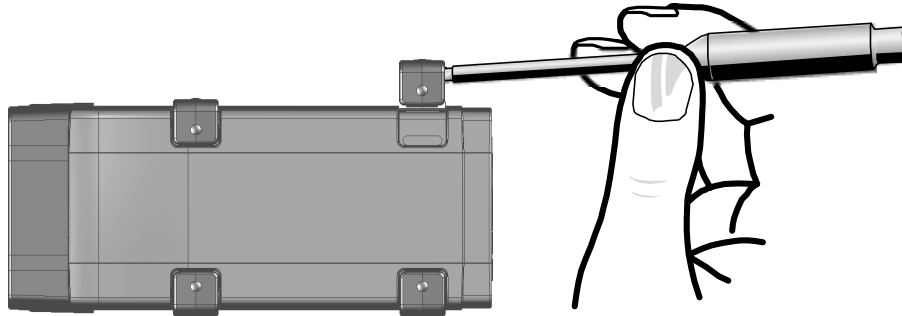
Fig. 6-1   Levering Off the Plastic Foot

3. A threaded hole will become visible under the plastic foot. The threads for fastening the module are located both on the bottom of the ES595.1 housing.
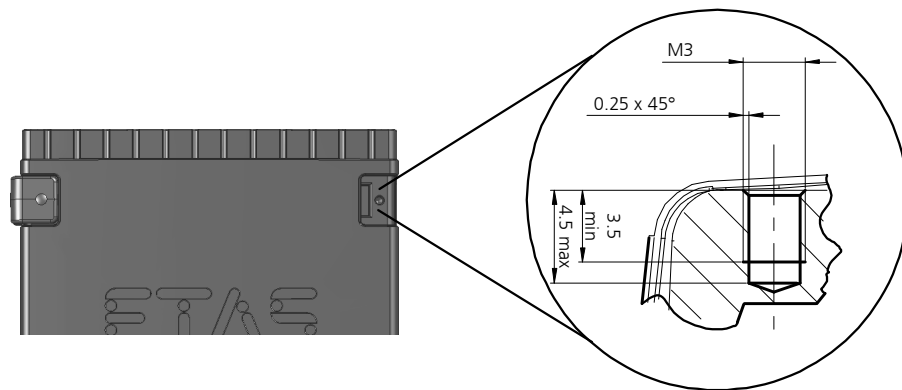
Fig. 6-2   Tapped blind hole

⚠ **CAUTION**

The electronic can be damaged or destroyed!

Do not rework the threaded hole.

▮ **NOTE**

Use **excluding** M3 cylinder screws and fastening the module onto your carrier system with a max. torque of 0.8 Nm.

The max. length of engagement into the tapped blind hole of housing is 3 mm (see Fig. 6-2 on page 29).


6.1.3   Connecting Several Modules Mechanically

As ETAS system housing was used, the ES595.1 can also be connected to modules of the ETAS compact line (ES59x, ES6xx, ES910). These can be combined easily using the T-Brackets provided to form larger blocks.

You can attach a further module of the ETAS compact line under the ES595.1. Just remove the four plastic feet on each of the relevant device sides and attach the T-Brackets provided in their place.

<u>To connect modules mechanically:</u>

1. Remove the four plastic feet from the bottom of the ES595.1 so a further module can be attached.

   This makes the assembly slits for the T Brackets accessible.

   You can attach a further module under the ES595.1.

2. Remove the four plastic feet on the relevant side of the second module.

3. Turn the seals of the T-Brackets so they are at a right angle to the longitudinal axis of the brackets

4. Click two brackets into the assembly slits on one long side of the first module.

5. Click the second module into the two T-Brackets.
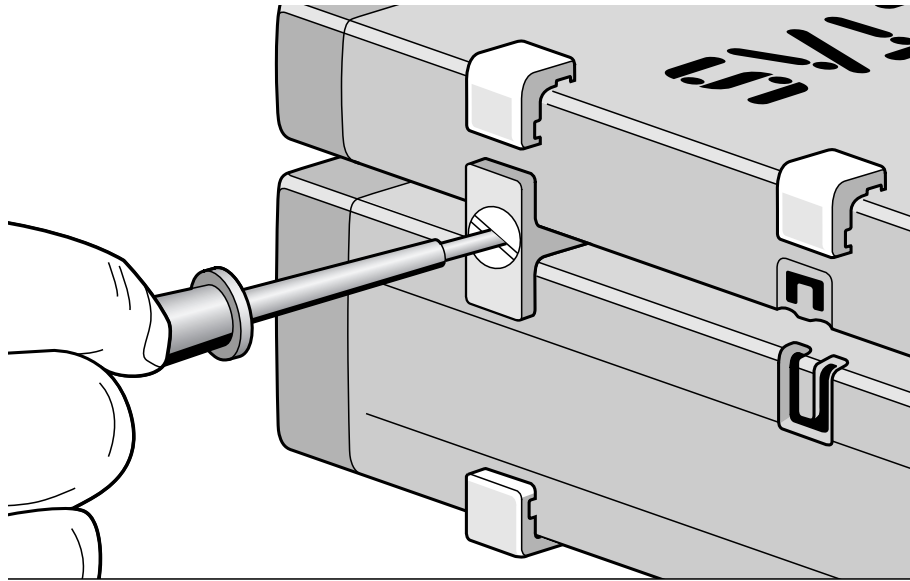
**Fig. 6-3**   Connecting the ES595.1 to Another Module

6. Quarter-turn the seals of the T-Brackets. This locks the connection of the two modules.

7. Click the other two T-Brackets into the assembly slits on the opposite long side of the device

8. Lock these brackets too.

9. If you would like to stack further modules, repeat this procedure with the next module.

6.2   Applications

For applications, the ES595.1 has direct access to XETK ECUs and to ECUs and vehicle buses.

NOTE

You can find a list of applications supported by the ES595.1 in chapter 8.8.2 on page 49.
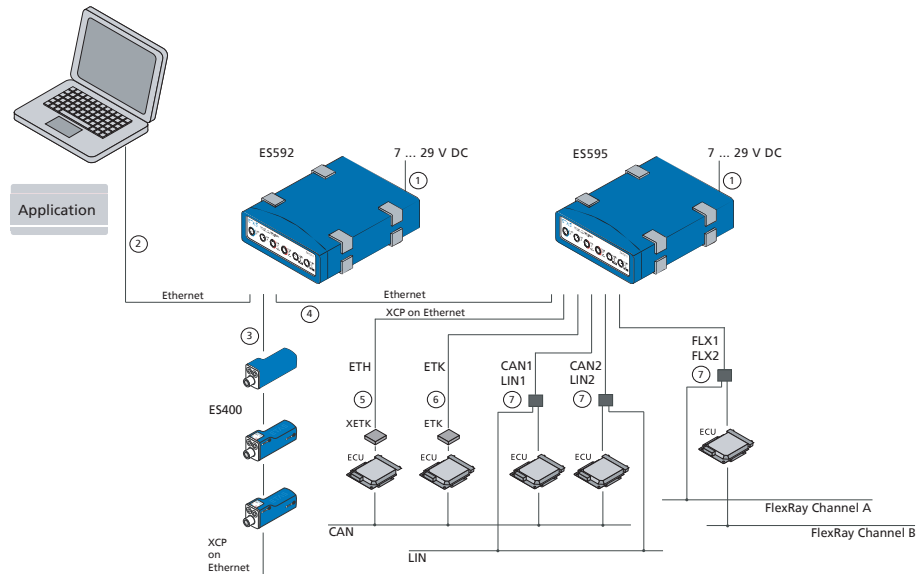
Fig. 6-4   ES593.1-D and ES595.1 with ES400 modules, XETK, ETK and vehicle buses

Cable in Fig. 6-4	Function	Short Name
1	Power supply cable	CBP120, CBP1205
2	Host connecting cable	CBE100
3	PC connecting and Power supply cable ES4xx, ES63x	CBEP420, CBEP425
4	Ethernet connecting cable	CBE130, CBE140
5	XETK connecting cable with XETK interface cable	CBAE330 and CBE230
6	ETK connecting cable	CBM150
7	CAN/ LIN/ FlexRay connecting cable	CBCFI100

6.3   Wiring

The ports of the ES595.1 may be wired in any order.

For order information on other cables which can be supplied separately, refer to the chapter "Cable and Accessoires" on page 58.

	NOTE

Be sure to check that the ports carry no voltage, before starting the cabling.

	NOTE

Make sure you carefully check the names of the cables used. Using the wrong cables can keep your ES595.1 from functioning properly or damage theES595.1 and any devices connected to it.

6.3.1   "HOST" Port

To connect the ES595.1 module with the PC ("HOST" port), you require the CBE100 cable provided.

To connect the ES595.1 with the PC

1. Connect the **HOST** port of the ES595.1 with the PC interface cable CBE100.

2. Connect the cable's RJ-45 connector with the free Ethernet interface of your PC.

6.3.2   "7-29V" Port

⚠	DANGER

Dangerous electrical voltage!

Connect the power cable only with a suitable vehicle battery or with a suitable lab power supply! The connection to power outlets is not allowed!

To prevent an inadvertent insertion in power outlets, ETAS recommends to equip the power cables with safety banana plugs CBP1205 in areas with power outlets.

To connect the ES595.1 module with the power supply, you require the CBP120 cable or the CBP1205 cable provided.

To connect the ES595.1 with the power supply

1. Connect the cable CBP120 or the cable CBP1205 for the power supply with the **7-29V** port of the ES595.1.

2. Connect the supply voltage pins of the cable with the required power supply.

   Note the color coding of the connectors.

   Note the current consumption of the ES595.1 and its supply voltage range. The admissible values are listed in section 8.9.1 on page 50.

6.3.3 "ETH1" Port

To connect the ES595.1 module with other modules ("ETH1" port), you require the CBE130 cable.

