

ETAS ES800

Measurement, Calibration, and Pro-
totyping System



User Guide

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1 Safety Information

This chapter contains information about the following topics:

- Intended Use 12
- Classification of Safety Messages 13
- Safety Information 13

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

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

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

- Technical Support: www.etas.com/hotlines
- ETAS contact partners by region: www.etas.com/contact

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

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

Before starting up the product, check whether there is a Known Issue Report (KIR) for that product version: www.etas.com/kir (password: KETASIR). Note the information given in the report.

Program codes or program control sequences that are created or changed via ETAS products, as well as all types of data obtained through the use of ETAS products, must be checked for their reliability and suitability prior to use or distribution. Only use these codes or sequences in public areas (e.g., in road traffic) if you have ensured that the application and product settings are safe through testing in self-contained and designated testing environments and circuits.

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

1.1 Intended Use

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

The ES800 system is designed for the measurement, calibration and rapid prototyping of electronic systems.

ES801.1, ES801.1-S: The product is designed for supplying power to the ES800 system.

ES820.1: The Drive Recorder Module is designed for automatically recording and saving data from connected ETAS modules.

ES830.1: The rapid prototyping module is designed for simultaneously performing rapid prototyping of ECU functions and carrying out measurement and calibration tasks on the ECU.

- Replacing real components with virtual hardware from simulation models
- Validating software function models in real time
- Testing control and diagnostics functions under real conditions

ES882.1, ES882.2, ES886.1, ES886.2, ES891.1, ES891.2, ES892.1, ES892.2:

The ECU and bus interface modules are designed for the following applications:

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

Application areas

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

Technical Condition

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

1.2 Classification of Safety Messages

The safety messages 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 moderate injury if not avoided.

NOTICE

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

1.3 Safety Information

1.3.1 Assembly

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

Installation Location

Install the product on a smooth, level and firm surface. The inclination angle must not be greater than 15°.



WARNING

The following products are Class A equipment:

- ES820.1, ES830.1, ES882.1, ES882.2, ES886.1, ES886.2
- ES891.1, ES891.2, ES892.1, ES892.2 in the power supply range of between 28 V and 32 V DC
- This piece of equipment may cause radio interference in living areas. In this case, the user may be required to take appropriate measures.

NOTICE

Damage to the electronics due to potential equalization

The cables' shield may be connected to the housing, the ground or the ground for the product's power supply. If there are different ground potentials in the test setup, equalizing currents can flow between the products via the cables' shield.

Take account of different electric potentials in your test setup and take appropriate measures to prevent equalizing currents.

Securing the Product

The housing must not be damaged while securing the product.

Only secure the product to fastening elements intended for this.



WARNING

Risk of injury due to inadequate fastening

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

Ventilation

- Protect the product against direct solar radiation and other sources of heat.
- Ensure that there is sufficient air circulation for efficient heat exchange.
 - On both long sides, keep an area of at least 5 cm clear above and below the product or product stack.
 - Do not cover the ventilation slots.
 - Do not operate the product in enclosed areas.

Interconnecting the Modules

The connector and connection must not be dirty.

Do not tilt the module during the interconnection process. Make sure that the module fully engages.



CAUTION

Risk of crushing when interconnecting the modules

Make sure that your hands or fingers do not become caught between the modules.



CAUTION

Risk of crushing between the release lever and the housing

Operate the release lever in a uniform and controlled manner.

1.3.2 Operation

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

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

Only operate the modules of the system with the protective flap closed.



WARNING

Risk due to undefined vehicle behavior during an ECU reset

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

- Only make changes when the vehicle is stationary (e.g., changes to the test setup, changes to the ETK configuration, software updates).
- If you are using the Drive Recorder ES820.1, wait until its MEAS LED is lit continuously before driving.



WARNING

Risk due to undefined system behavior when disconnecting the transparent automotive Ethernet communication between ES886.1/ES886.2 and the ECU

The ES886.1/ES886.2 must not be disconnected from the operating voltage during an active transparent automotive Ethernet connection.

ES820.1

Only operate the module with the memory module inserted or the memory slot cover attached.



CAUTION

Risk of burns upon contact with hot surfaces of the SSD memory module

Only touch the SSD memory module by the two push and twist closures.

1.3.3 Electrical Connection

Electrical Safety and Power Supply

- Only connect the product to electric circuits with safety extra-low voltage in accordance with IEC 61140 (devices of class III) within the voltage limits for accessible parts as per IEC 61010-1.
- Comply with the connection and setting values (see "Technical Data" on page 137).
- The power supply for the product must be safely disconnected from the mains power. For example, use a car battery or a suitable lab power supply.
- Only use lab power supplies with dual protection for the supply network (with double/reinforced insulation (DI/RI)).

- The power supply must be suitable for use according to the ambient conditions for the product.
- It is possible to discharge the vehicle battery in regular operation and long standby operation.
- Central load-dump protection is required for operation.

Connection to the power supply (ES801.1 only)



WARNING

Risk to life from electric shock

If an unsuitable power supply is used, this may generate a hazardous electrical voltage.

- Use a power supply that is permitted for the product.
- Do not connect the product to power outlets.
- To prevent inadvertent connection to power outlets, use power cords with safety banana plugs in areas with power outlets.

- Only connect the product to the power supply via a suitable fuse protection.
- Ensure that the connections of the power supply are easily accessible.

Connection to the power supply (not ES801.1)

A direct connection between the product and the power supply is not permitted. Only connect the product with an approved base module (e.g., ES801.1).

De-energizing the product

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

1.3.4 Cables and Accessories

Cables

- Only use ETAS cables, cables recommended by ETAS or other cables certified for the application.
- Route the cables such that they are protected against abrasion, damage, deformation and kinking.
- Do not place any objects on the cables.
- Do not use any damaged cables.
- The connector and connection must not be dirty.
- The connector and connection must be compatible.
- Correctly align the connector with the connection.

- Do not connect the connector and connection by force.

NOTICE

Damage to the electronics

ES820.1, ES830.1: The ground contacts of the "I/O" interface must not be connected to the vehicle ground.

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

Accessories

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

1.3.5 Transport

- Only transport and store the product with the protective flap closed and the protective cap attached.
- Separate the module group before transportation.
- Only transport the product individually.
- Remove all connected cables before transportation.
- Do not transport the product by the connected cables.
- ES820.1: Only transport and store the product with the memory slot closed.

1.3.6 Maintenance

Cleaning

- Only clean the product when it is de-energized.
- Only clean the product with protective flap closed and the protective cap attached.
- Do not use compressed air to clean the fans.
- Do not use cleaning agents that could harm the product.
- Do not apply cleaning agents directly onto the product.
- Use a dry or slightly dampened, soft, lint-free cloth.
- Make sure that no moisture enters the product.
- ES820.1: Only clean the product with the memory slot closed.

1.3.7 Repairs

If repairs are required, send the product to ETAS.

1.3.8 Shipment and Packaging

Shipping information (ES820.1, ES830.1)



WARNING

Fire hazard

The product contains a lithium battery. Damaged lithium batteries may cause heat, fire or short circuits.

If the battery is damaged, contact the ETAS support: www.etas.com/hotlines

Note the additional requirements for shipment and packaging. The shipment and packaging requirements that apply to this product, including the testing summary for the battery, can be found in the product-specific area on the ETAS website: www.etas.com/shipment_dangerous_goods.

Return form

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

2 Data Protection Declaration

2.1 Data Processing of the ES820.1 Drive Recorder

Personal or person-related data or data categories are processed, when using the ES820.1 Drive Recorder.



NOTE

The purchaser of the ES820.1 Drive Recorder is responsible for the legal conformity of processing the data in accordance with Article 4 No. 7 of the General Data Protection Regulation (GDPR).

As the manufacturer, ETAS GmbH is not liable for any mishandling of this data.

2.2 Data and Data Categories

The ES820.1 Drive Recorder collects particularly the following personal or person-related data or data categories for the purpose of configuring the FTP transmission channel and transmitting measurement data:

User data: <USER ID>

When using the ES820.1 Drive Recorder, possibly with the aid of additional software components, additional personal or person-related data or data categories may be collected for the purpose of further analysis.

This may, for example, the vehicle identification number (VIN) or the number plate, but also GPS, video, audio or other measurement data. You determine which these are when configuring your measurement system.

In such cases, you are responsible for the legally compliant handling of the data in accordance with applicable national law.

2.3 Technical and Organizational Measures



NOTE

By default, the ES820.1 Drive Recorder does not encrypt personal or personal-related data, nor does it encrypt experiment files.

2.3.1 Encryption Functions

In the ETAS "Drive Recorder Configurator" software, you can select the **hard disk encryption** (Bitlocker) and **end-to-end encryption** functions for data exchange between ES820.1 and PC.¹

Selecting these functions in the "Drive Recorder Configurator" software the following encryptions are activated:

- Encryption of the internal hard disk of the ES820.1 (Bitlocker)
[Menu: **Security > Disk Encryption**]

1. The encryption functions are supported from INCA V7.3 incl. Service Pack 5 and higher.

- INCA configuration files
- INCA experiment files
- Encryption of files transferred between ES820.1 and PC
[Menu: **File transfer settings** › **Encryption (E2E)**]
- INCA measurement files
- INCA experiment files
- Encryption of the personal or personal related data

The encryption functions are described in the online help of the "Drive Recorder Configurator" software.

2.3.2 Further measures

In addition, we recommend further suitable technical or organizational measures provided by your IT, such as classic theft protection and access protection on the hardware of the test setup.

3 ES800 System

This chapter contains information about the following topics:

- Overview 21
- ES800 Module and Module Stacks..... 22
- System Bus 23
- Power Supply 23
- Modules of the ES800 System..... 24
- Interfaces of the ES800 Modules..... 25
- Combination with ETAS Modules from other Series..... 26
- Properties of the ES800 System..... 26

3.1 Overview

The modular ES800 system is a universally applicable development and experimental platform for the calibration, diagnostics, and flash programming of ECUs as well as bus monitoring. It is designed for complex application tasks with high data throughput and easily scalable for every power demand.

The ES800 system comprises an ECU and Bus Interface Modules for connecting ECUs and vehicle networks, a Drive Recorder for the autonomous recording of measured data, as well as a Rapid Prototyping Module.

The ECU and Bus Interface Modules of the ES800 system support Automotive Ethernet-based vehicle buses, FlexRay, CAN FD, CAN and LIN, as well as ETK ECU access and can communicate with ECUs via emulator test probes (FETK, XETK, BR_XETK, Dual Mode ETK). ECUs that feature a separate Ethernet interface can be connected directly to ES800 modules.

The ES800 system is connected to the host, i.e., a PC or Drive Recorder, via Ethernet and is integrated into the measuring setup via the ETAS Ethernet topology.

The modules in the system stack communicate via the integrated system interface; no connecting cables are required.

The Drive Recorder ES820.1 can be directly connected to ES800 modules and/or module stacks or to other Ethernet-based modules via a cable.

The ES800 system with the ETAS synchronization mechanism or with the synchronization according to IEEE1588-2008 ensures a time-synchronous scanning of all measuring channels, even in larger module arrangements. The bus interfaces of the modules are integrated into the measuring setup with ETAS standard cables.

3.2 ES800 Module and Module Stacks

The modules of the ES800 system can be operated individually (standalone) or as module stack. In the module stack, the modules are mechanically and electrically connected to form a system without the need for additional cables. No additional tools are required.

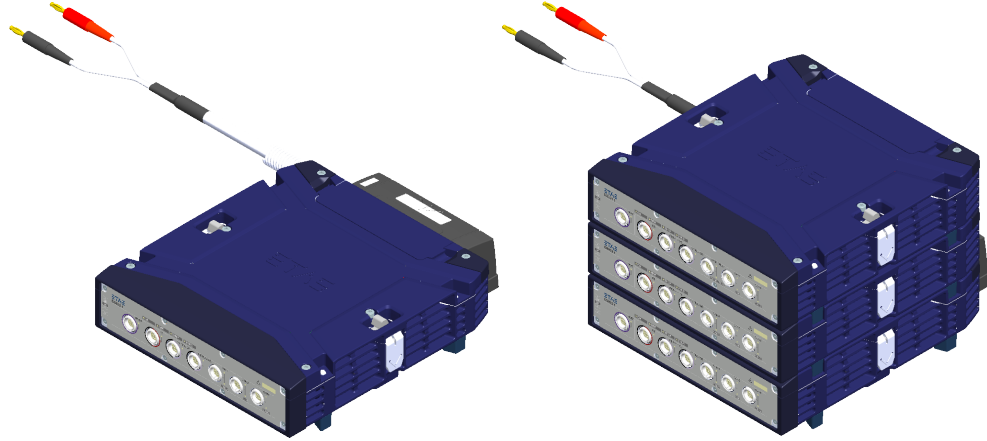


Fig. 3-1 ES800 module (standalone) and three modules (stack)

3.2.1 Number of Modules in a Module Stack

To connect to the power supply, an additional ES800 Base Module is required for every ES800 system (standalone or module stack)

Depending on the operating voltage, up to 5 modules can be operated to form a module stack

i NOTE

Observe the notes on the power supply of the ES800 system in chapter 16.9.1 on page 146.

3.2.2 Number of ES820.1 Drive Recorders in a Module Stack

i NOTE

Only one ES820.1 Drive Recorder can be operated in an ES800 module stack. The ES820.1 Drive Recorder must always be operated beneath interface modules (e.g. ES89x) in the module stack.

3.2.3 Number of ES830.1 Rapid Prototyping Modules in a Module Stack

i NOTE

Only one ES830.1 Rapid Prototyping Module can be operated in an ES800 module stack. The ES830.1 Rapid Prototyping Module must always be operated beneath interface modules (e.g. ES89x) in the module stack.

3.2.4 Positioning the Module Types in the Module Stack



NOTE

Hints for positioning the module types in the module stack can be found in chapter 13.3 on page 111.

3.3 System Bus

3.3.1 Electrical Connection of the Modules

Every module of the ES800 system is equipped with a system connector on both the top and bottom. When stacked, the system connectors of the modules are directly connected to one another.

When stacking the modules, all electrical connections between the modules (power supply and bus systems) are established without cables.

3.3.2 Protection of System Connectors

The system connectors are located at the rear end of the module housing at the top and bottom in each case. If the upper part of the system connector of a module is not used, it is protected by a flap.

Only transport and store the product with the protective flap closed and the protective cap attached.

3.4 Power Supply

The modules of the ES800 system are supplied with operating voltage by an ES800 Base Module jointly via the system connector of the modules. The ES800 Base Module is installed on the underside of an individual module or on the underside of a module stack. The connection to the power supply is established via the system connector on the underside of the lowest module.



NOTE

The connection of the modules to the vehicle battery or the lab power supply may only be performed with a module approved for the power supply to the ES800 modules (e.g. ES801.1). A direct connection to the power supply without an ES800 Base Module is not permitted.



NOTE

The ES800 Base Module (e.g. ES801.1) must be physically disconnected from all operating voltages so that the ES800 system does not take on any current.



NOTE

Observe the notes on the power supply of the ES800 system in chapter 16.9.1 on page 146.

3.5 Modules of the ES800 System

The following modules are part of the ES800 system:

Module	Designation	Description
ES801.1	Base Module	Power supply module, see chapter 4 on page 27
ES801.1-S	Base Module	Power supply module, see chapter 4 on page 27
ES820.1	Drive Recorder	Data recording module, see chapter 5 on page 29
ES830.1	Rapid Prototyping Module	Rapid prototyping module, see chapter 6 on page 46
ES882.x	ECU and Bus Interface Module	ECU and bus interface module, see chapter 7 on page 55
ES886.x	ECU and Bus Interface Module	ECU and bus interface module, see chapter 3 on page 21
ES891.x	ECU and Bus Interface Module	ECU and bus interface module, see chapter 9 on page 62
ES892.x	ECU and Bus Interface Module	ECU and bus interface module, see chapter 10 on page 66





NOTE

Additional modules and functions are being prepared for the ES800 system.

3.6 Interfaces of the ES800 Modules



3.6.1 ES820.1 Drive Recorder Module

The Drive Recorder ES820.1 of the ES800 system provides the following interfaces:

Interface Designation	Function	Interfaces per Module ES820.1
HOST	Ethernet (Host PC)	1
GE	Gigabit Ethernet	1
	USB 2.0	2
	USB 3.0	2
I/O	Digital inputs and outputs	1
6 ..32 V DC	Power supply	via ES80x Base Module

3.6.2 ES830.1 Rapid Prototyping Module

The Rapid Prototyping Module ES830.1 of the ES800 system provides the following interfaces:

Interface Designation	Function	Interfaces per Module ES820.1
HOST	Ethernet (Host PC)	1
GE	Gigabit Ethernet	1
	USB 2.0	2
	USB 3.0	2
I/O	Digital inputs and outputs	1
6 ..32 V DC	Power supply	via ES80x Base Module

3.6.3 ES88x and ES89x ECU and Bus Interface Modules

The ES88x and ES89x ECU and Bus Interface Modules of the ES800 system provide the following interfaces:

Interface Designation	Function	Interfaces per Module			
		ES882.x	ES886.x	ES891.x	ES892.x
HOST	Ethernet (Host PC, Drive Recorder)	1	1	1	1
FE	Fast Ethernet	1	1	1	1
GE	Gigabit Ethernet	1	1	2 ¹⁾	2 ¹⁾
AE	Automotive Ethernet	3	4	0	0
FETK	FETK	0	0	2 ¹⁾	2 ¹⁾

Designation	Function	Interfaces per Module			
		ES882.x	ES886.x	ES891.x	ES892.x
CAN	CAN, CAN FD, CAN FD SIC ²⁾	5	5	5 ¹⁾	5
LIN	LIN bus	1	1	1	1
FLX	FlexRay	0	0	1 ¹⁾	-

¹⁾: Number according to configuration
²⁾: ES8xx.2 only

3.7 Combination with ETAS Modules from other Series

If the ES800 system is extended with ES4xx/ES6xx measuring modules, with ES5xx interface modules, with the ES930 Multi-I/O module, or with the ES600.2 Ethernet switch module, additional signal types can be recorded.

The ES820.1 Drive Recorder enables the direct connection of the USB-based ES581.4, ES582.1, ES583.1 and ES584.1 bus interface modules.

Further ETAS modules can be connected to the Drive Recorder via an ES88x/ES89x interface module or via an ES600.2 Ethernet switch module.

Further ETAS modules can be connected to the ES830.1 Rapid Prototyping Module via an ES88x/ES89x interface module or via an ES600.2 Ethernet switch module.

3.7.1 "Wake-Up" and "Sleep" Functions with ETAS Modules from other Series

The "Wake-Up" and "Sleep" functions of the ES800 modules, when performed using ETAS modules from other series, connected to the "FE" interface or via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, are supported.

3.7.2 Synchronization of ETAS Modules from other Series at the "GE" Interface

The synchronization of the ETAS modules from other series, connected via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, is supported.

3.8 Properties of the ES800 System

Other important properties of the ES800 system:

- Robust metal housing with connections on the front of the device
- Automotive-capable modules suitable for use in the development environment, on the test bench and in the passenger cell of motor vehicles on test courses.
 - Adaptable to ambient conditions (temperature, EMC)
 - Wide supply voltage range
 - High level of mechanical stability and robustness
- Part of the ETAS Tool Suite

The complete technical data for the ES800 system can be found in chapter "Technical Data" on page 137.

4 ES801.1 Base Module

This chapter contains information about the following topics:

- Overview 27
- Versions..... 27
- Properties..... 28

4.1 Overview

An individual module or module stack is connected to the vehicle battery or the laboratory power supply via an ES800 Base Module (ES801.1 or ES801.1-S). Mounted on the underside of the module or module stack, the ES800 Base Module supplies the modules with operating voltage via a uniform system connector (see chapter 13.4.3 on page 113).

4.2 Versions

The ES800 Base Module ES801.1 can be supplied in two versions:

- ES800 Base Module ES801.1 with standard banana plugs
- ES800 Base Module ES801.1-S with safety banana plugs

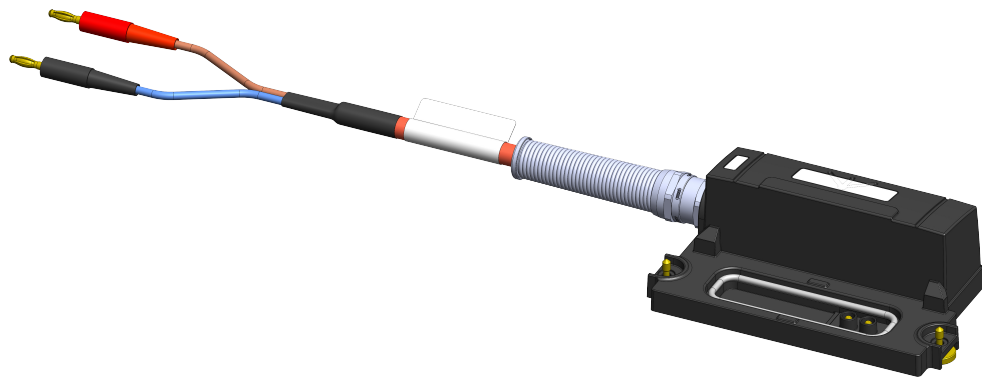


Fig. 4-1 ES801.1 Base Module

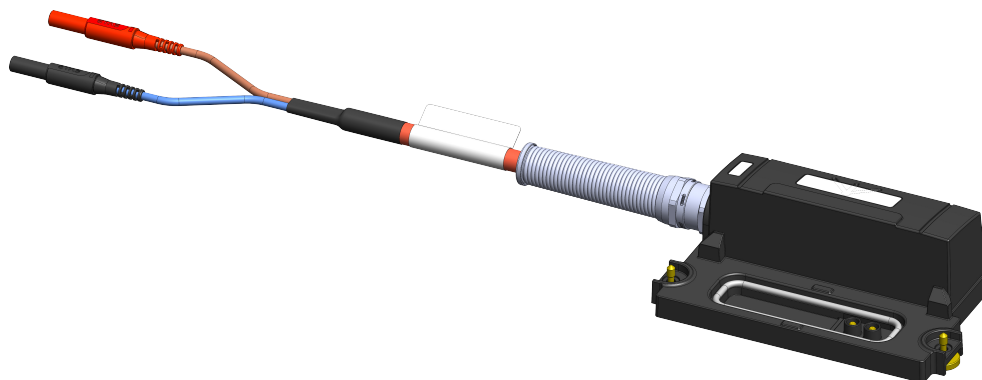


Fig. 4-2 ES801.1-S Base Module



WARNING

Risk to life from electric shock

If an unsuitable power supply is used, it may generate a hazardous electrical voltage.

- Use a power supply that is permitted for the product.
- Do not connect the product to power outlets.
- To avoid inadvertent connection to power outlets, use power cords with safety banana plugs in areas with power outlets.



NOTE

Please note that the ES800 Base Module ES801.1-S with safety banana plugs is only suitable for connection to voltage sources with safety sockets.



NOTE

The applications, permissible voltages and all further technical data for ES800 Base Modules ES801.1 and ES801.1-S are identical for both versions.

4.3

Properties

The most important properties:

- Universal module for connecting the ES800 system to the operating voltage
- Power supply to a single module
- Power supply to a module stack
- Can be supplied with standard banana plugs (ES801.1) or with safety banana plugs (ES801.1-S)

The complete technical data for ES800 Base Modules ES801.1 and ES801.1-S can be found in chapter "Technical Data" on page 137.

5 ES820.1 Drive Recorder

This chapter contains information about the following topics:

- Overview 29
- Properties 31
- Connections and Control Elements 32
- Function Groups 33
- Switching the Drive Recorder On and Off 37
- Data Transfer 45

5.1 Overview

The Drive Recorder ES820.1 is based on an Embedded PC and assumes the function of the PC in the measuring setup. It is suitable for measurement tasks during development, application and the validation of electronic vehicle systems.



Fig. 5-1 ES820.1 Drive Recorder

The Drive Recorder ES820.1 can record data from connected modules, perform measurement tasks autonomously and be activated by events (bus traffic, ignition, switching signals, timers).

5.1.1 Memory Module and Docking Station

The memory module of the Drive Recorder can be quickly and easily replaced with a different memory module without the need for tools.

In order to minimize vehicle test carrier downtimes, the data recorded with an external docking station and a PC can be transferred into the company network independently of the Drive Recorder.

5.1.2 Digital Inputs and Outputs

The extension connection provides four digital inputs as triggers or markers, and four digital outputs for indicating system states or events. The function of the "Power" button on the ES820.1 module can be assumed by an external "Remote Power" button at the "I/O" connection.

5.1.3 Extensions

The Drive Recorder ES820.1 can be easily extended:

- with modules from the ES800 series in a module group (stack),
- with an Automotive Ethernet Media Converter ES162.1 at the GE Ethernet connection,
- with USB-based interface modules (ES581.4, ES582.2, ES583.1, ES584.1), measuring instruments and storage devices at the USB interfaces,
- with ETAS modules from other series (ES4xx, ES5xx, ES6xx, ES930) via an ES600.2 switch at the GE Ethernet connection,
- with ETAS modules from other series (ES4xx, ES5xx, ES6xx, ES930) via an ES88x/ ES89x ECU and Bus Interface Module in the ES800 module stack,
- with an XETK for connecting to ECUs via an ES600.2 switch at the GE Ethernet connection.

Information on combining modules of the ES800 system with ETAS modules from other series can be found in chapter 3.7 on page 26.

5.1.4 Application Software

The Drive Recorder ES820.1 is compatible with INCA, the standard tool for the measurement, calibration, and diagnostics of ECUs. The selection of measure signals, setting data acquisition rates, and the configuration of triggers, communication and diagnostics protocols are performed directly by INCA.

Operating the ES820.1 Drive Recorder with Third Party Software



NOTE

Please contact the ETAS support team if you want to operate the ES820.1 Drive Recorder with Third Party software.

5.2 Properties

The most important properties of the ES820.1 module:

- PC-based module
- Integrated solid-state memory (SSD) for the operating system and application software
- Slot for replaceable memory module (SSD) for data recording
- 2 Ethernet interfaces with 1000 Mbit/s for connecting a PC or other modules:
 - 1 Gigabit Ethernet connection (Host)
 - 1 Gigabit Ethernet connection for compatible ETAS modules
 - Automatic standby function
 - Precise synchronization of all connected modules and their measuring channels
- 4 independent USB interfaces (2 x USB 3.0, 2 x USB 2.0) for extending the module, e.g., with
 - Flash memory (standard USB stick)
 - GPS receiver
- Digital inputs and outputs
 - Remote display of the LEDs on the front plate
 - Remote control of the "Power" button
 - 4 universal digital outputs
 - 4 universal digital inputs
 - Automatic activation via terminal 15 (K1.15)
- Fast startup and measurement readiness
- Execution of different experiments in a specified sequence
- Automotive-capable module that is suitable for use in the development environment and in the vehicle on test courses.
 - Adaptable to ambient conditions (temperature, EMC)
 - Wide supply voltage range
 - High level of mechanical stability and robustness
- Part of the ETAS Tool Suite

Complete technical data for the ES820.1 module can be found in the chapter "Technical Data" on page 137.

5.3 Connections and Control Elements

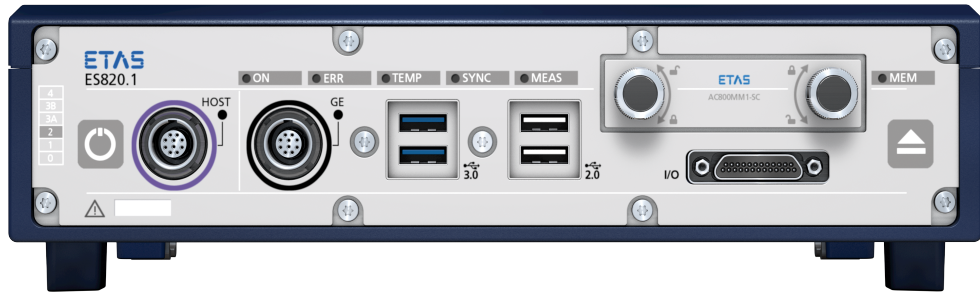







Fig. 5-2 ES820.1 front side

The front side of the ES820.1 module features the following connections and control elements:

Name	Interface	For description see
	"Power" button for switching on and off	Chapter 5.4.6 on page 35
HOST	1 x Gigabit Ethernet (HOST)	Chapter 12.1 on page 86
GE	1 x Gigabit Ethernet	Chapter 12.3 on page 88
	2 x USB 2.0	Chapter 5.4.2 on page 33
	2 x USB 3.0	Chapter 5.4.2 on page 33
I/O	Digital inputs and outputs	Chapter 12.10 on page 106
	Replaceable memory module, optional	Chapter 5.4.5 on page 34
	Button for safely removing the memory module	Chapter 5.4.7 on page 35

Information on combining modules of the ES800 system with ETAS modules from other series can be found in chapter 3.7 on page 26.

5.4 Function Groups

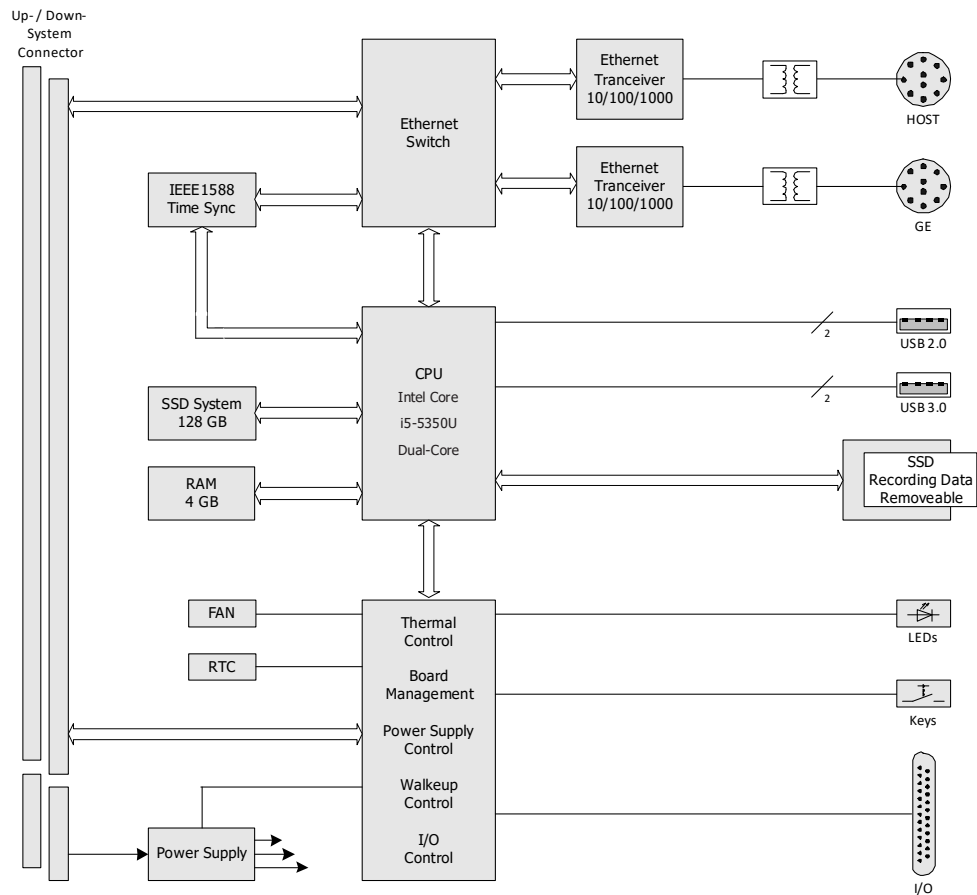


Fig. 5-3 ES820.1Function groups

5.4.1 Ethernet Switch

In addition to the Ethernet connection in the system connector of the stack (see chapter 3.3 on page 23), the Ethernet switch of the module provides interfaces for the connection of further modules:

- a HOST Ethernet interface (see chapter 12.1 on page 86)
- a GE Gigabit Ethernet interface (see chapter 12.3 on page 88)

The Ethernet interfaces enable time synchronization in accordance with IEEE1588.

5.4.2 USB Interfaces

The Drive Recorder ES820.1 is equipped with 4 independent USB interfaces (2 x USB 3.0, 2 x USB 2.0) for extending the module (see chapter 5.4.2 on page 33).

5.4.3 "I/O" Interface

The ES820.1 module provides digital inputs and outputs with different functions at the "I/O" interface (see chapter 12.10 on page 106).

5.4.4 Embedded PC

The Embedded PC of the Drive Recorder contains the operating system and the application software for control and data recording.

Solid state memory (internal)

The operating system and the application software are stored on the internal solid state memory (SSD).

Board controller

The board controller controls and monitors the Wake-Up function of the module, the control and display elements, as well as the digital inputs and outputs.

5.4.5 Replaceable Memory Module (Optional)

The Drive Recorder ES820.1 records measured data on a replaceable SSD memory module. The memory module can also be used to transfer the measurement configurations to the Drive Recorder. The memory module is integrated into a slot on the front of the ES820.1 and can be removed and replaced without the need for tools (see chapter 13.7 on page 120).

Advantages

- Simple transfer of recorded measured data
- Short vehicle downtimes thanks to replacement of memory modules
- Recorded measured data can be read on a PC with an external adapter without a Drive Recorder



NOTE

The AC800MM1-DS external docking station (see chapter 18.3 on page 208) can be ordered to enable the data from the replaceable SSD memory module to be read on a PC.



Fig. 5-4 ES820.1 with replaceable memory module



NOTE

The Drive Recorder ES820.1 can only hold one ES800 memory module type 1.

The memory modules are mechanically robust and are available with different memory capacities (see chapter 18.3 on page 208).

Surface Temperature of the ES820.1 Memory Module

When operating the Drive Recorder, the temperature inside the module is higher than the ambient temperature and the temperature on the surface of the module.

Depending on the length of time for which the Drive Recorder is operated, the surface temperature of the ES820.1 memory module can become so high, that there is a risk of burns when removing the memory module from the ES820.1.



CAUTION

Risk of burns upon contact with hot surfaces of the SSD memory module
Only touch the SSD memory module by the two push and twist closures.

5.4.6 "Power" Button

If the "Power" button is actuated, the Drive Recorder ES820.1 switches to a different operating state ("On" [Active on/Passive on] or "Off", see chapter 5.5 on page 37).



NOTE

The „Power“ button or an external „Remote Power“ button must **not** be actuated while the firmware or configuration software of the ES820.1 Drive Recorder is being updated or during installation.

5.4.7 "Safely Remove the Memory Module" Button

Pressing the "Safely remove the memory module" button prepares for the removal of the optional, replaceable memory module of the Drive Recorder (see chapter 13.7 on page 120). This disconnects the memory module from the operating system ("Safely remove").



NOTE

The button must always be pressed before removing the memory module.

5.4.8 Acoustic Signal Generator

Internal Acoustic Signal Generator

The ES820.1 features an acoustic signal generator.

External Acoustic Signal Generator

The status of the internal acoustic signal generator is an output as an electrical signal at a pin of the "I/O" connection. An external signal generator (Piezo buzzer) can also be directly connected here and housed in the passenger cell.

Acoustic Signals

The following actions and function states are signaled with the acoustic signal generator:

Number of signals	Duration of the signal [s]	Action/function state
1	0.5	"Power" button pressed
2	0.5	Ready for measurement
3	0.5	Measurement ended
1	2	Error

The acoustic signal can be deactivated or activated in the configuration program.

5.4.9 Other Function Groups

- Power supply (see chapter 3.4 on page 23)
- Function groups for power-saving functions ("Wake-Up", see chapter 11.3 on page 77)

5.5 Switching the Drive Recorder On and Off

5.5.1 Switching On

Pressing the "Power" button on the ES820.1 module or an external "Remote Power" button briefly switches on the ES820.1 (change from the "Standby" state to the "On" state).

This starts the installed operating system and the application software. The time required for this varies depending on the Standby mode ("Low power" or "Fast boot") and the measurement configuration.

5.5.2 Power Off

Switching off (shutting down)

If the Drive Recorder ES820.1 is in the "On" state, it can be shut down by briefly pressing the "Power" button on the module or an external "Remote Power" button.

If a measurement is in progress, it will be aborted, and the measured data will be saved before the system is shut down. After being shut down, the Drive Recorder ES820.1 enters the "Low power" or "Fast boot" Standby mode, depending on the configuration.



