ETAS

DRIVING EMBEDDED EXCELLENCE

ETAS ES920.1 FlexRay Module

User Guide

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ES920.1 - User Guide R08 EN - 03.2021

Contents

1 About this Document

1.1 Classification of Safety Messages

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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

1.2 Presentation of Instructions

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

Target definition

1. Step 1
2. Step 2
3. Step 3

> Result

1.3 Typographical Conventions

Hardware

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

1.4 Presentation of Supporting Information

NOTE

Contains additional supporting information.

2 About this Manual

This chapter contains information about the following topics:

2.1 Scope of Supply

Prior to the initial commissioning of the module, please check whether the module was delivered with all required components and cables (see chapter 9.1 on page 36).

Additional cables and adapters can be obtained separately from ETAS. A list of available accessories and their order designation is located in chapter “Accessories” on page 36 of this manual or in the ETAS product catalog.

2.2 Additional Information

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

3 Basic Safety Notices

This chapter contains information about the following topics:

3.1 General Safety Information

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

NOTE

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

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

3.2 Requirements for Users and Duties for Operators

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

General safety at work

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

3.3 Intended Use

The ES910.3-A has a simulation controller and the ECU interfaces CAN, LIN, ETK and XETK and also one interface for Daisy Chain modules (ES4xx/ES63x/ES93x modules).

If additional interfaces are required, the extension slot of the ES910.3-A can be used with the ES920.1 FlexRay Module, the ES921.1 CAN Module or with the ES922.1 CAN FD Module.

Application area of the product

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

Requirements for the technical state of the product

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

Requirements for operation

- Use the product only according to the specifications in the corresponding User's Guide. With any deviating operation, the product safety is no longer ensured.
- Observe the requirements on the ambient conditions.
- Do not use the product in a wet or damp environment.
- Do not use the product in potentially explosive atmospheres.

Electrical safety and power supply

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

Power supply

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

Connection to the power supply

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

DANGER

Dangerous electrical voltage!

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

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

Approved power supply cables

Power supply cables suitable for the ES910.3-A module can be delivered in two designs:

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

NOTE

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

NOTE

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

De-energizing the module

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

- Disconnecting the cables from the measurement inputs

and

- Disconnecting the module from the power supply
  - Disconnecting the module from the lab power supply

    Separating device is the lab plug of the power cable or the plug of the power cable at the connection of the module

  or

– Disconnecting the module from the vehicle battery
  Separating device is the lab plug of the power cable or the plug of the power cable at the connection of the module

or

– Disconnecting the vehicle battery.

Approved cables

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

Requirements for the location

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

Fixing the modules on a carrier system

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

Requirements on the ventilation

- Keep the module away from heat sources and protect it against direct exposure to the sun.

CAUTION

Heat concentration in the module possible!

The electronics can be damaged due to overheating.

Do not cover ventilation slits when setting up, assembling or connecting the ES910.3-A module.

Adhere to the minimum distances at the sides and above.

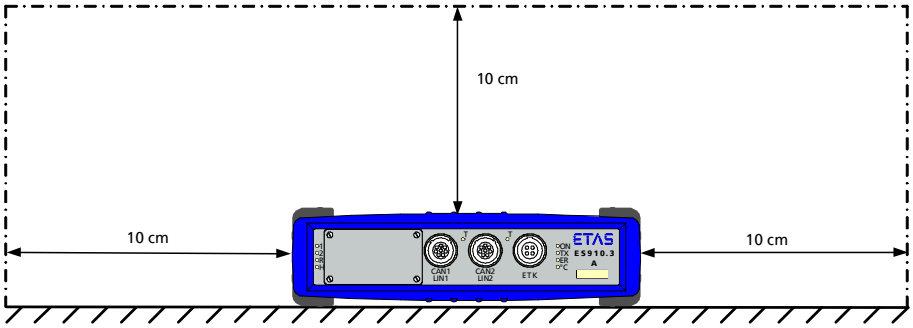
- Do not stand the module on its long sides.
- Do not stand the module on its top side.
- Never place objects on top of the module.
- The free space above and behind the module must be selected so that sufficient air circulation is ensured. Adhere to the minimum distances of at least 10 centimeters on the sides and above the module.
- Do not operate the module in completely enclosed containers.

CAUTION

Heat concentration on the long sides of the module.

The electronics can be damaged due to overheating.

Do not cover ventilation slits when setting up, assembling or connecting with other modules. Adhere to the minimum distance at the sides.



CAUTION

Heat concentration on the top of the module.

The electronics can be damaged due to overheating.

Do not stack several ES910.3-A modules on top of each other.

When stacking the ES910.3-A with other ETAS modules, it always has to be on top.

Assembling (interconnecting) the modules

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

Transport

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

Maintenance

The product is maintenance-free.