Simple Module Network

A simple module network consists of a single ES595.1 module with connected network or measure modules. ES59x measure modules are used in the following example.

<u>To connect an ES595.1 with ES59x measure modules</u>

1. Connect the **ETH1** port of the ES595.1 with the Ethernet cable CBE130.

2. Connect the second cable connector with the **HOST** port of an ES59x measure module.

Complex Module Network

A complex module network consists of several cascaded ES59x line modules with connected measure modules. ES59x measure modules are used in the following example.

With larger module networks, it is a good idea to make a sketch of the planned module network. The following figure shows an example of a module network with three cascaded ES59x modules.
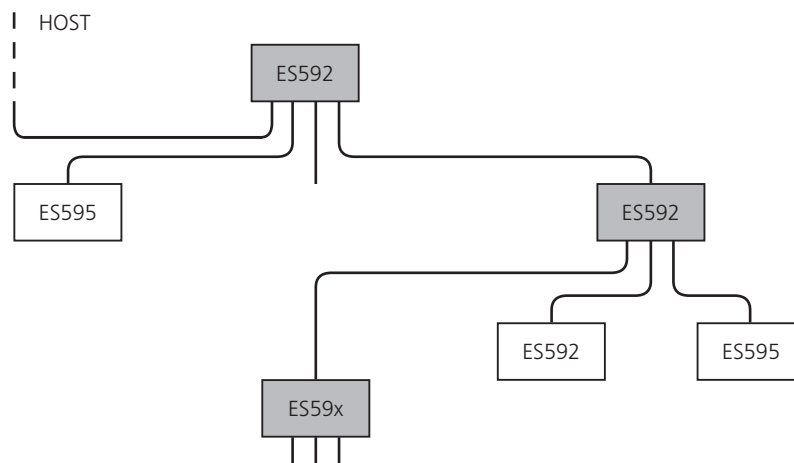
Fig. 6-5   Example of a Module Network

<u>To connect an ES59x module with other ES59x modules</u>

1. Connect the **HOST** port of the subordinate ES59x module with the **ETH1** port or with the **ETH2** port of the superordinate ES593.1-D module

    or

2. connect the **HOST** port of the subordinate ES59x module with the **ETH1** port of the superordinate ES595.1 module

    The superordinate ES59x module is nearer the host PC in the hierarchy.

3. Connect further ES59x modules in accordance with this principle with other **ETH** ports of the ES59x module.

6.4   Configuring the ES595.1

The ES595.1 is configured at the PC via a graphic user interface. A web browser
application is used as an interface.

6.4.1   Web Interface

The web interface of the ES595.1 consists of a home page, a page for custom-
ized configuration of the interfaces for the "Wake Up" function and other pages
with information on the status of the ES595.1.

6.4.2   Launching the ES595.1 Web Interface

To launch the ES595.1 web interface:

1. Connect the ES595.1 to the PC.

2. Start the HSP program on the PC.

3. Click **Hardware Search**.

4. Highlight the ES595.1 configured in the "Hardware" window.

5. Right-click **System Configuration**.

   The default web browser launches the web interface for con-
   figuring the ES595.1 with the current IP address of the module
   in the address field.

   The home page of the ES595.1 web interface is displayed.

6.4.3   Configuring the "Wake Up" Function

To configure the "Wake Up" function:

1. Click **Device Configuration**.

2. Click **Wake Up**.

   The page for configuring the "Wake Up" function is displayed.

3. Configure the interfaces of the ES595.1 for the "Wake Up" func-
   tion.

7   Troubleshooting Problems

This chapter gives some information of what you can do when problems arise with the ES595.1 and problems that are not specific to an individual software or hardware product.

7.1   Error LEDs

Please observe the LED which provides information on the functions of the interface and the ES595.1 (see the chapter "LEDs" on page 16) to be able to judge the operational state of the ES595.1 as well as troubleshooting measures.

7.2   Troubleshooting ES595.1 Problems

The following table lists some of the possible problems with a remedy.

If you have any further questions, please contact our Customer Support (see chapter 11 on page 77).

Problem	Diagnostic Questions	Possible Solutions
The ES595.1 is not found with "Search for Hardware" in INCA.	Did you install the INCA version required?	Check that the INCA software installed on your PC corresponds to the requirements listed in section 8.8.2 on page 49.
	Did you install the INCA ES5xx Add-On version required?	Check that the INCA ES5xx Add-On installed on your PC corresponds to the requirements listed in section 8.8.2 on page 49.
	Did you configure the network card correctly?	INCA, Config Tool and HSP operation: Check that your network card has been configured in accordance with section 8.8.1 on page 48.
	Is the hardware on the PC connected?	Check that the connection is undamaged.
The ETK interface is not initialized.	Have you installed the ETK Drivers and Tools?	Check that ETK Drivers and Tools installed on your PC corresponds to the requirements listed in section 8.8.2 on page 49.
	Which ETK is connected?	Check whether the connected ETK is supported (see chapter 8.9.4 on page 52).

Problem	Diagnostic Questions	Possible Solutions
The LIN interface is not initialized.	Have you installed the INCA-LIN Add-On?	Check that the INCA-LIN Add-On installed on your PC corresponds to the requirements listed in section 8.8.2 on page 49.
The FlexRay interface is not initialized.	Have you installed the INCA-FlexRay Add-On?	Check that the INCA-FlexRay Add-On installed on your PC corresponds to the requirements listed in section 8.8.2 on page 49.
Measurement does not start.	Are you being prompted to carry out an update in the INCA-Monitorlog?	Update the modules.
	Is there no data from the module?	Check that your power supply and test setup correspond to the requirements.
		Check that the wiring of the hardware to the PC is correct/intact.
Data is lost during data transfer.	Are you using WLAN in your test setup?	WLAN is not permissible within this ETAS net-work. Wire your test setup (ETAS modules and their connection to the PC) with ETAS cables only.
	Are you using the correct type of network card in your laptop?	Check whether you are using a PCMCIA network card in your laptop. PCM-CIA cards with an 8- or 16-bit data bus are not suitable. Only use PCM-CIA cards with a 32-bit data bus, mini-PCI or ExpressCards.

7.3 Problems and Solutions

This chapter contains information on general problems and their solutions for those using the ES400 modules with INCA or with the ES4xx Configuration Tool.

7.3.1 Network Adapter cannot be selected via Network Manager

Cause: APIPA is disabled

The alternative mechanism for IP addressing (APIPA) is usually enabled on all Windows XP and Vista systems. Network security policies, however, may request the APIPA mechanism to be disabled. In this case, you cannot use a network adapter which is configured for DHCP to access ETAS hardware. The ETAS Network Manager displays a warning message.

The APIPA mechanism can be enabled by editing the Windows registry. This is permitted only to users who have administrator privileges. It should be done only in coordination with your network administrator.

<u>To enable the APIPA mechanism:</u>

1. Open the Registry Editor:
   - Windows XP:
     Click **Start** and then click **Run**. Enter `regedit` and click **OK**.
   - Windows Vista:
     Click **Start**, enter `regedit` in the entry field, and push <ENTER>.

   The registry editor is displayed.

2. Open the folder `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpic\Parameters\`

3. Click **Edit** ∅ **Find** to search for the key `IPAutoconfigurationEnabled`.

If you cannot find any instances of the registry key mentioned, the APIPA mechanism has not been disabled on your system, i.e. there is no need to enable it. Otherwise proceed with the following steps.

4. Set the value of the key `IPAutoconfigurationEnabled` to `1` to enable the APIPA mechanism.

   You may find several instances of this key in the Windows registry which either apply to the TCP/IP service in general or to a specific network adapter. You only need to change the value for the corresponding network adapter.

5. Close the registry editor.

6. Restart your workstation in order to make your changes take effect.

7.3.2   Search for Ethernet Hardware fails

Cause: Personal Firewall blocks Communication

For a detailed description on problems caused by personal firewalls and possible solutions see "Personal Firewall blocks Communication" on page 39.

Cause: Client Software for Remote Access blocks Communication

PCs or notebooks which are used outside the ETAS hardware network sometimes use a client software for remote access which might block communication to the ETAS hardware. This can have the following causes:

- A firewall which is blocking Ethernet messages is being used (see „Cause: Personal Firewall blocks Communication" on page38)

- By mistake, the VPN client software used for tunneling filters messages. As an example, Cisco VPN clients with versions before V4.0.x in some cases erroneously filtered certain UDP broadcasts.

  If this might be the case, please update the software of your VPN client.

Cause: ETAS Hardware hangs

Occasionally the ETAS hardware might hang. In this case switch the hardware off, then switch it on again to re-initialize it.

Cause: Network Adapter temporarily has no IP Address

Whenever you switch from a DHCP company LAN to the ETAS hardware network, it takes at least 60 seconds until ETAS hardware can be found. This is caused by the operating system's switching from the DHCP protocol to APIPA, which is being used by the ETAS hardware.

Cause: ETAS Hardware had been connected to another Logical Network

If you use more than one PC or notebook for accessing the same ETAS hardware, the network adapters used must be configured to use the same logical network. If this is not possible, it is necessary to switch the ETAS hardware off and on again between different sessions (repowering).

Cause: Device driver for network card not in operation

It is possible that the device driver of a network card is not running. In this case you will have to deactivate and then reactivate the network card.

<u>To deactivate and reactivate the network card:</u>

1. To deactivate the network card first select in the Windows start menu the following item:

   - Windows XP:
     Control Panel ∅ **Network Connections**
   - Windows Vista:
     Control Panel ∅ **Network and Internet** ∅ **Network and Sharing Center** ∅ **Manage Network Connections**

2. Right click on the used network adapter and select **Disable** in the context menu.

3. In order to reactivate the network adapter right click on it again and select **Enable**.

Cause: Laptop power management deactivates the network card

The power management of a laptop computer can deactivate the network card. Therefore you should turn off power monitoring on the laptop.