NOTE

Always switch off the Drive Recorder ES820.1 using the "Power" button, the "Remote Power" button, via the "Power Status Coordination Input" (PSCI), or in a time-controlled manner. This ensures that any ongoing measurement is aborted correctly, and the Drive Recorder ES820.1 starts up without delay when it is switched back on.

Switching off ("Force switch-off")

The Embedded PC of the Drive Recorder is switched off when the "Power" button on the module or an external "Remote Power" button is pressed for at least 20 seconds.

This switch-off corresponds to the "Hard shutdown" function of a standard PC. System processes and measurements are aborted without being completed and data may only be partially saved or not saved at all.



NOTE

Data may be lost!

If the "Power" button is pressed for longer than 20 seconds, the Drive Recorder is switched off immediately, even if measurements are in progress. The recording of measured data may be incomplete or corrupted.

Switching off by disconnecting the Module from the Supply Voltage



NOTE

Data may be lost.

To prevent the loss of data, the Drive Recorder must not be disconnected from the supply voltage either during a measurement or when writing the data to the memory module.

Switch-off Sequence

The ES820.1 is switched off in a defined sequence in all operating states:

- A Stop the measurement that is in progress
- B Wait until data recording is complete
- C Wait until data has been transferred to the "HOST", "GE", "USB 2.0", "USB 3.0", "I/O" interfaces (at the used interface)
- D Save all measured data and close the recording file
- E Shut down the ES820.1 module

Error Handling

If any error occurs while saving the data during the switch-off process, the **ER** LED will indicate the issue, and the switch-off process will continue.

5.5.3 Remote Function of the "Power" Button

The function of the "Power" button on the ES820.1 module can be replaced by an external "Remote Power" button if required. To use this functionality, connect an external button to the "IN_POWER_BUTTON" pin at the "I/O" connection (see chapter 16.10.10 on page 172).

5.5.4 Changing between Operating States

State Diagram

The change between the operating states of the ES820.1 can be depicted in a state diagram (see Fig. 5-5 on page 39).

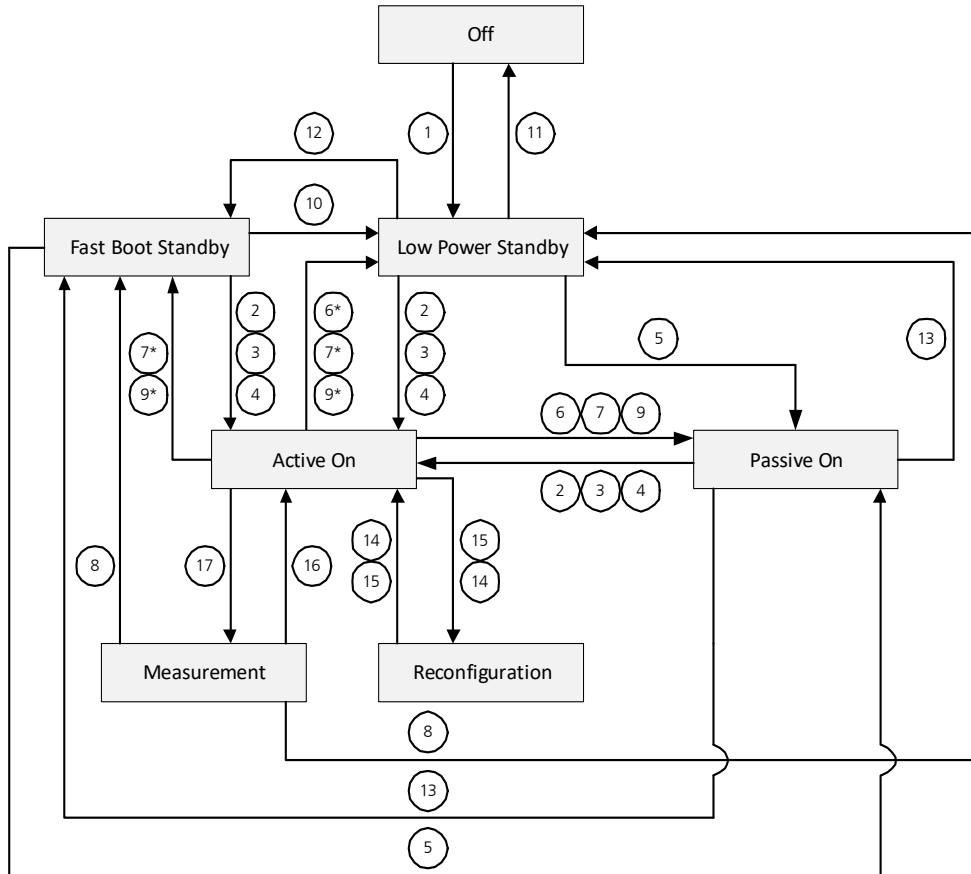



Fig. 5-5 Changing between operating states (simplified)

The numbers in the state diagram correspond to the number of operating state changes that can be performed by the ES820.1, triggered by events (triggers or timers) of the "Wake-Up" and "Sleep" functions (see chapter 11.4 on page 78).

5.5.5 Events

The ES820.1 is triggered to change between operating states by events. These events can be activated, deactivated and combined with timers in order to delay the event in the configuration software. The changes between operating state shown in Fig. 5-5 on page 39 are each linked to a selection of the events and timers listed here.

 **NOTE**

Further information can be found in the "Drive Recorder Configurator Tutorial" document, which is available in the ETAS Download Center.

General Events

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
1	PWR On	Power supply on
11	PWR Off	Power supply off

"Wake-Up" Events (change from "Low power standby" to "Fast boot standby")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
12		Fast boot preparation upon entry into the time frame

"Wake-Up" Events (change from "Low power standby" to "Active on")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
2	PBP	Pressing the "Power" button on the module
3	On pin	Pressing the external remote "Power" button or trigger event at the digital input ("PSCI" pin, "I/O" connection), Low to High
4	On time	Start at a specific point in time (configurable timer)

"Wake-Up" Events (change from "Passive on" to "Active on")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
2	PBP	Pressing the "Power" button on the module
3	On pin	Pressing the external remote "Power" button or trigger event at the digital input ("PSCI" pin, "I/O" connection), Low to High
4	On time	Start at a specific point in time (configurable timer)

"Wake-Up" Events (change from "Fast boot standby" to "Passive on")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
5	On ETH	Communication at the "ETH" interface (PC or measuring module)

"Wake-Up" Events (change from "Fast boot standby" to "Active on")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
2	PBP	Pressing the "Power" button on the module
3	On pin	Pressing the external remote "Power" button or trigger event at the digital input ("PSCI" pin, "I/O" connection), Low to High
4	On time	Start at a specific point in time (configurable timer)

"Wake-Up" Events (change from "Low power standby" to "Passive on")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
5	On ETH	Communication at the "ETH" interface (PC or measuring module)

"Wake-Up" Events (change from "Active on" to "Measurement")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
17		Measurement started

"Shutdown" Events (change from "Active on" to "Passive on")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
6	PBP	Pressing the "Power" button on the module and communication at the "ETH" interface (PC or measuring module)
7	On pin	Pressing the external remote "Power" button or trigger event at the digital input ("PSCI" pin, "I/O" connection), High to Low and communication at the "ETH" interface (PC or measuring module)
9	On time	End at a specific point in time (configurable timer) and communication at the "ETH" interface (PC or measuring module)

"Shutdown" Events (change from "Active on" to "Low power standby")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
6*	PBP	Pressing the "Power" button on the module and no communication at the "ETH" interface (PC or measuring module)
7*	On pin	Pressing the external remote "Power" button or trigger event at the digital input ("PSCI" pin, "I/O" connection), High to Low and no communication at the "ETH" interface (PC or measuring module)
9*	On time	End at a specific point in time (configurable timer) and no communication at the "ETH" interface (PC or measuring module)

"Shutdown" Events (change from "Active on" to "Fast boot standby")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
7*	On pin	Pressing the external remote "Power" button or trigger event at the digital input ("PSCI" pin, "I/O" connection), High to Low and no communication at the "ETH" interface (PC or measuring module)
9*	On time	End at a specific point in time (configurable timer) and no communication at the "ETH" interface (PC or measuring module)

"Shutdown" Events (change from "Passive on" to "Low power standby")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
13		No communication at the "ETH" interface (PC or measuring module)

"Shutdown" Events (change from "Passive on" to "Fast boot standby")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
13		No communication at the "ETH" interface (PC or measuring module)

"Shutdown" Events (change from "Measurement" to "Fast boot standby")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
8	Auto	Measurement ended, no further tasks

"Shutdown" Events (change from "Measurement" to "Active on")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
16		Measurement ended normally

"Shutdown" Events (change from "Measurement" to "Passive on")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
8	Auto	Measurement ended, no further tasks

"Shutdown" Events (change from "Fast boot standby" to "Low power standby")

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
10	Timer	Expiration of the timer

Reconfiguration

Event	Abbrevia- tion	Description
No. in Fig. 5-5		
14		Change to the module stack (addition or removal of modules)
15		Saving the system configuration

5.5.6 Available Timers

Configurable timers can be used to delay events that are to trigger the ES820.1 to change operating states. If necessary, a new hibernation file is generated.

Shutdown\Standby Delay Timer

In the configuration program, the counter can be used to define the amount of time by which all events that trigger the ES820.1 to change operating state are delayed. Pressing the "Power" button on the module and specific events of the INCA experiment are not influenced or delayed by this timer.

Fast Boot to Shutdown Timer

In the configuration program, the counter can be used to define the amount of time after which the ES820.1 changes from the "Fast boot standby" operating state to the "Low power standby" operating state. This counter is activated when changing to the "Fast boot standby" operating state.

5.6 Data Transfer

5.6.1 Data Transfer Options

Manual Data Transfer (Direct Access)

The exchange of configuration data (configuration settings) and recorded data is triggered by the user in the "Drive Recorder Configurator" program. The data can be transferred via cable or wireless (see chapter 5.6.2 on page 45).

Automatic Data Transfer (Remote Access)

If "Automatic Data Transfer" is selected in the configuration data of the ES820.1, the module checks during the upload of the recorded data to the PC or server whether a new configuration assigned to the module is available on the PC or server. If a new configuration is available, the ES820.1 uses this configuration for the next data recording. The data can be transferred via cable or wireless (see chapter 5.6.2 on page 45). The remote access allows operating the Drive Recorder automatically without user interaction.

5.6.2 Media for Data Transfer

Dependent on the used add-on modules, several options are available for the exchange of configuration data and recorded data:

- Cable-based data transfer
 - LAN
Connection of the ES820.1 at the "HOST" interface to the PC via an Ethernet cable
 - USB
Using a USB memory device on the "USB" port of the ES820.1
- Wireless data transfer
The ES820.1 Drive Recorder can be connected via an Ethernet or WLAN adapter with an external mobile or WLAN router to an SFTP server on the Internet:
 - Using a USB Ethernet adapter on the "USB" port, or
 - Using a USB WLAN adapter at the "USB" port that is protected via the WPA2 security standard



NOTE

ETAS does not recommend any special router. The choice is the responsibility of the customer.



NOTE

ETAS recommends a security check of the router in combination with the ES820.1 Drive Recorder and the additional modules used. A corresponding service (e.g. penetration test) can be booked at ETAS/ ESCRYP.T. Please contact your ETAS contact partner.

6 ES830.1 Rapid Prototyping Module

This chapter contains information about the following topics:

- Overview 46
- Rapid Prototyping of Software Functions..... 47
- Properties..... 48
- Connections and Control Elements 49
- Function Groups 50
- Switching the Rapid Prototyping Module On and Off..... 53

6.1 Overview

The ES830.1 Rapid Prototyping Module is a component in the ES800 system and is equipped with a simulation controller for CPU-intensive rapid prototyping applications in the development, application and validation of electronic vehicle systems.



Fig. 6-1 ES830.1 Rapid Prototyping Module

As a rapid prototyping target, the rapid prototyping of control unit functions can be carried out on the ECU at the same time as measuring and calibration tasks. The RTA-OSEK operating system ensures a simple transition from finished functional prototypes to the ECU series software.

In the ES800 system, the ES830.1 satisfies the high real-time requirements for comprehensive, CPU-intensive bypass applications with low latency periods and enables multi-ECU and multi-controller applications in combination with one or more simulation models.

Via the ES88x and ES89x ES800 modules, the ES830.1 module supports the ETK-S2x (FETK operating mode), XETK and FETK control unit interfaces, the CAN, CAN FD, FlexRay and LIN bus interfaces, and automotive Ethernet interfaces.

The ES830.1 Rapid Prototyping Module is equipped with Ethernet interfaces for connecting a PC or other modules, and can be used in vehicles or on test benches.

Digital Inputs and Outputs

The extension connection "I/O" features four digital inputs as triggers or markers and four digital outputs for indicating system states or events. The function of the "Power" key on the ES830.1 module can be assumed by an external "Remote Power" key at the "I/O" connection.

Extensions

The ES830.1 Rapid Prototyping Module can be easily extended:

- with modules from the ES800 series in a module group (stack),
- with an Automotive Ethernet Media Converter ES162.1 at the GE Ethernet connection,
- with ETAS modules from other series (ES4xx, ES5xx, ES6xx, ES930) via an ES600.2 switch at the GE Ethernet connection,
- with ETAS modules from other series (ES4xx, ES5xx, ES6xx, ES930) via an ES88x/ES89x ECU and Bus Interface Module in the ES800 module stack



NOTE

Only one ES830.1 Rapid Prototyping Module can be operated in an ES800 module stack.



NOTE

The ES830.1 Rapid Prototyping Module must always be operated beneath interface modules (e.g. ES89x) in the module stack. Information on positioning the module types in the module stack can be found in chapter 13.3 on page 111.

6.2

Rapid Prototyping of Software Functions

Here, "rapid prototyping" refers to processes that enable early control of the specifications in near-series vehicles. Early inspection and confirmation of new developments mean that risks are reduced, the development quality is increased, and both the development time and costs are reduced.

The modeled software function should be implemented as a prototype. Rapid prototyping systems can be used as an execution platform for the software components of these control and diagnostics functions. They are then connected to the sensors, actuators, and ECUs in the vehicle. These interfaces with the vehicle mean that the software functions in the rapid prototyping system must be carried out under real-time requirements as in the ECU.

Rapid prototyping systems are usually real-time computer systems with significantly higher computing power than an ECU. Depending on the application, they can be configured, e.g., with respect to the required interfaces for input and output signals. The entire system is intended for use in vehicles and can be operated using a PC, for instance. The software functions can be tested and modified directly in the vehicle. The rapid prototyping model can be executed on the module without the need to connect a PC.

For the bypass applications, new or modified software functions are specified by a model and executed on the rapid prototyping system. This process is suitable for increasing the number of existing functions. The existing functions in the ECU are frequently computed but modified so that the input values are sent via the bypass interface and the output values are used by the new bypass function.

6.3 Properties

The most important properties of the ES830.1 Rapid Prototyping Module at a glance:

- High-performance, compact development and experimental platform with high computing and simulation power thanks to the use of a fast simulation processor
- Simple transition from finished functional prototypes to the ECU software development through the use of the RTA-OSEK operating system
- Rapid Prototyping and Simultaneous Measuring / Calibrating via ETK and CAN
- Integrated solid-state drive (SSD) for operating system and model
- 2 Ethernet interfaces with 1000 Mbit/s for connecting a PC or for connection to further modules:
 - 1 Gigabit Ethernet connection (Host)
 - 1 Gigabit Ethernet connection for compatible ETAS modules
 - Automatic standby function
 - Precise synchronization of all connected modules and their measuring channels
- 4 independent USB interfaces (2 x USB 3.0, 2 x USB 2.0)
- Digital inputs and outputs ("I/O" connection)
 - Status of the LEDs of the module available for external displays
 - Function of the "Power" key available for external "Remote Power" key
 - 4 universal digital outputs, e.g., useable as the RP model "Bypass Enable Signal"
 - 4 universal digital inputs
 - Automatic activation via terminal 15 (T1.15), if this is connected at the "I/O" connection
- Automotive-capable module suitable for use in the development environment and in the vehicle on test courses.
 - Adaptable to ambient conditions (temperature, EMC)
 - Wide supply voltage range
 - High level of mechanical stability and robustness
- Part of the ETAS Tool Suite
 - Rapid prototyping of control functions using MATLAB®/Simulink®, ASCET and C through integration in INTECRIO
 - Supported by INCA, INCA-EIP, RTA-TRACE, HSP

Complete technical data for the ES830.1 module can be found in the chapter "Technical Data" on page 137.

6.4 Connections and Control Elements

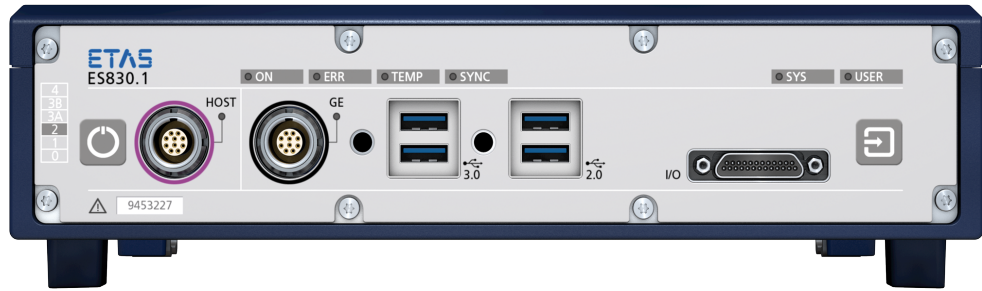






Fig. 6-2 ES830.1 Front Side

The front side of the ES830.1 module features the following connections and control elements:

Name	Interface	For description see
	"Power" key for switching on and off	Chapter 6.5.5 on page 51
HOST	1 x Gigabit Ethernet (HOST)	Chapter 12.1 on page 86
GE	1 x Gigabit Ethernet	Chapter 12.3 on page 88
	2 x USB 2.0	Chapter 6.5.2 on page 50
	2 x USB 3.0	Chapter 6.5.2 on page 50
I/O	Digital inputs and outputs	Chapter 6.5.3 on page 50
	"User" key	Chapter 6.5.6 on page 51

Information on combining modules of the ES800 system with ETAS modules from other series can be found in chapter 3.7 on page 26.

6.5 Function Groups

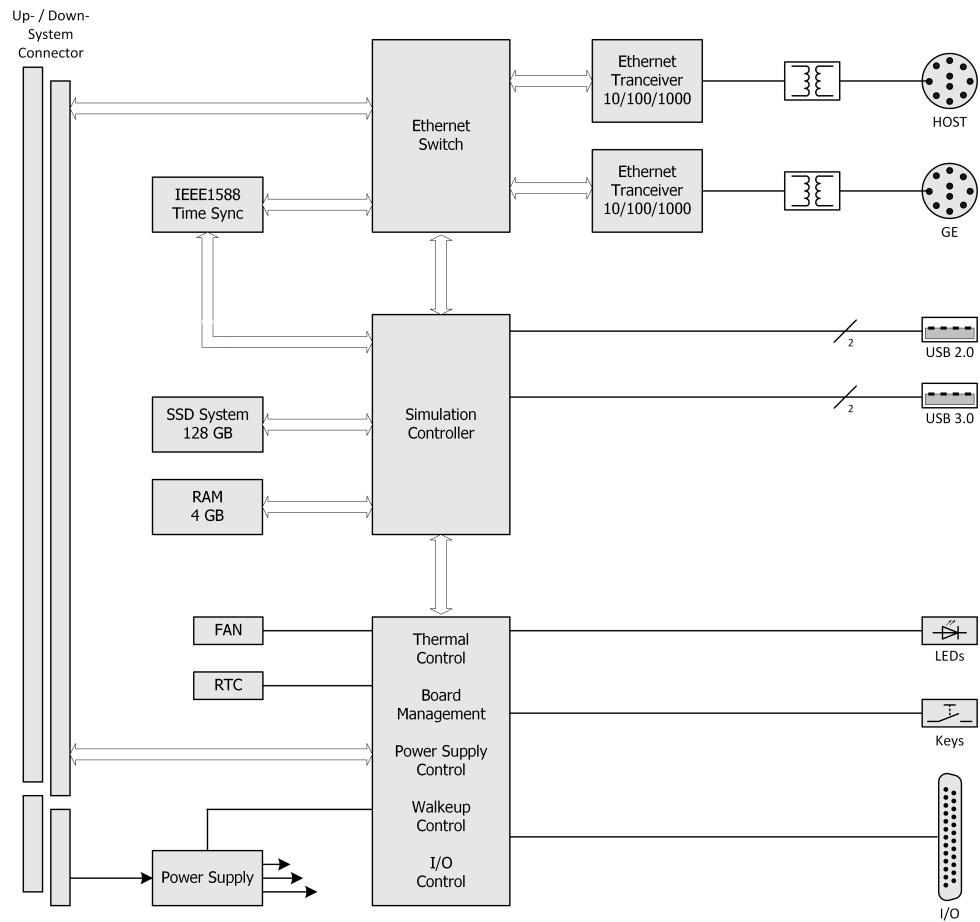


Fig. 6-3 ES830.1 Function Groups

6.5.1 Ethernet Switch

In addition to the Ethernet connection in the system connector of the stack (see chapter 3.3 on page 23), the internal Ethernet switch of the module provides interfaces for the connection of further modules:

- a HOST Ethernet interface (see chapter 12.1 on page 86)
- a GE Gigabit Ethernet interface (see chapter 12.3 on page 88)

The Ethernet interfaces enable time synchronization in accordance with IEEE1588.

6.5.2 USB Interfaces

The Rapid Prototyping Module ES830.1 is equipped with 4 independent USB interfaces (2 x USB 3.0, 2 x USB 2.0) for extending the module (see chapter 16.9.11 on page 160).

6.5.3 "I/O" Interface

The ES830.1 module provides digital inputs and outputs with different functions at the "I/O" interface (see chapter 12.10 on page 106).

6.5.4 Simulation Controller

The rapid prototyping model is executed on the simulation controller of the ES830.1 module.

Solid State Drive (Internal)

The operating system and the rapid prototyping model are stored on the internal solid state drive (SSD).

Board Controller

The board controller controls and monitors the Wake-Up function of the module, the control and display elements as well as the digital inputs and outputs.

6.5.5 "Power" Key

If the "Power" key is actuated, the Rapid Prototyping Module ES830.1 switches to a different operating state ("On", "Standby" or "Off", see chapter 6.6 on page 53).



NOTE

The "Power" key or an external "Remote Power" key must **not** be actuated while the firmware or configuration software of the ES830.1 Rapid Prototyping Module is being updated or during installation.

Remote Function of the "Power" Key

If necessary, the function of the "Power" key on the ES830.1 module can be assumed by an external "Remote Power" key. To use this function, connect an external key to the "IN_POWER_BUTTON" pin at the "I/O" connection (see chapter 16.10.10 on page 172).

6.5.6 "User" Key

Pressing the "User" key enables you to start or interrupt the configuration in INTE-CRIO, e.g., a switch between different functions in the model.

6.5.7 Acoustic Signal Generator

Internal Acoustic Signal Generator

The ES830.1 features an acoustic signal generator.

External Acoustic Signal Generator

The status of the internal acoustic signal generator is also output as an electrical signal at a pin of the "I/O" connection. An external signal generator (Piezo buzzer) can also be directly connected here and housed in the passenger cell.

Acoustic Signals

The following actions and function states are signaled with the acoustic signal generator:

Number of signals	Duration of the signal [s]	Action/function state
1	2	Error

6.5.8 Other Function Groups

- Power supply (see chapter 3.4 on page 23)
- Function groups for power-saving functions ("Wake-Up", see chapter 11.3 on page 77).

6.6 Switching the Rapid Prototyping Module On and Off

6.6.1 Switching On

If the Rapid Prototyping Module ES830.1 is in the "Off" state, and the "Power" key on the module or an external "Remote power" key on the "I/O" connection is pressed once, the module switches to the "On" state. This starts the installed operating system.

6.6.2 Power Off

Switching Off (Shutting Down)

If the Rapid Prototyping Module ES830.1 is in the "On" state, and the "Power" key on the module, an external "Remote power" key on the "I/O" connection is pressed twice within 5 seconds, the module or the ES800 module stack is switched off.

If wake-up conditions for the ES830.1 module or for a module within the stack are configured and satisfied, the system immediately restarts.



NOTE

Prototyping model can be stopped!

Always switch off the ES830.1 Rapid Prototyping Module with the "Power" key or the "Remote Power" key.

This ensures that the processes carried out by the system and any active models are stopped correctly.

Switching Off by Disconnecting the Module from the Supply Voltage



NOTE

The ES830.1 Rapid Prototyping Module must not be disconnected from the power supply while a model is active. This ensures that any active models are stopped correctly.

Error Handling

If errors occur during the switch-off process, this is indicated by the **ERR** LED, and the switch-off process is continued.

6.6.3 Remote Function of the "Power" Button

If necessary, the function of the "Power" button on the ES830.1 module can be assumed by an external "Remote Power" button. To use this function, connect an external button to the "IN_POWER_BUTTON" pin at the "I/O" connection (see chapter 16.10.10 on page 172).

6.6.4 Changing between Operating States

The ES830.1 is triggered to change between operating states by conditions and events. It can be activated, deactivated, and combined with timers in order to delay the event in the web interface (see chapter 11.6 on page 81).

Source	Selection	Default	Wake-Up	Keep alive
GE interface Ethernet	Enabled/ disabled	Disabled	X	X
Button „Power“ / „Remote Power“			X	
Host connection			X	X
I/O interface (pin 12; PSCI)	Enabled/ disabled	Disabled	X	X
ES830.1 shut down delay	Time in s			X
Model running	Model			X
ES830.1 always on (no standby)	Enabled/ disabled	Disabled	X	X



NOTE

Further information can be found in the Online Help of the ES830.1 web interface.

7 ES882.x ECU and Bus Interface Module

ES882.1 and ES882.2 are named in this document ES882.x. Only if there are differences, then they are named ES882.1 or ES882.2.

The only difference between the ES882.1 and ES882.2 is regarding the CAN-functionality. See chapter “CAN Interface (CAN)” on page 157.

This chapter contains information about the following topics:

- Overview 55
- Properties 55
- Connections 56
- Function Groups 57

7.1 Overview



Fig. 7-1 ES882.x ECU and Bus Interface Module

The ES882.x ECU and Bus Interface Module is part of the ES800 system and supports Ethernet based vehicle buses, CAN FD, CAN and LIN as well as BR_XETK and XETK ECU access.

7.2 Properties

The most important properties of the ES882.x module at a glance:

- 1 Gigabit Ethernet connection (Host)
- 1 Fast Ethernet connection for compatible ETAS modules
- 1 Gigabit Ethernet connection
- 3 Automotive Ethernet connections (100BASE-T1)
- Automatic standby function
- Precise synchronization of all connected modules and their measuring channels
- 5 independent CAN interfaces:
 - CAN FD (> 1 Mbaud) or CAN High-Speed (max. 1 Mbaud)
 - CAN protocols CAN V2.0a (standard identifier with 11 bit) and CAN V2.0b (extended identifier with 29 bit)
 - Baud rate configurable via software
 - ES882.2 with CAN-SIC capability
- 1 independent LIN interface:
 - LIN specification LIN V2.1
 - Slave operating mode (monitoring)

- Electrical isolation of the channels from each other, from device ground and from the supply voltage

Complete technical data for the ES882.x module can be found in the chapter "Technical Data" on page 137.

7.3 Connections

The front side of the ES882.x module features the following connections:



Fig. 7-2 ES882.x Front Side

Name	Interface	For description see
HOST	1 x Gigabit Ethernet (HOST)	Chapter 12.1 on page 86
FE	1 x Fast Ethernet	Chapter 12.2 on page 87
GE	1 x Gigabit Ethernet	Chapter 12.4 on page 89
AE	3 x 100BASE-T1 Automotive Ethernet	Chapter 12.5 on page 91
CAN5 / LIN	1 x CAN, CAN FD, CAN FD SIC ¹⁾ and 1 x LIN	Chapter 12.7 on page 99 and 12.8 on page 102
CAN3 / CAN4	2 x CAN, CAN FD, CAN FD SIC ¹⁾	Chapter 12.7 on page 99
CAN1 / CAN2	2 x CAN, CAN FD, CAN FD SIC ¹⁾	Chapter 12.7 on page 99

¹⁾: ES882.2 only

Information on combining modules of the ES800 system with ETAS modules from other series can be found in chapter 3.7 on page 26.

7.4 Function Groups

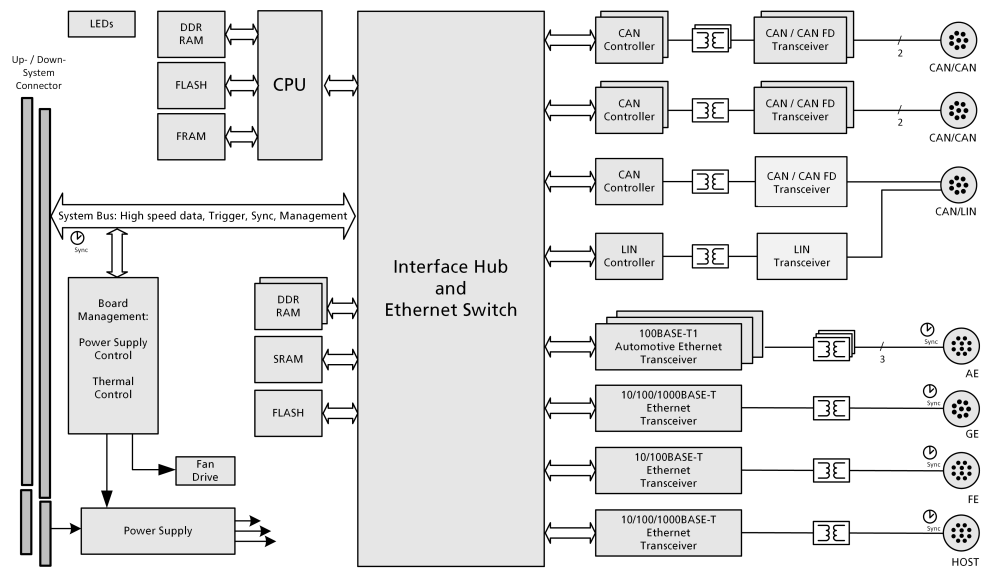


Fig. 7-3 ES882.x Function Groups

7.4.1 Ethernet Switch

In addition to the Ethernet connection in the system connector of the stack (see chapter 3.3 on page 23), the Ethernet switch of the module provides interfaces for the connection of further modules:

- a HOST Ethernet interface (see chapter 12.1 on page 86)
- an FE Fast Ethernet interface (see chapter 12.2 on page 87)
- two GE Gigabit Ethernet interfaces (see chapter 12.4 on page 89)
- three AE Automotive Ethernet interfaces (see chapter 12.5 on page 91)

7.4.2 Interfaces to the Vehicle Bus

The interfaces to the vehicle bus are available in different combinations:

- five CAN / CAN FD interfaces (see chapter 12.7 on page 99)
- an LIN interface (see chapter 12.8 on page 102)

7.4.3 Other Function Groups

- Power supply (see chapter 3.4 on page 23)
- Function groups for power-saving functions ("Wake-Up", see chapter 11.3 on page 77).

8 ES886.x ECU and Bus Interface Module

ES886.1 and ES886.2 are named in this document ES886.x. Only if there are differences, then they are named ES886.1 or ES886.2.

The difference between the ES886.1 and ES886.2:

- CAN-functionality. See chapter “CAN Interface (CAN)” on page 157.
- AE-functionality. See chapter “Automotive Ethernet Interface (AE)” on page 91.

This chapter contains information about the following topics:

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• Properties.....	58
• Connections	60
• Function Groups	61

8.1 Overview



Fig. 8-1 ES886.x ECU and Bus Interface Module

The ES886.x ECU and Bus Interface Module is part of the ES800 system and supports Ethernet based vehicle buses, CAN FD, CAN and LIN as well as BR_XETK and XETK ECU access.

8.2 Properties

The most important properties of the ES886.x module at a glance:

- 1 Gigabit Ethernet connection (Host)
 - 1 Fast Ethernet connection
- Ethernet monitoring:
- Hardware filtering for Ethernet Monitoring (at least 8 VLAN IDs are supported)
 - Parallel communication, e.g., XCP-on-Ethernet, is possible
- Connection for compatible ETAS modules
- 1 Gigabit Ethernet connection
- Ethernet monitoring:
- Hardware filtering for Ethernet Monitoring (at least 8 VLAN IDs are supported)
 - Parallel communication, e.g., XCP-on-Ethernet, is possible
- 4 Automotive Ethernet connections (100BASE-T1)

- Supports three independent BR_XETK / XCP-on-Ethernet communication partners at the Automotive Ethernet connections AE1, AE2, AE3 and/or
- Ethernet Monitoring at the AE1, AE2, AE3 and AE4 connections and/ or
- Internal TAP-function, see “TAP Function (ES886.x)” on page 93
- Hardware filtering for Ethernet Monitoring (at least 8 VLAN IDs are supported)
- Automatic standby function
- Precise synchronization of all connected modules and their measuring channels
- 5 independent CAN interfaces:
 - CAN FD (> 1 Mbaud) or CAN High-Speed (max. 1 Mbaud)
 - CAN protocols CAN V2.0a (standard identifier with 11 bit) and CAN V2.0b (extended identifier with 29 bit)
 - Baud rate configurable via software
 - ES886.2 with CAN-SIC capability
- 1 independent LIN interface:
 - LIN specification LIN V2.1
 - Slave operating mode (monitoring)
- Electrical isolation of the channels from each other, from device ground and from the supply voltage

Complete technical data for the ES886.x module can be found in the chapter “Technical Data” on page 137.

8.3 Connections



Fig. 8-2 ES886.x Front Side

The front side of the ES886.x module features the following connections:

Name	Interface	For description see
HOST	1 x Gigabit Ethernet (HOST)	Chapter 12.1 on page 86
FE	1 x Fast Ethernet	Chapter 12.2 on page 87
GE	1 x Gigabit Ethernet	Chapter 12.4 on page 89
AE	4 x 100BASE-T1 Automotive Ethernet	Chapter 12.5 on page 91
CAN5 / LIN	1 x CAN, CAN FD, CAN FD SIC ¹⁾ and 1 x LIN	Chapter 12.7 on page 99 and chapter 12.8 on page 102
CAN3 / CAN4	2 x CAN, CAN FD, CAN FD SIC ¹⁾	Chapter 12.7 on page 99
CAN1 / CAN2	2 x CAN, CAN FD, CAN FD SIC ¹⁾	Chapter 12.7 on page 99

¹⁾: ES886.2 only

Information on combining modules of the ES800 system with ETAS modules from other series can be found in chapter 3.7 on page 26.

8.4 Function Groups

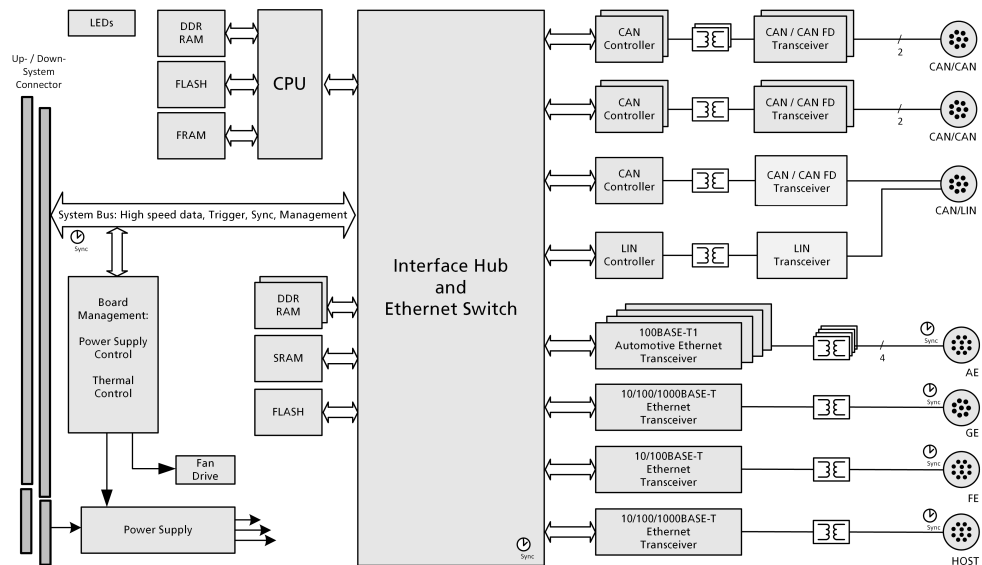


Fig. 8-3 ES886.x Function Groups

8.4.1 Ethernet Switch

In addition to the Ethernet connection in the system connector of the stack (see chapter 3.3 on page 23), the Ethernet switch of the module provides interfaces for the connection of further modules:

- a HOST Ethernet interface (see chapter 12.1 on page 86)
- an FE Fast Ethernet interface (see chapter 12.2 on page 87)
- two GE Gigabit Ethernet interfaces (see chapter 12.4 on page 89)
- four AE Automotive Ethernet interfaces (see chapter 12.5 on page 91)

8.4.2 Interfaces to the Vehicle Bus

The interfaces to the vehicle bus are available in different combinations:

- five CAN / CAN FD interfaces (see chapter 12.7 on page 99)
- an LIN interface (see chapter 12.8 on page 102)
- four AE Automotive Ethernet interfaces (see chapter 12.5 on page 91)

8.4.3 Other Function Groups

- Power supply (see chapter 3.4 on page 23)
- Function groups for power-saving functions ("Wake-Up", see chapter 11.3 on page 77).