Repair

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

Cleaning the module housing

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

Ambient conditions

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

Opening the module

CAUTION

Damage to the module and loss of properties based on IP30!

Do not open or change the module housing!

Work on the module housing may only be performed by ETAS.

Potential equalization

CAUTION

Potential equalization in the vehicle is possible via the shield of the connecting cables of the modules!

Install the modules only at locations with the same electrical potential or isolate the modules from the installation location.

Cabling

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

4 Hardware Description

This chapter provides an overview of FlexRay and the ES920.1 module and provides you with information on its properties, connectors and the LED.

4.1 Overview

4.1.1 FlexRay

The complexity of vehicle electronics is permanently on the increase due to the increasing number, growing function scope and the networking of electronic ECUs in vehicles. Error-free functioning of the systems is essential for safety applications such as X-by-Wire (e.g. for the brake system or steering). This requires, for example, reliable and real-time-capable data transfer between the electrical and mechatronic components.

The new powerful FlexRay bus system fulfils these demands. It has a range of innovative functional and safety features with which system safety in vehicles can be improved. The FlexRay bus system enables data rates of up to 10 MBit/s in a topology of point-to-point connections, active stars and mixed systems. Typical of this topology are, for example, ideal bus terminations and thus minimized reflections, defined electrical behavior, flexible expandability, error delimitation on affected branches and optimized EMC behavior.

The importance of the standardized FlexRay bus system is permantenly on the increase in development projects in the automotive industry. Due to redundant data transfer, FlexRay can also be used in safety-critical applications and the deterministic structure enables messages to be transferred reliably.

The signals to be monitored can be selected from the set of all signals available in the connected cluster. To obtain the corresponding information, the FIBEX file is imported to INTECRIO. INTECRIO then uses the FIBEX file to configure the FlexRay hardware.

4.1.2 Definitions

FlexRay

FlexRay is a scalable and fault-tolerant communication system for deterministic data exchange at high transfer rates. Using the time multiplex procedure enables the creation of distributed systems with a highly modular structure and high safety demands. The high bandwidth of 10 MBaud on two channels plays its part in overcoming high network loads caused by the increasing number of innovative electronic systems in modern vehicles.

The specifications of this communication system are issued by the FlexRay Consortium, a committee which is supported by a large number of vehicle manufacturers and suppliers worldwide.

FIBEX

FIBEX (**Fi**eld **B**us **Ex**change) is an XML scheme based exchange format used to describe the entire communication network in the vehicle. FIBEX is designed for various types of network (CAN, LIN, MOST, FlexRay) and includes information on bus architecture, signals, properties of the network nodes etc.

INTECRIO uses FIBEX files to coordinate software tools and ECUs and the communication scheme dictated by the FlexRay cluster, i.e. the FIBEX file defines, amongst other things, the signals. It also contains data to configure the hardware interface. The FIBEX files have to be made available by the vehicle manufacturer.

More information on the FIBEX standard can be obtained from http://www.asam.net.

4.2 ES920.1

4.2.1 Features

The ES920.1 FlexRay Module, when accommodated in the extension slot of the ES910 Rapid Prototyping Module, enables rapid prototyping applications at FlexRay channels.

NOTE

The ES920.1 FlexRay Module can be operated in the extension slot of the ES910.2 and the ES910.3-A.

Together with the ES910, the ES920.1 module is part of a highly efficient, compact development and experimental platform with high computing and simulation performance due to the use of a close-to-target, fast floating-point processor. The AUTOSAR-compatible RTA-OSEK operating system of the ES910 guarantees simple transition from the finished function prototype to ECU software development.

The ES920.1, equipped with the Bosch E-RAY IP, provides a FlexRay node with the channels A and B which can send and receive FlexRay frames. Interrupts can be triggered at cycle, segment and slot level.

To optimize system performance, a preprocessor handles the FlexRay communication paths independently from the simulation controller of the ES910. Together with the ES920.1, the ES910 is hardware optimized for rapid prototyping applications used to develop FlexRay ECUs.

The ES920.1 is configured entirely in INTECRIO.