To switch off power monitoring on the laptop:

1. From the Windows Start Menu, select
   - Windows XP:
     Control Panel ∅ **System**.
     Then select the **Hardware** tab and click on **Device Manager**.
   - Windows Vista:
     Control Panel ∅ **System and Maintenance** ∅ **Device Manager.**

2. In the Device Manager open the tree structure of the entry **Network Adapters**.

3. Right click on the used network adapter and select **Properties** in the context menu.

4. Select the **Power Management** tab and deactivate the **Allow the computer to turn off this device to save power** option.

5. Select the **Advanced** tab. If the property **Autosense** is included, deactivate it also.

6. Click **OK** to apply the settings.

Cause: Automatic disruption of network connection

It is possible after a certain period of time without data traffic that the network card automatically interrupts the Ethernet connection. This can be prevented by setting the registry key `autodisconnect`.

To set the registry key **autodisconnect**:

1. Open the Registry Editor.

2. Select under `HKEY_LOCAL_MACHINE\SYSTEM\ControlSet001\Services\lanmanserver\parameters` the Registry Key `autodisconnect` and change its value to `0xffffffff`.

7.3.3   Personal Firewall blocks Communication

Cause: Permissions given through the firewall block ETAS hardware

Personal firewalls may interfere with access to ETAS Ethernet hardware. The automatic search for hardware typically cannot find any Ethernet hardware at all, although the configuration parameters are correct.

Certain actions in ETAS products may lead to some trouble if the firewall is not properly parameterized, e.g. upon opening an experiment in ASCET or searching for hardware from within INCA or HSP.

If a firewall is blocking communication to ETAS hardware, you must either disable the firewall software while working with ETAS software, or the firewall must be configured to give the following permissions:

- Outgoing limited IP broadcasts via UDP (destination address 255.255.255.255) for destination port 18001
- Incoming limited IP broadcasts via UDP (destination IP 255.255.255.255, originating from source IP 0.0.0.0) for destination port 18001
- Directed IP broadcasts via UDP to the network configured for the ETAS application, destination port 18001
- Outgoing IP unicasts via UDP to any IP in network configured for the ETAS application, destination ports 69, 18001, 18017 or 49152 to 50175
- Incoming IP unicasts via UDP originating from any IP in the network configured for the ETAS application, source ports 69, 18001, 18017 or 49152 to 50175

> **NOTE**
>
> The ports that have to be used in concrete use cases depend on the hardware used. For more precise information on the port numbers that can be used please refer to your hardware documentation.

Windows XP and Vista come with a built-in personal firewall. On many other systems it is very common to have personal firewall software from third party vendors, such as Symantec, McAffee or BlackIce installed. The proceedings in configuring the ports might differ for each personal firewall software used. Therefore please refer to the user documentation of your personal firewall software for further details.

As an example for a firewall configuration, you will find below a description on how to configure the widely used Windows XP firewall if the hardware access is prohibited under Windows XP with Service Pack 2.

Solution for Windows XP Firewall, Users with Administrator Privileges

If you have administrator privileges on your PC, the following dialog window opens if the firewall blocks an ETAS product.


To unblock a product:

1. In the "Windows Security Alert" dialog window, click on **Unblock**.

   The firewall no longer blocks the ETAS product in question (in the example: ASCET). This decision survives a restart of the program, or even the PC.

Instead of waiting for the "Windows Security Alert" dialog window, you can unblock ETAS products in advance.

To unblock ETAS products in the firewall control:

1. From the Windows Start Menu, select Settings ∅ Control Panel.

2. In the control panel, double-click the **Windows Firewall** icon to open the "Windows Firewall" dialog window.
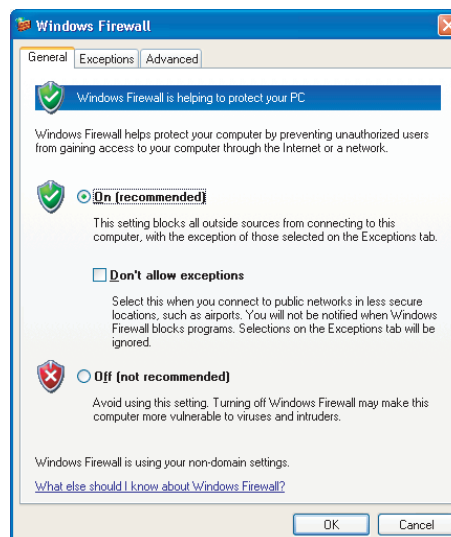
3. In the "Windows Firewall" dialog window, open the "Exceptions"
    tab.
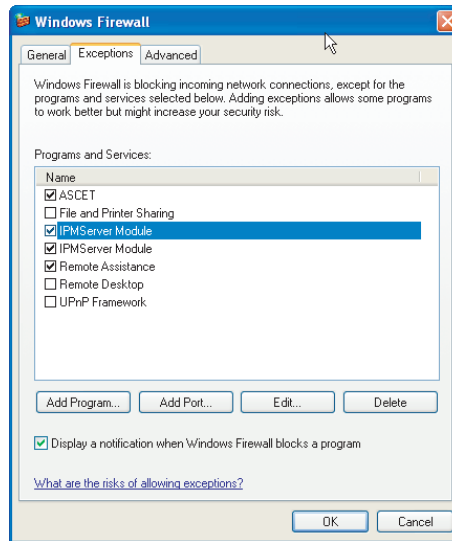
This tab lists the exceptions not blocked by the firewall. Use
Add Program or **Edit** to add new programs, or edit existing
ones.

4. Make sure that the ETAS products and services you want to
    use are properly configured exceptions.

    -   Open the "Change Setup" window.
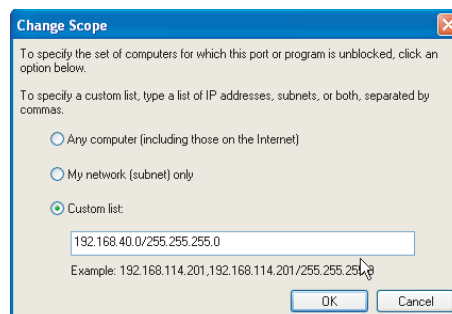
    -   To ensure proper ETAS hardware access, make sure that at
        least the IP addresses `192.168.40.xxx` are unblocked.
    -   Close the "Change Setup" window with **OK**.

5. Close the "Windows Firewall" dialog window with **OK**.

    The firewall no longer blocks the ETAS product in question.
    This decision survives a restart of the PC.

Solution for Windows XP Firewall, Users without Administrator Privileges

This section addresses users with restricted privileges, e.g., no system
changes, write restrictions, local login.

Working with an ETAS software product requires "Write" and "Modify" privileges
within the `ETAS`, `ETASData`, and ETAS temporary directories. Otherwise, an
error message opens if the product is started, and a database is opened. In that
case, no correct operation of the ETAS product is possible because the data-
base file and some `*.ini` files are modified during operation.

The ETAS software has to be installed by an administrator anyway. It is recommended that the administrator assures that the ETAS program/processes are added to the list of the Windows XP firewall exceptions, and selected in that list, after the installation. If this is omitted, the following will happen:

- The "Window Security Alert" window opens when one of the actions conflicting with a restrictive firewall configuration is executed.
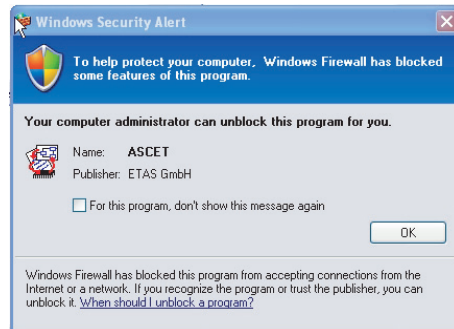
To unblock a program (no Admin privileges):

1. In the "Windows Security Alert" dialog window, activate the option **For this program, don't show this message again**.

2. Click **OK** to close the window.

   An administrator has to select the respective ETAS software in the "Exceptions" tab of the "Windows Firewall" dialog window to avoid further problems regarding hardware access with that ETAS product.

8 Technical Data

This chapter contains information on the following topics:

- "General Data" on page 45
- "RoHS Conformity" on page 47
- "CE conformity" on page 47
- "Taking the Product Back and Recycling" on page 47
- "Use of Open Source software" on page 48
- "System Requirements" on page 48
- "Electrical Data" on page 50
- "Pin Assignment" on page 54

8.1 General Data

8.1.1 Product Labeling

The following symbols are used for product labeling:

Symbol	Description
⚠	Prior to operating the product, be sure to read the user's guide!
SN: 1234567	Serial number (seven-digit)
Vx.y.z	Hardware version of the product
F 00K 123 456	Ordering number of the product, see chapter 10 on page 73
7-29V ===	Operating voltage range (DC)
xy A	Current consumption, max.
CE	Marking for CE conformity (Chapter 8.3 on page 47)
UKCA	Marking for UKCA conformity (Chapter 8.4 on page 47)
KC	Marking for KCC conformity (Chapter 8.5 on page 47)
⧖	Labeling for WEEE, see chapter 8.6 on page 47
e	Labeling for RoHS (China), see chapter on page 47

8.1.2   Fulfilled Standards and Norms

The module adheres to the following standards and norms:

Norm	Test
EN 61326-1	Electrical equipment for measurement, control and laboratory use - EMC requirements
EN 61000-6-2	Immunity for industrial environments
EN 61000-6-3	Emission standard (residential, commercial and light-industrial environments) [1]
EN 60 529	Degrees of protection provided by enclosures (IP code)
EN 60 068-2-32	Basic environmental testing procedures; part 2: tests; test Ed: free fall

[1]: For the external power supply of the LIN interface a direct current power supply or a battery must be used as operation voltage. Between module and power supply unit cables with a maximal length of 30 m are permitted.