9 ES891.x ECU and Bus Interface Module

ES891.1 and ES891.2 are named in this document ES891.x. Only if there are differences, then they are named ES891.1 or ES891.2.

The only difference between the ES891.1 and ES891.2 is regarding the CAN-functionality. See chapter “CAN Interface (CAN)” on page 157..

This chapter contains information about the following topics:

- Overview 62
- Properties 62
- Connections 64
- Function Groups 65

9.1 Overview



Fig. 9-1 ES891.x ECU and Bus Interface Module

The ES891.x ECU and Bus Interface Module is part of the ES800 system and supports the FlexRay, CAN FD, CAN and LIN vehicle buses as well as XETK and FETK ECU access.

9.2 Properties

The most important properties of the ES891.x module at a glance:

- 1 Gigabit Ethernet connection (Host)
- 1 Fast Ethernet connection for compatible ETAS modules
- 2 Gigabit Ethernet connections (FETK or Ethernet)
- Automatic standby function
- Precise synchronization of all connected modules and their measuring channels
- 5 independent CAN interfaces:
 - CAN FD (> 1 Mbaud) or CAN High-Speed (max. 1 Mbaud)
 - CAN protocols CAN V2.0a (standard identifier with 11 bit) and CAN V2.0b (extended identifier with 29 bit)
 - Baud rate configurable via software
 - ES891.2 with CAN-SIC capability
- 1 independent LIN interface:
 - LIN specification LIN V2.1
 - Slave operating mode (monitoring)
- 1 FlexRay node with two redundantly usable FlexRay channels

- BOSCH E-Ray-based FlexRay communication controller, compatible with the FlexRay protocol specification V2.1
- Support of future FlexRay versions through firmware update
- Configuration of the FlexRay node in the application software, e.g., in INCA, by importing the Fibex file
- Function of the FlexRay interface can be reconfigured in the web interface to 2 CAN interfaces
- Electrical isolation of the channels from each other, from device ground and from the supply voltage

Complete technical data for the ES891.x module can be found in chapter "Technical Data" on page 137.

9.3 Connections



Fig. 9-2 ES891.x Front Side

The front side of the ES891.x module features the following connections:

Name	Interface	For description see
HOST	1 x Gigabit Ethernet (HOST)	Chapter 12.1 on page 86
FE	1 x Fast Ethernet	Chapter 12.2 on page 87
FETK1 / GE	1 x FETK or 1 x Gigabit Ethernet	Chapter 12.4 on page 89
FETK2 / GE	1 x FETK or 1 x Gigabit Ethernet	Chapter 12.4 on page 89
CAN4/CAN5 or FLX1/FLX2	2 x CAN, CAN FD, CAN FD SIC ²⁾ or 1 x FlexRay A/B ¹⁾	Chapter 12.7 on page 99 and chapter 12.6 on page 97
CAN3 / LIN	1 x CAN, CAN FD, CAN FD SIC ²⁾ and 1 x LIN	Chapter 12.7 on page 99 and chapter 12.8 on page 102
CAN1 / CAN2	2 x CAN, CAN FD, CAN FD SIC ²⁾	Chapter 12.7 on page 99

¹⁾: Depending on the configuration

²⁾: ES891.2 only

Information on combining modules of the ES800 system with ETAS modules from other series can be found in chapter 3.7 on page 26.

9.4 Function Groups

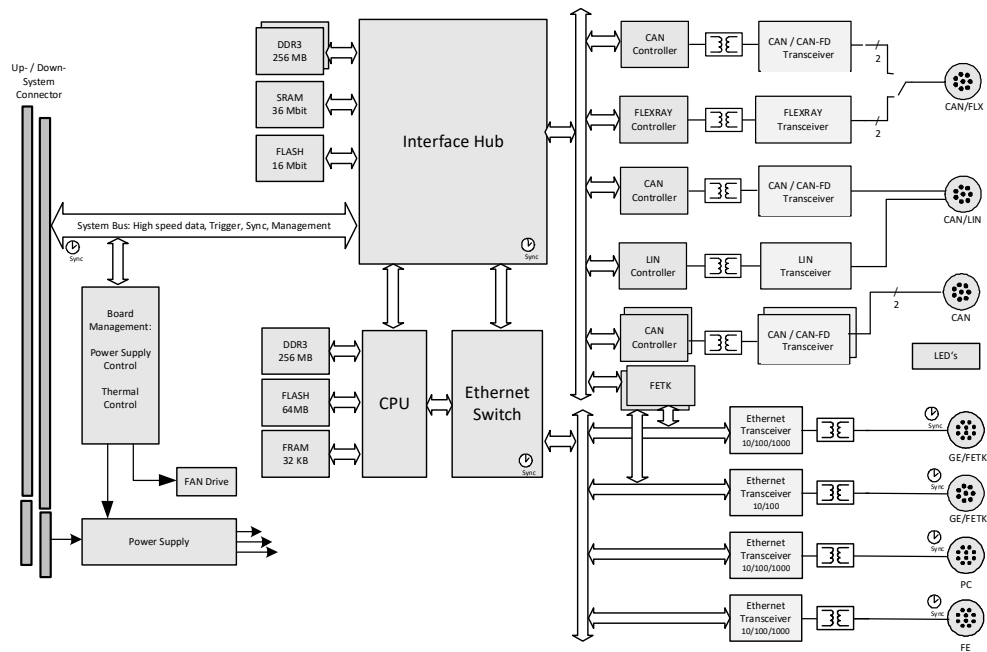


Fig. 9-3 ES891.x Function Groups

9.4.1 Ethernet Switch

In addition to the Ethernet connection in the system connector of the stack (see chapter 3.3 on page 23), the Ethernet switch of the module provides interfaces for the connection of further modules:

- a HOST Ethernet interface (see chapter 12.1 on page 86)
- an FE Fast Ethernet interface (see chapter 12.2 on page 87)
- two GE FETK/Gigabit Ethernet interfaces (see chapter 12.4 on page 89)

9.4.2 Interfaces to the Vehicle Bus

The interfaces to the vehicle bus are available in different combinations:

- five CAN / CAN FD interfaces (see chapter 12.7 on page 99)
- one LIN interface (see chapter 12.8 on page 102)
- one FlexRay interface (see chapter 12.6 on page 97)

9.4.3 Other Function Groups

- Power supply (see chapter 3.4 on page 23)
- Function groups for power-saving functions ("Wake-Up", see chapter 11.3 on page 77)

10 ES892.x ECU and Bus Interface Module

ES892.1 and ES892.2 are named in this document ES892.x. Only if there are differences, then they are named ES892.1 or ES892.2.

The only difference between the ES892.1 and ES892.2 is regarding the CAN-functionality. See chapter “CAN Interface (CAN)” on page 157..

This chapter contains information about the following topics:

- Overview 66
- Properties 66
- Connections 67
- Function Groups 68

10.1 Overview



Fig. 10-1 ES892.x ECU and Bus Interface Module

The ES892.x ECU and Bus Interface Module is part of the ES800 system and supports the CAN FD, CAN and LIN vehicle buses as well as XETK and FETK ECU access.

10.2 Properties

The most important properties of the ES892.x module at a glance:

- 1 Gigabit Ethernet connection (Host)
- 1 Fast Ethernet connection for compatible ETAS modules
- 2 Gigabit Ethernet connections (FETK or Ethernet)
- Automatic standby function
- Precise synchronization of all connected modules and their measuring channels
- 5 independent CAN interfaces:
 - CAN FD (> 1 Mbaud) or CAN High-Speed (max. 1 Mbaud)
 - CAN protocols CAN V2.0a (standard identifier with 11 bit) and CAN V2.0b (extended identifier with 29 bit)
 - Baud rate configurable via software
 - ES892.2 with CAN-SIC capability
- 1 independent LIN interface: I
 - LIN specification LIN V2.1
 - Slave operating mode (monitoring)

- Electrical isolation of the channels from each other, from device ground and from the supply voltage

Complete technical data for the ES892.x module can be found in the chapter "Technical Data" on page 137.

10.3 Connections



Fig. 10-2 ES892.x Front Side

The front side of the ES892.x module features the following connections:

Name	Interface	For description see
HOST	1 x Gigabit Ethernet (HOST)	Chapter 12.1 on page 86
FE	1 x Fast Ethernet	Chapter 12.2 on page 87
FETK1 / GE	1 x FETK or 1 x Gigabit Ethernet	Chapter 12.4 on page 89
FETK2 / GE	1 x FETK or 1 x Gigabit Ethernet	Chapter 12.4 on page 89
CAN4/CAN5	2 x CAN, CAN FD, CAN FD SIC ¹⁾	Chapter 12.7 on page 99
CAN3 / LIN	1 x CAN, CAN FD, CAN FD SIC ¹⁾ and 1 x LIN	Chapter 12.7 on page 99 and chapter 12.8 on page 102
CAN1 / CAN2	2 x CAN, CAN FD, CAN FD SIC ¹⁾	Chapter 12.7 on page 99

¹⁾: ES892.2 only

Information on combining modules of the ES800 system with ETAS modules from other series can be found in chapter 3.7 on page 26.

10.4 Function Groups

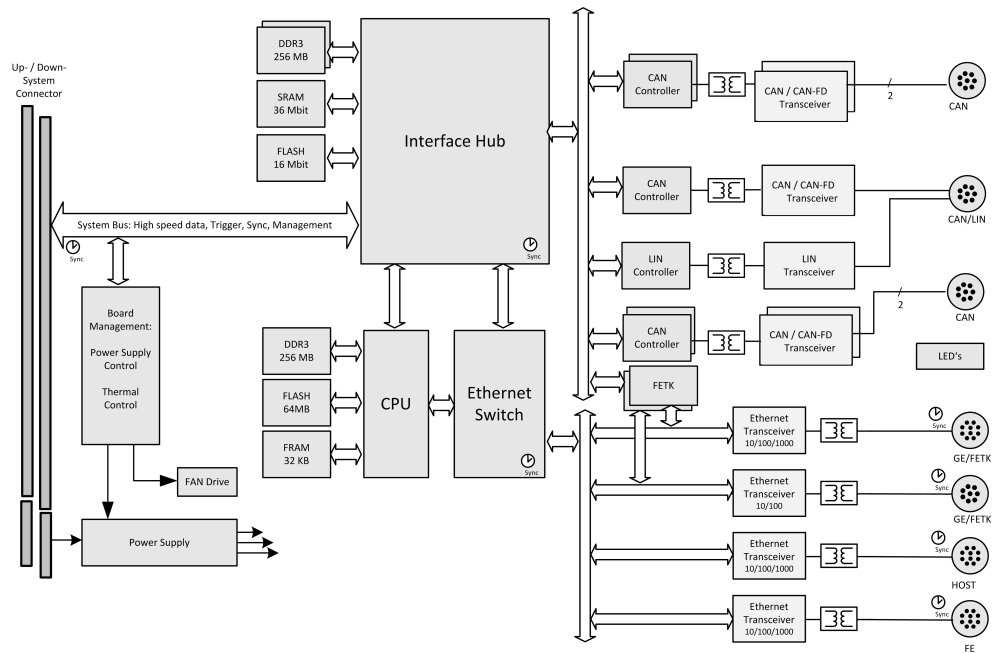


Fig. 10-3 ES892.x Function Groups

10.4.1 Ethernet Switch

In addition to the Ethernet connection in the system connector of the stack (see chapter 3.3 on page 23), the Ethernet switch of the module provides interfaces for the connection of further modules:

- a HOST Ethernet interface (see chapter 12.1 on page 86)
- an FE Fast Ethernet interface (see chapter 12.2 on page 87)
- two GE FETK/Gigabit Ethernet interfaces (see chapter 12.4 on page 89)

10.4.2 Interfaces to the Vehicle Bus

The interfaces to the vehicle bus are available in different combinations:

- five CAN / CAN FD interfaces (see chapter 12.7 on page 99)
- one LIN interface (see chapter 12.8 on page 102)

10.4.3 Other Function Groups

- Power supply (see chapter 3.4 on page 23)
- Function groups for power-saving functions ("Wake-Up", see chapter 11.3 on page 77)

11 Functions of the System

This chapter contains information about the following topics:

- LED Displays of the System. 69
- Operating States. 75
- "Wake-Up" Function. 77
- Changing between Operating States. 78
- Synchronization of the ES800 System 80
- Configuring the Modules (Web Interface) 81
- Updating the Firmware 82
- Software Integration 84

11.1 LED Displays of the System

Every module of the ES800 system is equipped with LEDs to indicate the operating and function state of the module as well as with LEDs to indicate the function of individual interfaces.

11.1.1 Display during Booting




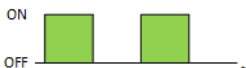


While the ES800 modules are booting, the LEDs are tested with different flashing sequences one after the other. The test lasts approximately 15 seconds.

11.1.2 Display of the Operating State (All Modules)



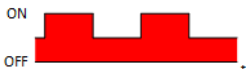

On the left of the front side of each module features four LEDs for indicating the operating, error and synchronization state of the module or module stack:

- ON: Power supply and operating mode
- ERR: Error states or firmware update of the module
- TEMP: Temperature inside the housing
- SYNC: Synchronization state and synchronization function (master or slave)


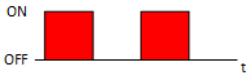

"ON" LED

LED ON	Description	State
 <p>OFF</p>	Off	No power supply to the module
 <p>ON</p> <p>OFF</p>	Flashing green, 0.1 s on/1.9 s off	Module in "Standby" operating mode ES820.1 in "Low Power Standby" (Suspend to Disk) operating mode
 <p>ON</p> <p>OFF</p>	Flashing green, 0.1 s on/0.4 s off	ES820.1 in "Fast Boot Standby" (Suspend to RAM) operating mode
 <p>ON</p> <p>OFF</p>	Flashing green, 0.5 s on/0.5 s off	Module booting
 <p>ON</p> <p>OFF</p>	Flashing green, 0.8 s on/0.2 s off	ES820.1 started and can be configured, not yet ready for measurement
 <p>ON</p> <p>OFF</p>	Illuminated green	Module in "Operation" operating mode




"ERR" LED

ERR LED	Description	State
 <p>OFF</p>	Off	No error
 <p>ON</p> <p>OFF</p>	Flashing red, 0.5 s on/0.5 s off	Critical operating state or firmware update is being performed
 <p>ON</p> <p>OFF</p>	Flashing red, reduced, 0.5 s on/0.5 s off	ES820.1: Module detection (Point Out)
 <p>ON</p> <p>OFF</p>	Illuminated red	Module booting or functional error state

"TEMP" LED

TEMP LED	Description	State
ON OFF 	Off	The temperature inside the housing is in normal operating range
ON  OFF	Flashing red, 0.5 s on/0.5 s off	The temperature inside the housing has reached the critical range; the module is still functional
ON  OFF	Illuminated red	The temperature inside the housing has exceeded the critical range and the module has shut down; if the temperature inside the housing returns to the normal operating range, the module starts up again

"SYNC" LED

SYNC LED	Description	State
ON OFF 	Off	No synchronization
ON  OFF	Flashing blue, 0.5 s on/0.5 s off	The module is the IEEE1588 synchronization master or the module is not externally synchronized (module in standalone mode)
ON  OFF	Illuminated blue	The module is the IEEE1588 synchronization slave; the module is synchronized by another module

**NOTE**

If the LEDs "**SYNC**" flash simultaneously on several modules of an ES800 stack, an IEEE1588 synchronization error has occurred. Observe the notes in chapter "Problems with ES800 Modules" on page 134.






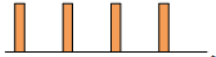

- 11.1.3 **Display of the Function State of Individual Interfaces (All Modules)**
 LEDs that indicate the function state of the interfaces are assigned to the connections of the modules. The displays of the LEDs are described in relation to the assigned interface (see chapter "Interfaces of the Modules" on page 85).

11.1.4 Display of the Measuring State (ES820.1 only)

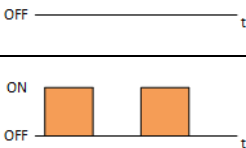

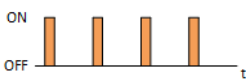
The front side of the ES820.1 features two LEDs for indicating the measuring state of the module:

- MEM: Status of the memory module and memory access
- MEAS: Status of the measurement

"MEM" LED

MEM LED	Description	State
ON OFF 	Off	No write access to the memory module, memory capacity sufficient
ON OFF 	Orange, reduced	No write access to the memory module, warning threshold for memory capacity reached, a small amount of memory capacity still available
ON OFF 	Illuminated orange	No write access to the memory module, memory capacity full. No further data can be recorded.
ON OFF 	Flashing orange, 0.5 s on/0.5 s off	Write access to the memory module
ON OFF 	Flashing orange, reduced, 0.5 s on/0.5 s off	Write access to the memory module, warning threshold for memory capacity reached, a small amount of memory capacity still available, limited recording time
ON OFF 	Flashing orange, 0.1 s on/0.4 s off	Memory module being prepared for removal, pending measured data being written to the memory module
ON OFF 	Flashing orange, 0.4 s on/0.1 s off	Memory module can be removed

"MEAS" LED

MEAS LED	Description	State
ON OFF	Off	No measurement
	Flashing orange, 0.5 s on/0.5 s off	Ready for measurement, waiting for trigger event
	Illuminated orange	Measurement and data recording active
	Flashing orange, 0.1 s on/0.4 s off	Measurement and data recording complete

Status of further Interfaces




The function state of the USB 2.0, USB 3.0 and I/O interfaces on the Drive Recorder ES820.1 is not indicated.

11.1.5 Display of the System State (ES830.1 only)

The front side of the ES830.1 features two LEDs for indicating the system state of the module:

- SYS: status as of bypass model OS
- USER: user-specific configuration in INTECRIO

LED „SYS“

SYS LED	Description	State
ON OFF	Off	No model running on the system
	Illuminated orange	Model was stopped
	Flashing orange, 0.5 s on/0.5 s off	Model running on the system from RAM
	Flashing orange, 0.1 s on / 1.9 s off	Model running on the system from Flash

LED „USER“

USER LED	Description	State
	Orange	User-specific configuration in INTECRIO (see Release Notes)

Status of further Interfaces

The function state of the USB 2.0, USB 3.0 and I/O interfaces on the Rapid Prototyping Module ES830.1 is not indicated.

11.2 Operating States

The modules of the ES800 system can have one of the following operating states:

Operating state	ES800 modules ¹⁾	ES820.1
Off	X	X
Standby	X	
Low power standby		X
Fast boot standby		X
Passive on		X
Active on (on)	X	X

¹⁾: ES8xx ECU and Bus Interface Module, ES830.1 Rapid Prototyping Module

11.2.1 "Off" Operating State

The ES800 Base Module (e.g. ES801.1) of the ES800 system is physically separated from all operating voltages or the external power supply is completely switched off.

The modules of the ES800 system are switched off and the Embedded PC of the ES820.1 Drive Recorders is shut down.



NOTE

The ES800 Base Module (e.g. ES801.1) must be physically disconnected from all operating voltages so that the ES800 system does not take on any current.

11.2.2 "Standby" Operating State

In the "Standby" operating state, all modules of the system are supplied with power but are deactivated. The modules connected to the interfaces are not being triggered. The current consumption is minimal.

The Embedded PC of the ES820.1 Drive Recorders can have one of the following Standby operating states:

- "Low power standby" operating state and
- "Fast boot standby" operating state.

The system remains in the "Standby" operating state until it switches to the "On" operating state following a "Wake-Up" event.

"Low power standby" Operating State (ES820.1)

In the "Low power standby" operating state, the Embedded PC of the Drive Recorder is in the idle state ("Hibernate", "Suspend-To-Disk"). The current consumption of the ES820.1 in this operating state is low.

In the "Low power standby" operating state, the current status and available settings are stored in the hibernation file.

The "Wake-Up" function is activated and the ES820.1 switches to a different operating state depending on the configured event.

In the "Low power standby" operating state, the ES820.1 Drive Recorder can start the recording of measured data with a short delay.

"Fast boot standby" Operating State (ES820.1)

In the "Fast boot standby" operating state, the Embedded PC of the Drive Recorder is in the idle state ("Standby mode", "Suspend-To-RAM"). The current consumption of the ES820.1 in this operating state is higher than in the "Low power standby" operating state.

The "Wake-Up" function is activated and the ES820.1 can switch to the "Low power standby" operating state in a time-controlled manner or to a different operating state following an event depending on the configuration.

In the "Fast boot standby" operating state, the Drive Recorder can start the recording of measured data with a minimal delay.

11.2.3 "On" Operating State

In the "On" operating state, all modules of the system are supplied with operating voltage and all interfaces are activated. The system was activated by a "Wake-Up" event. The system remains in the "On" operating state until it switches back to the "Standby" operating state following an event.

If the ES820.1 Drive Recorder is switched on, a distinction is made between the following operating states:

- "Passive on" operating state
- "On" operating state (Active on)

In the "On" operating state, the Drive Recorder can start the recording of measured data with the shortest delay.

"Passive on" Operating State (ES820.1)



NOTE

This operating mode enables an INCA PC to access modules of a module stack with an ES820.1 Drive Recorder. The Embedded PC of the ES820.1 module is prevented from accessing the other modules.

In the "Passive on" operating state, the ES820.1 Drive Recorder is supplied with operating voltage. Only the switch of the ES820.1 module is activated, so that other modules in the module stack can communicate via the system bus and exchange data via this assembly of the ES820.1.

The ES820.1 module cannot be accessed with the "Drive Recorder Configurator" configuration program. The Drive Recorder function of the module is not available.

"Active on" Operating State (ES820.1)

The "Active on" operating state of the ES820.1 is similar to the "On" operating state of the other modules of the system.

The Embedded PC of the ES820.1 module is started. The ES820.1 can be accessed with the "Drive Recorder Configurator" configuration program. The Drive Recorder function of the module is available.

11.3 "Wake-Up" Function

11.3.1 "Wake-Up" Function within the ES800 System

If the ES800 system is used in a vehicle, energy consumption must be as low as possible since the measuring setup is supplied by a battery. Therefore, the system offers various options for switching the modules in the stack to the "On" operating state only when necessary.

The modules of the system can automatically switch between the operating states "Standby" and "On" with the "Wake-Up" function, and automatically start the measurement after switch-on.

The ES800 system and ETAS modules connected to automatically switch to the "Standby" operating state if certain interfaces no longer receive link signals for some period of time or the host computer is being switched off or disconnected.

As soon as at least one of these interfaces receives link signals or the host computer is reactivated, the system automatically switches to the "On" operating state ("Wake-Up" function) and automatically switches on all ETAS modules connected in the measuring system.



NOTE

The events that activate and deactivate the system can be flexibly configured (e.g., via the web interface, see chapter 11.6 on page 81).

11.3.2 "Wake-Up" and "Sleep" Function with ETAS Modules from Other Series

The "Wake-Up" and "Sleep" functions of the ES800 modules that are performed using ETAS modules from other series, which are connected to the "FE" interface or via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, are supported.

11.4 Changing between Operating States

11.4.1 Changing from the "Standby" Operating State to the "On" Operating State

ES800 Interface Modules

The following events can trigger an ES800 interface module to switch from the "Standby" operating state to the "On" operating state:

- Another module in the stack switching to the "On" operating state
- A module being connected to one of the Ethernet interfaces and switched on (e.g. PC)
- The detection of data traffic at one of the Automotive Ethernet, FlexRay, CAN FD, CAN or LIN vehicle bus interfaces (ES88x/ ES89x only, dependent on the properties of the connected module).

ES820.1 Drive Recorder

When using the ES820.1 Drive Recorder, further events can trigger the module to change from the "Standby" operating state to the "On" operating state:

- Pressing the "Power" button on the front plate
- Pressing an external "Power" button, if it is connected to the "I/O" interface
- Switching on the ignition (KI.15), if it is connected to the "I/O" interface
- Activating a device connected to a USB interface
- Reaching a predefined point in time
- Further ETAS modules connected to the ES800 system changing to the "On" operating state.

Once the measurement task is complete, the ES800 system can return independently to the "Standby" operating state.

ES830.1 Rapid Prototyping Module

When using the ES830.1 Rapid Prototyping Module, further events can trigger the module to change from the "Standby" operating state to the "On" operating state:

- Pressing the "Power" button on the front plate
- Pressing an external "Power" button, if it is connected to the "I/O" interface
- Switching on the ignition (KI.15), if it is connected to the "I/O" interface
- Further ETAS modules connected to the ES800 system changing to the "On" operating state.

11.4.2 Changing from the "On" Operating State to the "Standby" Operating State

ES800 Modules

The following events can trigger an ES800 module to switch from the "On" operating state to the "Standby" operating state:

- A device connected to one of the Ethernet HOST interfaces being removed or switched off (e.g. PC)
- Data traffic no longer being detected at one of the Automotive Ethernet, FlexRay, CAN-FD, CAN or LIN bus interfaces (ES88x/ ES89x only in conjunction with ES820.1 or with ES830.1).

ES820.1 Drive Recorder

When using the ES820.1 Drive Recorder, further events can trigger the module to change from the "On" operating state to the "Standby" operating state:

- The completion of the measurement task
- Pressing the "Power" button on the front plate
- Pressing an external "Power" button, if it is connected to the "I/O" interface
- Switching off the ignition (Kl.15), if it is connected to the "I/O" interface
- Reaching a predefined point in time

ES830.1 Rapid Prototyping Module

When using the ES830.1 Rapid Prototyping Module, further events can trigger the module to change from the "On" operating state to the "Standby" operating state:

- Pressing the "Power" button on the front plate
- Pressing an external "Power" button, if it is connected to the "I/O" interface
- Switching off the ignition (Kl.15), if it is connected to the "I/O" interface

11.5 Synchronization of the ES800 System

11.5.1 Synchronization within the ES800 System

Every module of the ES800 system has its own clock to provide the samples of the input signals with a time stamp.

To ensure an accurate time reference between measurement signals from different modules, the clocks of the individual modules are synchronized. The clocks are synchronized via the communication network within which the data is transferred. No additional infrastructure is required.

The PTP protocol, according to IEEE1588-2008, is used between the modules of the ES800 system to enable synchronization with devices from other manufacturers.

One module in the network assumes the function of the synchronization master. The function is assigned dynamically depending on the accuracy of the participating clocks. All other modules in the network are slaves and synchronize with the cycle specified by the master module.

Synchronization takes place this way both within a module stack and between distributed modules.

11.5.2 Synchronization with ETAS Modules from other Series

Modules at the "FE" Interface

ETAS modules from the ES4xx, ES59x, ES6xx and ES9xx series that are connected to an ES800 module via the "FE" interface are also synchronized with the time of the ES800 synchronization master. In order to synchronize the recording of data from the ETAS modules connected to the "FE" interface, the periodic synchronization signal is superimposed over the Ethernet signals (ETAS synchronization mechanism).

A phase shift of the individual measuring signals to each other is ruled out, even if the measured values are acquired from different modules.

Modules at the "GE" Interface

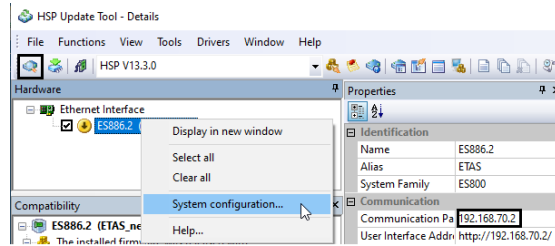
The synchronization of the ETAS modules from other series, which are connected via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, is supported.

11.6 Configuring the Modules (Web Interface)

Configuring the modules ES830.1 and ES88x/ ES89x is done using a web browser.

11.6.1 Starting the Web Interface

1. Connect the **HOST** connection of a single module (standalone operation) or the **HOST** connection of the **lowest** module in the module stack to the PC.
2. If known, type in the IP-address into the web browser or start the ETAS "Hardware Service Pack" (HSP) on the PC.



3. Click on **Search For Hardware**.
4. In the "Hardware" window, mark the entry of the module to be configured and right-click to select **System Configuration**.

The default web browser is started with the current IP address of the module. The start page of the web interface is displayed.

11.6.2 Representation of the Modules in the Web Interface

The front of the modules in the stack with the assigned LEDs are shown in the web interface.

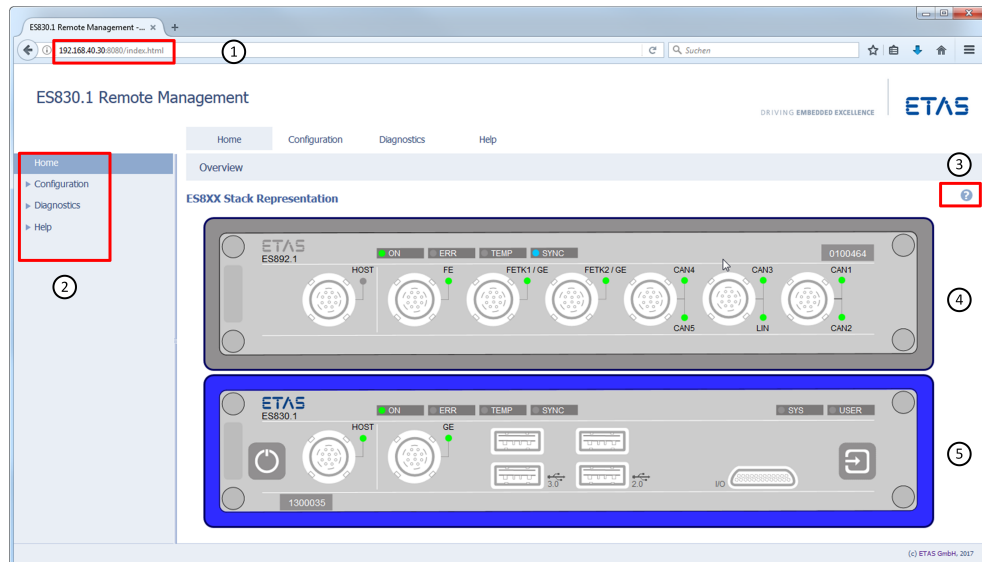


Fig. 11-1 ES800 Web Interface (Start Page)

Nb. in Fig. 11-1	Description
1	Network address of the ES800 module or the module stack
2	Menu for selecting the configuration pages: Home, Configuration, Diagnostics, Help
3	Web interface online help
4	Module within an module stack (example)
5	Module within an module stack (example), activated in the web interface for configuration (module blue marked)

11.6.3 Function of the Web Interface

- Wake-Up and Keep Alive (all modules)
- Network parametrization
- Export/ Import of the configuration (ES882.x, ES886.x, ES891.x, ES892.x)
- Model Runtime (ES830.1)
- Model Logging (ES830.1)
- Factory Defaults (all modules)
- Diagnostics
- Help and Information about licenses and Open Source software

11.7 Updating the Firmware

11.7.1 ES8xx ECU and Bus Interface Module and ES830.1 Rapid Prototyping Module

The firmware of the modules can be updated by the user, allowing existing modules to be used with new properties and functions. The firmware update is done with the help of the ETAS "Hardware Service Pack" (HSP) service software from the connected PC. The HSP service software can be downloaded free of charge [here](#) on the Internet from the ETAS home page. The HSP service software is being updated regularly.

Please follow the release notes.



NOTE

During a firmware update, neither the voltage supply to the module nor the Ethernet connection to the PC may be interrupted.



NOTE

The "Power" button and the external "Remote Power" button must not be actuated while the firmware or configuration software of the ES830.1 Rapid Prototyping Module is being updated or during installation.

11.7.2 ES820.1 Drive Recorder

The firmware of the ES820.1 module is updated during the installation of ES820.1 Service Packs. Further information can be found in the "Drive Recorder Configurator Tutorial" document.



NOTE

The "Power" button and the external "Remote Power" button must not be actuated while the firmware or configuration software of the ES820.1 Drive Recorder is being updated or during installation.



NOTE

ES820.1 Service Packs will be provided at a later date.

11.8 Software Integration

In order to operate the modules with third-party application software, you will need information about IP addresses and the software development kit.

11.8.1 Determining the IP Address of the Module

Integrating the module into third-party application software requires its IP address, which you can determine with the ETAS IP Manager or with ETAS HSP service software.

11.8.2 Access to the FETK Interfaces

For the XCP-on-Ethernet communication, the following TCP/UDP ports are permanently assigned to the FETK interfaces:

- FETK1 / GE: TCP/UDP port 1802
- FETK2 / GE: TCP/UDP port 1803

11.8.3 Access to the Vehicle Bus Interfaces

For communication with the vehicle bus interfaces (CAN, LIN, FlexRay), ETAS provides the software development kit "ECU and Bus Interfaces – Integration Package" (EBI-IP). Customers can use this SDK to develop drivers for the hardware access to integrate the module into separate application software. The ETAS EBI-IP is available on the ETAS home page in the download center: (www.etas.com/de/downloadcenter/18102.php).

12 Interfaces of the Modules

This chapter contains information about the following topics:

- "Gigabit Ethernet Interface (HOST)" on page 86
- "Fast Ethernet Interface (FE)" on page 87
- "FETK / Gigabit Ethernet Interface (FETK / GE)" on page 89
- "Gigabit Ethernet Interface (GE)" on page 88
- "Automotive Ethernet Interface (AE)" on page 91
- "FlexRay Interface (FLX)" on page 97
- "CAN Interface (CAN)" on page 99
- "LIN Interface (LIN)" on page 102
- "USB 2.0 and USB 3.0 Interfaces" on page 104
- "I/O Interface (I/O)" on page 106

12.1 Gigabit Ethernet Interface (HOST)



NOTE

The Gigabit Ethernet (HOST) interface is continuously activated in standalone operation. In an ES800 module stack, **only** the HOST interface in the **lowest** module is activated.

All other HOST interfaces of the module stack can neither send nor receive Ethernet signals and are deactivated.

The HOST Ethernet interface connects the module to the user PC, a Drive Recorder or the Ethernet interface of another module. This interface enables the ETAS software tools to access the connected modules.

12.1.1 Supported Functions

The HOST Ethernet interface supports the "Wake-Up" function.

12.1.2 Display of the Function State of the HOST Interface

In the activated state of the module, the LEDs assigned to the connections show the following function states:

HOST LED	Description	State
	Off	Physical Ethernet connection not available
	Illuminated yellow	Physical Ethernet connection available
	Flashing yellow	Ethernet connection active
	Illuminated red	Module booting or functional error state

12.2 Fast Ethernet Interface (FE)

Among other things, the switch of the ES88x/ ES89x module provides a fast Ethernet interface FE.

ECUs equipped with an XETK or having a separate Ethernet interface can be directly connected to the FE Ethernet interface and communicate with the application software via XCP-on-Ethernet.

With the FE fast Ethernet interface, additional modules or cascaded modules can be connected, such as the modules ES4xx, ES523, ES59x, and ES6xx.

12.2.1 Power Supply of Connected Modules




The module can take over the power supply of ES4xx modules or ES6xx modules that are connected to the FE fast Ethernet interface. The power supply is also handled via the Ethernet connecting cable. When cascading the modules, observe the maximum output current at the Ethernet interfaces.

NOTICE

Read the user manual of the connected device.

12.2.2 Display of Function State of FE Interface

In the activated state of the module, the LEDs assigned to the connections show the following function states:

FE LED	Description	State
ON OFF _____ t	Off	Physical Ethernet connection not available
ON  OFF _____ t	Illuminated yellow	Physical Ethernet connection available
ON  OFF _____ t	Flashing yellow, 0.5 s on/0.5 s off	Ethernet connection active
ON  OFF _____ t	Illuminated red	Error state: Ethernet data exchange interrupted, disabled or current overload from connected module

12.3 Gigabit Ethernet Interface (GE)

The ES800 modules provides a Gigabit Ethernet GE interface. This interface can be used as the connection of a Gigabit Ethernet interface of additional ETAS modules (ES88x/ ES89x, ES600.2).

