Two red lines intersect on a blue background. One line starts from the top right and goes down to the left. The other line starts from the top left and goes down to the right. They intersect at a point marked with a small white circle. A second red line starts from the intersection point and goes down to the left, ending at another small white circle.

ETAS ES160.1 / ES162.1 / ES165.1 Media Converter

User Guide

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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 moderate 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
<i>Italic</i>	Emphasis on content and newly introduced terms

1.4 Presentation of Supporting Information



NOTE

Contains additional supporting information.

1.5 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 "Order Information" on page 45).

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 46 of this manual or in the ETAS product catalog.

2 Basic Safety Notices

This chapter contains information about the following topics:

- General Safety Information 7
- Requirements for Users and Duties for Operators 7
- Intended Use 7

2.1 General Safety Information

Please observe the product safety notices ("ETAS Safety Advice") 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 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.

2.2 Requirements for Users and Duties for Operators

The product must be assembled, operated and maintained only if you have the necessary qualifications and experience for this product. Incorrect operation or operation by users without sufficient qualifications may lead to injuries, death or property damage.

General Safety at Work

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

2.3 Intended Use

Application Area of the Product

This product was developed and approved for applications in the automotive area. The product is suitable for use in interiors, in the passenger compartment or in the trunk of vehicles. 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 must only be operated in a technically flawless state, in accordance with its intended purpose and in a safety-conscious and hazard-aware manner under consideration of the documentation regarding the product.

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 its specifications. If the product is used in any other way, product safety is no longer ensured.
- Note the requirements for the ambient conditions.
- Do not use the product in a wet or damp environment.
- Do not use the product in potentially explosive atmospheres.

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.
- Only connect 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.
- Ensure compliance with the connection and setting values (see chapter "Technical Data" on page 30).
- Do not apply any voltages to the connections of the product that do not correspond to the specifications of the respective connection.

Power Supply (ES160.1)

The product is supplied from an external lab supply or vehicle battery with operating voltage.

Power Supply (ES162.1 / ES165.1)

The product is supplied with operating voltage from the connected ETAS products.

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.
- Only use lab power supplies with dual protection for the supply network (with double / reinforced insulation (DI/RI)). This requirement is met by lab power supplies that comply with IEC/EN 60950 or IEC/EN 61010.
- The lab power supply must be approved for use at an altitude of 5000 m and in ambient temperatures of up to 70 °C.
- In regular operation of the products as well as very long standby operation, a discharge of the vehicle battery is possible.

Connection to the power supply (ES160.1)



DANGER

Dangerous electrical voltage

Connect the power cord only with a suitable vehicle battery or with a suitable lab power supply. A connection to power outlets is prohibited.

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

- Use the product only in vehicles with central load dump protection.
- The power cord must not be directly connected to the vehicle battery or the lab power supply; instead, it should only be connected via fuse protection of 20 A maximum.
- Ensure that the connections of the power supply are easily accessible.
- Route the power cord in such a way that it is protected against abrasion, damages, deformation and kinking.
- Do not place any objects on the power cord.

Disconnection of the power supply (ES160.1)

The product does not have an operating voltage switch. The product can be de-energized in the following manner:

- Switch off the lab power supply
- Disconnect the product from the lab power supply (the lab plug of the power cord is the isolating device)
- Disconnect the product from the vehicle battery (the lab plug of the power cord is the isolating device)
- Disconnect the vehicle battery.

Disconnection of the power supply (ES162.1 / ES165.1)

The product does not have an operating voltage switch. The product can be de-energized in the following manner:

- Disconnect the LEMO plug from the power supplying ETAS product.
- De-energize the voltage supplying ETAS product connected to the LEMO connector.

Approved cables:

- Use exclusively ETAS cables at the product's connections.
- Adhere to the maximum permissible cable lengths.
- Do not use any damaged cables. Cables may only be repaired by ETAS.
- Plug connectors join easily in normal cases. If this is not the case, make sure 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 Installation Location

- Place the product on a smooth, level and firm surface.
- The product must always be firmly secured.

Requirements for the Cabling

Ensure that the cabling does not cause additional hazards (e.g. stumbling points, strangulation,...).

Requirements for the Configuration

Ensure that the configuration does not result in the vehicle being moved to an unsafe state.

Assembly on a Carrier System

When selecting the carrier system, note the static and dynamic forces that could be created by the product on the carrier system.

Requirements for Ventilation

- Keep the product away from heat sources and protect it against direct exposure to the sun.
- The clearance around the product must be selected so that sufficient air circulation is ensured.

Transport

- Do not transport the product by the cable.
- Prior to transport, disconnect the cables connected to the product.

Maintenance

The product is maintenance-free.

Repairs

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

Cleaning

- Use a dry or slightly dampened, soft, lint-free cloth to clean the housing.
- Do not use any sprays, solvents or abrasive cleaners which could damage the housing.
- Make sure that no moisture enters the housing. Never spray cleaning agents directly onto the housing.

Opening the Produkt



CAUTION

Damage to the product and loss of properties after IP42

Do not open or change the product housing.

Work on the housing may only be performed by ETAS.