8.1.3   Environmental Conditions

Temperature range (operation)	-40 °C bis +70 °C
	-40 °F bis +158 °F
Temperature range (storage) (module without packaging)	-40 °C bis +85 °C
	-40 °F bis +185 °F
Relative humidity (non-condensing)	0 to 85% (operation)
	0 to 95% (storage)
Implementation altitude	max. 5000 m/ 16400 ft
Protection class	IP30
Degree of pollution	2

> **i** **NOTE**
>
> The module is suited for use in interiors, in the passenger compartment or in the luggage compartment of vehicles. The module is **not** suited for installation in the engine compartment and similar environments.

8.1.4   Maintenance the Product

Do not open or change the module! Works on the module housing may be executed only by qualified technical personnel. Send defect modules to ETAS.

8.1.5   Cleaning the product

We recommend to clean the product with a dry cloth.

8.1.6   Mechanical Data

Dimensions (H x W x D)	45 mm x 127 mm x 160 mm
	1.75 in x 5.0 in x 6.3 in
Weight	Approx. 0.8 kg/ 1.8 lbs

8.2   RoHS Conformity

European Union

The EU Directive 2002/95/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.

8.3   CE conformity

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

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

8.4   UKCA conformity

With the UKCA mark attached to the product or its packaging, ETAS confirms that the product corresponds to the product-specific, applicable standards and directives of Great Britain.

The UKCA declaration of conformity for the product is available on request.

8.5   KCC conformity

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.

8.6   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 setup throughout the EU for the collection, treating 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. 8-1   WEEE Symbol

The WEEE symbol (see Fig. 8-1 on page 48) 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 chapter "Contact Information" on page 77).

8.7   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 shall 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" at the ETAS website www.etas.com.

8.8   System Requirements

8.8.1   Hardware
Operation of the ES595.1 requires a power supply voltage of 7 V to 29 V DC.

PC with one Ethernet interface
A PC with one open Ethernet interface (100 Mbit/s, full duplex) with RJ-45 connection is required. Ethernet interfaces that are implemented with an additional network card in the PC must feature a 32-bit data bus.

Requirement to ensure successful initialization of the module

> ℹ️ **NOTE**
>
> It is imperative you disable the function which automatically switches to power-saving mode on your PC network adapter when there is no data traffic on the Ethernet interface!

To deactivate the power saving mode

Choose in System Control Center / Device Manager / Network Adapter the used network adapter by double-click. Deactivate the "Allow the computer to turn off this device to save power" option in the "Power Management" register. Confirm your configuration.

The manufacturers of network adapter have different names for this function.

Example:

- "Link down Power saving"
- "Allow the computer to turn off this device to save power"

8.8.2   Supported Applications and Software Requirements

To configure the ES595.1 and for control and data acquisition, you need software in the following versions:

Inter-face	Application	Classifi-cation [1]	Support in Application Software	
			INCA V6.2.1 [2]	INCA V7.0 [3]
ETH	XCP on Ethernet	MC	yes	yes
ETK	ETK Measurement and Calibration	MC	yes [4]	yes [5]
CAN	CAN Monitoring	MC	yes	yes
	CAN Output	MC	yes	yes
	CCP	MC	yes	yes
	KWP on CAN	MC	yes	yes
	UDS	MC	yes	yes
	XCP on CAN	MC	yes	yes
LIN	LIN Monitoring	MC	yes [6]	yes [7]

Inter-face	Application	Classifi-cation [1]	Support in Application Software	
			INCA V6.2.1 [2]	INCA V7.0 [3]
FlexRay	XCP on FlexRay	MC	yes [8]	yes [9]
	FlexRay Monitoring	MC	yes [8]	yes [9]

[1]: MC: Measurement and Calibration
[2]: INCA V6.2.1 with Hotfix 13 and higher and additionally INCA-ES5xx Add-On V6.2.2 and higher
[3]: additionally INCA-ES5xx Add-On V7.0.0 and higher
[4]: additionally ETK Drivers and Tools V2.1.6 and higher
[5]: additionally ETK Drivers and Tools V3.0.0 and higher
[6]: additionally INCA-LIN Add-On V6.2.3 and higher
[7]: additionally INCA-LIN Add-On V7.0.1 and higher
[8]: additionally INCA-FlexRay Add-On V6.2.3 and higher
[9]: additionally INCA-FlexRay Add-On V7.0.1 and higher

8.9 Electrical Data

8.9.1 Power Supply

Operating voltage	7 V to 29 V DC
Power consumption, normal mode [1]	Typ. 500 mA at 14.4 V DC
Power consumption, standby [1]	Typ. 20 mA at 14.4 V DC
Current consumption, total	Max. 5 A (module: max. 3 A, output current per connection "ETH": nom. max. 2 A)
Energy management	On/ off at start/ stop of the Ethernet communication (on/ off upstream module)
Protection [2]	Protected against polarity inversion and Load Dump protection

[1]: module without power supply of connected modules
[2]: The module may be used only with central load dump protection.

8.9.2 Host Interface (HOST)

Type of connection	Upstream
Number	1 (HOST)
Connection	10/100Base-T Ethernet
Protocol	TCP/IP
Protocol	Ethernet Switching (Layer 2), IEEE802.3
Resolution synchronization	1 μs

Compatibility [1]	PC
	ES720 Drive Recorder
	Network and interface modules: ES51x, ES592, ES593-D, ES595, ES600

[1]: Support of the ETAS synchronization mechanism

> **i** **NOTE**
>
> To ensure successful initialization of the network card of your PC, refer to chapter "Hardware" on page 48.

8.9.3   Ethernet Interface (ETH1)

Type of connection	Downstream
Number	1 (ETH1)
Connection	10/100Base-T Ethernet
Protocol	TCP/IP
Resolution synchronization	1 µs
Nom. max. output current per connection "ETH"	Min. 2 A
Power supply of connected modules	ES4xx Measurement Modules, ES6xx Measurement Modules, XETKs
Compatibility [1]	Network Module: ES600
	Network and interface modules: ES51x, ES592, ES593-D, ES595
	Measurement modules: ES4xx, ES6xx, ES930.1
	Prototyping and Interface Module: ES910.3
	ECUs with XETK, ECUs with Ethernet interface
	Third party Ethernet devices [2]

[1]: Support of ETAS synchronization mechanism
[2]: No support of ETAS synchronization mechanism

8.9.4   ETK Interface (ETK)

Operating modes	Basic, Compatibility, Advanced
ETK protocol speed	8 Mbit/s / 100 Mbit/s
ETK protocol transfer	Single Mode / Block Mode

> **i NOTE**
>
> The ES595.1 supports all current ETK types.
> Exception:
> The ETK types not supported by the module are listed in the table. For more details, refer to the ETAS website.

ETKs not supported	ETKM
	ETK3.x
	ETK4
	ETK6.x
	ETK7.0
	METK1
	METK2
	ETK8.0
	ETK8.1
	ETKS1.0-A
	ETKS1.0-B
	ETKP1.0

8.9.5   CAN Interfaces (CAN1/LIN1 and CAN2/LIN2)

CAN1 and CAN2	2 independent interfaces, galvanically isolated from each other and from the other interfaces, every channel separately configurable (High-Speed CAN and Low-Speed CAN)
Protocols	CAN V2.0a (Standard Identifier), CAN V2.0b (Extended Identifier)

Low-Speed CAN

Transceiver (Physical Layer)	TJA1054A
Transfer speed	Max. 125 kBaud

High-Speed CAN

Transceiver (Physical Layer)	TJA1040
Transfer speed	Max. 1 MBaud with a bus length of 20 m
Differential internal resistor Ri	10 kOhm

8.9.6   LIN Interfaces (CAN1/LIN1 and CAN2/LIN2)

LIN1 and LIN2	2 independent interfaces, galvanically isolated from each other and from the other interfaces, every channel separately configurable
Specification	LIN V2.1
Controller	LIN-Core (FPGA)
Transceiver (Physical Layer)	MCZ33661EF
Operating mode [1]	Master [2] or Slave (configurable in the calibration software)

[1]: LIN Monitoring; Send support in preparation.
[2]: INCA support in preparation.

8.9.7   FlexRay Interfaces (FLX1 and FLX2)

FlexRay Controller

Communication Controller	Bosch E-Ray
Number of nodes/channels	1 node with 2 channels, 1 additional internal synchronization node [1]
FlexRay Specification	V2.1
FlexRay Conformance Test	According to ISO 9646
TX support	Max. 118 buffer
RX support	FIFO, based on min. 10 buffers
Payload	Max. 254 bytes
Hardware-based filtering	Slot counter, cycle counter and channel

[1]: INCA support in preparation.

Physical Layer

Bus driver	Philips TJA 1082 (per channel)

Galvanic Isolation

Galvanic isolation	Both channels are galvanically isolated from each other and from other parts of the circuit

8.10   Pin Assignment

> **i NOTE**
>
> All connectors are shown with a view of the interfaces of the ES595.1. All shields are at case potential.