12.3.1 Power Supply of Connected Modules





The module can take over the power supply of ETKs that are connected to the Gigabit Ethernet GE interface. The power supply is also handled via the Ethernet connecting cable. Observe the maximum output current at the Ethernet interface.

NOTICE

Read the user manual of the connected device.

12.3.2 Display of Function State of GE Interface

When the module is switched on, the GE LED assigned to the connection indicates the following function states:

GE LED	Description	State
ON OFF 	Off	Physical Ethernet connection not available
ON  OFF	Illuminated yellow	Physical Ethernet connection present at the GE interface
ON  OFF	Flashing yellow	Ethernet connection at the GE interface active
ON  OFF	Illuminated red	Error state: Ethernet data exchange interrupted, disabled or current overload from connected module

12.4 FETK / Gigabit Ethernet Interface (FETK / GE)

The ES89x modules provide two combined FETK and Gigabit Ethernet FETK/GE interfaces.

These interfaces can be used as the connection of a Gigabit Ethernet interface of additional modules, or for connecting FETKs or ETKs in the Dual Mode operating mode.



NOTE

Detailed information about the use of ETKs in the Dual Mode operating mode can be found in the user guides of the ETKs.





12.4.1 Power Supply of Connected Modules

The module can take over the power supply of ETKs that are connected to the Gigabit Ethernet interface FETK/GE. The power supply is also handled via the Ethernet connecting cable. Observe the maximum output current at the Ethernet interfaces.

12.4.2 Display of the Function State of the FETK/GE Interface

In the activated state of the module, the LEDs assigned to the connections show the following function states:

LED FETK1 / GE	Description	State
	Off	Physical Ethernet connection not available
	Illuminated yellow	Physical Ethernet connection present at the FETK1 interface or the GE interface
	Flashing yellow, 0.5 s on/0.5 s off	Ethernet connection active at the FETK1 interface or the GE interface
	Illuminated red	Error state: Ethernet data exchange interrupted, disabled or current overload by the connected module or connected ETK must be updated for Dual Mode operation at an ES59x or ES910 (see chapter 14.6 on page 132).

LED FETK2 / GE	Description	State
ON OFF  t	Off	Physical Ethernet connection not available
ON  t OFF	Illuminated yellow	Physical Ethernet connection present at the FETK2 interface or the GE interface
ON  t OFF	Flashing yellow, 0.5 s on/0.5 s off	Ethernet connection active at the FETK2 interface or the GE interface
ON  t OFF	Illuminated red	Error state: Ethernet data exchange interrupted, disabled or current overload by the connected module or connected ETK must be updated for Dual Mode operation at an ES59x or ES910 (see chapter 14.6 on page 132).

12.5 Automotive Ethernet Interface (AE)

100BASE-T1 Automotive Ethernet interfaces are available at the AE connection of ES800 modules:

- ES882.x: Three Automotive Ethernet interfaces
- ES886.x: Four Automotive Ethernet interfaces

The 100BASE-T1 Automotive Ethernet interface is based on the BroadR-Reach technology, developed by the OPEN Alliance Special Interest Group, and standardized by the IEEE working group 802.3bw. When using Automotive Ethernet, communication is carried out with a full duplex system via a cost-effective twisted two-wire cable.

ECUs equipped with a BR_XETK or a separate Automotive Ethernet interface can be directly connected and can communicate with the application software via XCP-on-Ethernet at the Automotive Ethernet interface (AE) of the module.



WARNING

Risk due to undefined system behavior when disconnecting the transparent automotive Ethernet communication between ES886.1/ES886.2 and the ECU. The ES886.1/ES886.2 must not be disconnected from the operating voltage during an active transparent automotive Ethernet connection.

A media converter between the 100BASE-T1 Automotive Ethernet and the IEEE 802.3 Standard Ethernet is not required when using the ES800 module with an Automotive Ethernet interface (AE).



NOTE

See chapter "Requirements for failsafe Automotive Ethernet Operation" on page 126 for details on wiring the Automotive Ethernet interface cables.


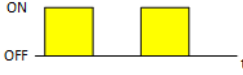

12.5.1 Display of the functional Status of the AE Interface

ES882.x

The three Automotive Ethernet interfaces AE1, AE2 and AE3 of the ES882.x module are assigned to the LEDs **1**, **2** and **3** respectively.

In the activated state of the module, the LEDs show the following function states:



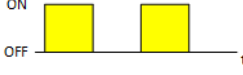

AE LED [1, 2, 3]	Description	State
ON	Off	Physical Automotive Ethernet connection not available
OFF		

AE LED [1, 2, 3]	Description	State
	Illuminated yellow	Physical Automotive Ethernet connection available
	Flashing yellow, 0.5 s on/0.5 s off	Automotive Ethernet connection active
	Illuminated red	Error state: Automotive Ethernet data transfer interrupted

ES886.x

The four Automotive Ethernet interfaces AE1, AE2, AE3 and AE4 of the ES886.x module are assigned to the LEDs **1**, **2**, **3** and **4** respectively.

In the activated state of the module, the LEDs show the following function states:

AE LED [1, 2, 3, 4]	Description	State
	Off	Physical Automotive Ethernet connection not available
	Illuminated yellow	Physical Automotive Ethernet connection available
	Flashing yellow, 0.5 s on/0.5 s off	Automotive Ethernet connection active
	Illuminated red	Error state: Automotive Ethernet data transfer interrupted

12.5.2 Automotive Ethernet Monitoring (ES886.x)

The following functions are supported at the Automotive Ethernet interfaces AE1, AE2, AE3 and AE4 of the ES886.x modules:

- three independent BR_XETKs at the Automotive Ethernet interfaces AE1, AE2 and AE3
and/ or
- Ethernet Monitoring at the Automotive Ethernet interfaces AE1, AE2, AE3 and AE4
and/ or
- Ethernet Monitoring with an additional internal TAP on the physical layer via both interfaces AE1 and AE2 respectively AE3 and AE4
- Ethernet Monitoring with an additional internal TAP on the Ethernet layer (L2) via both interfaces AE1 and AE2 respectively AE3 and AE4.

At the Automotive Ethernet interface and at the GE and the FE interface of the ES886.x module the Ethernet Monitoring is supported.

- VLAN hardware filter for Ethernet Monitoring

- monitoring data on module are filtered before capturing
- at least 8 VLAN IDs are supported
- filtering configuration is created and loaded to the ES886.x module by the application tool (e.g. INCA)

The table shows the combinations in which the functions can be used at the interfaces FE, GE, AE1, AE2, AE3 and AE4.

Nb.	FE	GE	AE1	AE2	AE3	AE4
1	-	-	BR_XETK	BR_XETK	BR_XETK	-(ES886.1)/ BR_XETK (ES886.2)
2	-	-	BR_XETK	BR_XETK	ETH-Mon	ETH-Mon
3	-	-	BR_XETK	BR_XETK	TAP-AE3/4	TAP-AE3/4
4	-	-	TAP-AE1/2	TAP-AE1/2	TAP-AE3/4	TAP-AE3/4
5	-	-	TAP-AE1/2	TAP-AE1/2	ETH-Mon	ETH-Mon
6	-	-	ETH-Mon	ETH-Mon	ETH-Mon	ETH-Mon
7	ETH-Mon	ETH-Mon	BR_XETK	BR_XETK	ETH-Mon	ETH-Mon
8	ETH-Mon	ETH-Mon	BR_XETK	BR_XETK	TAP-AE3/4	TAP-AE3/4
9	ETH-Mon	-	BR_XETK	ETH-Mon	ETH-Mon	ETH-Mon
10	-	ETH-Mon	ETH-Mon	BR_XETK	ETH-Mon	ETH-Mon

ETH Mon: Ethernet Monitoring (Capturing)

TAP-AE1/AE2: internal TAP via both interfaces AE1 and AE2

TAP-AE3/AE4: internal TAP via both interfaces AE3 and AE4

Ethernet Monitoring and Interfaces

The Ethernet Monitoring function can be configured for four interfaces at maximum:

- Ethernet Monitoring can be used either for the FE interface or the AE1 interface
- Ethernet Monitoring can be used either for the GE interface or the AE2 interface

12.5.3 TAP Function (ES886.x)

The ES886.x modules support the transport of Ethernet frames at the Automotive Ethernet interfaces AE1-4.

In the TAP-mode, the ES886.x, interrupts the existing Automotive Ethernet line and transmits the Ethernet Frames unchanged.

This functionality is referred to as TAP. TAP is used differently in other environments.

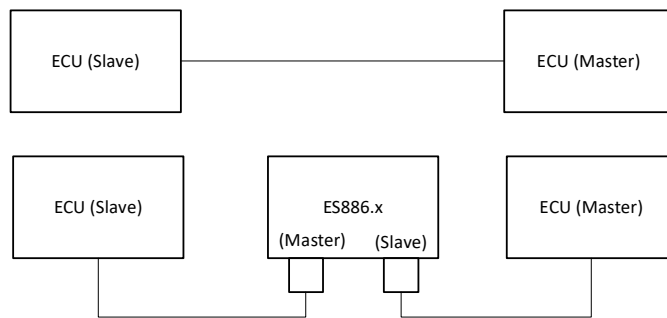


Fig. 12-1 Master-slave connection, below with a ES886.x in between

The initial Automotive Ethernet connection with two endpoints has four endpoints in the TAP mode.

In certain applications, it is necessary for the two Automotive Ethernet connections to behave like one link during link initiating and stopping. This is referred to as „Transparent Automotive Ethernet Link Setup“ in the following section.

So that the link structure appears unchanged from the point of view of the ECUs, alternating master/slave roles must be defined for the ES886.x. In addition, it must be prevented that the ECU (Master) concludes that there is already a link to ECU (Slave), while the link from ES886.x port (Master) to ECU (Slave) has not yet been established. A link is always initiated by the Master.

If the ES886.x detects an active Automotive Ethernet master at the slave port of the TAP, the module starts setting up the AE link at the master port. The AE link at the slave port of the TAP is only set up if the AE link at the master port is active.

If the TAP ports are assigned to other roles (e.g. Auto Detect), the operating mode "Transparent Automotive Ethernet Link Setup" is not active.

If the "Transparent Automotive Ethernet Link Setup" is active and a connection is lost at one of the two AE interfaces of the TAP, then the Automotive Ethernet connection at the other port of the TAP is also deactivated. The two AE links at the TAP, therefore, behave like only one AE link. Subsequently, the ES886.x module attempts to set up the transparent Automotive Ethernet connections at both TAP ports. "Transparent Automotive Ethernet Link Setup" refers only to the behavior when establishing links of the involved AE-ports.

Configuration

The connections are configured in the application software or in the web interface of the ES886.x and are permanently stored.

Please refer to the documentation of the application software or the web interface of the ES886.x (see web interface chapter 11.6 on page 81).

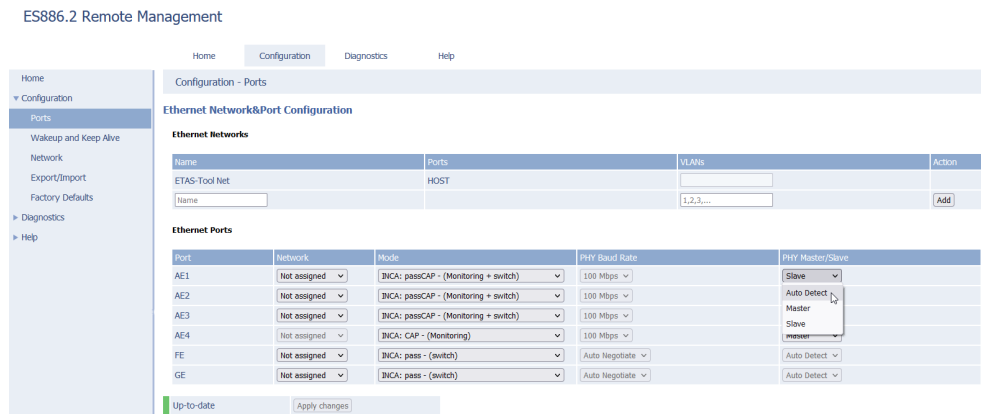


Fig. 12-2 Web-Interface example

i NOTE

If interfaces AE1, AE2, AE3 and AE4 are no longer used for Ethernet Monitoring or for Ethernet Monitoring with an additional internal TAP on the physical layer, the configuration must be reset in the application software or in the web interface of the ES886.x.

Differences ES886.1 and ES886.2 when disconnecting from operating voltage

If the ES886.x module is disconnected from the operating voltage, the Automotive Ethernet connection is disconnected.

If the ES886.2 module is disconnected from the operating voltage, passive TAP connection between ports AE1/2 and AE3/4 is maintained.

Debug Bypass - ES886.2 only

Bypass a configured TAP connection at AE1/2 or AE3/4 with a physical interconnection of both ports via a relay.

This feature is for debugging purposes only. It is intended to temporarily isolate the vehicle network completely from the ETAS hardware.

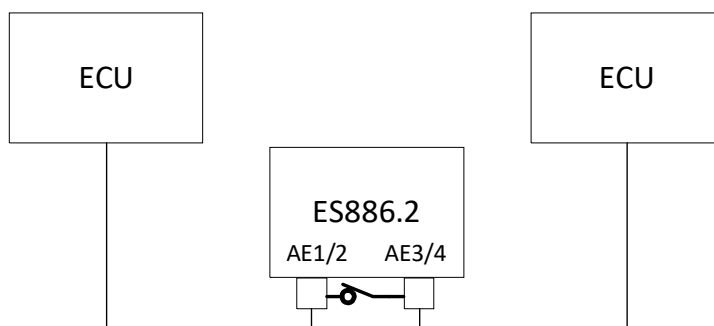


Fig. 12-3 Debug Bypass - ES886.2 only

One use case could be to help to identify communication problems caused by the cable setup. The bypass becomes immediately active when the option **Debug Bypass** is selected. Deselecting the option **Debug Bypass** opens the bypass again. The text "Bypass active" reflects the status of the relay. Whenever the relay opens or closes, an interruption of the Automotive-Ethernet link is unavoidable. Setting the bypass to "active" will keep the relay closed for the next power-cycle of the device.

The bypass will automatically become inactive on the second power-cycle.

12.6 FlexRay Interface (FLX)

The CAN / FLX interface of the ES891.x module can optionally be operated as CAN FD interface or as FlexRay interface.



NOTE

On delivery, the ES891.x CAN/FLX interface is configured for the CAN operating mode. The operating mode is selected in the web interface of the module. After each change of the operating mode of the interface between CAN and FlexRay, a restart of the system is required.

In the FlexRay operating mode, the two FlexRay channels, FLX1 and FLX2, are available with separate connections. The interfaces are electrically isolated from each other and from the other interfaces.

12.6.1 Properties

An overview of the FlexRay applications supported by the module is listed in chapter 16.9.8 on page 156.

12.6.2 Bus Termination Resistor

The FlexRay specification allows the design of different bus topologies, such as passive bus, passive star, or active star. Each of the topologies requires a corresponding bus termination. The FlexRay termination selected by ETAS in the context of the FlexRay specification measures 100 ohm. To support the design in FlexRay networks, ETAS offers FlexRay cables and matching FlexRay terminations. The terminations must be connected to the cable or the plug.

12.6.3 Synchronization Nodes

After the start of a FlexRay network, the local clock generators of all nodes of the network must be synchronized. Prerequisites for the synchronization process are at least two nodes that can send sync frames (synchronization node). The other nodes of the network synchronize themselves by analyzing the occurrence of the sync frame and adjusting their local clock generator.

The FlexRay interface is equipped with an additional internal synchronization node. The synchronization node can take over only synchronization functions and is internally connected with the FlexRay channels FLX1 and FLX2. If this synchronization node sends Start-up/Sync messages as the second node of the FlexRay network, then FlexRay networks in which no other nodes with synchronization module exist can be started and synchronized with a single ES89x module.

12.6.4 Application Examples

Testing/starting up FlexRay ECUs outside of FlexRay networks

- Flashing ECUs via FlexRay
- Display of function state of FLX interface

12.6.5 Display of the Function State of the FlexRay Interface

Each FlexRay channel is assigned an LED to indicate the function state of the FlexRay node (LEDs CAN4/FLX1 and CAN5/FLX2). In the activated state of the module, the LEDs assigned to the connections show the following function states:

LED CAN4/FLX1	LED CAN5/FLX2	State
ON OFF _____ t	ON OFF _____ t	FlexRay node inactive, FlexRay controller not configured
Off	Off	
ON OFF _____ t	ON OFF _____ t	FlexRay channel A active, waiting for synchronization
Flashing yellow, 0.5 s on/0.5 s off	Off	
ON OFF _____ t	ON OFF _____ t	FlexRay channel A active, synchronized, ready for data exchange
Illuminated yellow	Off	
ON OFF _____ t	ON OFF _____ t	FlexRay channel B active, waiting for synchronization
Off	Flashing yellow, 0.5 s on/0.5 s off	
ON OFF _____ t	ON OFF _____ t	FlexRay channel B active, synchronized, ready for data exchange
Off	Illuminated yellow	
ON OFF _____ t	ON OFF _____ t	FlexRay node active (channel A and channel B), waiting for synchroniza- tion
Flashing yellow, 0.5 s on/0.5 s off	Flashing yellow, 0.5 s on/0.5 s off	
ON OFF _____ t	ON OFF _____ t	FlexRay node active (channel A and channel B), synchronized, ready for data exchange
Illuminated yellow	Illuminated yellow	
ON OFF _____ t	ON OFF _____ t	Error
Off	Off	

12.7 CAN Interface (CAN)

12.7.1 ES891.x

The CAN/FLX interface of the ES891.x module can optionally be operated as a CAN FD interface or as a FlexRay interface.



NOTE

On delivery, the ES891.x CAN/FLX interface is configured for the CAN operating mode. The operating mode is selected in the web interface of the module. After every change of the operating mode of the interface between CAN and FlexRay, a restart of the system is required.

The ES891.x module feature CAN interfaces in the following combinations:

- two CAN interfaces on one plug connector (CAN / CAN)
- two CAN interfaces on one plug connector that can optionally be operated as FlexRay interface (CAN / FLX)
- one CAN interface and one LIN interface on one plug connector (CAN / LIN)

12.7.2 ES882.x / ES886.x / ES892.x

The CAN interfaces of the modules ES882.x / ES886.x / ES892.x can be used as CAN-FD interfaces. The ES882.2 / ES886.2 / ES892.2 can be used in the CAN FD SIC-mode.

12.7.3 Operating Modes

Each one of the ES800 system CAN interfaces can optionally be operated in the operating mode High-Speed CAN (ISO 11898-2). The module supports both operating modes simultaneously and independently of each other. The operating mode can be configured independently for the CAN interfaces in the INCA application software (HWC) or in the web interface of the module.

12.7.4 Feature

The CAN applications supported by ES88x/ ES89x modules are listed in an overview in chapter 16.9.9 on page 157.

12.7.5 "Wake-Up" Function

The CAN interfaces support the "Wake-Up" function (see chapter 11.3 on page 77).


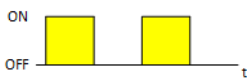

12.7.6 Bus Termination Resistor

The CAN interface requires the use of bus terminating resistors in both operating modes. According to the CAN specification, one bus terminating resistor each of 120 ohm is required at the two open ends of the bus. It must be connected to the cable or the plug. ETAS offers cables and terminating resistors of 120 ohm to set up CAN networks.


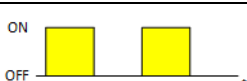

12.7.7 Display of Function State of CAN Interface

In the switched-on state of the module, the LEDs assigned to the connections CAN and CAN / FLX of the ES891.x module show the following function states in the CAN operating mode:




CAN4/FLX1 Interface (CAN Operating Mode)

LED CAN4 / FLX1	Description	State
	Off	Communication at the CAN4 interface interrupted
	Flashing yellow, 0.5 s on/0.5 s off	Communication at the CAN4 interface
	Illuminated red	Error


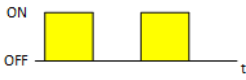

CAN5/FLX2 Interface (CAN Operating Mode)

LED CAN5 / FLX2	Description	State
	Off	Communication at the CAN5 interface interrupted
	Flashing yellow, 0.5 s on/0.5 s off	Communication at the CAN5 interface
	Illuminated red	Error


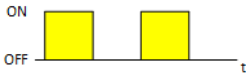

CAN3 Interface

LED CAN3	Description	State
	Off	Communication at the CAN3 interface interrupted
	Flashing yellow, 0.5 s on/0.5 s off	Communication at the CAN3 interface
	Illuminated red	Error

CAN1 Interface

LED CAN1	Description	State
ON OFF 	Off	Communication at the CAN1 interface interrupted
ON  OFF	Flashing yellow, 0.5 s on/0.5 s off	Communication at the CAN1 interface
ON  OFF	Illuminated red	Error

CAN2 Interface

LED CAN2	Description	State
ON OFF 	Off	Communication at the CAN2 interface interrupted
ON  OFF	Flashing yellow, 0.5 s on/0.5 s off	Communication at the CAN2 interface
ON  OFF	Illuminated red	Error

12.8 LIN Interface (LIN)

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

12.8.1 Operating Modes

In the application software, the LIN interface can be configured either as LIN master or as LIN slave. Switching between both operating modes is controlled by the software.

12.8.2 Feature

The LIN applications supported by the module are listed in an overview in chapter 16.9.10 on page 159.

12.8.3 Bus-Based Voltage Supply

The LIN node of the module can optionally be supplied with voltage externally by the LIN bus or internally by the module. The type of supply must be configured in the application software.

To maintain the reference level (and thereby equal switching thresholds) at the individual nodes of the LIN bus, the LIN transceivers (physical layer) of all nodes of the bus should be operated with the same voltage. It is recommended to switch off the internal voltage supplies and operate all nodes of the LIN bus with the external voltage, which also supplies the other bus nodes (LIN_UBATT, see Fig. 12-4 on page 102).

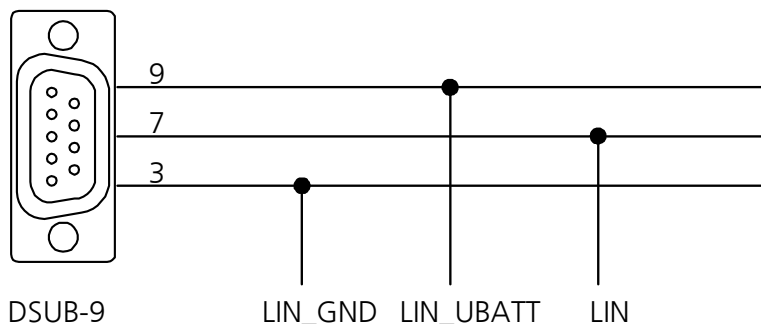



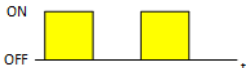

Fig. 12-4 Voltage supply at the LIN bus

If there is no access or no possibility of using the LIN_UBATT voltage as reference and supply voltage, the LIN transceivers of the LIN node of the ES88x/ ES89x module must be supplied by a switchable internal voltage source of the module. This internal supply voltage is not routed outside via the CAN/LIN plug connector. The module is not designed for the supply of external nodes at the LIN bus.

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

12.8.4 Display of the Function State of the LIN Interface

In the activated state of the module, the LEDs assigned to the connections show the following function states:

LIN LED	Description	State
	Off	Communication at the LIN interface interrupted
	Flashing yellow, 0.5 s on/0.5 s off	Communication at the LIN interface
	Illuminated red	Error or overload from connected module

12.9 USB 2.0 and USB 3.0 Interfaces

12.9.1 ES820.1 Drive Recorder

The Drive Recorder ES820.1 provides two USB 2.0 interfaces and two USB 3.0 interfaces.

These interfaces only support USB devices that feature software/drivers that are compatible with Windows. The basic functions of the USB devices connected to the USB interfaces can be used immediately without the prior installation of a specific driver. Manufacturer-specific extensions that require additional software or a dedicated driver must be installed by the user.

12.9.2 ES830.1 Rapid Prototyping Module

The Rapid Prototyping Module ES830.1 provides two USB 2.0 interfaces and two USB 3.0 interfaces.

These interfaces only support USB devices that feature software/drivers that are compatible with the QNX operating system. The basic functions of the USB devices connected to the USB interfaces can be used immediately without the prior installation of a specific driver by ETAS.



NOTE

Please ensure that the functionality of the USB interfaces on the ES830.1 module is enabled for operation later.

12.9.3 "Wake-Up" Function



NOTE

Support for the "Wake-Up" function at the USB interfaces will be enabled for operation at a later point in time.

The USB interfaces support the "Wake-Up" function. When the "Wake-Up" function is activated, the power supply to the USB interfaces remains switched on, even in the "Standby" operating state.



NOTE

Connected devices that support the "Wake-Up" function can trigger a change in operating state from "Standby" to "On" with the ES820.1 module. Therefore, only activate the "Wake-Up" function if the function is to be used.



NOTE

If the "Wake-Up" function is activated for one or more USB interfaces, the current consumption increases in the "Standby" operating state. It is possible to discharge the vehicle battery prematurely.

12.9.4 Overload and Emergency Shutdown

If the output stage of a USB interface of the module is overloaded as a result of a short-circuit or if its output current exceeds the USB standard value, the following steps are automatically performed:

- A All USB connections are switched off
- B The measurement/experiment is aborted

NOTE

If the measurement is aborted as a result of the USB connections being switched off, the recorded data may be lost.

- C Emergency shutdown of the module in order to protect the hardware
- D Display of an error state.

NOTE

If this error state occurs, the module must be restarted.

12.9.5 Strain Relief

Larger USB devices (e.g., memory sticks) can damage the USB connections of the module as a result of vibrations and the resulting forces.

NOTE

We recommend connecting larger USB devices to the ES820.1 by means of a USB cable rather than directly.

Threaded Holes

In addition to the USB interfaces, the housing of the ES820.1 and of the ES830.1 features two threaded holes for screws. This enables strain relief devices (e.g. cable clamps) to be connected easily so as to secure the connected USB cables in place.

Screws

Screws for attaching the strain relief devices are not included in the scope of supply.

NOTE

Screw the strain relief onto the module using **exclusively** M3x6 cylinder screws and a max. torque of 0.8 Nm.

The screw-in depth in the blind hole of the housing measures max. 6 mm.

Provision of strain Relief

The strain relief for the USB devices must be provided by the user.

12.10 I/O Interface (I/O)

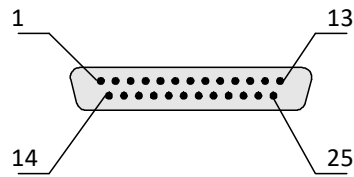


Fig. 12-5 I/O connection

12.10.1 Overview and Functions

At the "I/O" connection, a 25-pin Micro DSUB plug, the ES820.1 and the ES830.1 module provides digital inputs and outputs with various functions:

Pin assignment see chapter "'I/O' Connection: Socket and matching Plug" on page 174.

Pin at "I/O"	Number of I/Os	Type	Description
1, 2, 3, 4	4	Output	Can be controlled by INCA
9	1	Output	Corresponds to operating state of the ES820.1/ ES830.1 module, can be used to switch on the operating voltage of additional measuring modules: High = ES820.1/ ES830.1 switched on, Low = ES820.1/ ES830.1 in standby
11	1	Input	For the connection of an external "Remote Power" button to ground; the function of the external "Remote Power" button and the "Power" button on the module is identical
12	1	Input	Terminal 15 (KI.15), can be used for automatic activation with "Ignition on"
13, 14, 15, 16	4	Input	Can be evaluated by INCA (signal status, trigger); max. acquisition rate 10 Hz
18, 19, 21, 22, 23, 24, 25	7	Output	The status of the outputs corresponds to the status of the assigned LED on the front of the module
20	1	Output	Status as per internal acoustic signal generator, suitable for the direct connection of a Piezo buzzer
5, 6, 7, 8, 17	5	GND	Reference level for outputs and Remote Power

12.10.2 "Remote Power" Input

The "Remote Power" input ("I/O" connection, pin 11) enables the ES820.1/ ES830.1 module to be switched on and off remotely (e.g. from the passenger cell). The external "Remote Power" button switches the input to ground. The function of the external "Remote Power" button and the "Power" button on the module is identical. The function of the "Remote Power" input can be configured.

12.10.3 "PSCI" Input

The "Power Status Coordination Input" PSCI ("I/O" connection, pin 12) enables the ES820.1/ ES830.1 module to be automatically switched on when the ignition is switched on (KI.15) and to be automatically switched off when the ignition is switched off (KI.15).

To achieve this, the "PSCI" input is connected to the corresponding signal of the vehicle electrical system. The function of the "PSCI" input can be configured. The switch-off of the ES820.1/ ES830.1 module can be delayed to prevent a shutdown and restart of the module if the ignition is only switched off briefly.

12.10.4 "In 1-4" Inputs

The statuses of inputs "In 1-4" can be recorded together with other signals or used as a trigger for starting and ending the recording. The signals can also be used to change the measurement configuration or to start data transmissions.

12.10.5 "Operation" Output

The "Operation" output signals the operating state of the ES820.1/ ES830.1 module. The output can be used to automatically switch on the operating voltage of other modules (e.g. additional measuring instruments) with the ES820.1/ ES830.1 module. The signal level is "High" whenever the ES820.1/ ES830.1 module is in the "On" operating state. Otherwise, the signal level is "Low". A corresponding switching device (relay, solid state relay) is required to switch the supply voltage of a further measuring instrument.

12.10.6 LEDs Outputs

The "LEDs" outputs enable the operating state of the ES820.1/ ES830.1 module to be displayed remotely (e.g. in the passenger cell). The LEDs are connected to ground. The series resistors are already integrated in the device.

12.10.7 "Out 1-4" Outputs

Outputs "Out 1-4" can be used universally for display or control tasks. The outputs are controlled by the software.

12.10.8 "Signal Generator" Output

The "Signal Generator" output enables remote signaling (e.g. in the passenger cell). The signal generator is connected to ground.



NOTE

The inputs and outputs of the "I/O" interface are protected against surge voltages and short-circuits.

NOTICE

Damage to the electronics

ES820.1, ES830.1: The ground contacts of the "I/O" interface must not be connected to the vehicle ground.

12.10.9 Application Examples

Digital Inputs

The digital inputs can be used for the following:

- Monitoring terminal 15 (Tl. 15, ignition on)
 - Booting the module with the rising edge at Tl. 15
 - Shutting down the module with the falling edge at Tl. 15
- Controlling the module by means of manual activation
 - Starting the recording by means of a manual trigger
 - Selecting the configuration
 - Manually starting the data upload
- Measuring digital signals
 - Recording status signals together with other signals
 - Recording events (marks)

Digital Outputs

The digital outputs can be used for the following:

- Signaling the system status
 - System status "Module booting"
 - System status "Recording running"
- Activating/deactivating connected modules
 - For modules that do not support the "Wake-Up" function
 - For measuring setups with several masters to prevent Ethernet conflicts
- Outputting measure signals
 - Monitoring measure signals and displaying range excess
 - Displaying the status of the ECU

13 Commissioning

This chapter contains information about the following topics:

- "Requirements for the Transport" on page 110
- "Requirements for Operation" on page 110
- "Modules in the Module Stack" on page 111
- "Joining and Separating Modules (Stacking)" on page 113
- "Fastening Modules to Carrier Systems" on page 119
- "Securing Modules with a Kensington Lock" on page 119
- "Installing and Replacing the Memory Module" on page 120.

13.1 Requirements for the Transport



NOTE

Possible damage or destruction of electronics!

Transport the modules of the system only with protective flap closed and protective cap attached!

13.2 Requirements for Operation

13.2.1 Setting Up and Fastening the Modules

The modules must be positioned securely and, for example, fastened in the vehicle:

- Position the module or the module stack on a smooth, level underground.
- The module or the module stack must always be securely fastened.
- The module or the module stack may be sloped by no more than 15°.



WARNING

Risk of injury due to inadequate fastening

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

13.2.2 Heat Exchange with the Environment

When operating the modules, an efficient heat exchange with the environment must be ensured:

- Keep the module away from heat sources and protect the module against direct exposure to the sun.
- Maintain minimum distances from the module to the top and a distance of at least 5 cm on both longitudinal sides of the system.
- The free space above and behind the module must be selected so that sufficient air circulation is ensured.
- Do not cover the ventilation slots of the module!
- Do not place the module or the module stack on one of the longitudinal sides with ventilation slots.
- Secure the module or module stack in such a way that ventilation is not compromised.
- Do not operate the module in completely enclosed containers.

13.3 Modules in the Module Stack



NOTE

A maximum of one ES820.1 Drive Recorder can be used in a module stack.



NOTE

A maximum of one ES830.1 Rapid Prototyping Module can be used in a module stack.

13.3.1 Stack Regulations

If the modules of the system are to be operated in a module stack, the modules must be arranged in a **defined order** for communication between the modules via their system bus.



NOTE

If **different** module types are used in a module stack, these **must** be placed in the stack in a defined order.

13.3.2 Module Categories

Every **module type** of the ES800 system (e.g. ES891.x or ES820.1) is assigned to a certain category. This category assigns the modules the required position within the module stack.

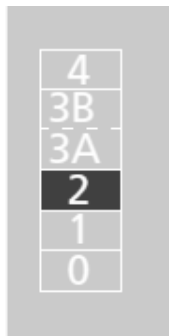


Fig. 13-1 Identification of the category on the front plate of the modules (here a module of category 2)

The category of the module is highlighted on the left of the front plate in a symbolic module stack and therefore clearly marked (see Fig. 13-1 on page 111).

13.3.3 Position of the Modules

Position in the stack	Category	Module (example)
5 (top)	4	Reserved
4	3B	Reserved
3	3A	ES882.x, ES886.x, ES891.x, ES892.x
2	2	ES820.1, ES830.1
1	1	Reserved
0 (bottom)	0	ES801.1, ES801.1-S

13.3.4 Sequence for Stacking

- The modules must be arranged in ascending order from bottom to top according to their categories.
- Modules with an **identical category** can be positioned in any order.
- If there are no modules of a category, the module of the next following category is installed.

13.3.5 Examples

ES820.1 and ES830.1 Modules

The ES820.1 and ES830.1 modules are modules of category 2:

- Modules of category 2 must be positioned above modules of category 1 and below modules of category 3A.
- Several modules of category 2 can be arranged in random order.

ES882.x, ES886.x, ES891.x and ES892.x Modules

The ES882.x, ES886.x, ES891.x, and ES892.x modules are modules of category 3A. It must be positioned above modules of category 0, 1 and 2 as well as below modules of category 3B and 4.

13.4 Joining and Separating Modules (Stacking)

13.4.1 Operating State During Stacking



NOTE

Possible damage or destruction of electronics!

Only connect the Base Module to the modules of the system in the de-energized state. Only stack the modules in the de-energized state.

13.4.2 Video: Joining and Separating Modules

The video shows how to join and separate the modules of the ES800 system.



NOTE

Read the following chapter carefully for detailed descriptions of how to join and separate the modules.



NOTE

The video can be found on the ETAS website [ES800 module stack](#).

13.4.3 Connecting an ES800 Base Module to an ES800 Module

Required Tools

You will need a screwdriver or a coin to fasten the ES800 Base Module to an ES800 module.

Preparations

Watch the video on stacking the modules

1. Watch the video on the ETAS website [ES800 module stack](#) to see the steps involved in stacking the modules.

Disconnecting the Base Module from the voltage supply



NOTE

Possible damage or destruction of electronics!

Only connect the Base Module to the modules of the system in the de-energized state. Only stack the modules in the de-energized state.

2. Disconnect the Base Module from the voltage supply.

Removing the protective cap from the system connector

3. Turn the ES800 module over and place it on its top side.

4. Remove the protective cap at the underside of the module.



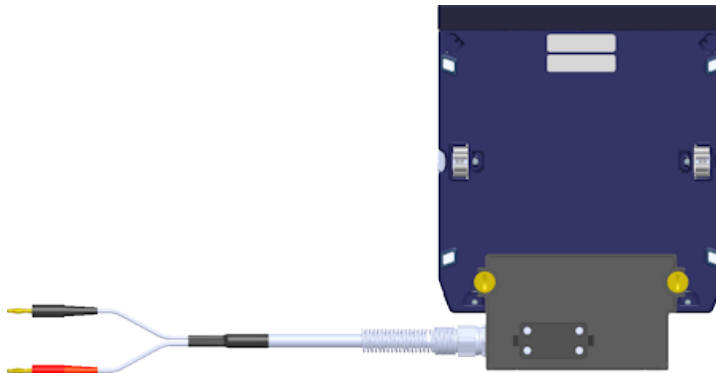
The system connector of the module (see marking in the illustration) is exposed and can be connected to other modules.