3 Hardware Description

This chapter contains information about the following topics:

- Overview 12
- Design 13
- LEDs 16
- Functions 22

3.1 Overview

3.1.1 Description

Media Converter ES160.1, ES162.1 and ES165.1 are functionally identical to a large extent. They will be designated as ES16x in the following text. Differences in the Media Converter are identified accordingly in the manual.

Media Converter ES16x converts Automotive Ethernet (100/1000BASE-T1) into Standard Ethernet (IEEE 802.3). The connection speed and connection mode of the Automotive Ethernet can be configured via a web interface.

With the ES165.1, communication speed on the host side is limited to a maximum of 100 Mbit/s.

3.1.2 Properties


The most important properties of the Media Converter ES16x:

- Conversion of Automotive Ethernet (100/1000BASE-T1) into Standard Ethernet
- Automotive-capable product 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
- Display of the operating state and fault statuses
- ES160.1: RJ45 connector for connection of the product to the PC
- ES162.1 and ES165.1: Lemo connector for connection of the product to ETAS modules
- Automatic and manual configuration of the Automotive Ethernet speed (100/1000 Mbit/s) and the Master/Slave mode
- Support time synchronization in accordance with IEEE1588
- Compensation for the signal runtimes corresponding to the Precision Time Protocol PTP (IEEE1588)
- Standby operation
- Firmware updates via Hardware Service Pack (HSP)
- No additional drivers required
- Together with BR_XETKs, the product supports the measurement, application and flash programming of control units

Complete technical data for the Media Converter can be found in chapter “Technical Data” on Page 30.

3.2 Design

3.2.1 Housing



CAUTION

Loss of Properties After IP42

Do not open or alter the product housing.
Work on the product housing must only be carried out by qualified technical personnel.

The housing consists of a thermoplastic elastomer.

The housing, connectors and plug connectors of the cables meet the requirements of protection class IP42.

3.2.2 Connections ES160.1



Fig. 3-1 Connections ES160.1

Fig. 3-1	Connection	Function
1	TE VAL-U-LOK	Connection for power cords with banana connectors CBP160.1-0.5m Connection for power cords with safety banana connectors CBP1605.1-0.5m
2	RJ45	100/1000 BASE-T Ethernet (IEEE 802.3) Connection to the PC
3	LEMO 1B	100/1000BASE-T1 Automotive Ethernet Connection

3.2.3 Connections ES162.1



Fig. 3-2 Connections ES162.1

Fig. 3-2	Connection	Comment
1	LEMO 1B	Combined connection for power supply and 100/1000 BASE-T Ethernet (IEEE 802.3) via connected ETAS module (e.g. ES8xx series)
2	LEMO 1B	100/1000BASE-T1 Automotive Ethernet Connection

3.2.4 Connections ES165.1



Fig. 3-3 Connections ES165.1

Fig. 3-3	Connection	Comment
1	LEMO 1B	Combined connection for power supply and 10/100 BASE-T Ethernet (IEEE 802.3) via connected ETAS module (e.g. ES5xx and ES8xx)
2	LEMO 1B	100/1000BASE-T1 Automotive Ethernet Connection

3.3 LEDs

The ES16x displays the connection status to the Automotive Ethernet (AE), the device status and the connection speed to the host with colored LEDs. The LED layout of the ES160.1 and the ES162.1 are identical. The LED layout of the ES165.1 differs only in the display of the connection speed to the host.