8.10.1   Power Supply Interface (7-29V)
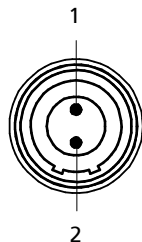
Fig. 8-2   Power Supply Interface (7-29V)

Pin	Signal	Meaning
1	UBATT+	Supply voltage, plus
2	Ground	Ground

8.10.2   Host Interface (HOST)
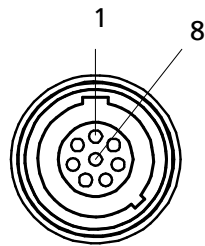
Fig. 8-3   Host Interface (HOST)

Pin	Signal	Meaning
1	-	Reserved
2	-	Reserved
3	-	Reserved
4	RX+	Received data, plus
5	TX-	Send data, minus
6	RX-	Received data,, minus
7	-	Reserved
8	TX+	Send data, plus

8.10.3   Ethernet Interface (ETH1)
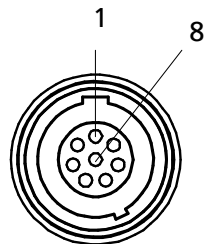
Fig. 8-4   Ethernet Interface (ETH1)

Pin	Signal	Meaning
1	UBATT+	Supply voltage, plus
2	UBATT+	Supply voltage, plus
3	UBATT-	Supply voltage, minus
4	RX+	Receive data, plus
5	TX-	Send data, minus
6	RX-	Receive data, minus
7	UBATT-	Supply voltage, minus
8	TX+	Send data, plus

8.10.4   ETK Interface (ETK)
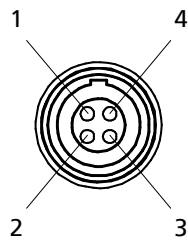
Fig. 8-5   ETK Interface (ETK)

Pin	Signal	Meaning
1	TX+	Send data, plus
2	TX-	Send data, minus
3	RX+	Received data, plus
4	RX-	Received data, minus

8.10.5   CAN/LIN Interface (CAN1/LIN1 and CAN2/LIN2)
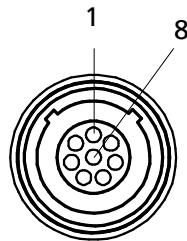
Fig. 8-6   CAN/LIN Interface (CAN1/LIN1 and CAN2/LIN2)

Pin	Signal	Meaning
1	UBATT (LIN)	
2	CAN_LOW	
3	CAN_GND	
4	LIN	
5	LIN_GND	
6	CAN_GND	
7	CAN_HIGH	
8	-	Reserved

8.10.6   FlexRay Interfaces (FLX1 and FLX2)
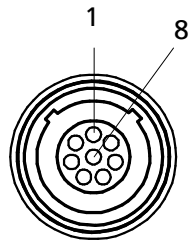
Fig. 8-7   FlexRay Interfaces (FLX1 and FLX2)

Pin	Signal	Meaning
1	-	Reserved
2	FLX1_LOW	FlexRay Channel 1, Low
3	FLX1_GND	FlexRay Channel 1, Ground
4	FLX2_HIGH	FlexRay Channel 2, High
5	FLX2_GND	FlexRay Channel 2, Masse
6	FLX1_GND	FlexRay Channel 1, Ground
7	FLX1_HIGH	FlexRay Channel 1, High
8	FLX2_LOW	FlexRay Channel 2, Low

9   Cable and Accessoires

The "Cables and Accessories" chapter contains an overview of the available cables and accessories.

NOTE

Only use the ETAS cables named in this User's Guide at the interfaces of the ES595.1. The maximum admissible cable lengths must be adhered to.

NOTE

Custom cables can be produced according to your specifications. For more information on custom cables, please contact your local ETAS sales representative.

9.1   Cable for the "7-29 V DC" connection

⚠ **DANGER**

Dangerous electrical voltage!

Connect the power cable only with a suitable vehicle battery or with a suitable lab power supply! The connection to power outlets is not allowed!

To prevent an inadvertent insertion in power outlets, ETAS recommends to equip the power cables with safety banana plugs CBP1205 in areas with power outlets.

Power supply cables suitable for the ES593.1-D module can be delivered in two designs:

- power supply cable CBP120 with standard banana plugs (current design)
- power supply cable CBP1205 with safety banana plugs (new design)

NOTE
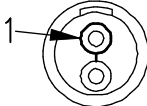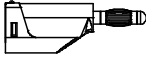
Application, permissible voltages and all the other technical data of the power supply cables are identical for both designs.

9.1.1   CBP120 Cable
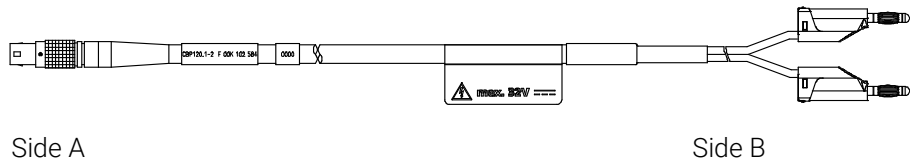
Side A   Side B

Fig. 9-1   Cable CBP120-2 (power supply cable with standard banana plugs)

Side A		Side B	
Pin	Signal	Plug	Signal
1	UBATT-	Red	UBATT-
2	Ground	Black	Ground

Order name	Short name	Order number
Power Supply Cable, Lemo 1B FGJ Banana (2fc-2mc), 2 m	CBP120-2	F 00K 102 584

9.1.2   CBP1205 Cable
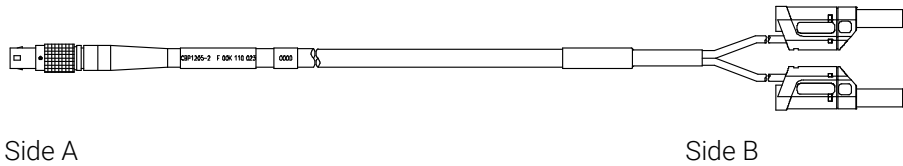
Side A   Side B

Fig. 9-2   Cable CBP1205 (power supply cable with safety banana plugs)

Side A		Side B	

Pin	Signal	Plug	Signal
1	UBATT	Red	UBATT
2	Ground	Black	Ground

Order Name	Short name	Order Number
Power Supply Cable, Lemo 1B FGJ – Safety Banana (2fc-2mc), 2 m	CBP1205-2	F 00K 110 023

> **NOTE**
>
> Power supply cables with safety banana plug are suitable only for connection to voltage sources with safety socket.

9.2   HOST Interface Cable

Side A   Side B
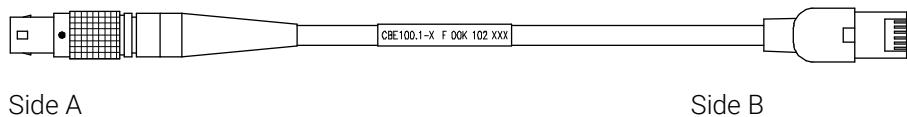
Fig. 9-3   CBE100-x Cable

Order Name	Short name	Order Number
Ethernet PC Connection Cable, Lemo 1B FGG - RJ45 (8mc-8mc), 3 m	CBE100-3	F 00K 102 559
Ethernet PC Connection Cable, Lemo 1B FGG - RJ45 (8mc-8mc), 8 m	CBE100-8	F 00K 102 571

9.3   ETH1 Interface Cable

9.3.1   Ethernet Connection and Power Supply Cable

CBE130-x Cable

Side A   Side B
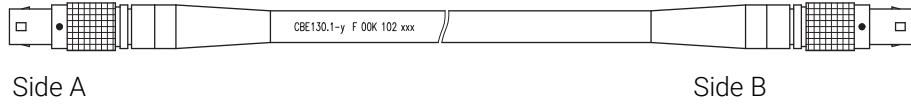
Fig. 9-4   CBE130-x Cable

Order Name	Short name	Order Number
Ethernet Connection and Power Supply Cable, Lemo 1B FGF Lemo 1B FGD (8mc-8mc), 0m45	CBE130-0m45	F 00K 102 748
Ethernet Connection and Power Supply Cable, Lemo 1B FGF Lemo 1B FGD (8mc-8mc), 3 m	CBE130-3	F 00K 102 587

CBE140 Cable

Side A   Side B
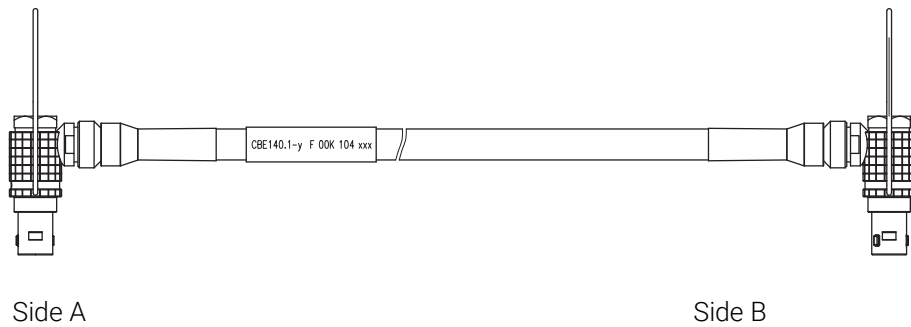
Fig. 9-5   CBE140-0m45 Cable

Order Name	Short name	Order Number
Ethernet Connection and Power Supply Cable with Angular Connectors, Lemo 1B FMF Lemo 1B FMD (8mc-8mc), 0m45	CBE140-0m45	F 00K 104 153

CBEP420.1 Cable

Side A   Side B
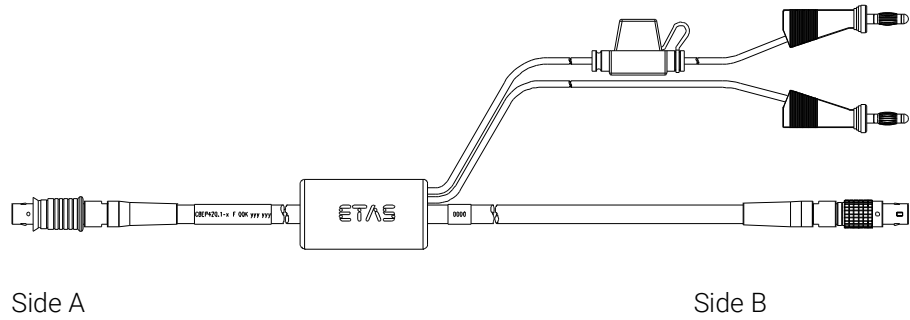
Fig. 9-6   CBEP420.1 Cable