5. Secure the protective cap from being lost.

Connecting the ES800 Base Module to an ES800 Module

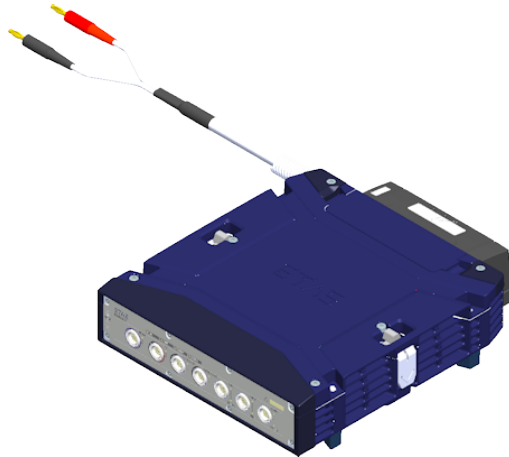
Connecting an ES800 Base Module to an ES800 module

1. Turn the ES800 Base Module over and position it with the correct side above the lowest system connector of the ES800 module.



2. Plug the Base Module onto the ES800 module.
The module is mechanically guided on the rear while placing it on the Base Module.
One captive thumb screw each is installed on the Base Module at the right and left.
3. Screw the two thumb screws of the Base Module to the ES800 module so that they are hand-tight.

4. Turn the connected modules over.



The module can be extended with further modules to form a module stack or the interfaces of the module can be cabled.

13.4.4 Joining Several ES800 Modules (Stacking)

NOTE

If **different** module types are used in a module stack, these **must** be placed in the stack in a defined order. Refer to the information on positioning the modules in the stack in chapter 13.3 on page 111.

Required Tools

No tools or additional parts are required in order to connect the modules to one another.

Preparations

Watch the video on stacking the modules

1. Watch the video to see the steps involved in stacking the modules as described in chapter 13.4.2 on page 113.

Disconnecting the Base Module from the voltage supply

NOTE

Possible damage or destruction of electronics!
Only stack the modules in the de-energized state.

1. Disconnect the Base Module from the voltage supply.

Removing the protective cap from the system connector

1. Turn over the ES800 module to be mounted on the existing module/module stack and place it on its top side.

2. Remove the protective cap at the underside of the module.



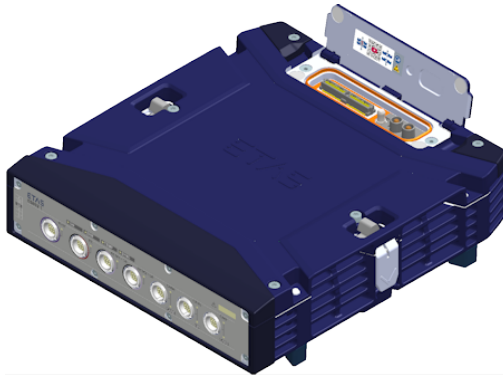
The system connector of the module (see marking in the illustration) is exposed.

3. Secure the protective cap from being lost.

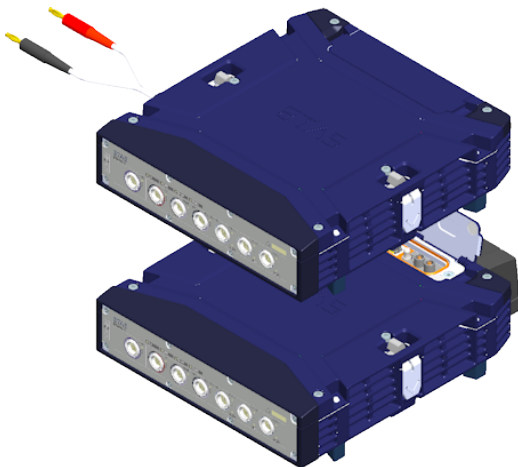
Joining several ES800 Modules (Stacking)

Joining ES800 modules

1. Open the protective flap of the module/upper module of the module stack.



2. Position the lower system connector of this module over the system connector of the lower module/module stack.



- The upper module is mechanically guided during the positioning.



CAUTION

Risk of crushing when interconnecting the modules

Make sure that your hands or fingers do not become caught between the modules.



NOTE

Possible malfunction.

Make sure that the locks on the module latch into place correctly on both sides of the module stack.

- Press the upper module down vertically and evenly into the end position without tilting it.

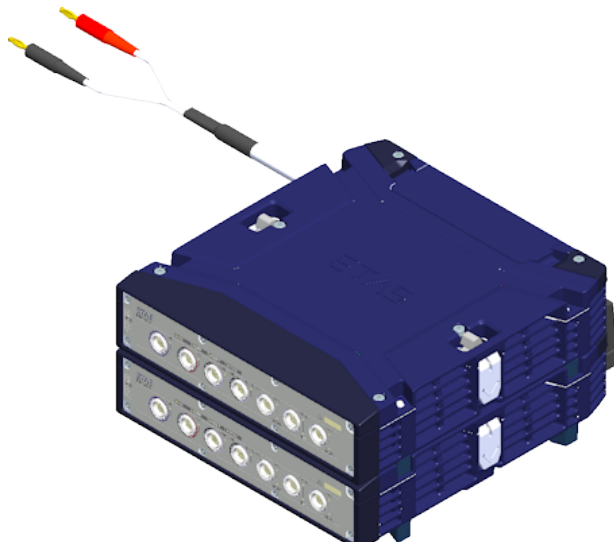


NOTE

Possible damage to the module.

If the module is tilted during assembly, carefully separate the modules and reconnect them.

The end position is reached when the two lateral levers lie flush with the side module wall.



Both modules are mechanically locked and electrically connected.

The module stack can be extended to include further modules or the interfaces of the modules can be cabled.

13.4.5 Separating Modules

Required Tools

No tools or additional parts are required in order to separate the modules from one another.

Preparations

Watch the video on separating the modules

1. Watch the video in chapter 13.4.2 on page 113 to see the steps involved in separating the modules. Note how the top module needs to be tilted during the separation process.

Disconnecting the Base Module from the voltage supply



NOTE

Possible damage or destruction of electronics!

Only separate the connected modules in the de-energized state.

2. Disconnect the Base Module of the module stack from the voltage supply.

Separating the Modules

Separating modules



CAUTION

Risk of crushing between the release lever and the housing

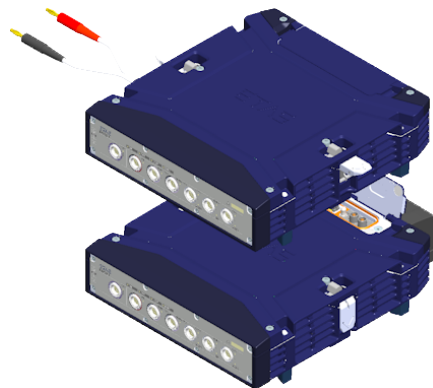
Operate the release lever in a uniform and controlled manner.

1. Fold the two lateral levers up for unlocking the upper module.
2. Lift the front part of the top module.
3. Ensure that the two lateral levers for unlocking the module latch back into place.

The top module is still latched onto the rear system connector.

4. Press down on the front edge of the top module.

The top module is separated from the bottom module.



5. Lift the top module from the module stack and place it down carefully.

Attaching the protective cap to the system connector

1. Turn the top module over and place it on its top side.



2. Place the protective cap onto the lower system connector of the disconnected module (see marking in the illustration).

Closing the protective flap on the lower module

3. Close the protective flap on the lower module.

13.5 Fastening Modules to Carrier Systems

Modules or module stacks of the ES800 system can be fastened to a carrier system.



WARNING

Risk of injury due to inadequate fastening

- Secure the product so that it does not move uncontrollably.
 - Only use carrier systems and fastening materials that can accommodate the static and dynamic forces of the product and are suitable for the ambient conditions.
-
- Only use carrier systems and attachment elements that do not damage the housing of the modules.
 - Do not damage the housing of the modules. They may neither be drilled into nor provided with holes.
 - 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.
 - Only use materials that are suitable for absorbing static and dynamic forces to secure the module or module stack.

13.6 Securing Modules with a Kensington Lock

The rear side of each module features two openings to which the module can be secured using a Kensington lock.

13.7 Installing and Replacing the Memory Module

13.7.1 Delivery State of the ES820.1 Drive Recorder

NOTE

The memory slot of the Drive Recorder, which holds a memory module, is not fitted on delivery. The memory slot is protected by a cover.
The memory module for data recording can be ordered separately from ETAS (see chapter 17.9 on page 205).

Detailed information on the ES820.1 memory module type 1 can be found in chapter 5.4.5 on page 34

13.7.2 Installing the Memory Module in the Drive Recorder for the First Time

The Drive Recorder does not contain a memory module for measurement data (delivery state). The memory module needs to be installed for the first time.

Assembly Steps

- A Remove the memory slot cover
- B Install the memory module

Removing the Memory Slot Cover

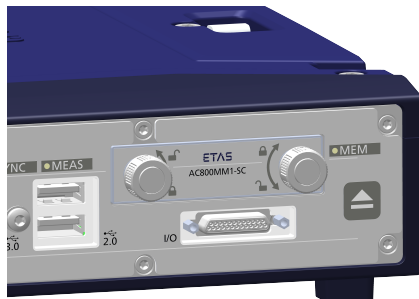
NOTE

The memory slot cover and the memory module are each secured in place in the ES820.1 module with two push and twist closures. The module slot cover and the memory module can be installed and removed without tools.

Remove the memory slot cover

1. Press the two push and twist closures on the memory slot cover in and turn them counterclockwise.

The memory slot cover is unlocked



NOTE

The push and twist closures are permanently connected to the memory module.

2. Pull the memory slot cover out of the ES820.1 module by the push and twist closures.

The insertion force of the memory module contacts must be overcome.



3. Set aside the memory slot cover carefully.

Installing the Memory Module for the first Time

NOTE

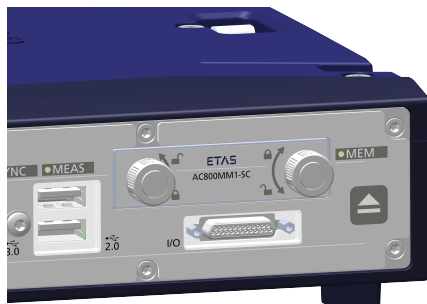
The memory slot cover and the memory module are each secured in place in the ES820.1 module with two push and twist closures. The module slot cover and the memory module can be installed and removed without tools.

Installing the memory module for the first time

1. Insert the memory module in the correct position and with the guide rails facing up into the memory slot of the module. Do not tilt the memory module and position the push and twist closures correctly.

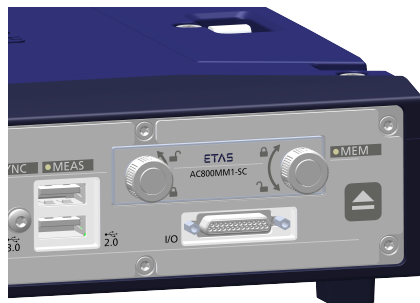


2. Slide the memory module in until it reaches the stop in the memory slot. The insertion force of the memory module contacts must be overcome.



3. Press the two push and twist closures of the memory module in and turn them clockwise.

The memory module is locked in the memory slot of the ES820.1 module.



13.7.3 Replacing the Memory Module of the Drive Recorder

The Drive Recorder holds a memory module containing measurement data. The memory module should be removed or replaced with a different memory module in order to record further measured data.

Preparation and Assembly Steps

- A End any measurement that is in progress
- B Remove the memory module
- C Install a new memory module or fit the memory slot cover

Ending a Measurement that is in Progress

Before removing the memory module from the Drive Recorder ES820.1, any measurement that is in progress must be ended and data access to the memory module terminated.

i NOTE

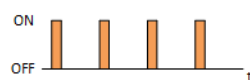
Data may be lost.

The memory module must not be removed from the Drive Recorder either during a measurement or when writing the data to the memory module.

Ending a measurement that is in progress

1. Press the "Eject memory module" button.

MEM LED



Flashing orange,
0.1 s on/0.4 s off

The MEM LED flashes; the memory module is prepared for removal. Pending measured data is written to the memory module

i NOTE

The memory module must not yet be removed.

2. Wait until the MEM LED goes out.

MEM LED

ON

Off

OFF ————— t

Access to the memory module is terminated. Memory module can now be removed.

Removing the Memory Module



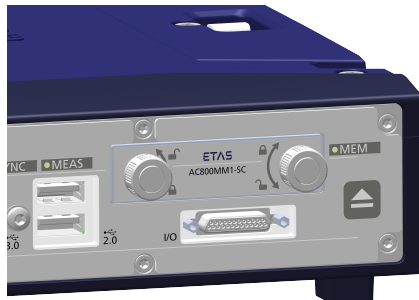
NOTE

The memory slot cover and the memory module are each secured in place in the ES820.1 module with two push and twist closures. The module slot cover and the memory module can be installed and removed without tools.

Remove the memory module

1. Press the two push and twist closures of the memory module in and turn them counterclockwise.

The memory module is unlocked.

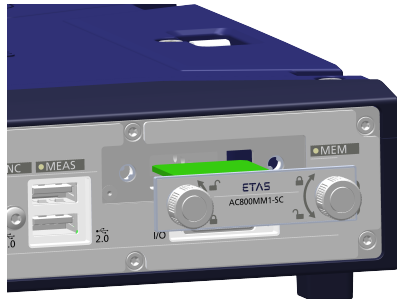


NOTE

The push and twist closures are permanently connected to the memory module.

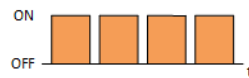
- Pull the memory module out of the ES820.1 module by the push and twist closures.

The insertion force of the memory module contacts must be overcome.



After the memory module has been removed, the MEM LED flashes.

MEM LED



Flashing orange,
0.4 s on/0.1 s off

- Wait until the MEM LED goes out.

MEM LED



Off

A memory module can now be inserted.

Installing another Memory Module

NOTE

The memory slot cover and the memory module are each secured in place in the ES820.1 module with two push and twist closures. They can be installed and removed without tools.

Installing a new memory module

- To install the memory module, proceed as described in chapter 13.7.2 on page 120.

Fitting the Memory Slot Cover

If the removed memory module is not to be replaced by a new memory module, the memory slot of the ES820.1 must be closed with the corresponding cover.

NOTE

The memory slot cover and the memory module are each secured in place in the ES820.1 module with two push and twist closures. They can be installed and removed without tools.

Fitting the memory slot cover

1. Close the memory slot of the ES820.1 module
 - with a new memory module

or

2. with the memory slot cover.

Store the memory module in accordance with the ESD specifications.

14 Applications

This chapter contains information about the following topics:

- Remarks on the Application Setup 126
- Requirements for failsafe Automotive Ethernet Operation 126
- ETAS Modules of other Series and ETKs in Application Setup 127
- Cabling for MC Applications 128
- Cabling for Rapid Prototyping Applications 130
- Dual Mode ETKs on ES89x Modules 132

14.1 Remarks on the Application Setup



NOTE

Ensure that the connections are de-energized before you start the cabling.



NOTE

Carefully check the designations of the cables used. Wrong cables can impair the functional capability of the module or damage the module and the devices connected to them.

The order of the cabling of the connections is random.

Connecting cables for the module interfaces can be ordered from ETAS. An overview is located in the chapter “Cables and Accessories” on page 180.

14.2 Requirements for failsafe Automotive Ethernet Operation

For failsafe operation of the Automotive Ethernet communication channel, all customer specific installations - including cables, connectors and board adaptations - have to be compliant to:

- IEEE Std. 802.3bwTM-2015, “Amendment 1: Physical Layer Specifications and Management Parameters for 100 Mb/s Operation over a Single Balanced Twisted Pair Cable (100BASE-T1)”, chapters 96.7 - 96.9
- Open Alliance, “BroadR-Reach® Definitions for Communication Channel, Version 2.0”



NOTE

To achieve an appropriate Automotive Ethernet channel performance all PCB board and cable segments have to be optimized with regard to line impedance matching, length matching within the differential net routing or twisted pair cabling and on the reduction of untwisted regions. Stub segments must be avoided for the Point-to-Point cable connection in favor of inline connectors and shielding measures shall be considered depending on the operation environment.



NOTE

Please contact your ETAS partner if you need to use Automotive Ethernet cables in areas with severe interference.

14.3

ETAS Modules of other Series and ETKs in Application Setup

If you are using ETAS modules from other series in your test setup, please note the following:

The synchronization of the ETAS modules from other series, which are connected via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, is supported.

The "Wake-Up" and "Sleep" functions of the ES800 modules that are performed using ETAS modules from other series, which are connected to the "FE" interface or via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, are supported.

Detailed information on ETAS modules and ETKs in the experimental setup, applications and technical data can be found in the product user guide.

14.4 Cabling for MC Applications

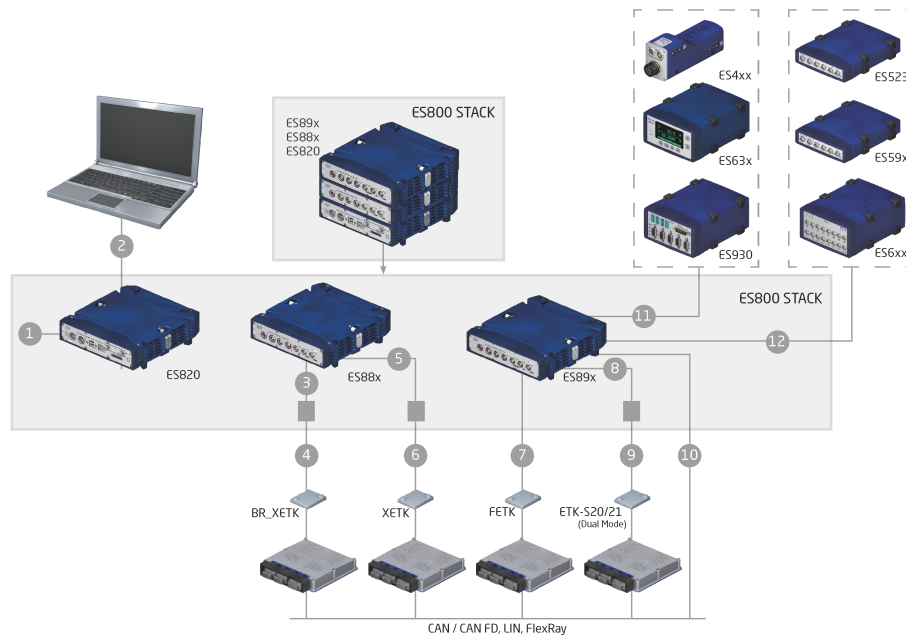


Fig. 14-1 Cabling the ES800 system for MC applications

Cables in Fig. 14-1	Function	Short name
1	Power supply via an ES800 Base Module (ES801.1 or ES801.1-S for the module stack)	ES801.1/ ES801.1-S
2	Gigabit Ethernet PC connecting cable	CBE250
3	Automotive Ethernet Splitter Cable (at ES882.1)	CBEB240
	Automotive Ethernet Splitter Cable (at ES886.x)	CBEB242
	Automotive Ethernet Splitter Cable (at ES88x)	CBEB245
4	Automotive Ethernet Interface Cable for ES88x (connected to CBEB240)	CBEB125
	Automotive Ethernet Interface Cable for ES88x (connected to CBEB242)	CBEB120
5	Fast Ethernet ES89x/XETK connection (connected to CBAE330)	CBE230
6	Adapter cable for connecting an XETK (connected to CBE230)	CBAE330
7	Gigabit Ethernet ES89x/FETK connecting cable and ES89x power cord	CBE260
8	ETK adapter cable	CBAE360
9	ETK cable	CBM150

Cables in Fig. 14-1	Function	Short name
10	Vehicle bus connections: CAN	K106, K107, CBAC150, CBAC160, CBCX130, CBCX131.1
	Vehicle bus connections: CAN/LIN/FlexRay	CBCF1100
	Vehicle bus connections: FlexRay	CBFX131
11	Fast Ethernet connection to ES4xx, ES63x and ES930 modules	CBE400.2, CBE401.1
	Fast Ethernet connection and power supply to the ES4xx, ES63x and ES9x modules	CBEP420, CBEP425
12	Fast Ethernet connection to ES520, ES59x, ES600, ES610, ES620 and ES650 modules	CBE130, CBE140

**NOTE**

Only one ES820.1 Drive Recorder can be operated in an ES800 module stack.

**NOTE**

The ES820.1 Drive Recorder must always be operated beneath interface modules (e.g. ES89x) in the module stack. Information on positioning the module types in the module stack can be found in chapter 13.3 on page 111.

14.5 Cabling for Rapid Prototyping Applications

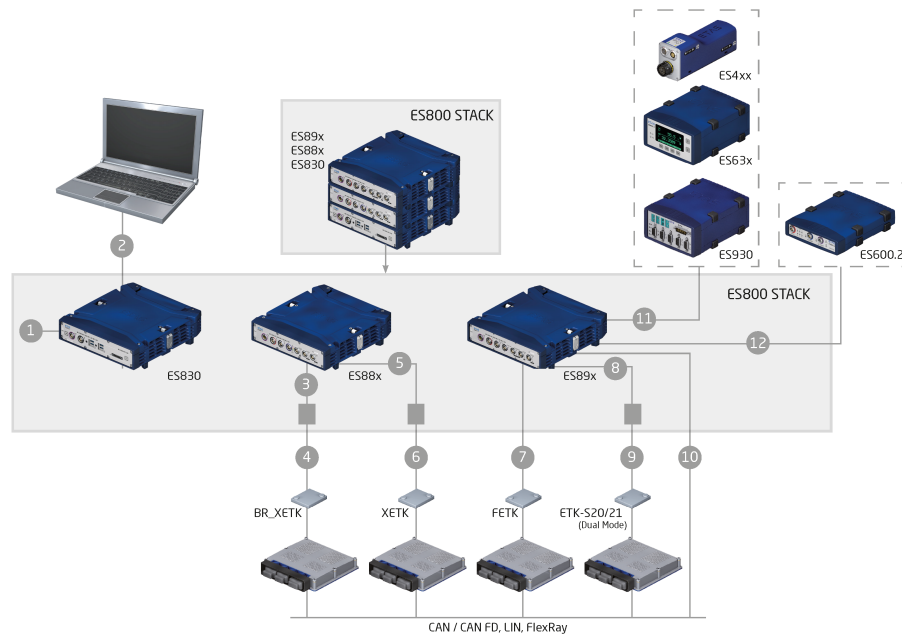


Fig. 14-2 Cabling the ES800 system for Rapid Prototyping applications

Cables in Fig. 14-1	Function	Short name
1	Power supply via an ES800 Base Module (ES801.1 or ES801.1-S for the module stack)	ES801.1/ ES801.1-S
2	Gigabit Ethernet PC connecting cable	CBE250
3	Automotive Ethernet Splitter Cable (at ES88x)	CBEB240
	Automotive Ethernet Splitter Cable (at ES88x)	CBEB242
	Automotive Ethernet Splitter Cable (at ES88x)	CBEB245
4	Automotive Ethernet Interface Cable for ES88x (connected to CBEB240)	CBEB125
	Automotive Ethernet Interface Cable for ES88x (connected to CBEB242)	CBEB120
5	Fast Ethernet ES89x/XETK connection (connected to CBAE330)	CBE230
6	Adapter cable for connecting an XETK (connected to CBE230)	CBAE330
7	Gigabit Ethernet ES89x/FETK connecting cable and ES89x power cord	CBE260
8	ETK adapter cable	CBAE360
9	ETK cable	CBM150

Cables in Fig. 14-1	Function	Short name
10	Vehicle bus connections: CAN	K106, K107, CBAC150, CBAC160, CBCX130, CBCX131.1
	Vehicle bus connections: CAN/LIN/FlexRay	CBCF1100
	Vehicle bus connections: FlexRay	CBFX131
11	Fast Ethernet connection to ES4xx, ES63x and ES930 modules	CBE400.2, CBE401.1
	Fast Ethernet connection and power supply to the ES4xx, ES63x and ES9x modules	CBEP420, CBEP425
12	Fast Ethernet connection to ES520, ES59x, ES600, ES610, ES620 and ES650 modules	CBE130, CBE140

**NOTE**

Only one ES830.1 Rapid Prototyping Module can be operated in an ES800 module stack.

**NOTE**

The ES830.1 Rapid Prototyping Module must always be operated beneath interface modules (e.g. ES89x) in the module stack. Information on positioning the module types in the module stack can be found in chapter 13.3 on page 111.

**WARNING**

Risk due to undefined vehicle behavior during an ECU reset

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

- Only make changes when the vehicle is stationary (e.g., changes to the test setup, changes to the ETK configuration, software updates).
- If you are using the Drive Recorder ES820.1, wait until its MEAS LED is lit continuously before driving.

14.6 Dual Mode ETKs on ES89x Modules

At the FETK/GE interfaces of the ES89x modules, Dual Mode ETKs (e.g. ETK-S20.1, ETK-S21.1) can be operated in FETK mode.



NOTE

An overview of the system requirements for the operating mode FETK Mode is located in the user guides of the ETKs.

Dual Mode ETKs can use the same A2L file in ETK mode and in FETK mode; changes are not required.

14.6.1 Cabling

Connecting a Dual Mode ETK requires a CBAE360 adapter cable which is connected to the ES89x and to the ETK CBM150 connecting cable.

14.6.2 Checking the Dual Mode ETK

If a Dual Mode ETK is connected to the ES89x, the ES89x module automatically checks whether the connected ETK is a Dual Mode ETK. If a Dual Mode ETK was detected, a check is performed to ascertain whether it is prepared for operation at the FETK/GE interface. This state of the ETK is indicated by the LED at the FETK / GE interface:

FETK / GE LED	Description
Off	The connected ETK is not a Dual Mode ETK. Operating the ETK at the ES89x module is not possible.
Red	If the connected ETK is a Dual Mode ETK, the ETK is not prepared for operation at the 89x module. It is necessary to update the ETK with HSP.
Yellow	The connected ETK is a Dual Mode ETK and prepared for operation at the 89x module. It is not necessary to update the ETK with HSP.

14.6.3 Initial Update of Dual Mode ETKs with HSP

 **NOTE**

Dual Mode ETKs that are not yet prepared for operation at the ES89x module must be updated **once** with the HSP service software. This update of the ETKs is possible only at the modules ES59x or ES910.

Next, the Dual Mode ETKs can be operated without any further change either in FETK mode at the ES89x module or in standard ETK mode at ETK interfaces.

 **NOTE**

If the power supply or the Ethernet connection is interrupted during the described initial update of the Dual Mode ETKs, the ETK can no longer be used. Please contact the ETAS support.

14.6.4 Additional Updates of Dual Mode ETKs with HSP

Additional updates of Dual Mode ETKs with HSP can be performed at the ES89x, ES59x or ES910 modules.

 **NOTE**

During a firmware update, neither the voltage supply of the module and the ETK nor the Ethernet connection to the PC may be interrupted!

15 Troubleshooting Problems

This chapter contains information about the following topics:

- Displays of the LEDs 134
- Problems with ES800 Modules 134

15.1 Displays of the LEDs

When assessing the operating state and rectifying faults on the modules, please note the display of the LEDs which provide information about the function of the interfaces and the ES800 modules (see chapter 11.1 on page 69).

15.2 Problems with ES800 Modules

The following table lists some of the possible problems together with a possible solution. In case of further questions, please contact our technical service (see chapter 19 on page 220).

Problem	Diagnostics questions	Possible solutions
The module/module stack is not found in INCA using "Search for hardware".	Is the hardware connected to the PC?	Check whether the connection is intact.
	Power supply	Check whether your power supply and measuring setup meet the requirements listed in chapter 14.4 on page 128.
	Have you configured the network card correctly?	INCA, Config Tool and HSP operation: Check whether your network card is configured according to chapter 16.8.2 on page 144. Check whether the function for automatically switching to power-save mode is deactivated on your PC network card ¹⁾ . Deactivate this function.
	Did you install the required firmware on the module?	Check with HSP whether the required firmware is installed on the module.
	Have you installed the required version of INCA?	Check whether the INCA software installed on your PC meets the requirements listed in chapter 16.8.3 on page 145.
	Have you installed the required version of the INCA Add-on?	Check whether the INCA Add-on installed on your PC meets the requirements listed in chapter 16.8.3 on page 145.
The LIN interface is not initialized.	Have you installed the INCA LIN Add-on?	Check whether the required version of the INCA LIN Add-on is installed (see chapter 16.8.3 on page 145).

Problem	Diagnostics questions	Possible solutions
The FlexRay interface is not initialized.	Have you installed the INCA FlexRay Add-on?	Check whether the required version of the INCA FlexRay Add-on is installed (see chapter 16.8.3 on page 145).
	Have you configured the FlexRay function of the interface?	Check whether the FlexRay function of the interface is selected in the web interface (see chapter 11.6 on page 81). Start the module/module stack.
The CAN interface is not initialized.	Have you installed the INCA CAN Add-on?	Check whether the required version of the INCA CAN Add-on is installed (see chapter 16.8.3 on page 145).
	Have you configured the CAN function of the interface?	Check whether the CAN function of the interface is selected in the web interface (see chapter 11.6 on page 81). Start the module/module stack.
The measurements are not being started.	Does the INCA monitor log ask you to perform an update?	Update the modules.
	Does the module provide no data?	Check whether your power supply and measuring setup meet the requirements. Check whether the cabling of the hardware to the PC is correct and intact.
Data losses occur during the transmission.	Are you using WLAN in your measurement setup?	WLAN is not allowed within this ETAS network. Cable your measuring setup (ETAS modules and their connection to the PC) exclusively with ETAS cables.
	Are you operating the modules on a PC with MultiCore processor?	Install an up-to-date driver for the network card that supports the NDIS protocol.
The ERR LED of the module lights up red.	Have you just performed an update?	Users of INCA/INTECRIO/ASCET-RP/Configuration Tool: Switch the module off and on again. Reload the measurement configuration. If the LED continues to light up, send the module to ETAS for repair.

Problem	Diagnostics questions	Possible solutions
The SYNC LEDs of several modules of an ES800 stack flash simultaneously.	ES800 stack without ES820.1 or ES830.1	Disconnect the ES800 stack from the power supply. To restart the system, connect the ES800 stack to the power supply.
	ES800 stack with ES820.1 or ES830.1	Press the "Power" button on the module. Wait. When the module is shut down, press the "Power" button on the module again.
The LED SYNC of an additional (sixth) module cascaded with a cable to a ES800 stack flashes in master mode, although it is a slave module.	To which module of the ES800 stack is the cascaded (sixth) module connected?	Do not connect the cascaded (sixth) module to the module of the ES800 stack in the uppermost position, but to a module of a lower position.

¹⁾: The manufacturers of the PC cards provide different names for this function. Example: "Link down Power saving"




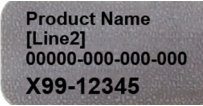



16 Technical Data




This chapter contains information about the following topics:

- "Marking on the Product" on page 138
- "Standards and Norms" on page 140
- "RoHS Conformity" on page 141
- "CE Marking" on page 141
- "Product Return and Recycling" on page 142
- "Open Source Software" on page 142
- "System Requirements" on page 143
- "Electrical Data" on page 146
- "Terminal Assignment" on page 163
- "Mechanical Data" on page 175.





16.1 Marking on the Product

16.1.1 Product Label: Symbols Used

Symbol	Description
	Prior to operating the product, be sure to read the user manual.
	Ensure sufficient ESD protection measures are in place before touching the contacts.
	Risk of burning upon contact with hot surfaces of the SSD memory module when removing it from the Drive Recorder. Do not touch the surfaces of the SSD memory module after operating the Drive Recorder at high ambient temperatures. High surface temperatures can occur on the memory module when used in the vehicle and at high ambient temperatures.
ETAS GmbH	Manufacturer of the product
ES801.1, ES801.1-S, ES820.1, ES830.1, ES882.x, ES886.x, ES891.x, ES892.x	Name of the product
F 00K 123 456	Order number of the product
SN: yyxxxxx	Serial number of the product (7-digit) with barcode
Vc.dd	Hardware version of the product
zzzz	year of production
	MAC address (optional)
	License of operating system (optional)
6-32V 	Operating voltage range (DC voltage, example)
xy W	Power consumption (watt), information on Base Module
xy A - xz A max	Current consumption (amps), specification on module
	Marking for RoHS China, see chapter 16.3 on page 141
	Marking for CE conformity, see chapter 16.5.1 on page 141

Symbol	Description
	UKCA conformity symbol (see chapter 16.5.2 on page 141)
	Marking for KCC conformity, see chapter 16.5.2 on page 141
	Marking for WEEE, see chapter 16.6 on page 142

16.1.2 Marking of Interfaces and Buttons

Symbol	Description
	Marking for USB 2.0 connection
	Marking for USB 3.0 connection
	"Power" button for switching the module on and off (ES820.1 and ES830.1)
	Button for safely removing the memory module of the ES820.1

16.2 Standards and Norms

16.2.1 Electromagnetic Compatibility

Standard	Test
IEC 61326-1	Electrical equipment for measurement, control, and laboratory use - EMC requirements
ISO 7637-2:2011-03	Road vehicles - Electrical disturbances from conduction and coupling ¹⁾
ISO16750-2:2012-11	Road vehicles - Environmental conditions and testing for electrical and electronic equipment (in conjunction with Base Module ES801.1 Test Level C) ¹⁾

¹⁾: Please contact ETAS for detailed information.



WARNING

The following products are Class A equipment:

- ES820.1, ES830.1, ES882.1, ES882.2, ES886.1, ES886.2
- ES891.1, ES891.2, ES892.1, ES892.2 in the power supply range of between 28 V and 32 V DC
- This piece of equipment may cause radio interference in living areas. In this case, the user may be required to take appropriate measures.

16.2.2 Safety

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

16.2.3 Housing Properties

Standard	Test
IEC 61010-1	Temperature of the housing surface (operation, metallic surfaces): < +70 °C/ +158 °F at +40 °C ambient temperature
	Temperature of the housing surface (operation, non-metallic surfaces): < +80 °C/ +168 °F at +40 °C ambient temperature
IEC 60068-2-27, ISO 16750-3	Mechanical vibration (operation)
IEC 60068-2-27, ISO 16750-3	Mechanical shock (transport)
IEC 60529	IP65: ES801.1 IP44: ES882.x, ES886.x, ES891.x, ES892.x IP40: ES820.1, ES830.1,

16.3 RoHS Conformity

16.3.1 European Union

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

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

16.3.2 China

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

16.4 Declarable Substances

European Union

Some products from ETAS GmbH (e.g. modules, boards, cables) use components with substances that are subject to declaration in accordance with the REACH regulation (EU) no.1907/2006.

Detailed information is located in the ETAS download center in the customer information "REACH Declaration" (www.etas.com/Reach). This information is continuously being updated.

16.5 Declaration of Conformity

16.5.1 CE Marking

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.

16.5.2 UKCA Declaration of Conformity (Great Britain)

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.

16.5.3 KCC Marking

With the KCC 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.

16.6 Product Return and Recycling

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

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



Fig. 16-1 WEEE symbol

The WEEE symbol (see Fig. 16-1 on page 142) on the product or its packaging identifies that the product may not be disposed of together with regular trash.

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

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

Additional information about the recycling program of ETAS GmbH is available from the ETAS sales and service locations (see chapter "Contact Information" on page 220).

16.7 Open Source Software

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

16.8 System Requirements

16.8.1 Ambient Conditions

Operating temperature range	-40 °C to +70 °C
	-40 °F to +158 °F
Storage temperature range (without packaging)	-40 °C to +85 °C
	-40 °F to +185 °F
Max. relative humidity (non-condensing)	85% (operation)
	95% (storage)
	IEC 60068, IEC 60529, DIN 40040, IEC 721-3-3
Max. altitude	5000 m / 16400 ft
Degree of contamination (IEC 60664-1, IEC 61010-1)	2
Protection rating (when closed)	IP65: ES801.1, ES801.1 -S
	IP40: ES820.1, ES830.1
	IP44: ES882.1, ES882.2, ES886.1, ES886.2, ES891.1, ES891.2, ES892.1, ES892.2

Setting up the Modules

For the lateral fans to dissipate the heat of the module or the module stack, certain minimum distances must be maintained when setting up the modules.