Overview of the Major Features of the ES920.1:

- One FlexRay node with two FlexRay channels which can be used redundantly
  - Channels galvanically isolated from each other, from the device ground and from the supply voltage
  - “Wake Up” via FlexRay
- Efficient connection of the ES920.1 FlexRay port to the ES910 simulation controller
- Use of the BOSCH E-Ray IP Module as a FlexRay Communication Controller, compatible with the FlexRay Protocol Specification V2.1
- Support of future FlexRay versions with firmware update
- Configuration possibilities in the calibration software:

  - Data rates of up to 10 MBit/s
  - Max. 128 frames
  - 8 kByte message RAM, for example
    to save 128 frames with max. 48 byte payload or
    to save 30 frames with max. 254 byte payload
  - Slot counter filter, cycle counter filter and channel filter
  - Network management support
- After integration into the ES910, the ES920.1 is a module suitable for use in automotive applications which is perfect for use in the development environment and in the vehicle on test drives.
  - Not sensitive to extreme environmental conditions (temperature, EMC)
  - High mechanical stability and durability
- Part of the ETAS Tool Suite
  - Rapid prototyping of control functions with MATLAB®/Simulink®, ASCET-MD as well as C by integrating into INTECRIO
  - INTECRIO supports:
    FIBEX import to configure the FlexRay node,
    The simple allocation of the signals required for control and diagnostic functions to the FlexRay frames,
    Static and dynamic FlexRay segments and
    Different interrupt levels, based on frame, segment or slot
  - Supported by INCA/INCA-EIP, INTECRIO, ASCET-RP, HSP

For the complete technical data of the ES920.1, refer to the chapter “Technical Data” on page 28.

4.2.2 View of the Module

The following figure shows the ES920.1 FlexRay module with the position of the ports and the LED.

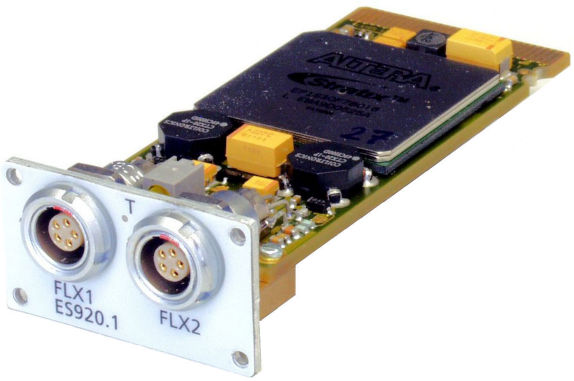


Fig. 4-1 ES920.1 Module

4.2.3 Ports

The FlexRay ports FLX1 for channel A and FLX2 for channel B are on the front of the ES920.1.

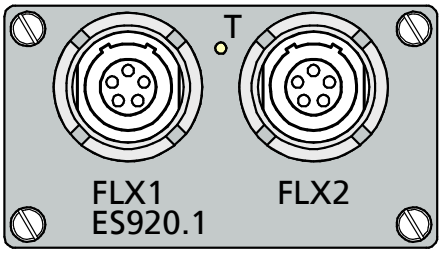


Fig. 4-2 ES920.1Ports

4.2.4 LEDs

The ES920.1 has one LED, **T**, which displays the functional state of the FlexRay node. When the ES910 is powered on, the following functional states are displayed:

LED	Display	Functional State
T	Yellow	FlexRay node active, synchronized, ready to exchange data
	Yellow, flashing	FlexRay node active, waiting for synchronization
	Off	FlexRay node inactive

5 Functional Description

This chapter describes the block diagram, bus termination, the “Wake Up” and “Sleep” functions and also provides tips on the firmware update.

5.1 Block Diagram

The ES910 has a slot for extension modules (extension slot). This slot can, for example, accommodate the ES920.1 FlexRay Module.

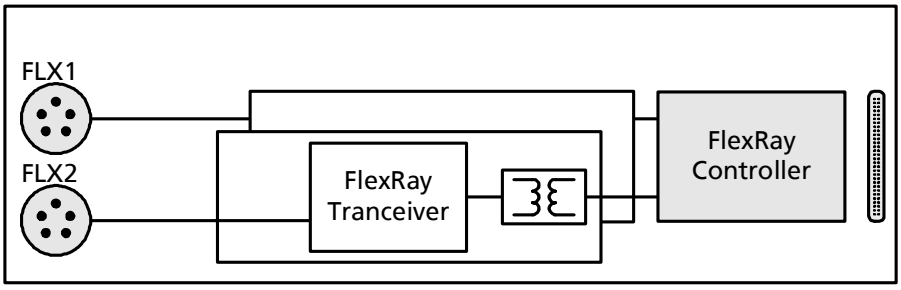


Fig. 5-1 Block Diagram of the ES920.1

5.2 Bus Termination Resistor

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

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

5.3 “Wake Up” and “Sleep” Functions

The ES920.1 module supplements the “Wake Up” and “Sleep” functions of the ES910 module with further control possibilities. The ES920.1 can control the toggling of the overall system ES910/ ES920.1 in the vehicle between on and standby.

The overall system ES910/ ES920.1 can effectively be in three different states: Off, Standby and On.