Order Name	Short name	Order Number
Ethernet Connection and Power Supply Cable, Lemo 1B FGF Lemo 1B FGL Banana (8mc-8fc+2mc), 3 m	CBEP420.1-3	F 00K 105 292

CBEP425.1 Cable

Side A   Side B
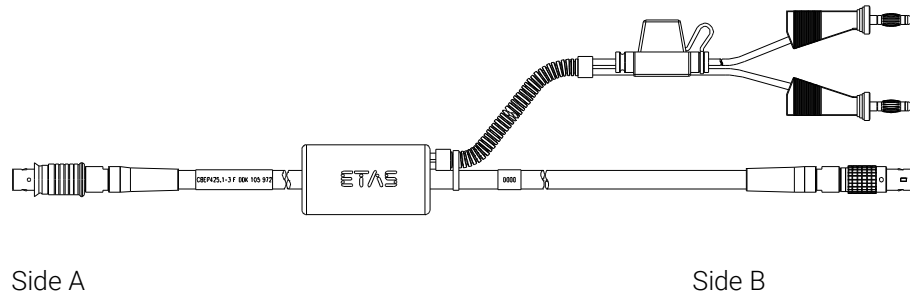
Fig. 9-7   CBEP425.1 Cable

Order Name	Short name	Order Number
Ethernet Connection and Power Supply Cable, Lemo 1B FGF Lemo 1B FGL Banana (8mc-8fc+2mc), 3 m	CBEP425.1-3	F 00K 105 972

> **NOTE**
>
> The wiring of the modules of the ES400 product family with each other and the cables required by the modules are described in the documentation of the ES4xx modules.

9.3.2   Ethernet Connection Cable

CBE330.1 Cable

Side A   Side B
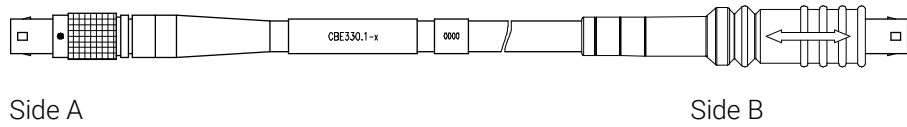
Fig. 9-8   CBE330.1 Cable

Order Name	Short name	Order Number
Ethernet Connection Cable, Lemo 1B FGF - Lemo 1B FGK (8mc-8fc), 5 m	CBE330.1-5	F00K 106 547

CBE400.2 Cable

Side A   Side B
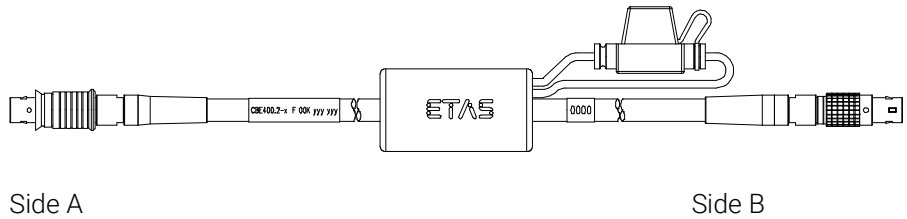
Fig. 9-9   CBE400.2 Cable

Order Name	Short name	Order Number
Ethernet PC Connection Cable, Lemo 1B FGF Lemo 1B FGL (8mc-8fc), 3 m	CBE400.2-3	F00K 104 920

CBE401.1 Cable

Side A   Side B
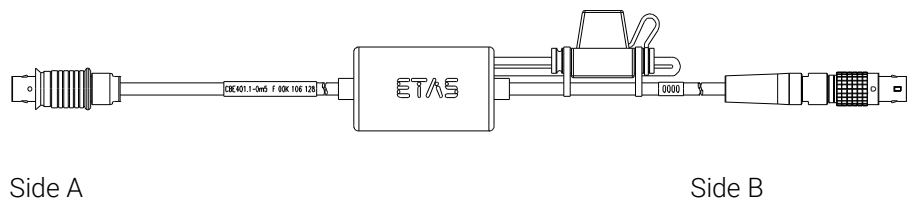
Fig. 9-10   CBE401.1 Cable

Order Name	Short name	Order Number
Ethernet PC Connection Cable, Highly Flexible, Lemo 1B FGF Lemo 1B FGL (8mc-8fc), 0m5	CBE401.1-0m5	F00K 106 128

9.3.3   Ethernet Connection Adapter Cable

Side A   Side B
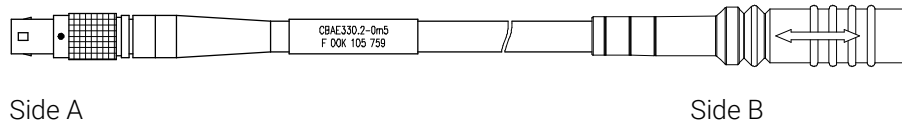
Fig. 9-11   CBAE330.2 Cable

Order Name	Short name	Order Number
Ethernet Connection Adapter Cable 1 Gbit/s to 100 Mbit/s, Lemo 1B PHE - Lemo 1B FGF (10fc-8mc), 0m5	CBAE330-0m5	F 00K 105 759

9.4   ETK Interface Cable

Side A   Side B
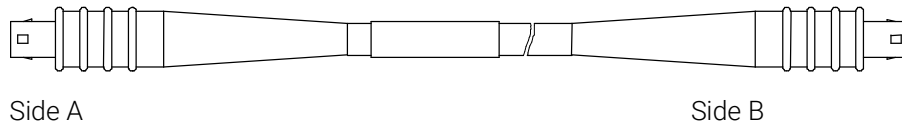
Fig. 9-12   CBM150-x Cable

Order Name	Short name	Order Number
ETK Interface Cable 100 Mbit/s, Lemo 1B FFG Lemo 1B FFG (4mc-4mc), 3 m	CBM150-3	F 00K 102 556
ETK Interface Cable 100 Mbit/s, Lemo 1B FFG Lemo 1B FFG (4mc-4mc), 5 m	CBM150-5	F 00K 102 557
ETK Interface Cable 100 Mbit/s, Lemo 1B FFG Lemo 1B FFG (4mc-4mc), 10 m	CBM150-10	F 00K 102 553

9.5   CAN/LIN Interface Cable and Adapter

9.5.1   CAN Interface Cable

CBAC150-2m5 Cable

Side A   Side B
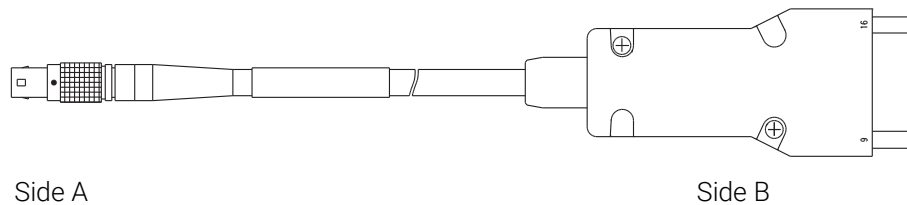
Fig. 9-13   CBAC150-2m5 Cable

Order Name	Short name	Order Number
CAN Interface Cable, OBDII J1962 Lemo 1B FGC (16mc-8mc), 2m5	CBAC150-2m5	F 00K 104 159

CBAC160-1m5 Cable

Side A   Side B
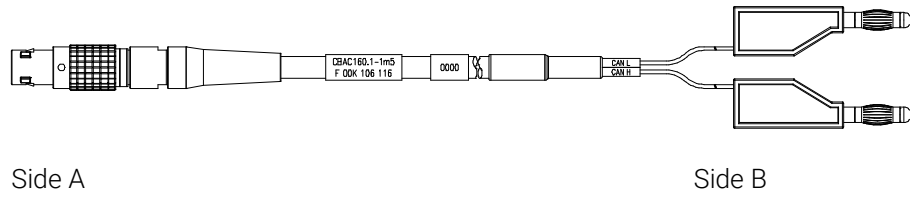
Fig. 9-14   CBAC160-1m5 Cable

Order Name	Short name	Order Number
CAN Interface Cable, Lemo 1B FGC - Banana (8mc - 2mc), 1m5	CBAC160.1-1m5	F00K 106 116

K106 Cable

Side A   Side B
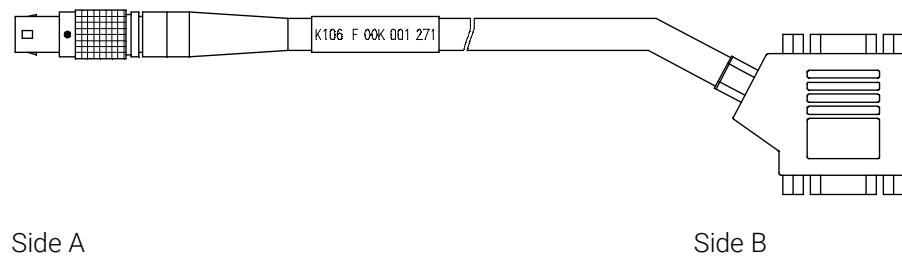
Fig. 9-15   K106 Cable

Order Name	Short name	Order Number
CAN Interface Y-Cable, Lemo 1B FGC 2xDSUB (8mc-9fc+9mc), 2 m	K106	F 00K 001 271

K107 Cable

Side A   Side B
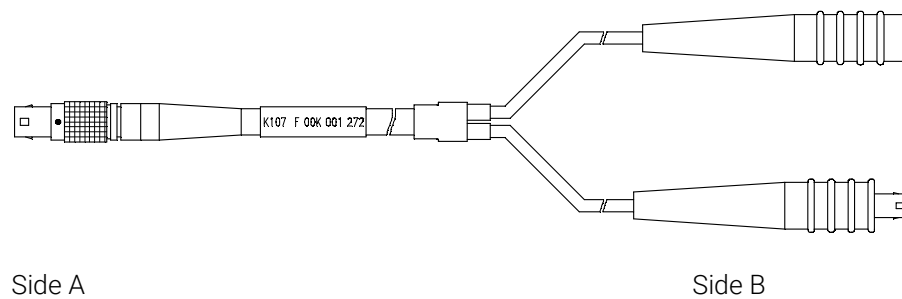
Fig. 9-16   K107 Cable

Order Name	Short name	Order Number
CAN Interface Y-Cable, Lemo 1B FGC Lemo 0S PCA Lemo 0S FFA (8mc,-2fc+2mc) , 2 m	K107	F 00K 001 272