Ensure that there is sufficient air circulation for efficient heat exchange.

- On both long sides, keep an area of at least 5 cm clear above and below the product or product stack.
- Do not cover the ventilation slots.
- Do not operate the product in enclosed areas.

16.8.2 Hardware

ES830.1/ ES88x/ ES89x Modules

Operating the ES830.1 / ES88x / ES89x modules requires a PC with a Ethernet interface port (1 Gbit/s, full duplex). Alternatively, the modules can also be operated with an ES820.1 Drive Recorder.

ES820.1 Drive Recorder

The ES820.1 Drive Recorder is designed for operation without a PC. The configurations can be transferred to the Drive Recorder and the measurement files can be transferred from the Drive Recorder to the PC via an Ethernet connection to the PC.



NOTE

If the devices are operated in a stack, only the Ethernet interface of the lowest module in the stack is active. Only this interface can be used for the connection to the PC.

Initializing the Modules



NOTE

It is absolutely necessary to deactivate the function for automatic switching to power-save mode of your PC network adapter if there is no data traffic at the Ethernet interface!

Deactivating the Power-Save Mode

In Control Panel / Device Manager / Network Adapter, select the network adapter used with a double-click. On the "Power Management" tab, deactivate the option "Allow the computer to turn off this device to save power". Confirm your configuration.

The manufacturers of the network adapters provide different names for this function.

Example:

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

16.8.3 Software

Web Browser

The configuration of the modules of the system is done on the PC using a graphical user interface. A web browser application is used as the interface. No Internet access is required for the configuration.

The ES820.1 Drive Recorder is configured by means of configuration software. The configurations are either transferred via an Ethernet cable, the replaceable memory module, or a USB storage media to the Drive Recorder.

The status of the Drive Recorder can be determined, and a few basic settings can be made via the web interface of the ES800 system.

ETAS Software Tools

For the configuration of ES800 system the as well as the control and data acquisition, you need ETAS software in the following versions (or higher):

Module	HSP	INCA	INCA-EIP	INTECRIO
ES820.1	no HSP update	V7.1.9 with INCA-ES820 Add-On	-	-
ES830.1	V11.11	V7.2.11	V7.2.11	V4.7
ES882.1	V11.7	V7.2	-	-
ES882.2	V13.3.0	V7.4.3	-	-
ES886.1	V11.9	V7.2.9	-	-
ES886.2	V13.0	V7.4.0	-	-
ES891.1	V10.9 ¹⁾	V7.1.2	-	-
ES891.2	V13.3.0	V7.4.3	-	-
ES891.x, ES892.x	V10.10 ^{2), 3)} V11.0 ^{4), 5)}	V7.1.2 V7.2.0	- -	- -
ES892.2	V13.3.0	V7.4.3	-	-

1): ETK (Dual Mode) or FETK-S support only on FETK1/GE

2): ETK (Dual Mode) or FETK-S support on FETK1/GE and FETK2/GE

3): ETAS HW synchronization support on Fast Ethernet

4): FETK-T1.0 support on FETK1/GE and FETK2/GE

5): CAN/CAN FD, LIN and FlexRay interface support

Operating the ES820.1 Drive Recorder with Third Party Software



NOTE

Please contact the ETAS support team if you want to operate the ES820.1 Drive Recorder with Third Party software.

16.9 Electrical Data

16.9.1 Power Supply of the ES800 System



NOTE

Load dump protection required!

Operating the ES800 system requires central load dump protection that is protected against polarity reversal (in conjunction with an ES800 Base Module, e.g. ES801.1) in accordance with ISO 16750-2 Test B.

ES800 System with ES801.1 Base Module

An ES800 Base Module (ES801.1 or ES801.1-S) is installed on the underside of an individual module or on the underside of a module stack. The ES800 Base Module is connected to the vehicle battery or the laboratory power supply and supplies the ES800 system with operating voltage via the uniform system connector (see chapter 4 on page 27).

Operating voltage ¹⁾	7 V to 29 V DC ($\pm 10\%$) ²⁾
Operating voltage (typ.)	12 V DC
Max. permitted current consumption for product stack	25 A
Fuse ³⁾	30 A / 32 V DC

¹⁾: Use an operating voltage that is permissible for all modules in the product stack.

²⁾: Due to the tolerance specifications of $\pm 10\%$, the rating for these products has changed. Check the product label to see which operating voltage is valid for your product.

³⁾: Only fuses of type "Littelfuse ATOF Blade Fuses", part number 0287030.PXS, may be used. Additional information is available on the Internet: Littelfuse.

Recommendations for Operation

For the safe and reliable operation of the ES800 module stack throughout the entire area of application (e.g. for cold start tests), you must provide the operating voltage in the following ranges at the connection of the ES800 Base Module (ES801.1 or ES801.1-S):

Number of modules	Operating voltage at ES801.1/ES801.1-S
1	7 V to 29 V DC
2	7 V to 29 V DC
3	7 V to 29 V DC
4	8 V to 29 V DC
5	10.5 V to 29 V DC



NOTE

The direct power supply to ETAS modules from other series at the GE and FE interfaces was not taken into account for the recommendations.

16.9.2 Power Supply of the ES800 Modules

ES820.1 Drive Recorder

Operating voltage range (max.)	6 V to 32 V DC
Operating voltage (typ.)	12 V DC
Current consumption	<p>Operation: Max. 8 A at 6 V DC, Max. 5 A at 12 V DC, Max. 2 A at 32 V DC</p> <hr/> <p>Fast boot standby: < 60 mA at 12 V DC, max. 120 mA (without current consumption of connected devices)</p> <hr/> <p>Low power standby: < 10 mA at 12 V DC, max. 20 mA (without current consumption of connected devices)</p>
Energy management	<p>"On/Off" with start/stop of Ethernet traffic</p> <hr/> <p>"On" with start of a connected module</p> <hr/> <p>"On/Off", timer-based</p> <hr/> <p>"On/Off" via button on the front plate</p> <hr/> <p>"On/Off" via I/O interface</p>
Protection	Protection against reverse polarity, overload protection
Overvoltage category (mains supply, IEC 60664-1)	II

ES830.1 Rapid Prototyping Module

Operating voltage range	6 V to 32 V DC
Operating voltage (typ.)	12 V DC
Current consumption	Operation: Max. 8 A at 6 V DC, Max. 5 A at 12 V DC, Max. 2 A at 32 V DC Standby: < 10 mA at 12 V DC, max. 20 mA (without current consumption of connected devices)
Energy management	"On/Off" with start/stop of Ethernet traffic "On" with start of a connected module "On/Off" via button on the front plate "On/Off" via I/O interface
Protection	Protection against reverse polarity, overload protection
Overvoltage category (mains supply, IEC 60664-1)	II

ES882.x ECU and Bus Interface Module

Operating voltage	ES882.1: 6V to 32V DC ES882.2: 7V to 29V DC
Operating voltage (typ.)	12 V DC
Current consumption, operation	Max. 7 A at 6 V DC, Max. 5 A at 12 V DC, Max. 4 A at 32 V DC
Current consumption, standby	Typ. 17 mA at 12 V DC Max. 25 mA
Output current per "GE" connection	Nom. max. 0.5 A
Output current per "FE" connection	Nom. max. 2 A
Energy management	On/Off with start/stop of Ethernet traffic (On/Off upstream module)
Protection	Protection against reverse polarity, overload protection
Overvoltage category (mains supply, IEC 60664-1)	II

ES886.x ECU and Bus Interface Module

Operating voltage	ES886.1: 6V to 32V DC ES886.2: 7V to 29V DC
Operating voltage (typ.)	12 V DC
Current consumption, operation	Max. 7 A at 6 V DC, Max. 5 A at 12 V DC, Max. 4 A at 32 V DC

Current consumption, standby	Typ. 17 mA at 12 V DC Max. 25 mA
Output current per "GE" connection	Nom. max. 0.5 A
Output current per "FE" connection	Nom. max. 2 A
Energy management	On/Off with start/stop of Ethernet traffic (On/Off upstream module)
Protection	Protection against reverse polarity, overload protection
Overvoltage category (mains supply, IEC 60664-1)	II

ES891.x ECU and Bus Interface Module

Operating voltage	ES891.1: 6V to 32V DC ES891.2: 7V to 29V DC
Operating voltage (typ.)	12 V DC
Current consumption, operation	Max. 7 A at 6 V DC, Max. 5 A at 12 V DC, Max. 4 A at 32 V DC
Current consumption, standby	Typ. 17 mA at 12 V DC Max. 25 mA
Output current per "GE" connection	Nom. max. 0.5 A
Output current per "FE" connection	Nom. max. 2 A
Energy management	On/Off with start/stop of Ethernet traffic (On/Off upstream module)
Protection	Protection against reverse polarity, overload protection
Overvoltage category (mains supply, IEC 60664-1)	II

ES892.x ECU and Bus Interface Module

Operating voltage	ES892.1: 6V to 32V DC ES892.2: 7V to 29V DC
Operating voltage (typ.)	12 V DC
Current consumption, operation	Max. 7 A at 6 V DC, Max. 5 A at 12 V DC, Max. 4 A at 32 V DC
Current consumption, standby	Typ. 17 mA at 12 V DC Max. 25 mA
Output current per "GE" connection	Nom. max. 0.5 A
Output current per "FE" connection	Nom. max. 2 A

Energy management	On/Off with start/stop of Ethernet traffic (On/Off upstream module)
Protection	Protection against reverse polarity, overload protection
Overvoltage category (mains supply, IEC 60664-1)	II

16.9.3 Gigabit Ethernet Interface (HOST)



NOTE

The Gigabit Ethernet (HOST) interface is activated only in standalone operation and in an ES800 module stack **only** in the **lowest** module. All other HOST interfaces of the module stack can neither send nor receive Ethernet signals and are deactivated.

Connection type	Upstream
Number	1 (HOST)
Connection	Duplex mode; IEEE 802.3 - 1000BASE-T, IEEE 802.2 - 10/100BASE-TX
IP address	Dynamic via INTECRIO or INCA
Synchronization	IEEE1588-2008
Synchronization resolution	1 μ s
Electrical isolation	Connection electrically isolated from module

16.9.4 Fast Ethernet Interface (FE)

Connection type	Downstream
Number	1 (FE)
Connection	Duplex mode; 1000 BASE-T 100 BASE-TX
Protocol	TCP/IP
Support	Fast Ethernet
Ethernet Monitoring (ES886.x): Hardware based filtering	VLAN filter
Synchronization	ETAS synchronization mechanism or IEEE1588-2008
Synchronization resolution	ETAS synchronization mechanism: 1 μ s IEEE1588-2008 synchronization: 1 μ s
Output current at connection	max. 2 A (for power supply of connected ETAS modules)
Electrical isolation	Ethernet connections electrically isolated from the module, power supply connec- tions not electrically isolated from the module

Applications with ETAS Modules from other Series

If the FE interface is used to connect to ETAS modules from other series, please note the following:

The synchronization of the ETAS modules from other series, which are connected via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, is supported.

The "Wake-Up" and "Sleep" functions of the ES800 modules that are performed using ETAS modules from other series, which are connected to the "FE" interface or via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, are supported.

16.9.5 Gigabit Ethernet Interface (GE)



NOTE

The GE interface of the ES820.1 Drive Recorder and the GE interface of the ES830.1 Rapid Prototyping Module can be used to connect additional ETAS modules.

Connection type	Downstream
Number	1 (GE)
Connection	Duplex mode; IEEE 802.3 - 1000BASE-T, IEEE 802.2 - 100BASE-TX
Protocol	TCP/IP
Support	Gigabit Ethernet
Ethernet Monitoring (ES886.x): Hardware based filtering	VLAN filter
Synchronization	IEEE1588-2008
Synchronization resolution	1 μ s
Output current for each connection	max. 0.5 A (for power supply to connected ETAS modules)
Electrical isolation	Ethernet connections electrically isolated from the module, power supply connections not electrically isolated from the module

Applications with ETAS Modules from other Series

If the GE interface is used to connect to ETAS modules from other series, please note the following:

The synchronization of the ETAS modules from other series, which are connected via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, is supported.

The "Wake-Up" and "Sleep" functions of the ES800 modules that are performed using ETAS modules from other series, which are connected to the "FE" interface or via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, are supported.

16.9.6 FETK/Gigabit Ethernet Interface (FETK/GE)



NOTE

The technical data for the FETK / Gigabit Ethernet interfaces (FETK / GE) of the module is identical.



NOTE

The FETK/GE interface can be used for connecting an ETK (Dual Mode), an FETK or as a Gigabit Ethernet connection.

Connection type	Downstream
Number	2 (FETK1 / GE, FETK2 / GE)
Connection	Duplex mode; 1000BASE-T, 100BASE-TX
Protocol	TCP/IP
Support	Gigabit Ethernet or FETK or ETK in FETK mode
Synchronization	IEEE1588-2008
Synchronization resolution	1 μ s
Output current for each connection	max. 0.5 A (for power supply to connected ETAS modules)
Electrical isolation	Ethernet connections electrically isolated from the module, power supply connections not electrically isolated from the module

Applications with ETAS Modules from other Series

If the FETK/GE interface is used as a Gigabit Ethernet connection to connect to ETAS modules from other series, please note the following:

The synchronization of the ETAS modules from other series, which are connected via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, is supported.

The "Wake-Up" and "Sleep" functions of the ES800 modules that are performed using ETAS modules from other series, which are connected to the "FE" interface or via the "GE-HOST" Gigabit HOST interface of an ES600.2 module to the "GE" interface of an ES800 module, are supported.

16.9.7 Automotive Ethernet Interface (AE)

**NOTE**

The technical data for the interfaces AE1 to AE3 of the module ES882.x and for the interfaces AE1 to AE4 of the modules ES886.1 and ES886.2 are identical. The functionality of the Automotive Ethernet interfaces AE is different (see chapter "TAP Function (ES886.x)" on page 93).

Connection type	Master or Slave (statically or automatically)
Number	ES882.x: 3 (AE) ES886.x: 4 (AE)
Connection	IEEE 802.3bw 100BASE-T1, Automotive Ethernet- / BroadR-Reach (100BASE-T1)
Protocol	TCP/IP, UDP
Ethernet Monitoring (ES886.x): Hardware based filtering	VLAN filter
Synchronization	IEEE1588-2008
Synchronization resolution	1 μ s
Transfer delay data	TAP Physical Layer (100BASE-T1 - 100BASE-T1): < 2.24 μ s TAP Ethernet Layer ¹⁾ (100BASE-T1 - 100BASE-T1): < 46 μ s
Electrical isolation	Connections separately electrically iso- lated from the module

¹⁾ Lead time without additional frames through the application

Applications with ETAS-ETKs with Automotive Ethernet Interface (BR_XETK-S)

If the XETKs BR_XETK-S1.0 and BR_XETK-S2.0 are operated at the AE interface, the synchronization function in accordance with IEEE1588-2008 is not available.

16.9.8 FlexRay Interface (FLX)

FlexRay Controller

Communication controller	Bosch E-Ray
Number of nodes/channels	1 node with 2 channels (A+B), 1 additional internal node for bus synchronization of individual FlexRay nodes/ECUs that are not located on a FlexRay bus (e.g. for flashing ECUs)
FlexRay specification	FlexRay protocol V2.1 Rev. A
FlexRay conformance test	In accordance with ISO 9646
Payload	max. 254 bytes
Hardware-based filtering	Slot counter, cycle counter and channel

Designation and Mapping of FlexRay Channels

FLX1	FlexRay channel A
FLX2	FlexRay channel B

Physical Layer

Transceiver	NXP TJA1082
Termination	100 Ohm
Transmission speed, max.	10 Mbaud / channel

"FlexRay Sleep" and "FlexRay Wake-Up" Functions

Function	Condition
Sleep on no Traffic	No FlexRay data traffic
Wake-Up on Traffic	FlexRay data traffic detected
Configuration	The conditions for the functions are configured in the application software.

Electrical Isolation

Electrical isolation	Both channels are electrically isolated from each other and other switching components
----------------------	--

16.9.9 CAN Interface (CAN)

ES882.1, ES886.1, ES891.1, ES892.1.

Standard	CAN, CAN FD	ISO11898-1:2015, ISO15765-4, ISO11898-2:2016
Non-Standard	CAN FD	Bosch CAN FD Specification V1.0 (Non-ISO)
Transmission speed	CAN	1 Mbit/s
	CAN FD	2 Mbit/s (higher number of nodes and sub topologies)
		5 Mbit/s (point-to-point connections)
Payload	CAN	Max. 8 Byte
	CAN FD	Max. 64 Byte
Controller		Bosch M_CAN
Transceiver (physical layer)		NXP TJA1044G
Differential internal resis- tance Ri		10 kOhm
Electrical isolation		Interfaces separated from each other and the other interfaces
Configuration		Each channel can be configured sep- arately

ES882.2, ES886.2, ES891.2, ES892.2

Standard	CAN, CAN FD SIC ¹⁾ ,	ISO11898-1:2015, ISO15765-4, ISO11898-2:2016, CiA601-4 V2.0.0
Transmission speed	CAN	1 Mbit/s
		2 Mbit/s (higher number of nodes and sub topologies)
	CAN FD SIC ¹⁾	5 Mbit/s (higher number of nodes and sub topologies)
		8 Mbit/s (point-to-point connections)
Payload	CAN	Max. 8 Byte
	CAN FD SIC ¹⁾	Max. 64 Byte
Controller		Bosch M_CAN
Transceiver (physical layer)		NXP TJA1462
Differential internal resis- tance Ri		10 kOhm

Electrical isolation	Interfaces separated from each other and the other interfaces
Configuration	Each channel can be configured separately

¹⁾: CAN FD SIC = CAN Flexible Data Rate Signal Improvement Capability

"CAN Sleep" Function

The conditions for the "CAN Sleep" function are configured in the web interface of the module.

"CAN Wake-Up" Function

Wake-Up on traffic	Differential input voltage (min.)	$V_{diff, min} = 0.2 \text{ V}$
	Rise rate of signal edges	$t/dV < 150 \text{ ns/V}$
	Differential input resistance	$R_{i, diff} = 10 \text{ kOhm}$
	At least two signal edges of the same polarity must fall within a time of 100 ms	
Configuration	The conditions for the "CAN Wake-Up" function are configured in the web interface of the module.	

16.9.10 LIN Interface (LIN)

Standard	LIN V2.2A, compatible with LIN V1.3, LIN V2.0 and LIN V2.1
Controller	LIN core (FPGA)
Transceiver (physical layer)	MCZ33661EF
Electrical isolation	Interface separated from the other interfaces
LIN reference voltage Vbat	Internal from module or external from LIN bus
Operating modes	Master or slave
Master resistance	Connectible
Configuration	Configurable in the application software

16.9.11 USB 2.0 and USB 3.0 Interfaces (2.0 and 3.0)



NOTE

Please ensure that the functionality of the USB interfaces on the ES830.1 module is enabled for operation later.

Properties



NOTE

The technical data for the two USB2.0 interfaces of the ES820.1 module is identical.



NOTE

The technical data for the two USB3.0 interfaces of the ES820.1 module is identical.

Output Current

Terminal assignment	Standard USB socket, type A
Output current per USB 2.0 interface	max. 0.5 A
Output current per USB 3.0 interface	max. 0.9 A

Compatible ETAS Hardware

- ES581.4 CAN Bus Interface USB Module
- ES582.1 CAN FD Bus Interface USB Module
- ES583.1 FlexRay Bus Interface USB Module
- ES584.1 CAN FD and LIN Bus Interface USB Module

Other compatible Hardware

The USB connections are suitable for the connection of USB peripheral devices and enable the system to be extended. ETAS can neither guarantee compatibility with all available USB devices nor provide a compatibility list.



NOTE

Observe the technical data and ambient conditions of the USB devices. They may restrict the area of application of the ES820.1.

USB Cable

NOTE

Please note that ETAS does not offer cables for USB connections. Only use high-quality, commercially available cables that are suitable for the temperature range of the application in question (e.g. elasticity at low temperatures).

Using external Storage Media

NOTE

Commercially available USB storage media are often unsuitable for use in a vehicle.

ETAS recommends using the replaceable SSD memory module from the range of accessories for the ES820.1 (see chapter "ES800 Memory Module" on page 208).

NOTE

Software and other data on the USB storage media must be uninstalled or deleted prior to use with the ES820.1.

NOTE

Data may be lost.

Do not remove USB storage media from the ES820.1 during data transfer.

16.9.12 Computer Unit of the Drive Recorder ES820.1

Processor	Intel Core i5-5350U Dual-Core
RAM	4 GB RAM
Mass storage	128 GB SSD internal (operating system and application)
Operating system	Windows Embedded 7 ¹⁾ Windows 10 IoT ²⁾

¹⁾: up to INCA V7.2.19; Windows 10 IoT update with ES820.1 Service Contract

²⁾: INCA V7.3.5 (SP5) and higher

16.9.13 Measurement Readiness of the Drive Recorder ES820.1

Operating state	Boot time/measurement readiness ¹⁾
"On"	Recording starts immediately, no delay
"Fast boot standby" (Suspend to RAM)	Approx. 10 s
Low power standby (Suspend to Disk)	Approx. 60 s

¹⁾: Depending on the boot time of the connected modules and the scale of the experiment

16.9.14 Simulation Controller of the Rapid Prototyping Module ES830.1

Processor	Intel Core i5-5350U Dual-Core
RAM	4 GB RAM
Mass storage	128 GB SSD internal (operating system)

16.9.15 Boot Time of the Rapid Prototyping Module ES830.1

Operating state	Boot time ¹⁾
"On"	Approx. 15 s

¹⁾: Depending on the boot time of the connected modules

16.9.16 Boot Time of the Modules ES882.x, ES886.x, ES891.x, and ES892.x

Operating state	Boot time
„On“	Approx. 12 s

16.10 Terminal Assignment

**NOTE**

All connections are shown with a view onto the interfaces of the modules.
All shields are on housing potential.

16.10.1 Power Supply Connection (ES801.1 and ES801.1-S)

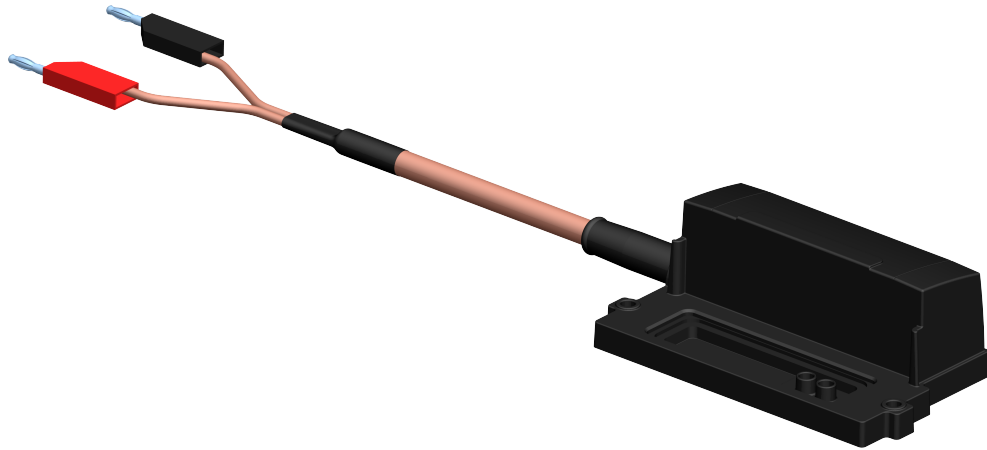


Fig. 16-2 Power supply connection (PWR, Base Module ES801.1 and ES801.1-S)

Plug	Signal	Meaning
Red	UBATT+	Supply voltage, positive
Black	UBATT-	Supply voltage, ground

16.10.2 HOST Connection (HOST)

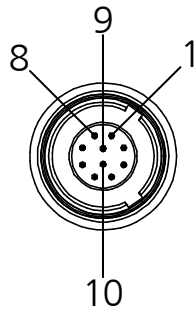


Fig. 16-3 HOST connection (HOST)

Pin	Signal	Meaning
1	BI_DA+	Gigabit Ethernet
2	BI_DC-	Gigabit Ethernet
3	BI_DC+	Gigabit Ethernet
4	BI_DB-	Gigabit Ethernet
5	BI_DB+	Gigabit Ethernet
6	BI_DD-	Gigabit Ethernet
7	BI_DD+	Gigabit Ethernet
8	BI_DA-	Gigabit Ethernet
9	N.C.	Not connected
10	N.C.	Not connected

16.10.3 Fast Ethernet Connection (FE)

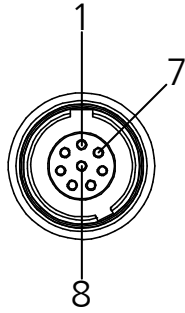


Fig. 16-4 Fast Ethernet connection (FE)

Pin	Signal	Meaning
1	UBATT+	Supply voltage, positive
2	UBATT+	Supply voltage, positive
3	UBATT-	Supply voltage, negative
4	RX+	Receiving data, positive
5	TX-	Transmitting data, negative
6	RX-	Receiving data, negative
7	UBATT-	Supply voltage, negative
8	TX+	Transmitting data, positive

16.10.4 Gigabit Ethernet Connection (GE)

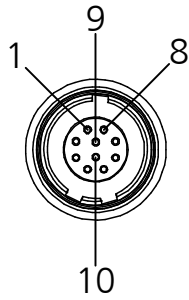


Fig. 16-5 Gigabit Ethernet connection (GE)

Pin	Signal	Meaning
1	BI_DA+	
2	BI_DC-	
3	BI_DC+	
4	BI_DB-	
5	BI_DB+	
6	BI_DD-	
7	BI_DD+	
8	BI_DA-	
9	UBATT+	Supply voltage, positive
10	UBATT-	Supply voltage, negative

16.10.5 FETK/Gigabit Ethernet Connection (FETK/GE)

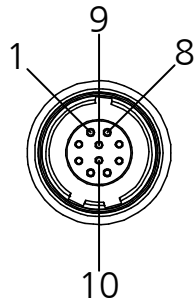


Fig. 16-6 FETK/Gigabit Ethernet connection (FETK/GE)

Pin	Signal	Meaning
1	BI_DA+	
2	BI_DC-	
3	BI_DC+	
4	BI_DB-	
5	BI_DB+	
6	BI_DD-	
7	BI_DD+	
8	BI_DA-	
9	UBATT+	Supply voltage, positive
10	UBATT-	Supply voltage, negative

16.10.6 Automotive Ethernet Connection (AE)

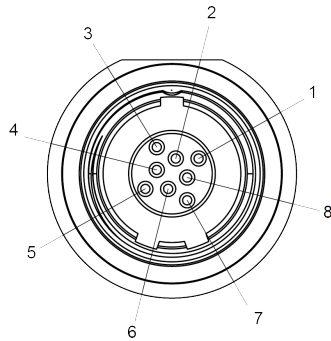


Fig. 16-7 Automotive Ethernet Connection (AE)

ES882.x

Pin	Signal	Meaning
1	AE1+	Automotive Ethernet, Interface 1
2	AE1-	Automotive Ethernet, Interface 1
3	AE2+	Automotive Ethernet, Interface 2
4	AE2-	Automotive Ethernet, Interface 2
5	AE3+	Automotive Ethernet, Interface 3
6	AE3-	Automotive Ethernet, Interface 3
7	N.C.	Not connected
8	N.C.	Not connected

ES886.x

Pin	Signal	Meaning
1	AE1+	Automotive Ethernet, Interface 1
2	AE1-	Automotive Ethernet, Interface 1
3	AE2+	Automotive Ethernet, Interface 2
4	AE2-	Automotive Ethernet, Interface 2
5	AE3+	Automotive Ethernet, Interface 3
6	AE3-	Automotive Ethernet, Interface 3
7	AE4+	Automotive Ethernet, Interface 4
8	AE4-	Automotive Ethernet, Interface 4

16.10.7 FlexRay Connection (FLX1/FLX2) ES891.x only

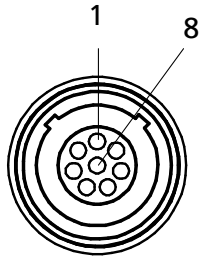


Fig. 16-8 FlexRay connection (FLX1/FLX2)

Pin	Signal	Meaning
1	-	Reserved
2	FLX1 B-negative	FlexRay node 1, channel A, bus negative
3	FLX1 GND	FlexRay node 1, channel A, ground
4	FLX2 B-positive	FlexRay node 2, channel B, bus positive
5	FLX2 GND	FlexRay node 2, channel B, ground
6	FLX1 GND	FlexRay node 1, channel A, ground
7	FLX1 B-positive	FlexRay node 1, channel A, bus positive
8	FLX2 B-negative	FlexRay node 2, channel B, bus negative

16.10.8 CAN Connection (CAN/CAN)

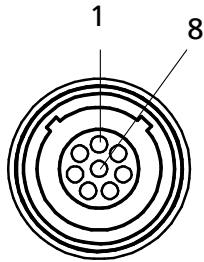


Fig. 16-9 CAN connection

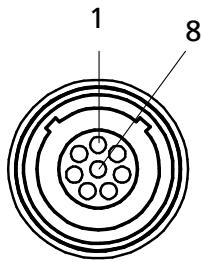
Connection for CAN4/CAN2

Pin	Signal	Meaning
1	-	Reserved
2	CAN1_L	CAN 1, low
3	CAN1_GND_1	CAN 1, ground
4	CAN2_H	CAN 2, high
5	CAN2_GND	CAN 2, ground
6	CAN1_GND_2	CAN 1, ground
7	CAN1_H	CAN 1, high
8	CAN2_L	CAN 2, low

Connection for CAN4/CAN5

Pin	Signal	Meaning
1	-	Reserved
2	CAN4_L	CAN 4, low
3	CAN4_GND_1	CAN 4, ground
4	CAN5_H	CAN 5, high
5	CAN5_GND	CAN 5, ground
6	CAN4_GND_2	CAN 4, ground
7	CAN4_H	CAN 4, high
8	CAN5_L	CAN 5, low

16.10.9 CAN / LIN Connection

**Fig. 16-10** CAN/LIN connection

CAN3/LIN (ES891.x, ES892.x)

Pin	Signal	Meaning
1	LIN_UBATT	LIN, UBATT
2	CAN3_L	CAN 3, low
3	CAN3_GND_1	CAN 3, ground
4	LIN	LIN
5	LIN_GND	LIN, ground
6	CAN3_GND_2	CAN 3, ground
7	CAN3_H	CAN 3, high
8	-	Reserved

CAN5/LIN (ES882.x, ES886.x)

Pin	Signal	Meaning
1	LIN_UBATT	LIN, UBATT
2	CAN5_L	CAN 5, low
3	CAN5_GND_1	CAN 5, ground
4	LIN	LIN
5	LIN_GND	LIN, ground
6	CAN5_GND_2	CAN 5, ground
7	CAN5_H	CAN 5, high
8	-	Reserved

16.10.10 I/O Connection (I/O)

Functional description see chapter "I/O Interface (I/O)" on page 106.

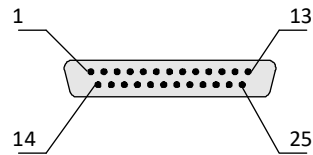


Fig. 16-11 I/O connection

Pin	Signal	Type	Logic	I max. [mA]	Meaning
1	OUT_1	Output	5 V	10	Low: <0.5 V @ 0 mA, high: > 2.5 V @ 10 mA, can be used as INCA signal
2	OUT_2	Output	5 V	10	Low: <0.5 V @ 0 mA, high: > 2.5 V @ 10 mA, can be used as INCA signal
3	OUT_3	Output	5 V	10	Low: <0.5 V @ 0 mA, high: > 2.5 V @ 10 mA, can be used as INCA signal
4	OUT_4	Output	5 V	10	Low: <0.5 V @ 0 mA, high: > 2.5 V @ 10 mA, can be used as INCA signal
5	GND	-	-	-	Ground
6	GND	-	-	-	Ground
7	GND	-	-	-	Ground
8	GND	-	-	-	Ground
9	OUT_STA- TUS	Output	5 V	state	Low: <0.5 V @ 0 mA, high: > 2.5 V @ 10 mA High = ES820.1/ ES830.1 switched on, Low = ES820.1/ ES830.1 in standby
11	IN_POW- ER_BUT- TON	Input	3.3 V	-	Low: <2.0 V, high: > 2.4 V For connecting an external "Remote Power" button to ground; function of external "Remote Power" button and "Power" button on the module is identical
12	PSCI	Input	-	-	Low: <2.2 V, high: > 2.7 V To be switched on automatically when e.g., the ignition (KI.15) is switched on
13	IN1	Input	-	-	Low: <2.2 V, high: > 2.7 V. Can be used for INCA signals (signal state, trigger)
14	IN2	Input	-	-	Low: <2.2 V, high: > 2.7 V. Can be used for INCA signals (signal state, trigger)

Pin	Signal	Type	Logic	I max. [mA]	Meaning
15	IN3	Input	-	-	Low: <2.2 V, high: > 2.7 V. Can be used for INCA signals (signal state, trigger)
16	IN4	Input	-	-	Low: <2.2 V, high: > 2.7 V. Can be used for INCA signals (signal state, trigger)
17	GND	-	-	-	Ground
18	LED_SYNC	Output	5 V		Status corresponds to the status of the LED SYNC (synchronization), dimensioned for direct connecting Low Current LEDs to ground
19	LED_ETH	Output	5 V		Status corresponds to the status of the LED ETH (Ethernet, combined), dimensioned for direct connecting Low Current LEDs to ground
20	Buzzer	Output	5 V	-	Status as per internal acoustic signal generator, suitable for the direct connection of a Piezo buzzer (e.g., Murata PKB24SPCH3601-B0)
21	LED_ON	Output	5 V		Status corresponds to the status of the LED ON (ES820.1/ ES830.1 operating state), dimensioned for direct connecting Low Current LEDs to ground
22	LED_MEAS	Output	5 V		ES820.1: status corresponds to the status of the LED MEAS (measurement), dimensioned for direct connecting Low Current LEDs to ground
	LED_SYS	Output	5 V		ES830.1: status corresponds to the status of the LED SYS (status of the bypass model OS), dimensioned for direct connecting Low Current LEDs to ground
23	LED_ERR	Output	5 V		Status corresponds to the status of the LED ERR (error status), dimensioned for direct connecting Low Current LEDs to ground
24	LED_MEM	Output	5 V		Status corresponds to the status of the LED MEM (memory), dimensioned for direct connecting Low Current LEDs to ground
	LED_USER	Output	5 V		Status corresponds to the status of the LED USER (user-specific configuration in INTECRIO), dimensioned for direct connecting Low Current LEDs to ground
25	LED_TEMP	Output	5 V		Status corresponds to the status of the LED TEMP (temperature), dimensioned for direct connecting Low Current LEDs to ground

Latency Period

Latency period	Maximum	Typical
All pins/ signals at "I/O" connection	100 ms	< 10 ms

Duration of the signal

All signals must have a static state for more than 20ms to be recognized reliably.

Protection

All inputs and outputs at the "I/O" connection are protected up to +/- 32 V against surge voltages.



NOTE

The "I/O" connection is not electrically isolated from the ground of the module's supply voltage. Therefore, never connect the connections marked with GND/ ground to the vehicle ground, the vehicle body, or other potentials.