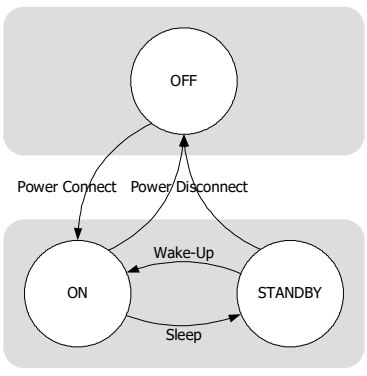


Fig. 5-2 Operating Modes

For more detailed information on the operating modes refer to the ES910 manual.

NOTE

The **ON/AUTO** switch of the ES910 must be switched to **AUTO** for this function to be able to be used.

5.3.1 “Wake Up” Function

“Wake Up” Conditions

There are two different “Wake Up” conditions in the system:

- when FlexRay traffic is detected
- when the FlexRay “Wake Up” pattern is detected

Definition of the FlexRay “Wake Up” Pattern.

If the ES920.1 detects the “Wake Up” pattern defined in Fig. 5-3 on page 19 , the ES910/ ES920.1 system changes from “Standby” to “On”.

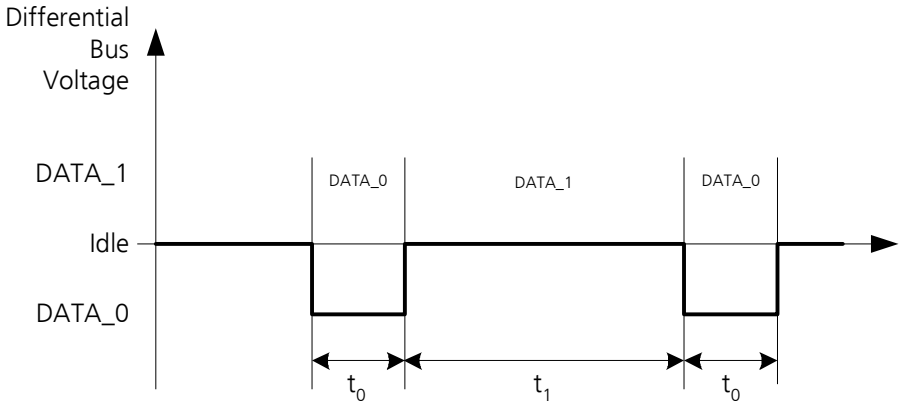


Fig. 5-3 Definition of the “Wake Up Pattern”

Level	Zeit	Min	Max
DATA_0	t_0	4 µs	40 µs
DATA_1 or Idle	t_1	4 µs	40 µs

5.3.2 “Sleep” Function

The “Sleep” condition is fulfilled as soon as there is no further FlexRay traffic.

5.3.3 Configuration

The “Wake Up” and “Sleep” behavior of the ES920.1 are configured in the web interface of the ES910 module (see section 6.5.2 on page 27).

5.4 Firmware

5.4.1 ES920.1 Firmware

NOTE

As delivered, the ES910 module contains *no* firmware to support the modules mountable in the extension slot.

The required firmware will be loaded additionally when the extension module is plugged in and the ES910 firmware is updated by the HSP service software. This firmware update is esssential in following cases:

- after the first-time installation of an extension module and
- after every module type replacement in the extension slot (e.g. ES920 replaces the ES921).

If immediate successively different examplares of the same module type (e.g. ES920) are used in the same ES910 module no additional firmware update is necessary.

5.4.2 Firmware Update

The firmware of the ES920.1 can be updated by the user so that future versions of the module can also be implemented. The firmware update is executed on the connected PC using the HSP service software.

6 Getting Started

The “Getting Started” chapter contains a description of how to install the ES920.1 in and remove it from the ES910 module, the applications, wiring, configuration and notes on troubleshooting for the ES920.1.

6.1 Assembly

The extension slot on the front of the ES910 has a removable front panel. You have to replace this front panel with the ES920.1 module if you want to use the FlexRay channels.

6.1.1 Removing the Front Panel of the ES910 Extension Slot

To install the ES920.1 in the ES910, you need a flat-bladed screwdriver (width of edge 2 mm).

CAUTION

Some components may be damaged or even destroyed by static discharge!

Leave the module in its transport package until you want to install it.

The module should only be taken from its package and installed at a working place that is protected against static discharge.

To remove the front panel of the ES910 extension slot:

1. Switch off the power supply to the ES910 module.
2. Make sure that all devices connected to the module with cables are powered off.
3. Place the ES910 on a solid surface.

CAUTION

Damage to the ES910 possible!

The ES910 module must not be stood on its back when removing the front panel.

The mounting screws of the extension slot must not fall into the module.

4. Unscrew and remove the four screws from the corners of the front panel of the extension slot.

5. Keep the screws in a safe place. They are needed to secure the ES920.1 module.
6. Remove the front panel.
7. Four threads for the screws which will secure the ES920.1 module become visible under the front panel.
8. Keep the front panel in a safe place. You need it if you want to operate the ES910 without the ES920.1.