9.5.2   Combined CAN and LIN Cable

Side B/C
gray

Side A   Side D/E
black
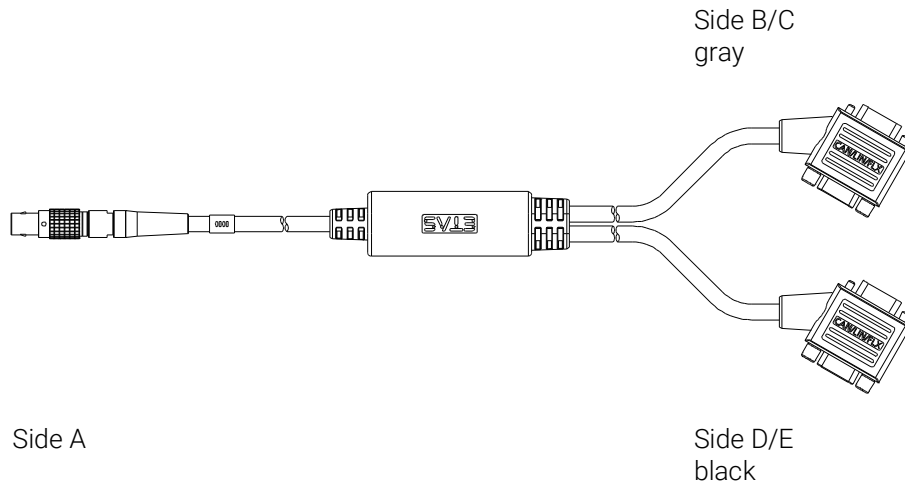
Fig. 9-17   CBCFI100 Cable

Order Name	Short Name	Order Number
CAN, FlexRay and LIN Interface Y-Cable, Lemo 1B FGC - 2xDSUB (8mc-9fc + 9mc), 2 m	CBCFI100-2	F 00K 106 893

Mapping of DSUB Socket Plug Combinations of the Cable

The 8-pin Lemo plug of the CBCFI100 cable can be connected either to the CAN1/LIN1 interface or the CAN2/LIN2 interface. At the other end of the CBC-FI100 cable are two 9-pin DSUB socket plug combinations:

- a socket plug combination (side B and C) marked in gray for connection to the CAN bus
- a socket plug combination (side D and E) marked in black for connection to the LIN bus

Mapping of DSUB Socket Plug Combinations to ES595.1

If one CBCFI100 cable each is used at the interfaces CAN1/LIN1 and CAN2/LIN2 of ES595.1, these interfaces are mapped to the DSUB socket plug combinations of both cables as follows:

ES595.1	Cable	Cables in CBCFI100 Fig. 9-17	
Connection		Socket (B) / plug (C) (DSUB, color: gray)	Socket (D) / plug (E) (DSUB, color: black)
CAN1/LIN1	1	CAN1	LIN1
CAN2/LIN2	2	CAN2	LIN2

Connector Pin assignment of Cable at the CAN1/LIN1 or CAN2/LIN2 Interface

The DSUB socket plug combinations of the CBCFI100 cable are assigned the signals of the CAN1/LIN1 or CAN2/LIN2 interface of ES595.1 as follows:

Lemo [Side A]			DSUB, Color: gray [Side B, Side C]	
Pin	Signal		Pin	Signal
1	LIN_UBATT		1	-
2	CAN_LOW		2	CAN_LOW
3	CAN_GND		3	CAN_GND
4	LIN		4	-
5	LIN_GND		5	-
6	CAN_GND		6	CAN_GND
7	CAN_HIGH		7	CAN_HIGH
8	-		8	-
			9	-
			DSUB, Color: black [Side D, Side E]	
			Pin	Signal
			1	-
			2	-
			3	LIN_GND
			4	-
			5	-
			6	-
			7	LIN
			8	-
			9	LIN_UBATT

NOTE

The CBCFI100 cable can be used at the interfaces CAN1/LIN1, CAN2/LIN2 and FLX1/FLX2.

9.5.3   CAN Termination Resistor

Fig. 9-18   CBCX131-0 Termination Resistor

Order Name	Short name	Order Number
CAN 120 & Termination Resistor, 2xDSUB (9fc+9mc)	CBCX131-0	F 00K 103 786

9.6   FLX Interface Cable and Adapter

9.6.1   FlexRay Interface Cable

Side B/C
(gray)

FLX1 (CHA)

FLX1/ FLX2 (CHA/ CHB)   FLX1 (CHB)

Side A   Side D/E
                                                                 black
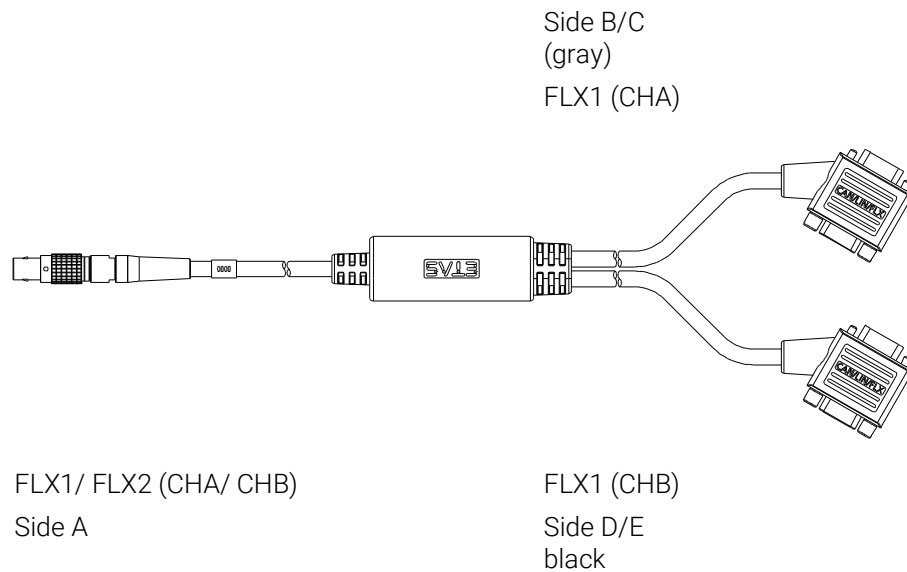
Fig. 9-19   CBCFI100 Cable

Order Name	Short Name	Order Number
CAN, FlexRay and LIN Interface Y-Cable, Lemo 1B FGC - 2xDSUB (8mc-9fc + 9mc), 2 m	CBCFI100-2	F 00K 106 893

Mapping of DSUB Socket Plug Combinations of the Cable

The 8-pin Lemo plug of the CBCFI100 cable can be connected to the FLX1/ FLX2 interface. At the other end of the CBCFI100 cable are two 9-pin DSUB socket plug combinations:

- a socket plug combination (side B and C) marked in gray for connection to loop into the FlexRay channel 1
- a socket plug combination (side D and E) marked in black for connection to loop into the FlexRay channel 2

Mapping of DSUB Socket Plug Combinations to ES595.1

If one CBCFI100 cable is used at the interface FLX1/FLX2 of ES595.1, these interfaces are mapped to the DSUB socket plug combinations of both cables as follows:

ES595.1	Cable	Cables in CBCFI100 Fig. 9-17	
Connection		Socket (B) / plug (C) (DSUB, color: gray)	Socket (D) / plug (E) (DSUB, color: black)
FLX1/FLX2	1	FLX1	FLX2

Connector Pin assignment of Cable at the FLX1/FLX2 Interface

The DSUB socket plug combinations of the CBCFI100 cable are assigned the signals of the FLX1/FLX2 interface of ES595.1 as follows:

Lemo [Side A]			DSUB, Color: gray [Side B, Side C]	
Pin	Signal		Pin	Signal
1	-		1	-
2	FLX1_LOW		2	FLX1_LOW
3	FLX1_GND		3	FLX1_GND
4	FLX2_HIGH		4	-
5	FLX2_GND		5	-
6	FLX1_GND		6	FLX1_GND
7	FLX1_HIGH		7	FLX1_HIGH
8	FLX2_LOW		8	-
			9	-
			DSUB, Color: black [Side D, Side E]	
		Cable CBCFI100	Pin	Signal
			1	-
			2	FLX2_LOW
			3	FLX2_GND
			4	-
			5	-
			6	-
			7	FLX2_HIGH
			8	-
			9	-