"I/O" Connection: Socket and matching Plug

A 25-pin Micro DSUB socket (MOLEX Micro D) is installed at the "I/O" connection. Matching plugs for the "I/O" connection:

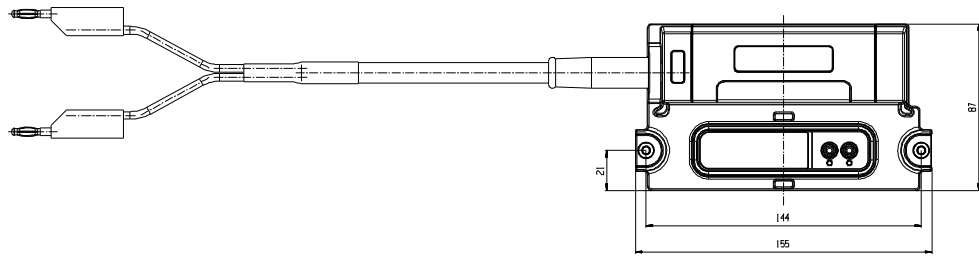
- Micro D Receptacle Kit (without contacts) Molex 83424-9014
- Contacts Molex 83000-0083

Optional:

- Pigtail cable Molex 83424-9021

16.11 Mechanical Data

16.11.1 ES801.1 and ES801.1-S

**Fig. 16-12** ES801.1 and ES801.1-S Dimensions (in mm)

Dimensions without cable (height x width x depth)	54 x 155 x 87 mm 2.13 x 6.1 x 3.43 in
Length of cable outside of the module	2 m / 78.7 in
Weight (with cable)	0.77 kg / 1.70 lb

16.11.2 ES820.1 Module

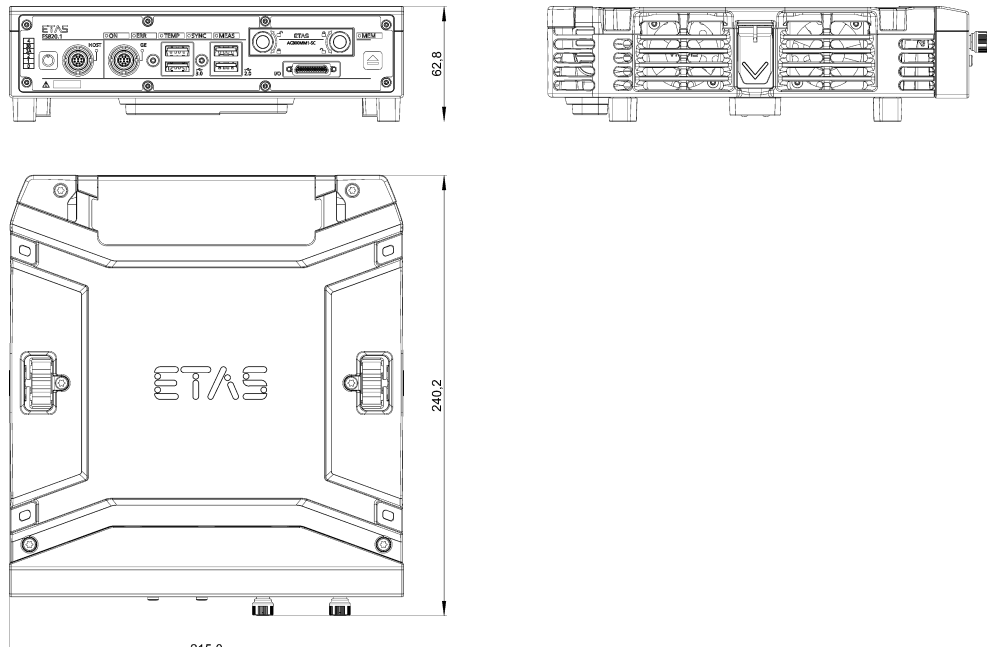


Fig. 16-13 ES820.1 Dimensions (in mm)

Dimensions (height x width x depth)	With ES820.1 memory module: 63 x 215 x 241 mm 2.47 x 8.46 x 9.49 in
Weight (with memory module)	3.70 kg / 8.16 lb

16.11.3 ES830.1 Module

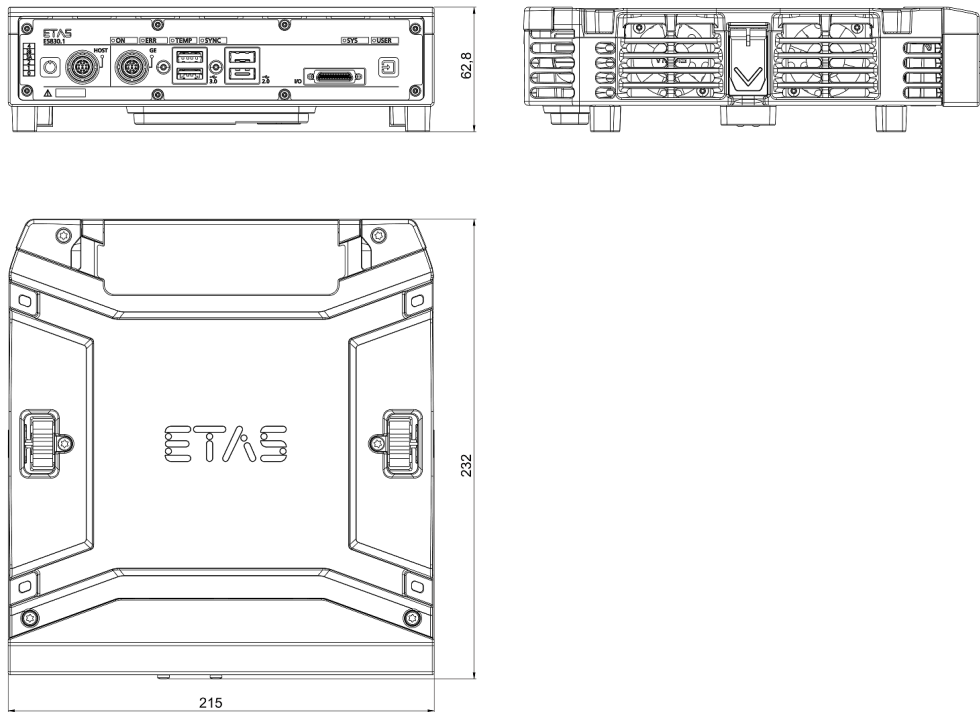


Fig. 16-14 ES830.1 Dimensions (in mm)

Dimensions (height x width x depth)	63 x 215 x 230 mm 2.47 x 8.46 x 9.06 in
Weight	3.70 kg / 8.16 lb

16.11.4 ES88x and ES89x Modules

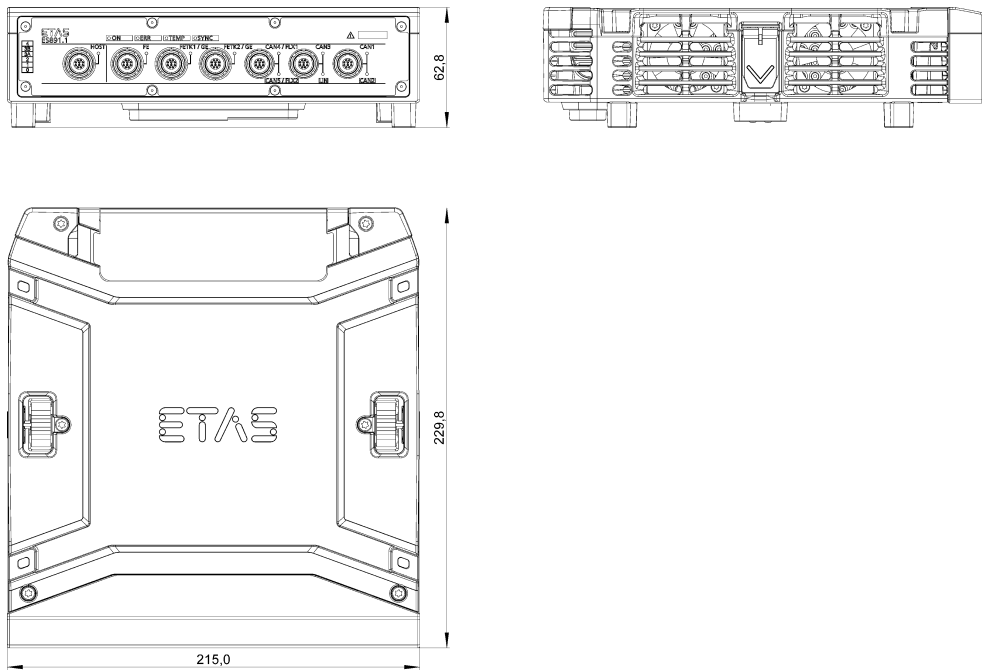


Fig. 16-15 ES882.x, ES886.x, , ES891.x and ES892.x Dimensions (in mm)

Dimensions (height x width x depth)	63 x 215 x 230 mm 2.47 x 8.46 x 9.06 in
Weight	2.92 kg / 6.44 lb

16.11.5 ES801.1 with ES8xx/ ES89x Module

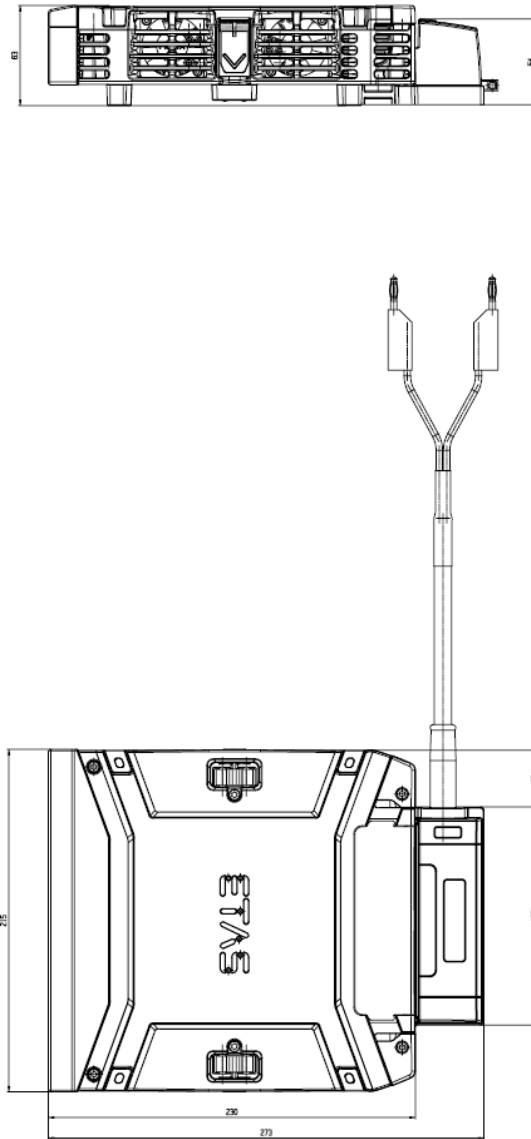


Fig. 16-16 ES801.1 and ES8xx/ ES89x Module Dimensions (in mm)

17 Cables and Accessories

This chapter contains information about the following topics:

- "Requirements for failsafe Operation" on page 180
- "Requirements for failsafe Automotive Ethernet Operation" on page 181
- "Cables for the HOST Interface" on page 182
- "Cables for the FE Interface" on page 183
- "Cables for the FETK and GE Interfaces" on page 190
- "Cables for the AE Interface" on page 191
- "Cables and Accessories for the CAN/LIN/FlexRay Interface" on page 197
- "Cables for the I/O Interface" on page 202
- "ES800 Memory Module Type 1" on page 205
- "Docking Station for ES800 Memory Module Type 1" on page 206
- "Docking Station for ES800 Memory Module Type 1" on page 206

17.1 Requirements for failsafe Operation



NOTE

Use exclusively ETAS cables at the interfaces of the module! Adhere to the maximum permissible cable lengths!



NOTE

Application-specific cables are available from ETAS. Please contact your ETAS contact partner or e-mail sales.de@etas.com.



NOTE

See chapter "Requirements for failsafe Automotive Ethernet Operation" on page 126 for details on wiring the Automotive Ethernet interface cables.



NOTE

Please contact your ETAS partner if you need to use Automotive Ethernet cables in areas with severe interference.

17.2 Requirements for failsafe Automotive Ethernet Operation

For failsafe operation of the Automotive Ethernet communication channel, all customer specific installations - including cables, connectors and board adaptations - have to be compliant to:

- IEEE Std. 802.3bwTM-2015, "Amendment 1: Physical Layer Specifications and Management Parameters for 100 Mb/s Operation over a Single Balanced Twisted Pair Cable (100BASE-T1)", chapters 96.7 - 96.9
- Open Alliance, "BroadR-Reach® Definitions for Communication Channel, Version 2.0"

NOTE

To achieve an appropriate Automotive Ethernet channel performance, all PCB board and cable segments have to be optimized with regard to line impedance matching, length matching within the differential net routing or twisted pair cabling, and on the reduction of untwisted regions. Stub segments must be avoided for the Point-to-Point cable connection in favor of inline connectors, and shielding measures shall be considered depending on the operating environment.

NOTE

Please contact your ETAS partner if you need to use Automotive Ethernet cables in areas with severe interference.

17.3 Cables for the HOST Interface

17.3.1 Cable CBE250



Fig. 17-1 Cable CBE250

Gigabit Ethernet cable, connection to PC

Order name	Short name	Order number
Ethernet PC Connection Cable 1 Gbit/s, Lemo 1B FGM – RJ45 (10fc-8mc), 3 m	CBE250.1-3	F 00K 109 469
Ethernet PC Connection Cable 1 Gbit/s, Lemo 1B FGM – RJ45 (10fc-8mc), 5 m	CBE250.1-5	F 00K 109 470
Ethernet PC Connection Cable 1 Gbit/s, Lemo 1B FGM – RJ45 (10fc-8mc), 8 m	CBE250.1-8	F 00K 109 471

17.4 Cables for the FE Interface

17.4.1 Cable CBAE190



Fig. 17-2 Cable CBAE190

100 MBit/s Ethernet adapter cable for Rapid Prototyping with ES89x

Order name	Short name	Order number
100 MBit/s Ethernet Connection Adapter Cable for RP with ES89x, Lemo 1B FGA - Lemo 1B PHG (8mc-8fc), 0.3 m	CBAE190-0m3	F 00K 109 902

17.4.2 Cable CBE400.2

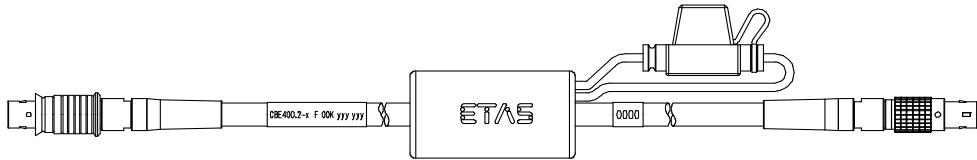


Fig. 17-3 Cable CBE400.2

Ethernet and voltage supply connection of an ES4xx/ES63x/ES93x measuring module to an ES600 network module or an ES592/ES593-D/ES595 interface module.

A replaceable fuse is located in the cable (MINI car blade-type fuse, fast, 3 A, 58 V). Robust, water-proof and dust-proof (IP67).

Temperature range: -40°C to +125°C/-40°F to +257°F

Product	Length	Order number
CBE400.2-3	3 m	F 00K 104 920

17.4.3 Cable CBE401.1

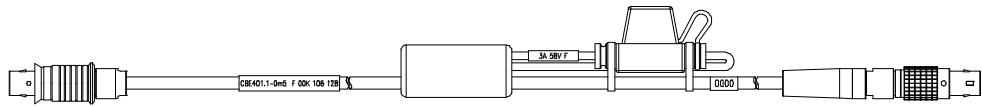


Fig. 17-4 Cable CBE401.1

Ethernet and voltage supply connection of an ES4xx/ES63x/ES93x measuring module to an ES600 network module or an ES592/ES593-D/ES595 interface module.

A replaceable fuse is located in the cable (MINI car blade-type fuse, fast, 3 A, 58 V).

Robust, water-proof and dust-proof (IP67).

Temperature range: -40°C to +125°C/-40°F to +257°F

Product	Length	Order number
CBE401.1-0m5	0.5 m	F 00K 106 128

17.4.4 Cable CBE430.1

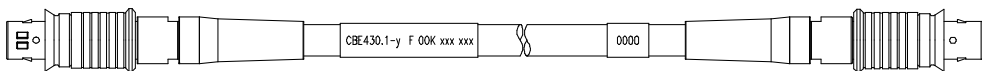


Fig. 17-5 Cable CBE430.1

Cable for interconnecting ES4xx/ES63x/ES93x modules. Incompatible with ES59x, ES6xx, ES11xx. To connect this modules, use cable CBE130 or CBE140.

Robust, water-proof and dust-proof (IP67).

Temperature range: -40°C to +125°C/-40°F to +257°F

Product	Length	Order number
CBE430.1-0m45	0.45 m	F 00K 104 923

17.4.5 Cable CBE431.1

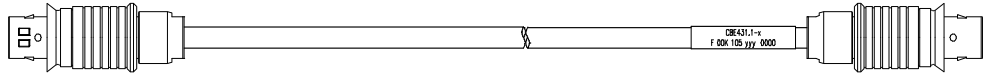


Fig. 17-6 Cable CBE431.1

Highly flexible cable for interconnecting adjacent ES4xx/ES63x/ES93x modules. Incompatible with ES59x, ES6xx, ES11xx. To connect these modules, use cable CBE130 or CBE140.

Robust, water-proof and dust-proof (IP67).

Temperature range: -40°C to +125°C/-40°F to +257°F

Product	Length	Order number
CBE431.1-0m14	0.14 m	F 00K 105 676
CBE431.1-0m3	0.30 m	F 00K 105 685

17.4.6 Cable CBEX400.1

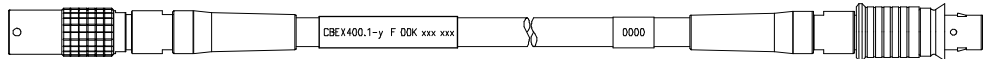


Fig. 17-7 Cable CBEX400.1

Extension for ES4xx/ES63x/ES93x Ethernet cable. Also serves as extension of the connection of ES4xx modules to the PC, an ES600 module or an ES1135, e.g., when routing the cabling through the front bulkhead.

Robust, water-proof and dust-proof (IP67).

Temperature range: -40°C to +125°C/-40°F to +257°F

Product	Length	Order number
CBEX400.1-3	3 m	F 00K 105 294

17.4.7 Cable CBEP410.1

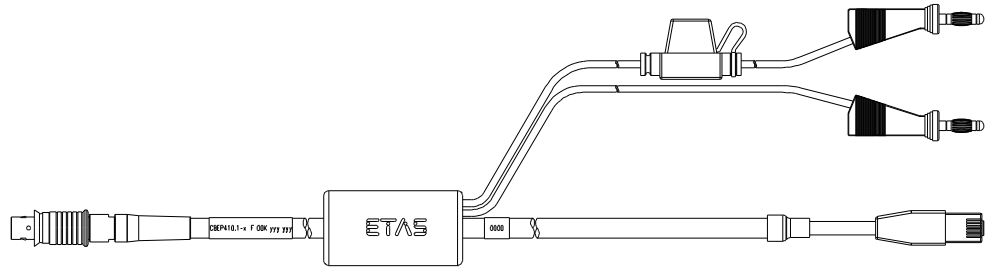


Fig. 17-8 Cable CBEP410.1

Connecting an ES4xx/ES63x/ES93x module to PC and power supply (standalone operation). Supply battery in the vicinity of the modules.

Incompatible with ES610, ES611, ES620 and ES650. To connect these modules, use cable CBEP120.

Robust, water-proof and dust-proof (IP67).

A replaceable fuse is located in the cable (MINI car blade-type fuse, fast, 3 A, 58 V).

Robust, water-proof and dust-proof (IP67).

Temperature range: -40°C to +125°C/-40°F to +257°F

Product	Length	Order number
CBEP410.1-3	3 m	F 00K 104 927

17.4.8 Cable CBEP415.1

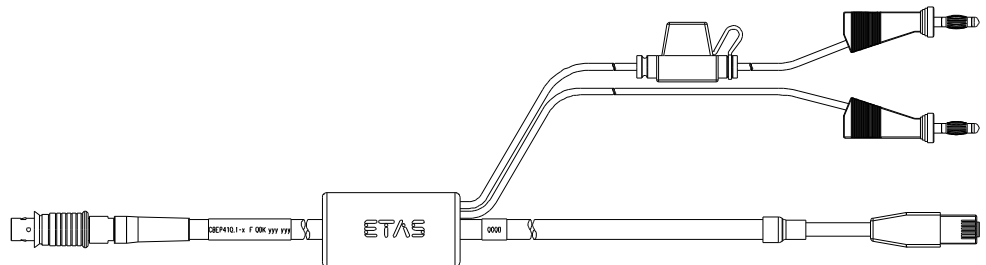


Fig. 17-9 Cable CBEP415.1

Connecting an ES4xx/ES63x/ES93x module to PC and power supply (standalone operation). Supply battery at the other end (i.e., in the trunk).

Incompatible with ES610, ES611, ES620 and ES650. To connect these modules, use cable CBEP120.

A replaceable fuse is located in the cable (MINI car blade-type fuse, fast, 3 A, 58 V).

Robust, water-proof and dust-proof (IP67).

Temperature range: -40°C to +125°C/-40°F to +257°F

Product	Length	Order number
CBEP415.1-5	5 m	F 00K 105 680

17.4.9 Cable CBEP420.1

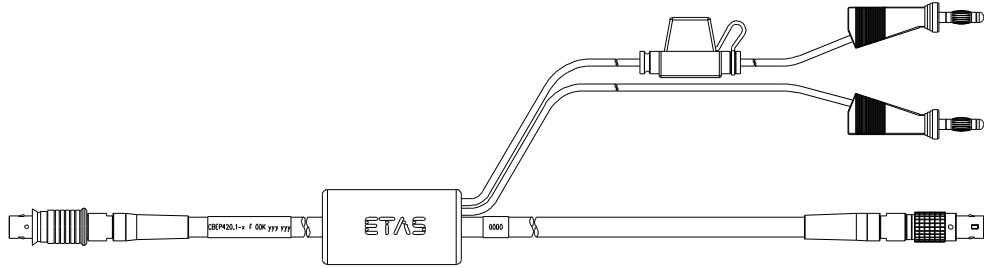


Fig. 17-10 Cable CBEP420.1

Ethernet and voltage supply connection of an ES4xx/ES63x/ES93x measuring module with an ES600 network module or ES592/ES593-D/ES595 interface module (if the current consumption of the connected ES4xx/ES63x chain exceeds 2.5 A), an ES1135 simulation/system controller card or an ES720 Drive Recorder. Incompatible with ES610, ES611, ES620 and ES650. To connect these modules, use cable CBEP120.

A replaceable fuse is located in the cable (MINI car blade-type fuse, fast, 3 A, 58 V). Robust, water-proof and dust-proof (IP67).

Temperature range: -40°C to +125°C/-40°F to +257°F

Product	Length	Order number
CBEP420.1-3	3 m	F 00K 105 292

17.4.10 Cable CBEP425.1

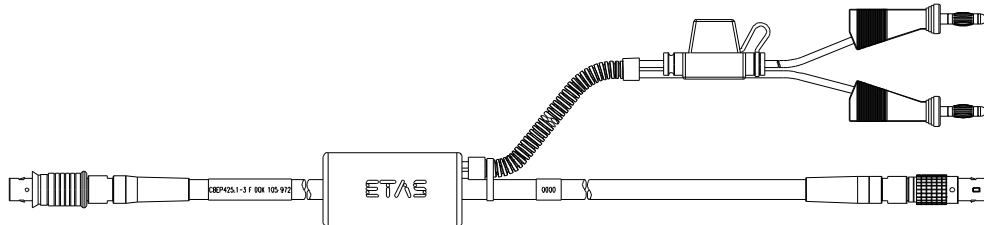


Fig. 17-11 Cable CBEP425.1

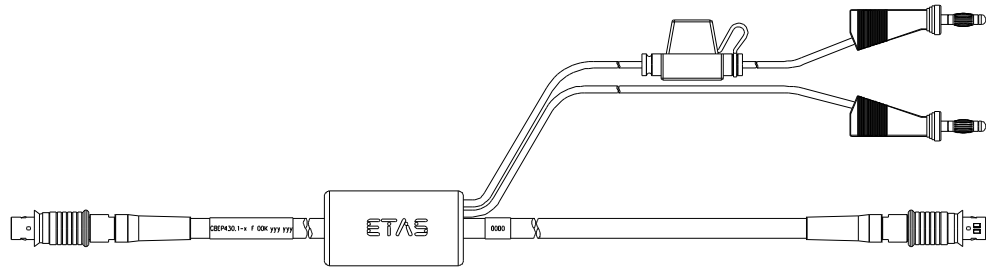
Ethernet and voltage supply connection of an ES4xx/ES63x/ES93x measuring module with an ES600 network module or ES592/ES593-D/ES595 interface module (if the current consumption of the connected ES4xx/ES63x/ES93x chain exceeds 2.5 A), an ES1135 simulation/system controller card or an ES720 Drive Recorder.

A replaceable fuse is located in the cable (MINI car blade-type fuse, fast, 3 A, 58 V). Robust, water-proof and dust-proof (IP67).

Temperature range: -40°C to +125°C/-40°F to +257°F

Product	Length	Order number
CBEP425.1-3	3 m	F 00K 105 972

17.4.11 Cable CBEP430.1

**Fig. 17-12** Cable CBEP430.1

For interconnecting ES4xx/ES63x/ES93x modules and for connecting an ES4xx/ES63x/ES93x chain to an ES910.3 rapid prototyping module. Additional connection to the power supply to compensate voltage losses in long chains.

Incompatible with ES59x, ES6xx and ES11xx. To connect these modules, use cable CBE130 or CBE140.

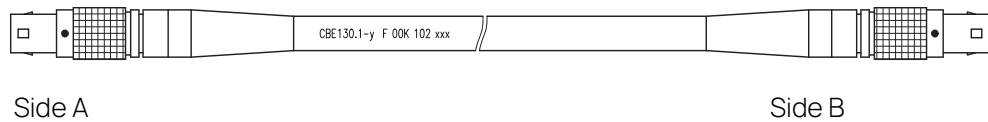
A replaceable fuse is located in the cable (MINI car blade-type fuse, fast, 3 A, 58 V).

Robust, water-proof and dust-proof (IP67).

Temperature range: -40°C to +125°C/-40°F to +257°F

Product	Length	Order number
CBEP430.1-0m5	0.5 m	F 00K 104 928

17.4.12 Cable CBE130-x

**Fig. 17-13** Cable CBE130-x

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

17.4.13 Cable CBE140

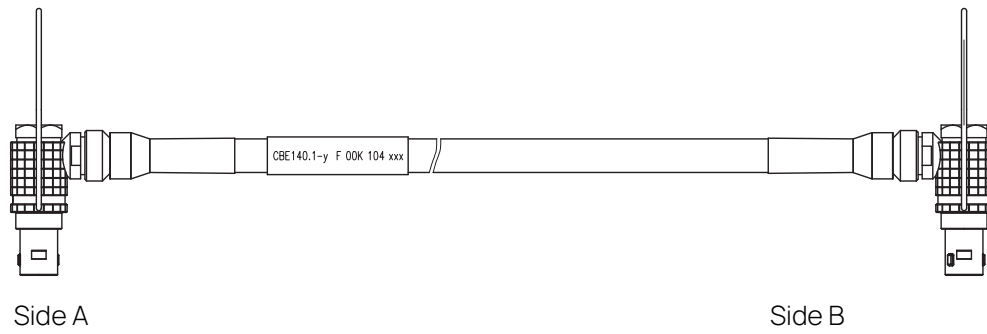


Fig. 17-14 Cable CBE140-0m45

Order name	Short name	Order number
Ethernet Connection and Power Supply Cable, Lemo 1B FGF Lemo 1B FGD (8mc-8mc), 0m45	CBE140-0m45	F 00K 104 153

17.4.14 Adapter Cable CBAE330

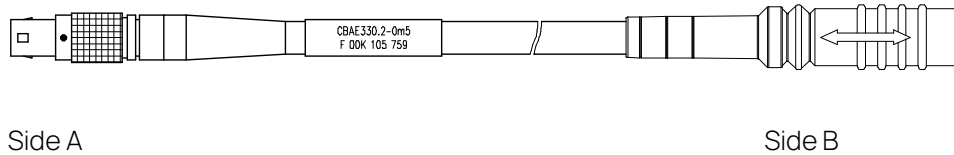


Fig. 17-15 Cable CBAE330.2

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

17.5 Cables for the FETK and GE Interfaces

17.5.1 Cable CBE260



Fig. 17-16 Cable CBE260

Gigabit Ethernet cable, connection to FETK, with power supply

Order name	Short name	Order number
GBit Ethernet and Power Connection Cable, Lemo 1B FGM - Lemo 1B FGH (10fc-10mc), 3 m	CBE260.1-3	F 00K 109 446
GBit Ethernet and Power Connection Cable, Lemo 1B FGM - Lemo 1B FGH (10fc-10mc), 8 m	CBE260.1-8	F 00K 109 447

17.5.2 Cable CBAE220



Fig. 17-17 Cable CBAE220

1 GBit/s Ethernet adapter cable for Rapid Prototyping with ES910/ES89x

Order name	Short name	Order number
1 GBit/s Ethernet Connection Adapter Cable for RP with ES910/ES89x, Lemo 1B FGE - Lemo 1B PHM (10mc-10fc), 0.3 m	CBAE220-0m3	F 00K 109 903

17.5.3 Cable CBAE360



Fig. 17-18 Cable CBAE360

Gigabit Ethernet cable, connection to Dual Mode ETK

Order name	Short name	Order number
GBit Ethernet Connection Adapter Cable for Dual Mode ETK, Lemo 1B FGH - Lemo 1B PHG (10mc-4fc), 0m3	CBAE360.1-0m3	F 00K 109 448

17.6 Cables for the AE Interface

17.6.1 CBEB240 Cable

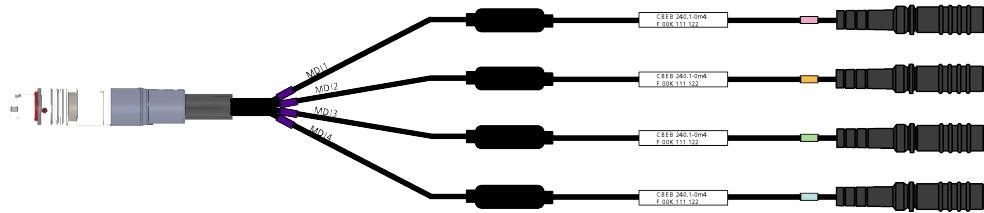


Fig. 17-19 CBEB240.1 Cable

Usage

Cable for connecting the Automotive Ethernet interface (AE) of an ES800 module to BR_XETKs, ECUs with Automotive Ethernet interfaces or Ethernet-based vehicle buses.

Assignment of the Automotive Ethernet Channels to the Cable Sections

The CBEB240.1 cable consists of four identical cable sections [n], each mapped to an Automotive Ethernet channel [n] of the Automotive Ethernet interface (AE) and wired in accordance with the same pattern. Each of the cable section is equipped with a LEMO connector.

Labeling of the Automotive Ethernet Channels and the Cable Sections

The cable sections are labeled n=1 to n=4 and are also marked with the color of the LEDs corresponding to the channels [n] at the AE connection of the module. The colors of the channels [n] at the AE connection of the module and the cable sections are identical.

ES800 module	Color	Automotive Ethernet channel	
"AE" LED	"AE" LED/cable	ES882.x	ES886.x
1	Purple	AE 1	AE 1
2	Orange	AE 2	AE 2
3	Green	AE 3	AE 3
4	Blue	-	AE 4

When using the CBEB240.1 cable at the AE interface of the module ES882.x (three Automotive Ethernet channels), three of the four cable sections are used in accordance with the assignment in the table.

Assignment of the Automotive Ethernet Signal to the LEMO Connectors

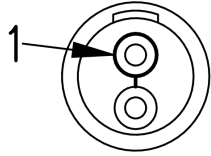


Fig. 17-20 "AE" connection (one cable section)

The assignment of the connections of the LEMO connector of a cable section to the signals of an Automotive Ethernet channel [N] is represented in the table.

Pin	Signal	Meaning
1	AE [n]-	Automotive Ethernet, channel [n], BI_DA-
2	AE [n]+	Automotive Ethernet, channel [n], BI_DA+

Temperature Range

-40 °C to +85 °C/ -40 °F to +185 °F

Order Information

Order name	Short name	Order number
Automotive Ethernet Splitter cable 100 Mbit/s, Yamaichi YCP - 4x Lemo PHA 1B (8mc -4x 2fc), 0m4	CBEB240.1-0m4	F 00K 111 122

17.6.2 CBEB242 Cable

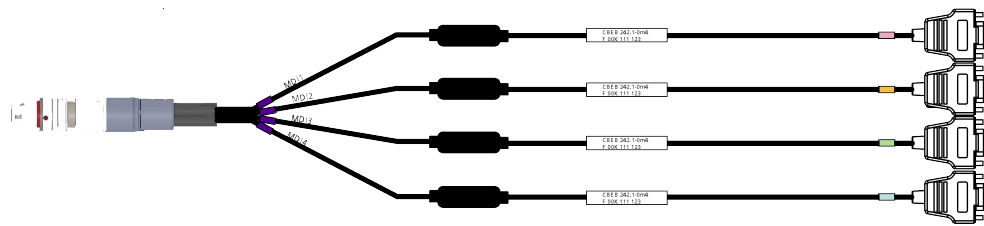


Fig. 17-21 CBEB242.1 cable

Usage

Cable for connecting the Automotive Ethernet interface (AE) of an ES800 module to BR_XETKs.

i NOTE

The CBEB242.1 cable is designed for directly connecting BR_XETKs. For other areas of application, ETAS recommends the CBEB240.1 Automotive Ethernet cable (see chapter 17.6.1 on page 191).

Assignment of the Automotive Ethernet Channels to the Cable Sections

The CBEB242.1 cable consists of four identical cable sections [n], each mapped to an Automotive Ethernet channel [n] of the Automotive Ethernet interface (AE) and wired in accordance with the same pattern. Each of the cable section is equipped with a DSUB9 connector.

Labeling of the Automotive Ethernet Channels and the Cable Sections

The cable sections are labeled [n]=1 to [n]=4 and are also marked with the color of the LEDs corresponding to the channels [n] at the AE connection of the module. The colors of the channels [n] at the AE connection of the module and the cable sections are identical.

ES800 module	Color	Automotive Ethernet channel	
"AE" LED	"AE" LED/cable	ES882.x	ES886.x
1	Purple	AE 1	AE 1
2	Orange	AE 2	AE 2
3	Green	AE 3	AE 3
4	Blue	-	AE 4

When using the CBEB242.1 cable at the AE interface of the module ES882.x (three Automotive Ethernet channels), three of the four cable harnesses are used in accordance with the assignment in the table.

Assignment of the Automotive Ethernet Signal to the DSUB9 Connectors

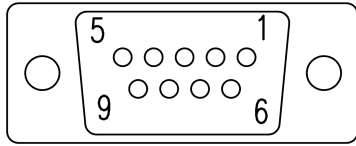


Fig. 17-22 "AE" connection (one cable section)

The assignment of the connections of the DSUB9 connector of a cable section to the signals of an Automotive Ethernet channel [N] is represented in the table.

Pin	Signal	Meaning
4	AE [n]+	Automotive Ethernet, channel [n], BI_DA+
5	AE [n]-	Automotive Ethernet, channel [n], BI_DA-

Temperature Range

-40 °C to +85 °C / -40 °F to +185 °F

Order Information

Order name	Short name	Order number
Automotive Ethernet Splitter Cable 100 Mbit/s, Yamaichi YCP - 4x DSUB (8mc - 4x 9mc), 0m4	CBEB242.1-0m4	F 00K 111 123

17.6.3 CBEB245 Cable

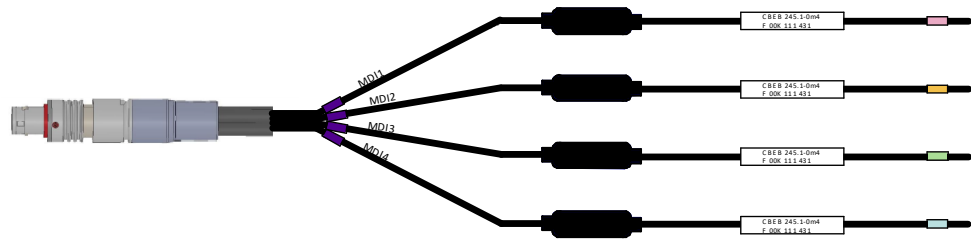


Fig. 17-23 CBEB245.1 cable

Usage

Cable for connecting the Automotive Ethernet interface (AE) of an ES800 module to BR_XETKs.



NOTE

See chapter “Requirements for failsafe Automotive Ethernet Operation” on page 126 for details on wiring the Automotive Ethernet interface cables.

Assignment of the Automotive Ethernet Channels to the Cable Sections

The CBEB245.1 cable consists of four identical cable sections [n] with open wire (cable tails), each mapped to an Automotive Ethernet channel [n] of the Automotive Ethernet interface (AE) and wired in accordance with the same pattern.