6.1.2 Installing the ES920.1 in the ES910 Module

There are guide rails on the right and left in the extension slot of the ES910 for accommodating the ES920.1. The mechanical connection of the modules simultaneously establishes all necessary electrical connections between the modules.

CAUTION

Some components may be damaged or even destroyed by static discharge!

Leave the module in its transport package until you want to install it.

The module should only be taken from its package and installed at a working place that is protected against static discharge.

To install the ES920.1 into the ES910 module:

1. Place the ES910 on a solid surface.

CAUTION

Damage to the ES910 possible!

The ES910 module must not be stood on its back when the ES920.1 is installed in the ES910 module.

2. Position the ES920.1 in front of the extension slot of the ES910 module.

   Align the back of the ES920.1 with the front of the housing of the ES910.

NOTE

The labeling on the fronts of both modules must be pointing in the same direction!

3. Slide the module into the guide rails without getting it off-line.

NOTE

The contact spring in the extension slot of the ES910 must not be damaged when the ES920.1 is installed.

4. Press on the front panel of the ES920.1 from the front.

   The connectors of the ES920.1 and the ES910 click into place.

CAUTION

Damage to the ES910 possible!

The mounting screws of the extension slot must not fall into the module.

5. Screw the four screws with which the front panel was attached into the front panel of the ES910 module.
6. Screw the two modules together.

   ES920.1 and ES910 are now mechanically connected. All necessary electrical connections between the ES920.1 and ES910 were established at the same time.

6.2 Disassembly

6.2.1 Removing the ES920.1 from the ES910 Module

To remove the ES920.1 from the ES910, you need a flat-bladed screwdriver (width of edge 2 mm). To make removing the device simpler, make sure you have two CBF100-2 FlexRay cables readily available.

CAUTION

Some components may be damaged or even destroyed by static discharge!

Leave the module in its transport package until you want to install it.

The module should only be taken from its package and installed at a working place that is protected against static discharge.

To remove the ES920.1 from the ES910 module:

1. Switch off the power supply to the ES910 module.
2. Make sure that all devices connected to the module with cables are powered off.
3. Place the ES910 on a solid surface.

CAUTION

Damage to the ES910 possible!

The ES910 module must not be stood on its back when the ES920.1 is being removed.

The mounting screws of the extension slot must not fall into the module.

4. Unscrew and remove the four screws from the corners of the front panel of the extension slot.

   Keep the screws in a safe place. They are needed to attach the front panel.
5. Connect one FlexRay cable to each of the FlexRay ports.
6. Get hold of the cables as near as possible to the module.
7. Slide the ES920.1 module out of the ES910 without getting it off-line.

8. Remove the two cables from the ES920.1.
9. Store the ES920.1 in accordance with the ESD regulations.

6.2.2 Attaching the Front Panel of the ES910 Extension Slot

To attach the front panel of the ES910 extension slot:

1. Position the front panel in front of the extension slot of the ES910 module.

   Align the back of the front panel with the front of the housing of the ES910.

2. Use the screws the ES920.1 was attached with to screw on the front panel.

CAUTION

Damage to the ES910 possible!

The ES910 module must not be stood on its back when the front panel is being attached.

The mounting screws of the extension slot must not fall into the module.

3. Tighten the four screws on the front panel of the ES910 module.

   The ES910 and the front panel are now mechanically connected.

6.3 Applications

6.3.1 Function Development for FlexRay ECUs

In conjunction with the ES920.1, the ES910 enables the creation of a highly efficient FlexRay node with two channels for sending and receiving FlexRay frames (see Fig. 6-1 on page 25).

6.3.2 Gateway Function between CAN and FlexRay Buses

In conjunction with the ES920.1, the ES910 enables the creation of a gateway between a highly efficient FlexRay node with two channels and one CAN bus.

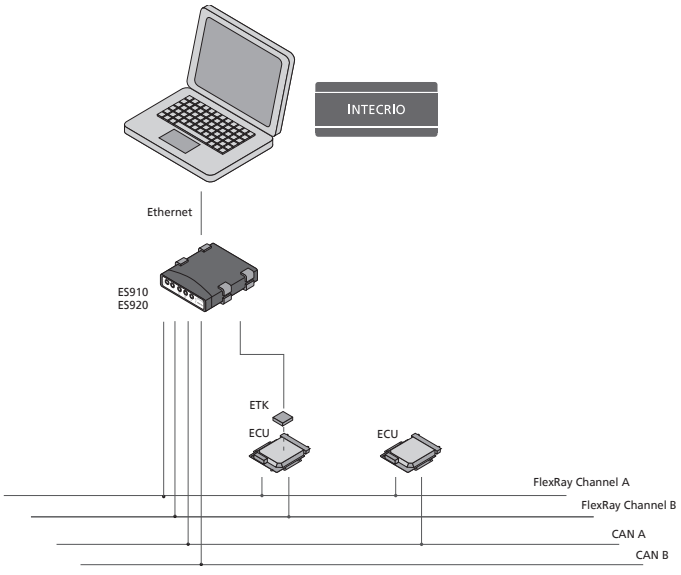


Fig. 6-1 Function Development for FlexRay ECUs with INTECRIO and the ES910 Rapid Prototyping Module