NOTE

The CBCFI100 cable can be used at the interfaces CAN1/LIN1, CAN2/LIN2 and FLX1/FLX2.
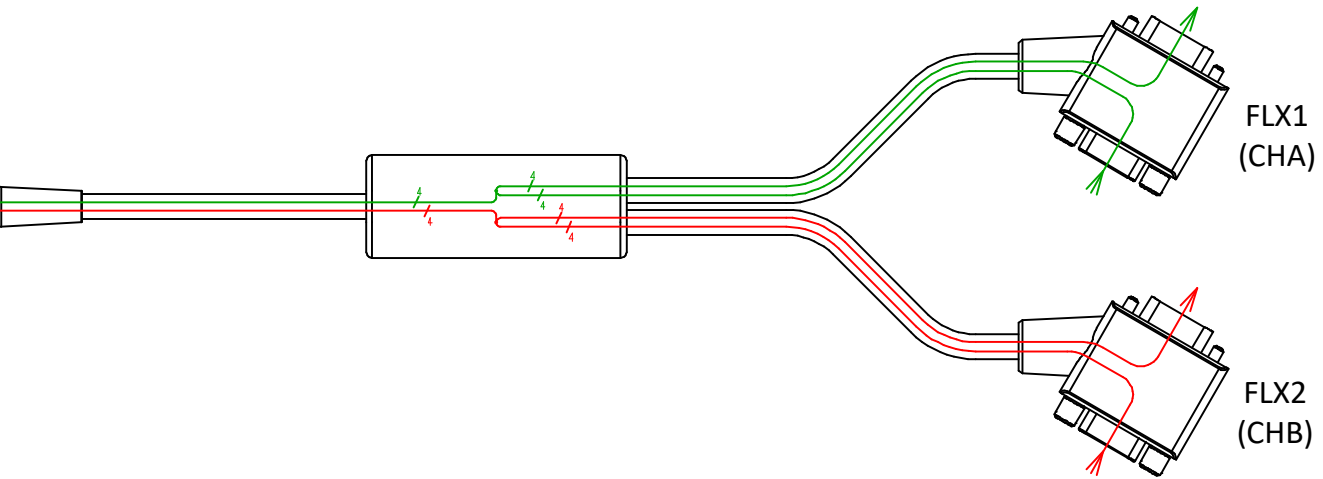
Fig. 9-20   Cable CBCFI100 at the FlexRay Bus (Dual Channel Bus)

9.6.2   FlexRay Termination Resistor
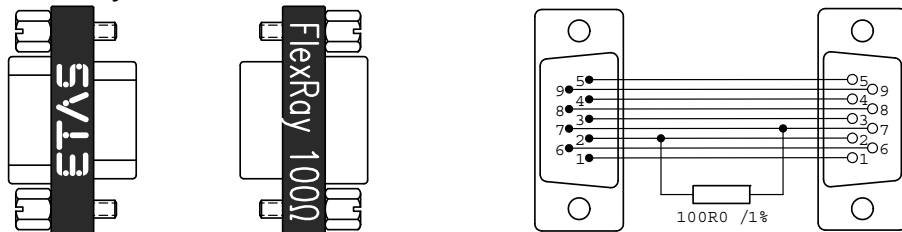
Fig. 9-21   CBFX131-0 Termination Resistor

Order Name	Short name	Order Number
FlexRay Termination Resistor 100 Ohm, 2xDSUB (9fc-9mc), 0 m	CBFX131-0	F 00K 104 689

10   Ordering Information

10.1   ES595.1

10.1.1   ES595.1 with CBP120 Power Supply Cable

Order Name	Short Name	Order Number
ES595.1 ETK, CAN, LIN and FlexRay Inter-face Module	ES595.1	F 00K 106 866

Package Contents

ES595.1 ETK, CAN, LIN and FlexRay Inter-face Module,
Cable CBE100-3, CBP120-2,
T-Bracket for Housing, ES523_CD,
List "Content of this Package",
QNX Licence with AP for ES5xx,
ES5xx Premium Line Safety Advice,
China-RoHS-leaflet_Compact_green_cn

> **NOTE**
>
> The cables for additional interfaces of the module are not part of the delivery scope and must be ordered separately (see chapter 10.2 on page 74).

10.1.2   ES595.1 with CBP1205 Power Supply Cable

Order Name	Short Name	Order Number
ES595.1 ETK, CAN, LIN and FlexRay Inter-face Module with Safety Cable	ES595.1-S	F 00K 110 483

Package Contents

ES595.1 ETK, CAN, LIN and FlexRay Inter-face Module,
Cable CBE100-3, CBP1205-2,
T-Bracket for Housing, ES523_CD,
List "Content of this Package",
QNX Licence with AP for ES5xx,
ES5xx Premium Line Safety Advice,
China-RoHS-leaflet_Compact_green_cn

> **NOTE**
>
> The cables for additional interfaces of the module are not part of the delivery scope and must be ordered separately (see chapter 10.2 on page 74).

10.2 Cable and Accessoires

> **NOTE**
>
> Only use the ETAS cables named in this User's Guide at the interfaces of the ES595.1. The maximum admissible cable lengths must be adhered to.

> **NOTE**
>
> Custom cables can be produced according to your specifications. For more information on custom cables, please contact your local ETAS sales representative.

10.2.1 Cable for the "7-29 V DC" connection

Order Name	Short Name	Order Number
Power Supply Cable, Lemo 1B FGJ Banana (2fc-2mc), 2 m	CBP120-2	F 00K 102 584
Power Supply Cable, Lemo 1B FGJ – Safety Banana (2fc-2mc), 2 m	CBP1205-2	F 00K 110 023

10.2.2 "HOST" Interface Cable

Order Name	Short Name	Order Number
Ethernet PC Connection Cable, Lemo 1B FGG - RJ45 (8mc-8mc), 3 m	CBE100-3	F 00K 102 559
Ethernet PC Connection Cable, Lemo 1B FGG - RJ45 (8mc-8mc), 8 m	CBE100-8	F 00K 102 571

10.2.3 "ETH1" Interface Cable

Ethernet Connection and Power Supply Cable

Order Name	Short Name	Order Number
Ethernet Connection and Power Supply Cable, Lemo 1B FGF Lemo 1B FGD (8mc-8mc), 0m45	CBE130-0m45	F 00K 102 748
Ethernet Connection and Power Supply Cable, Lemo 1B FGF Lemo 1B FGD (8mc-8mc), 3 m	CBE130-3	F 00K 102 587
Ethernet Connection and Power Supply Cable with Angular Connectors, Lemo 1B FMF Lemo 1B FMD (8mc-8mc), 0m45	CBE140-0m45	F 00K 104 153
Ethernet Connection and Power Supply Cable, Lemo 1B FGF Lemo 1B FGL Banana (8mc-8fc+2mc), 3 m	CBEP420.1-3	F 00K 105 292
Ethernet Connection and Power Supply Cable, Lemo 1B FGF Lemo 1B FGL Banana (8mc-8fc+2mc), 3 m	CBEP425.1-3	F 00K 105 972

Ethernet Connection Cable

Order Name	Short Name	Order Number
Ethernet Connection Cable, Lemo 1B FGF - Lemo 1B FGK (8mc-8fc), 5 m	CBE330.1-5	F00K 106 547
Ethernet PC Connection Cable, Lemo 1B FGF Lemo 1B FGL (8mc-8fc), 3 m	CBE400.2-3	F00K 104 920
Ethernet PC Connection Cable, Highly Flexible, Lemo 1B FGF Lemo 1B FGL (8mc-8fc), 0m5	CBE401.1-0m5	F00K 106 128

Ethernet Connection Adapter Cable

Order Name	Short Name	Order Number
Ethernet Connection Adapter Cable 1 Gbit/s to 100 Mbit/s, Lemo 1B PHE - Lemo 1B FGF (10fc-8mc), 0m5	CBAE330-0m5	F00K 105 709

10.2.4   "ETK" Interface Cable

Order Name	Short Name	Order Number
ETK Interface Cable 100 Mbit/s, Lemo 1B FFG Lemo 1B FFG (4mc-4mc), 3 m	CBM150-3	F 00K 102 556
ETK Interface Cable 100 Mbit/s, Lemo 1B FFG Lemo 1B FFG (4mc-4mc), 5 m	CBM150-5	F 00K 102 557
ETK Interface Cable 100 Mbit/s, Lemo 1B FFG Lemo 1B FFG (4mc-4mc), 10 m	CBM150-10	F 00K 102 553

10.2.5   "CAN/LIN" Interface Cable and Adapter

CAN Interface Cable

Order Name	Short Name	Order Number
CAN Interface Cable, OBDII J1962 Lemo 1B FGC (16mc-8mc), 2m5	CBAC150-2m5	F 00K 104 159
CAN Interface Cable, Lemo 1B FGC - Banana (8mc - 2mc), 1m5	CBAC160.1-1m5	F00K 106 116
CAN Interface Y-Cable, Lemo 1B FGC 2xDSUB (8mc-9fc+9mc), 2 m	K106	F 00K 001 271
CAN Interface Y-Cable, Lemo 1B FGC Lemo 0S PCA Lemo 0S FFA (8mc,-2fc+2mc) , 2 m	K107	F 00K 001 272
CAN, FlexRay and LIN Interface Y-Cable, Lemo 1B FGC - 2xDSUB (8mc-9fc+ 9mc), 2 m	CBCFI100-2	F 00K 106 893

CAN Termination Resistor

Order Name	Short Name	Order Number
CAN 120 & Termination Resistor, 2xDSUB (9fc+9mc)	CBCX131-0	F 00K 103 786

10.2.6   "FLX1/FLX2" Interface Cable and Adapter

FlexRay Interface Cable

Order Name	Short Name	Order Number
CAN, FlexRay and LIN Interface Y-Cable, Lemo 1B FGC - 2xDSUB (8mc-9fc+ 9mc), 2 m	CBCFI100-2	F 00K 106 893

FlexRay Termination Resistor

Order Name	Short Name	Order Number
FlexRay Termination Resistor 100 Ohm, 2xDSUB (9fc-9mc), 0 m	CBFX131-0	F 00K 104 689

10.2.7   Housing Accessoires

Order Name	Short Name	Order Number
T-Bracket for ES600 Housing	ES600_H_TB	F 00K 001 925

10.2.8   Software

Order Name	Short Name	Order Number
INCA ES5xx Software Integration Package for INCA V6.2.1 and later	ISW_ES5xx	F 00K 106 641

11   Contact Information

ETAS Headquarters

ETAS GmbH

Borsigstraße 24	Phone:	+49 711 3423-0
70469 Stuttgart	Fax:	+49 711 3423-2106
Germany	Internet:	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:

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ETAS technical support	Internet:	www.etas.com/en/hotlines.php

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