Labeling of the Automotive Ethernet Channels and the Cable Sections

The cable sections are labeled [n]=1 to [n]=4 and are also marked with the color of the LEDs corresponding to the channels [n] at the AE connection of the module. The colors of the channels [n] at the AE connection of the module and the cable sections are identical.

ES800 module	Color	Automotive Ethernet channel	
"AE" LED	"AE" LED/cable	ES882.x	ES886.x
1	Purple	AE 1	AE 1
2	Orange	AE 2	AE 2
3	Green	AE 3	AE 3
4	Blue	-	AE 4

When using the CBEB245.1 cable at the AE interface of the module ES882.x (three Automotive Ethernet channels), three of the four cable harnesses are used in accordance with the assignment in the table.

Assignment of the Automotive Ethernet Signal to the open Wires

The assignment of the open wires of a cable section to the signals of an Automotive Ethernet channel [N] is represented in the table.

Color	Signal	Meaning
Green	AE [n]+	Automotive Ethernet, channel [n], BI_DA+
White	AE [n]-	Automotive Ethernet, channel [n], BI_DA-

Temperature Range

-40 °C to +85 °C/ -40 °F to +185 °F

Order Information

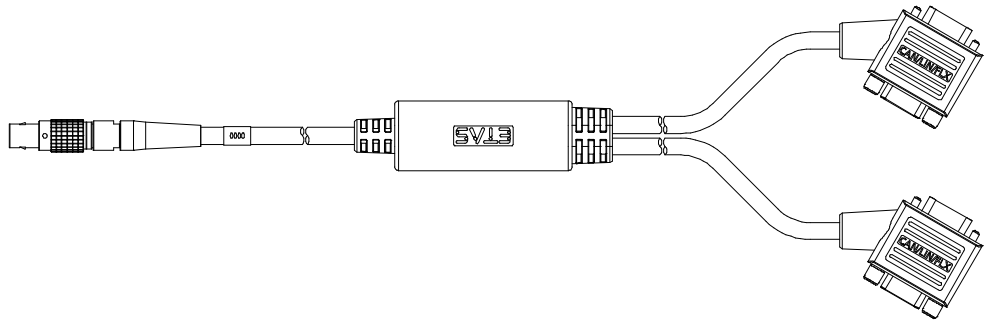
Order name	Short name	Order number
Automotive Ethernet Splitter Cable 100 Mbit/s, Yamaichi YCP - 4x Open Wire (8mc - 4x 2c), 0m4	CBEB245.1-0m4	F 00K 111 431
Automotive Ethernet Splitter Cable 100 Mbit/s, Yamaichi YCP - 4x Open Wire (8mc - 4x 2c), 2m	CBEB245.1-2	F 00K 111 385

17.7 Cables and Accessories for the CAN/LIN/FlexRay Interface

17.7.1 Combined CAN/LIN/FLX Cable

Lemos

DSUB9 female
DSUB9 male
grey



DSUB9 female
DSUB9 male
black

Fig. 17-24 Cable CBCFI100

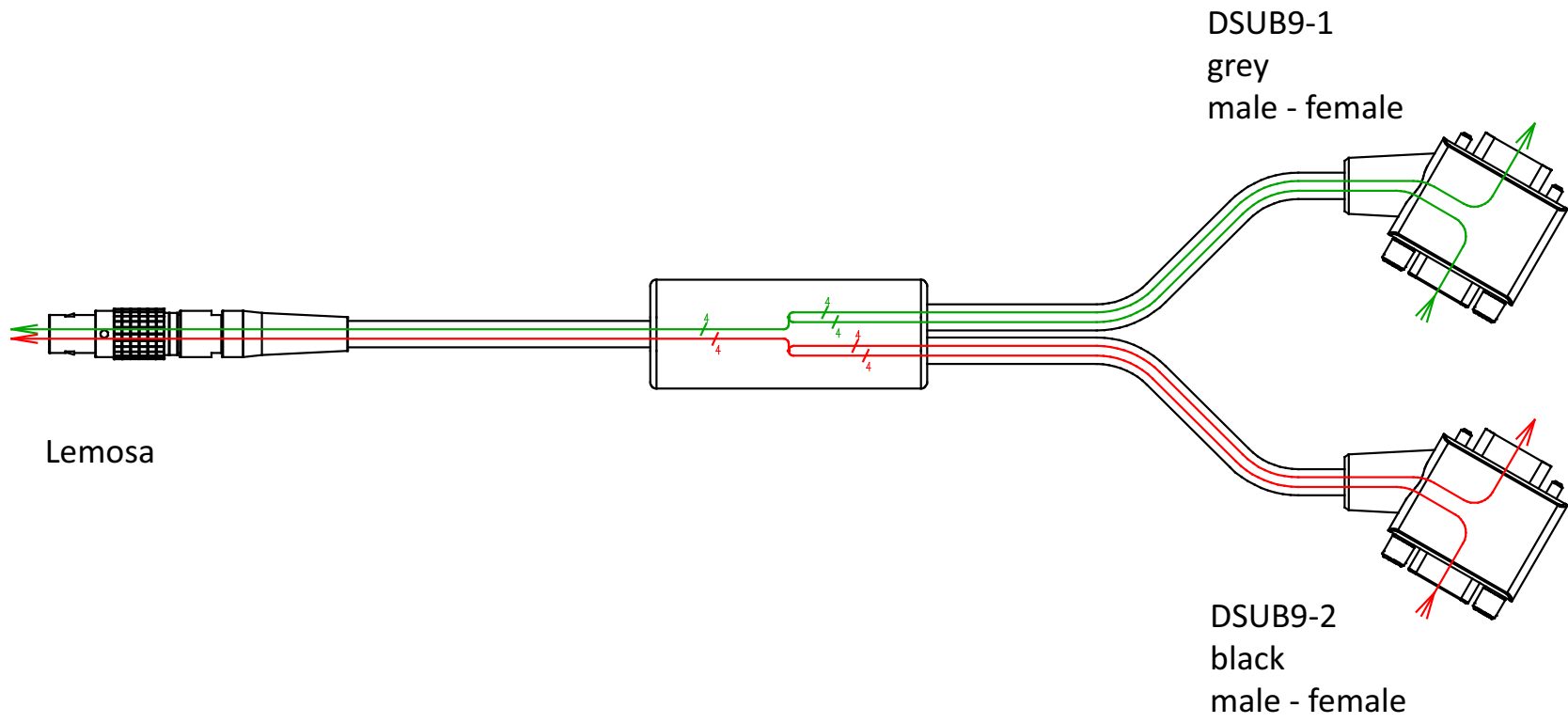
The Lemo connector of the cable is connected to one of the combined interfaces CAN/CAN, FLX/FLX or CAN/LIN. On the other side of the cable, there are two 9-pin DSUB socket-connector combinations for loping into the vehicle bus:

- a grey-marked socket-connector combination or
- a black-marked socket-connector combination

See Fig. 17-25 on page 198

The Assignments of the pins is shown on page 199.

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



Lemos

DSUB9-1
grey
male - female

DSUB9-2
black
male - female

Fig. 17-25 Cable CBCFI100 on FlexRay bus (dual channel bus)

Pin Assignments of the Cable

		ES891.x	ES882.x ES886.x ES891.x, ES892.x	ES882.x ES886.x	ES882.x ES886.x	ES891.x, ES892.x	ES891.x, ES892.x
	Lemos	FLX1/FLX2	CAN1/CAN2	"CAN3/CAN4"	CAN5/LIN	"CAN3/LIN"	CAN4/CAN5
DSUB1 grau	Pin 1	-	-	-	-	-	-
DSUB1 grau	Pin 2	FLX1_LOW	CAN1_LOW	CAN3_LOW	CAN5_LOW	CAN3_LOW	CAN4_LOW
DSUB1 grau	Pin 3	FLX1_GND	CAN1_GND_1	CAN3_GND_1	CAN5_GND	CAN3_GND	CAN4_GND_1
DSUB1 grau	Pin 4	-	-	-	-	-	-
DSUB1 grau	Pin 5	-	-	-	-	-	-
DSUB1 grau	Pin 6	FLX1_GND	CAN1_GND_2	CAN3_GND_2	CAN5_GND	CAN3_GND	CAN4_GND_2
DSUB1 grau	Pin 7	FLX1_HIGH	CAN1_HIGH	CAN3_HIGH	CAN5_HIGH	CAN3_HIGH	CAN4_HIGH
DSUB1 grau	Pin 8	-	-	-	-	-	-
DSUB1 grau	Pin 9	-	-	-	-	-	-
DSUB2 schwarz	Pin 1	-	-	-	-	-	-
DSUB2 schwarz	Pin 2	FLX2_LOW	CAN2_LOW	CAN4_LOW	-	-	CAN5_LOW
DSUB2 schwarz	Pin 3	FLX2_GND	CAN2_GND	CAN4_GND	LIN_GND	LIN_GND	CAN5_GND
DSUB2 schwarz	Pin 4	-	-	-	-	-	-
DSUB2 schwarz	Pin 5	-	-	-	-	-	-
DSUB2 schwarz	Pin 6	-	-	-	-	-	-
DSUB2 schwarz	Pin 7	FLX2_HIGH	CAN2_HIGH	CAN4_HIGH	LIN	LIN	CAN5_HIGH
DSUB2 schwarz	Pin 8	-	-	-	-	-	-
DSUB2 schwarz	Pin 9	-	-	-	LIN_UBATT	LIN_UBATT	-

17.7.2 Cable CBAC150

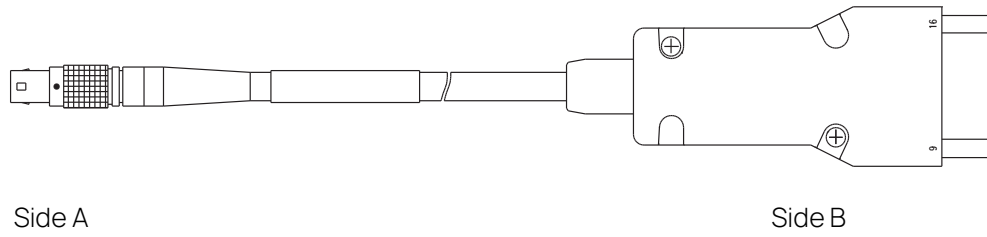


Fig. 17-26 Cable CBAC150-2m5

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

17.7.3 Cable CBAC160

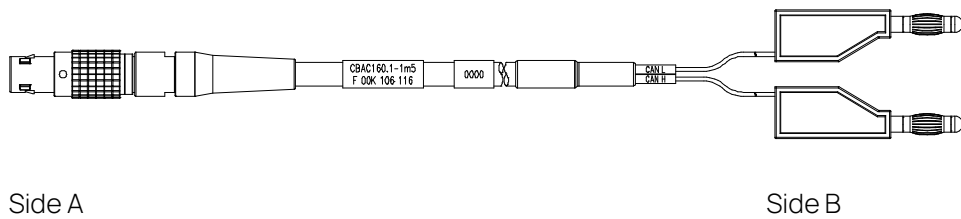


Fig. 17-27 Cable CBAC160-1m5

Order name	Short name	Order number
CAN Interface Cable, Lemo 1B FGC - Banana (8mc - 2mc), 1m5	CBAC160.1-1m5	F 00K 106 116

17.7.4 Cable K106

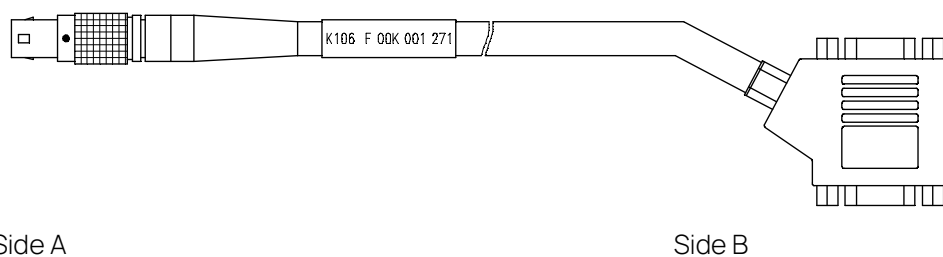


Fig. 17-28 Cable K106

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

17.7.5 Cable K107

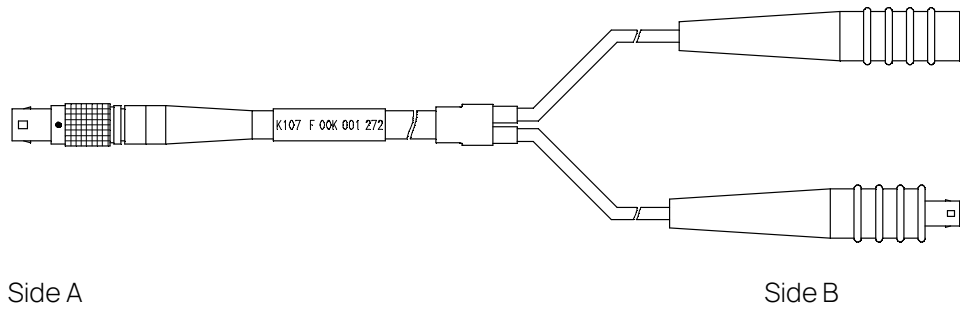


Fig. 17-29 Cable K107

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

17.7.6 CAN Terminating Resistor

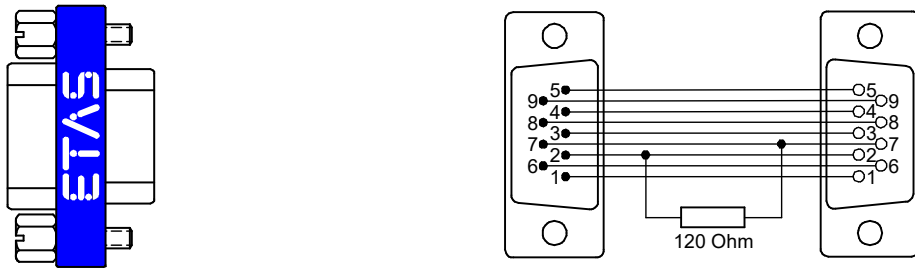


Fig. 17-30 Terminating resistor CBCX131.1-0

Order name	Short name	Order number
CAN 120 Ohm Terminating Resistor, 2xDSUB (9fc+9mc)	CBCX131.1-0	F 00K 103 786

17.7.7 FlexRay Terminating Resistor

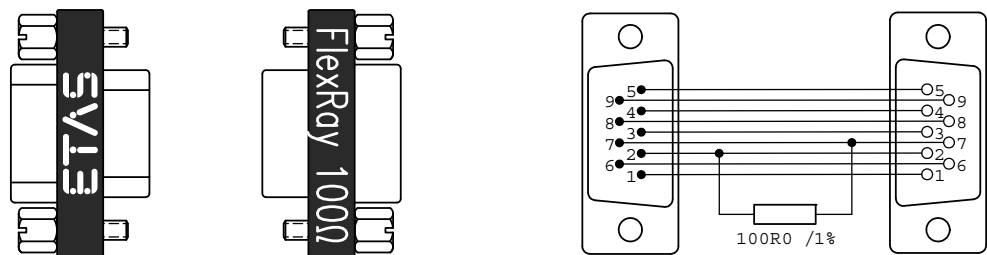


Fig. 17-31 Terminating resistor CBFX131.1-0

Order name	Short name	Order number
FlexRay Termination Resistor 100 Ohm, 2xD-SUB (9fc-9mc)	CBFX131.1-0	F 00K 104 689

17.8 Cables for the I/O Interface

17.8.1 Cable CBV821

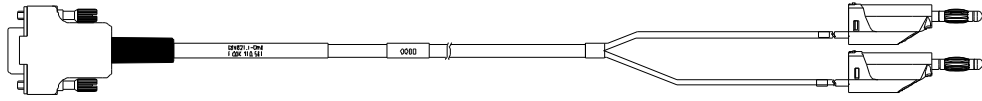


Fig. 17-32 Cable CBV821.1

Usage

Cable for connecting inputs IN1 and PSCI of the I/O interface of the ES820.1 Drive Recorder or the ES830.1 Rapid Prototyping Module to external (trigger) signals, e.g., to terminal 15.

Assignment of I/O Signal and Banana Plug



NOTE

The cable ends are marked with the assigned signal name.

The banana plugs of the cable are supplied with lab plug connectors attached. The colors of the banana plug and the lab plug connector are identical.

Pin	Signal	Color
12	PSCI	Green
13	IN1	Yellow

Temperature Range

-40 °C to +85 °C / -40 °F to +185 °F

Order Information

Order name	Short name	Order number
ES820 IO cable basic, DSUB - Banana (25fc - 2 Banana), 0m8 / 2.6 ft	CBV821.1-0m8	F 00K 110 561

17.8.2 Cable AS_CBV822.2

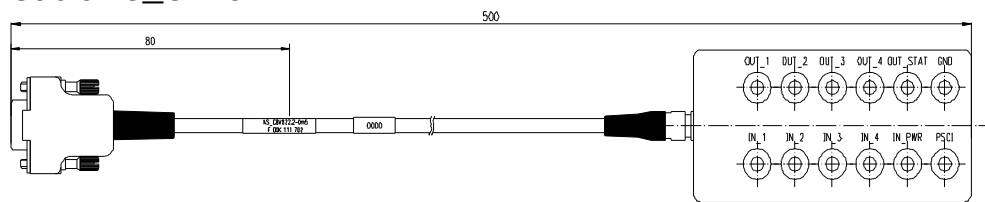


Fig. 17-33 Cable AS_CBV822.2

Usage

Cable for connecting the I/O interface of the ES820.1 Drive Recorder or the ES830.1 Rapid Prototyping Module via a breakout box with laboratory sockets. The following sockets are provided:

- Inputs:
 - IN1 to IN4
 - IN_POWER_BUTTON
 - Power Status Coordination Input (PSCI)
- Outputs:
 - OUT1 to OUT4
 - OUT_STATUS
- Other:
 - Ground of the ES820.1/ ES830.1 modules

Assignment of I/O Signal and Laboratory Sockets

The signals of the I/O interface are assigned to the following laboratory sockets:

I/O Interface		Designation of the laboratory sockets
Pin	Signal	
1	OUT_1	OUT_1
2	OUT_2	OUT_2
3	OUT_3	OUT_3
4	OUT_4	OUT_4
9	OUT_STATUS	OUT_STAT
11	IN_POWER_BUTTON	IN_PWR
12	PSCI	PSCI
13	IN_1	IN_1
14	IN_2	IN_2
15	IN_3	IN_3
16	IN_4	IN_4
17	GND	GND

Temperature Range

-40 °C to +85 °C/ -40 °F to +185 °F

Order Information

Order name	Short name	Order number
Digital I/O Connection Cable with Breakout Box, Micro-D – 12x Banana (25fc–12fc), 0m5 (1.6 ft)	AS_CBV822.2-0m5	F 00K 111 702

17.9 ES800 Memory Module Type 1

The measured data of the Drive Recorder ES820.1 is recorded on the ES800 memory module type 1. It is located in a slot on the front of the ES820.1 module and is secured in place with push and twist closures.

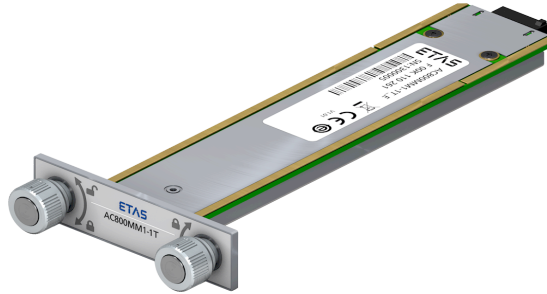


Fig. 17-34 Memory module type 1



NOTE

The memory module is not included in the scope of supply of the Drive Recorder.

The memory module can be removed from the Drive Recorder in order to transfer the data to another disk-space (e.g., the company network). An ES800 docking station type 1 is required in order to read the data on a PC.



Fig. 17-35 Memory module, front view

Order name	Short name	Order number
Memory Module (Type 1) for ES800 - 500 GB	AC800MM1-500	F 00K 110 255
Memory Module (Type 1) for ES800 - 1TB	AC800MM1-1T	F 00K 110 256

17.10 Docking Station for ES800 Memory Module Type 1

The AC800MM1-DS Docking Station for ES800 Memory Modules Type 1 allows to transfer data recorded on an ES820.1 Drive Recorder SSD memory module to a PC.



Fig. 17-36 AC800MM1-DS Docking Station



NOTE

ES800 Memory Modules Type 1 can only be operated in the ES820.1 Drive Recorder or in the AC800MM1-DS Docking Station for ES800 memory modules.

The ES800 SSD memory module must be removed from the ES820.1 module, mounted in the AC800MM1-DS Docking Station, and connected to the USB interface of a PC. The ES800 memory module is inserted into the docking station, it is automatically recognized as a data carrier by the PC.

Please refer to the user manual for your PC for Information on the automatic detection of data carriers.

18 Order Information

This chapter contains information about the following topics:

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- ES801.1-S Base Module 207
- ES820.1 Drive Recorder 208
- ES830.1 Rapid Prototyping Module 209
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- ES891.2 ECU and Bus Interface Module 210
- ES891.2 ECU and Bus Interface Module Package 211
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18.1 ES801.1 Base Module

Order name	Short name	Order number
ES801.1 Base Module for ES800 - Banana (2mc), 2 m	ES801.1	F 00K 109 483

Scope of supply

ES801.1 Base Module,
 ES8xx Safety Advice,
 China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package"

18.2 ES801.1-S Base Module

Order name	Short name	Order number
ES801.1-S Base Module for ES800 - Safety Banana (2mc), 2 m	ES801.1-S	F 00K 110 057

Scope of supply

ES801.1-S Base Module,
 ES8xx Safety Advice,
 China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package"

18.3 ES820.1 Drive Recorder

Order name	Short name	Order number
ES820.1 Drive Recorder	ES820.1	F 00K 110 251

Scope of supply

ES820.1 Drive Recorder, ES8xx Safety Advice, China_RoHS_Leaflet_orange_ES8xx, List "Content of this Package"

**NOTE**

The memory module is not included in the scope of supply of the ES820.1 Drive Recorder. The memory module can be ordered separately from ETAS.

18.3.1 ES800 Memory Module

Order name	Short name	Order number
Memory Module (Type 1) for ES800 - 500 GB	AC800MM1-500	F 00K 110 255
Memory Module (Type 1) for ES800 - 1 TB	AC800MM1-1T	F 00K 110 256

**NOTE**

The ES800 memory module type 1 can only be operated in the Drive Recorder ES820.1 or in a docking station for ES800 memory modules.

18.3.2 Docking Station for ES800 Memory Module Type 1

Order name	Short name	Order number
Docking station to connect the memory modules for ES800 devices to a PC via USB 3.0	AC800MM1-DS	F 00K 110 491

18.3.3 ES820.1 Licenses

Order name	Short name	Order number
Machine named license for ES820	ES820.1_LIC-MP	F 00K 110 254
Service Contract for a machine-named license for ES820	ES820.1_SRV_ME52	F 00K 110 253

18.4 ES830.1 Rapid Prototyping Module

Order name	Short name	Order number
ES830.1 Rapid Prototyping Module	ES830.1	F 00K 111 285

Scope of supply

ES830.1 Rapid Prototyping Module,
 QNX License for ES8xx/ARM,
 QNX License for x86 incl. QNX build environment,
 ES8xx Safety Advice,
 China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package"

18.5 ES882.2 ECU and Bus Interface Module

Order name	Short name	Order number
ES882.2 ECU and Bus Interface Module	ES882.2	F 00K 114 846

Scope of supply

ES882.2 ECU and Bus Interface Module,
 QNX License with AP for ES8xx/ARM,
 ES8xx Safety Advice,
 Application Notice for Lemo Connectors,
 Application Notice for Disc. ES8xx Mod.,
 China-China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package"

18.6 ES882.2 ECU and Bus Interface Module Package

Order name	Short name	Order number
ES882.2 Package	ES882.2 Package	F 00K 114 854

Scope of supply

ES882.2 ECU and Bus Interface Module, ES801.1 Base Module, CBE250.1-3 Ethernet PC Connection Cable,
 QNX License with AP for ES8xx/ARM,
 ES8xx Safety Advice,
 Application Notice for Lemo Connectors,
 Application Notice for Disc. ES8xx Mod.,
 China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package",

18.7 ES886.2 ECU and Bus Interface Module

Order name	Short name	Order number
ES886.2 ECU and Bus Interface Module	ES886.2	F 00K 113 276

Scope of supply

ES886.2 ECU and Bus Interface Module,
 QNX Licence with AP for ES8xx/ARM,
 ES8xx Safety Advice,
 Application Notice for Lemo Connectors,
 Application Notice for Disc. ES8xx Mod.,
 China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package"

18.8 ES886.2 ECU and Bus Interface Module Package

Order name	Short name	Order number
ES886.2 Package	ES886.2 Pack- age	F 00K 113 461

Scope of supply

ES886.2 ECU and Bus Interface Module,
 ES801.1 Base Module, CBE250.1-3 Ethernet PC
 Connection Cable,
 QNX Licence with AP for ES8xx/ARM,
 ES8xx Safety Advice,
 Application Notice for Lemo Connectors,
 Application Notice for Disc. ES8xx Mod.,
 China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package",

18.9 ES891.2 ECU and Bus Interface Module

Order name	Short name	Order number
ES891.2 ECU and Bus Interface Module	ES891.2	F 00K 114 806

Scope of supply

ES891.2 ECU and Bus Interface Module,
 QNX Licence with AP for ES8xx/ARM,
 ES8xx Safety Advice,
 Application Notice for Lemo Connectors,
 Application Notice for Disc. ES8xx Mod.,
 China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package"

18.10 ES891.2 ECU and Bus Interface Module Package

Order name	Short name	Order number
ES891.2 Package	ES891.2 Pack- age	F 00K 114 852

Scope of supply

ES891.2 ECU and Bus Interface Module,
 ES801.1 Base Module,
 CBE250.1-3 Ethernet PC Connection Cable,
 QNX Licence with AP for ES8xx/ARM,
 ES8xx Safety Advice,
 Application Notice for Lemo Connectors,
 Application Notice for Disc. ES8xx Mod.,
 China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package"

18.11 ES892.2 ECU and Bus Interface Module

Order name	Short name	Order number
ES892.2.ECU and Bus Interface Module	ES892.2	F 00K 114 809

Scope of supply

ES892.2 ECU and Bus Interface Module,
 QNX Licence with AP for ES8xx/ARM,
 ES8xx Safety Advice,
 Application Notice for Lemo Connectors,
 Application Notice for Disc. ES8xx Mod.,
 China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package"

18.12 ES892.2 ECU and Bus Interface Module Package

Order name	Short name	Order number
ES892.2 Package	ES892.2 Pack- age	F 00K 114 853

Scope of supply

ES892.2 ECU and Bus Interface Module,
 ES801.1 Base Module,
 CBE250.1-3 Ethernet PC Connection Cable,
 QNX Licence with AP for ES8xx/ARM,
 ES8xx Safety Advice,
 Application Notice for Lemo Connectors,
 Application Notice for Disc. ES8xx Mod.,
 China_RoHS_Leaflet_orange_ES8xx,
 List "Content of this Package"

18.13 ES892.2 ECU and Bus Interface Module Package LC

Order name	Short name	Order number
ES892.2 Package LC	ES892.2 Package LC	F 00K 115 532

Scope of supply

ES892.2_E
 ES801.1_E
 CBE250.1-8
 QNX License for ES8xx/ARM
 List "Content of this Package"
 ES8xx Safety Advice
 China_RoHS_Leaflet_orange_ES8xx
 Application Notice for Lemo Connectors
 Application Notice for Disc. ES8xx Mod.

18.14 Housing Accessories

Order name	Short name	Order number
Lemo 1B Cap	CAP_LEMO_1B	F 00K 105 298
Lemo 1B Cap LC	CAP_LEMO_1B_LC	F 00K 105 683
Cap to protect unused Souriau sockets against dirt and water	CAP_SOURIAU_8STA	F 00K 105 303

18.15 Upgrade ES8xx.1 to ES8xx.2 for faster CAN FD-SIC transceivers

For the ES882.1, the ES891.1 and 892.1, there is following upgrade available:

Replacement of all CAN FD transceivers with faster CAN FD-SIC transceivers.

This service includes a product check and 1 year warranty, starting with the date of the product upgrade.

18.15.1 ES882.1 upgrade to ES882.2.

Order name	Short name	Order number
Upgrade service from ES882.1 to ES882.2	Upgrade ES882.1 to ES882.2	F 00K 114 848

Scope of supply

Paid upgrade service from ES882.1 to ES882.2. This replaces for all CAN FD interfaces the CAN transceivers with faster CAN FD-SIC transceivers. This service includes a product check and 1 year warranty, starting with the date of the product upgrade.

Unless stated otherwise, the standard contract duration is 12 months starting from provision date.

18.15.2 ES891.1 upgrade to ES891.2.

Order name	Short name	Order number
Upgrade service from ES891.1 to ES891.2	Upgrade ES891.1 to ES891.2	F 00K 114 808

Scope of supply

Paid upgrade service from ES891.1 to ES891.2. This replaces for all CAN FD interfaces the CAN transceivers with faster CAN FD-SIC transceivers. This service includes a product check and 1 year warranty, starting with the date of the product upgrade. Unless stated otherwise, the standard contract duration is 12 months starting from provision date.

18.15.3 ES892.1 upgrade to ES892.2.

Order name	Short name	Order number
Upgrade service from ES892.1 to ES892.2	Upgrade ES892.1 to ES892.2	F 00K 114 811

Scope of supply

Paid upgrade service from ES892.1 to ES892.2. This replaces for all CAN FD interfaces the CAN transceivers with faster CAN FD-SIC transceivers. This service includes a product check and 1 year warranty, starting with the date of the product upgrade. Unless stated otherwise, the standard contract duration is 12 months starting from provision date.

18.16 ES882.1 upgrade to ES886.2.

Order name	Short name	Order number
Upgrade service from ES882.1 to ES886.2	Upgrade ES882.1 to ES886.2	F 00K 113 463

Scope of supply

Upgrade of an ES882.1 module to an ES886.2 module.

The ES886.2 module has an integrated bypass between the AE1 < (>&<) > AE2 and the AE3 < (>&<) > AE4 interfaces to ensure the communication between the connected AE nodes via the tapped AE-line, even if the module is not powered. ES886.2 supports the injection of VLAN-tagged ETH packages into the vehicle network; different IP-versions (IPv4 / IPv6) in the company-IT and in the vehicle network are also supported.

This service includes a product check and 1 year warranty, starting with the date of the product upgrade.

18.17 Cables and Adapter

**NOTE**

Only the ETAS cables listed in this user guide may be used at the interfaces of the module. The maximum permissible cable lengths must be maintained.

**NOTE**

Application-specific cables are available from ETAS. Please contact your ETAS contact partner or e-mail sales.de@etas.com.

18.17.1 Cables for the "HOST" Interface

Order name	Short name	Order number
Ethernet PC Connection Cable 1 Gbit/s, Lemo 1B FGM - RJ45 (10fc-8mc), 3 m	CBE250.1-3	F 00K 109 469
Ethernet PC Connection Cable 1 Gbit/s, Lemo 1B FGM - RJ45 (10fc-8mc), 5 m	CBE250.1-5	F 00K 109 470
Ethernet PC Connection Cable 1 Gbit/s, Lemo 1B FGM - RJ45 (10fc-8mc), 8 m	CBE250.1-8	F 00K 109 471

18.17.2 Cables for the "FETK / GE" Interface

Order name	Short name	Order number
Gbit Ethernet and Power Connection Cable, Lemo 1B FGM - Lemo 1B FGH (10fc-10mc), 3 m	CBE260.1-3	F 00K 109 446
Gbit Ethernet and Power Connection Cable, Lemo 1B FGM - Lemo 1B FGH (10fc-10mc), 8 m	CBE260.1-8	F 00K 109 447
Gbit Ethernet Connection Adapter Cable for Dual Mode ETK, Lemo 1B FGU - Lemo 1B PHG (10mc-4fc), 0m3	CBAE360.1-0m3	F 00K 109 448

Adapter Cables

Order name	Short name	Order number
1Gbit/s Ethernet Connection Adapter Cable for Rapid Prototyping with ES910/ES89x, Lemo 1B FGE - Lemo 1B PHM (10mc-10mc), 0.3 m	CBAE220-0m3	F 00K 109 903

18.17.3 Cables for the "FE" Interface

Combined Ethernet and Power Supply Cables

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 Cables

Order name	Short name	Order number
Ethernet PC Connection Cable, Lemo 1B FGF – Lemo 1B FGL (8mc-8fc), 3 m	CBE400.2-3	F 00K 104 920
Ethernet PC Connection Cable, Highly Flexible, Lemo 1B FGF – Lemo 1B FGL (8mc-8fc), 0m5	CBE401.1-0m5	F 00K 106 128

Adapter Cables

Order name	Short name	Order number
100 MBit/s Ethernet Connection Adapter Cable for RP with ES910/ES89x, Lemo 1B FGE - Lemo 1B PHD (10mc-8fc), 0m3	CBAE190-0m3	F 00K 109 902
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

18.17.4 Cables and Adapters for the „AE“ Interface

Automotive Ethernet Splitter Cable

Order name	Short name	Order number
Automotive Ethernet Splitter Cable 100 Mbit/s, Yamaichi YCP - 4x Lemo PHA 1B (8mc -4x 2fc), 0m4	CBEB240.1-0m4	F 00K 111 122
Automotive Ethernet Splitter Cable 100 Mbit/s, Yamaichi YCP - 4x DSUB (8mc - 4x 9mc), 0m4	CBEB242.1-0m4	F 00K 111 123
Automotive Ethernet Splitter Cable 100 Mbit/s, Yamaichi YCP - 4x Open Wire (8mc - 4x 2c), 0m4	CBEB245.1-0m4	F 00K 111 431
Automotive Ethernet Splitter Cable 100 Mbit/s, Yamaichi YCP - 4x Open Wire (8mc - 4x 2c), 2 m	CBEB245.1-2	F 00K 111 385

Automotive Ethernet Adapter Cables

Order name	Short name	Order number
100 Mbit/s Broad(R) Reach Connection Cable for CBEB105, Lemo 1B FGA - DSUB (2mc-9fc), 3 m	CBEB120.1-3	F 00K 111 111
100 Mbit/s BroadR Reach Connection Cable for CBEB105, Lemo 1B FGA - DSUB (2mc-9fc), 5m	CBEB120.1-5	F 00K 111 112
100 Mbit/s BroadR Reach Connection Cable for ES88x, Lemo 1B FGA - Lemo 1B FGA (2mc-2mc), 3m	CBEB125.1-3	F 00K 111 115
100 Mbit/s BroadR Reach Connection Cable for ES88x, Lemo 1B FGA - Lemo 1B FGA (2mc-2mc), 8m	CBEB125.1-8	F 00K 111 116

18.17.5 Cables and Adapters for the "FLX1/FLX2" Interface

Combined CAN-LIN-FlexRay Interface Cable

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

FlexRay Terminating Resistor

Order name	Short name	Order number
FlexRay Termination Resistor 100 Ohm, 2xD-SUB (9fc-9mc)	CBFX131.1-0	F 00K 104 689

18.17.6 Cables and Adapters for the "CAN" Interface

CAN Interface Cables

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	F 00K 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), 2m	CBCFI100.1-2	F 00K 106 893

CAN Terminating Resistor

Order name	Short name	Order number
CAN 120 & Terminating Resistor, 2xDSUB (9fc+9mc)	CBCX131.1-0	F 00K 103 786

18.17.7 Cables and Adapters for the "LIN" Interface

Combined CAN-LIN-FlexRay Interface Cable

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

18.17.8 Cables for the „I/O“ Interface

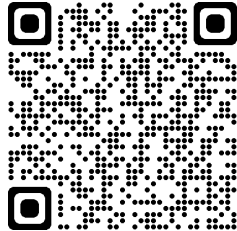
Order name	Short name	Order number
ES820 IO cable basic, DSUB - Banana (25fc - 2 Banana), 0m8 / 2.6 ft	CBV821.1-0m8	F 00K 110 561
Digital I/O Connection Cable with Breakout Box, Micro-D – 12x Banana (25fc-12fc), 0m5 (1.6 ft)	AS_C- BV822.2-0m5	F 00K 111 702

19 Contact Information

Technical Support

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

www.etas.com/en/hotlines.php



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