6.4 Wiring

NOTE

Make sure you carefully check the names of the cables used. Using the wrong cables can keep your ES920.1 from functioning properly or damage the ES920.1 and any devices connected to it.

NOTE

The ports of the ES920.1 must be wired in accordance with the FlexRay specification.

ETAS supplies special connecting cables which can be ordered separately if required. An overview is contained in the chapter “Accessories” on page 36.

The CBF100-2 cable, a Y cable, is used to split the FlexRay bus. Termination resistors for this cable can be ordered separately.

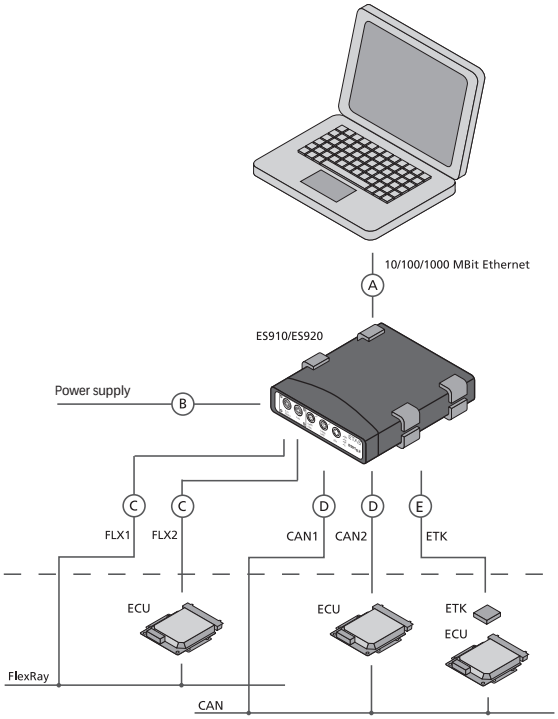


Fig. 6-2 Wiring the ES920.1 and ES910 Modules

Cable in Fig. 6-2	Function	Short Name
A	PC connecting cable	CBE200
B	Power supply cable	CBP120, CBP1205
C	FlexRay connecting cable	CBF100
D	CAN connecting cable	K106, K107, K95, CBAC140, CBAC150, CBCX130
E	ETK connecting cable	CBM150

6.5 Configuring the ES920.1

The ES920.1 is configured on your PC in the application program; the “Wake Up” function of the ES920.1 is configured in the web interface of the ES910 module.

6.5.1 Web Interface

The web interface of the ES910 consists of a home page, a page for customized configuration of the ES920.1 for the “Wake Up” function and other pages.

6.5.2 Configuring the “Wake Up” Function of the ES920.1 Module

To launch the ES910 web interface:

1. Connect the ES910 to the PC.
2. Start the HSP program on the PC.
3. Click **Hardware Search**.
4. Highlight the ES910 to be configured in the “Hardware” window.
5. Right-click **System Configuration**.

   The default web browser launches the web interface for configuring the ES910 with the current IP address of the module in the address field.

   The home page of the ES910 web interface is displayed.

To configure the “Wake Up” function:

1. Click **Config**.
2. Click **Wake Up**.

   The page for configuring the “Wake Up” function is displayed.
3. Configure the interfaces of the ES920.1 for the “Wake Up” function.

6.6 Troubleshooting

Please observe the LEDs which provide information on the functions of the ports and the ES920.1 (see the section “LEDs” on page 17) to be able to judge the operational state of the ES920.1 as well as troubleshooting measures.

The following table lists one possible problem with a remedy.

Problem	Diagnostic Questions	Possible Solutions
The ES920.1 is not found in HSP with “Search for Hardware”.	Is the hardware connected to the PC with the CBE100 cable?	Check that the connection is undamaged.

If you have any further questions, please contact our Customer Support (see chapter 10 on page 37).

7 Technical Data

This chapter describes general data, electrical data and the pin assignment of the ES920.1.

7.1 General Data

7.1.1 Identifications on the Product

The following symbols are used for identifying the product:

Symbol	Description
	The User's Guide must be read prior to the startup of the product!
SN: 1234567	Serial number (7-digit)
Vx.yz	Hardware version of the product
F 00K 123 456	Order number of the product (see chapter 9.1 on page 36)
	Marking for CE conformity (Chapter 7.4 on page 29)
	Marking for UKCA conformity (Chapter 7.5 on page 29)
	Marking for KCC conformity (Chapter 7.6 on page 29)
	Marking for WEEE, see chapter 7.7 on page 30
	Marking for China RoHS, see chapter on page 29

7.2 Fulfilled Standards and Norms

CE Norms

The module adheres to the following standards and norms:

Norm	Test
EN 61326	Electrical equipment for measurement, control and laboratory use - EMC requirements
EN 61000-6-2	Immunity (industrial environments)
EN 61000-6-4	Emission standard (industrial environments)

The module is designed only for use in industrial environments in accordance with EN 61000-6-4. When using the module outside of industrial environments avoid possible radio disturbances by additional shielding measures!

WARNING

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

7.3 RoHS Conformity

European Union

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

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

China

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

7.4 CE conformity

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

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

7.5 UKCA conformity

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

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

7.6 KCC conformity

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

7.7 Product return and recycling

The European Union (EU) has issued the guideline on waste electric and electronic equipment (Waste Electrical and Electronic Equipment - WEEE) in order to ensure the institution of systems for collection, handling, and disposal of all electronic scrap.

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. 7-1 WEEE symbol

The WEEE symbol (see Fig. 7-1 on page 30) on the product or its packaging identifies that the product may not be disposed of together with the remaining trash.

The user is obligated to separate the waste equipment and to provide it to the WEEE return system for reuse.

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 10 on page 37).

7.8 Use of Open Source Software

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

7.9 System Requirements

7.9.1 Hardware

To operate the modules, an ES910 Rapid Prototyping Module is necessary.

NOTE

Operating the ES920.1 is possible in the extension slot of the ES910.2 and the ES910.3-A.

7.9.2 Software

ES920.1 mounted in the ES910.2

To configure the ES920.1 mounted in the ES910.2 and for control and data acquisition, you need software in the following versions and higher:

			Support in Application Software		
Application	Classification [1]	HSP	INCA	INTECRIO	ASCET-RP
FlexRay-IO	RP	V5.1.1	no	V2.1	V6.1 [3]
FlexRay Monitoring	MC	V8.1.0	V6.2.1 [2]	no	no
XCP on FlexRay	MC	V8.1.0	V6.2.1 [2]	no	no

[1]: RP: Rapid Prototyping, MC: Measurement and Calibration
[2]: INCA V6.2.1 with Hotfix 13 and additionally INCA-ES9xx Add-On V6.2.2 and INCA-FlexRay Add-On V6.2.3 and higher
[3]: with HSP V8.1.0 and higher

ES920.1 mounted in the ES910.3-A

To configure the ES920.1 mounted in the ES910.3-A and for control and data acquisition, you need software in the following versions and higher:

			Support in Application Software		
Application	Classification [1]	HSP	INCA	INTECRIO	ASCET-RP
FlexRay-IO	RP	V8.0.0	no	V3.1.1	V6.1 [3]
FlexRay Monitoring	MC	V8.1.0	V6.2.1 [2]	no	no
XCP on FlexRay	MC	V8.1.0	V6.2.1 [2]	no	no

[1]: RP: Rapid Prototyping, MC: Measurement and Calibration
[2]: INCA V6.2.1 with Hotfix 13 and additionally INCA-ES9xx Add-On V6.2.2 and INCA-FlexRay Add-On V6.2.3 and higher
[3]: with HSP V8.1.0 and higher

7.9.3 ES920.1 Firmware

NOTE

As delivered, the ES910 module contains *no* firmware to support the modules mountable in the extension slot.
The required firmware has to be loaded additionally (see chapter 5.4 on page 20).

7.9.4 Environmental Conditions

Temperature range (operation)	Complies with ES910.3-A: -40 °C to +50 °C / -40 °F to +122 °F
Temperature range (storage)	-40 °C to +85 °C
	-40 °F to +185 °F

NOTE

The module is suitable for use in interiors, in the passenger cell or in the trunk of vehicles. The module is **not** suitable for installation in the engine compartment and similar environments.

7.9.5 Mechanical Data

Dimensions (H x W x D)	20 mm x 35 mm x 83 mm
Weight	Approx. 50 g

7.10 Electrical Data

This section contains the electrical data on the ES920.1.

7.10.1 Power Supply

Operating voltage	Power supply via extension slot of the ES910
Input voltage	3.3 V; 5 V
Power consumption (operation)	1.2 W (typ.), 1.8 W (max.)
Current consumption (standby)	< 1.2 mA

7.10.2 FlexRay Module

Flexray Controller

Communication Controller	Bosch E-Ray IP-Module (FPGA-based)
Number of nodes/channels	1 node with 2 channels
FlexRay Specification	V2.1
FlexRay Conformance Test	According to ISO 9646
Frames per communication cycle	Send and/or receive max. 128 frames
Payload	Max. 254 bytes
Hardware-based filtering	Slot counter, cycle counter and channel

Physical Layer

Bus driver	Philips TJA 1080 (per channel)

Galvanic Isolation

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

Miscellaneous

Functions	Wake Up, Sleep
LED	Status display of FlexRay bus

7.11 Pin Assignment

NOTE

All ports are shown with a view of the ports of the ES920.1.
All shields are at case potential.

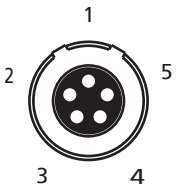


Fig. 7-2 FlexRay Ports (FLX1, FLX2)

Pin	Signal	Meaning
1	FlexRay GND	Ground (FlexRay)
2	FlexRay Low	
3	FlexRay Low	Optional for termination resistor [1)]
4	FlexRay High	
5	FlexRay High	Optional for termination resistor [1)]

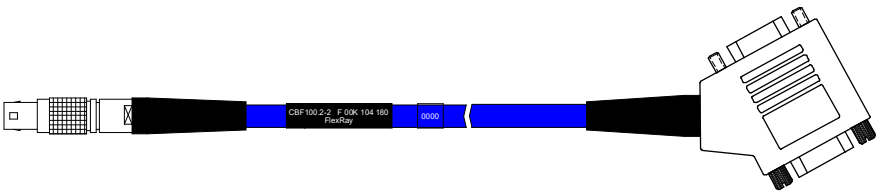
[1)] Specifications of the FlexRay interface: www.flexray.com

8 Cables and Accessories

NOTE

Only use ETAS cables at the ports of the ES920.1. The maximum admissible cable lengths must be adhered to.

8.1 FlexRay Interface Cable



Side A

Side B
Side C

Fig. 8-1 CBF100-2 Cable

Side A		Side B		Side C	
Pin	Signal	Pin	Signal	Pin	Signal
1	FlexRay GND	1	n.c.	1	n.c.
2	FlexRay Low	2	FlexRay Low	2	FlexRay Low
3	FlexRay Low	3	FlexRay GND	3	FlexRay GND
4	FlexRay High	4	n.c.	4	n.c.
5	FlexRay High	5	n.c.	5	n.c.
		6	n.c.	6	n.c.
		7	FlexRay High	7	FlexRay High
		8	n.c.	8	n.c.
		9	n.c.	9	n.c.
S1	Shield	S1	Shield	S1	Shield

Product	Length	Order Number
CBF100-2	2 m	F 00K 104 180

8.2 FlexRay Interface Termination Resistor

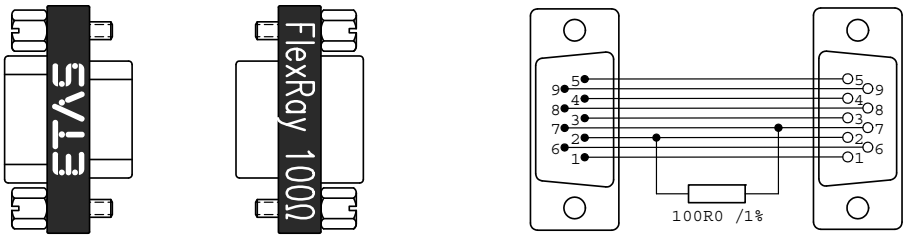


Fig. 8-2 CBFX131-0 Termination Resistor

Product	Length	Order Number
CBFX131.1-0	-	F 00K 104 689

9 Ordering Information

9.1 ES920.1

Order Name	Short Name	Order Number
ES920.1 FlexRay Module (2-CH)	ES920.1	F 00K 104 540
Package Contents		
ES920.1 FlexRay Module (2-CH), 2 x cable CBF100-2, 2 x FlexRay termination resistor CBFX131-0, ES900_Screws, List "Content of this Package", FlexRay Bosch IPCore Licence, ES910 Safety Advice, China-RoHS-leaflet_Compact_green_cn		

9.2 Accessories

9.2.1 FlexRay Interface Cable

Order Name	Short Name	Order Number
FlexRay Interface Cable DSUB, Lemo 0B FGB - 2xDSUB (5mc-9fc+9mc), 2 m	CBF100-2	F 00K 104 180

9.2.2 Termination Resistor

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

9.2.3 Spare Screws

Order Name	Short Name	Order Number
ES900 Spare Screws for Extension Slot	ES900_Screws	F 00K 105 362

10 Contact Information

ETAS Headquarters

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ETAS Subsidiaries and Technical Support

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

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

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