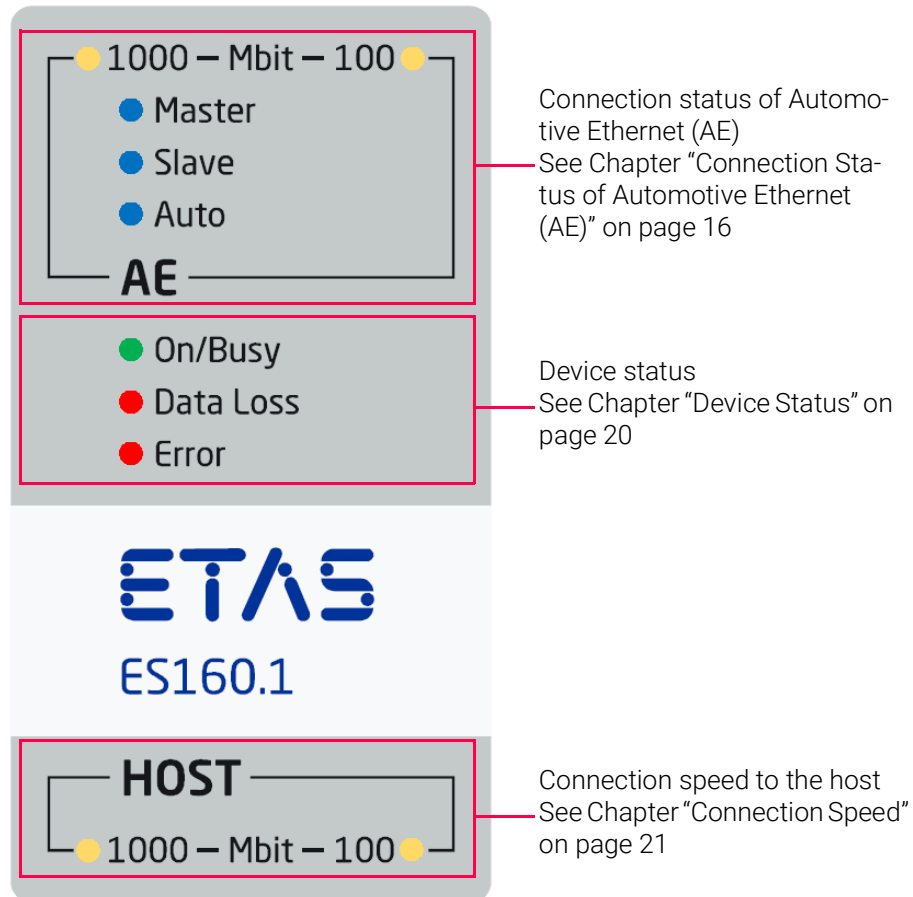


Fig. 3-4 Example of the LED layout of the ES160.1

3.3.1 Connection Status of Automotive Ethernet (AE)

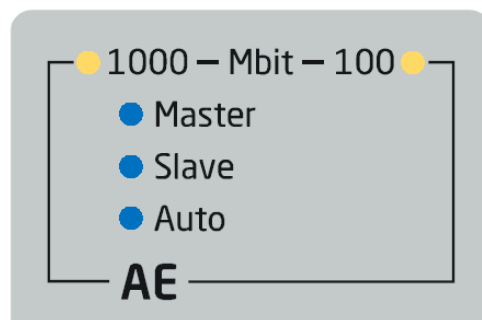




Fig. 3-5 LED display for AE connection status



The connection mode (**Master/Slave/Auto**) and the connection speed (**100/1000 Mbit/Auto**) to the Automotive Ethernet can be configured via a web interface (see Chapter “Web Interface” on page 27).

Default connection mode and connection speed after a restart: **Auto**


Master (Automatic Configuration)

LED code	Display	State
ON OFF 	Off	No target connected or Slave mode detected
ON  OFF	Lit blue	Target connected in Master mode



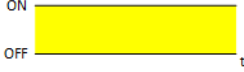
Slave (Automatic Configuration)

LED code	Display	State
ON OFF 	Off	No target connected or Master mode detected
ON  OFF	Lit blue	Target connected in Slave mode




Master and Slave (Automatic Configuration)

LED code	Display	State
ON  OFF	Master and Slave flash blue at the same time	Connection to target lost

1000 Mbit (Automatic Configuration)

LED code	Display	State
ON OFF 	Off	No target with 1000 Mbit connected
ON  OFF	Irregular flashing yellow	Target connected, traffic- dependent flashing yellow
ON  OFF	Lit yellow	Target connected, no traffic




100 Mbit (Automatic Configuration)

LED code	Display	State
ON OFF 	Off	No target with 100 Mbit connected
ON  OFF	Irregular flashing yellow	Target connected, traffic- dependent flashing yellow
ON  OFF	Lit yellow	Target connected, no traffic




1000 Mbit and 100 Mbit (Automatic Configuration)

LED code	Display	State
	1000 Mbit and 100 Mbit flashing yellow at the same time	Connection to target lost or being established





Master (Manual Configuration)

LED code	Display	State
	Off	Manual Slave mode set.
	Flashing blue	Master mode set; connection to target lost or being established
	Lit blue	Target connected in Master mode




Slave (Manual Configuration)

LED code	Display	State
	Off	Manual Master mode set.
	Flashing blue	Slave mode set; connection to target lost or being established
	Lit blue	Target connected in Slave mode


1000 Mbit (Manual Configuration)

LED code	Display	State
	Off	Manual 100 Mbit set.
	Flashing yellow	Connection to target lost or being established
	Irregular flashing yellow	Target connected, traffic-dependent flashing yellow
	Lit yellow	Target connected, no traffic

100 Mbit (Manual Configuration)

LED code	Display	State
ON OFF _____ t	Off	Manual 1000 Mbit set.
ON  OFF _____ t	Flashing yellow	Connection to target lost or being established
ON  OFF _____ t	Irregular flashing yellow	Target connected, traffic-dependent flashing yellow
ON  OFF _____ t	Lit yellow	Target connected, no traffic

Auto (Automatic and Manual Configuration)

LED code	Display	State
ON OFF _____ t	Off	Manual Master/Slave mode selected
ON  OFF _____ t	Lit blue	Auto mode selected

3.3.2 Device Status

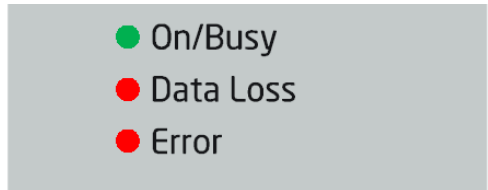


Fig. 3-6 LED display for device status

On/Busy

LED code	Display	State
ON OFF	Off	No power supply
ON OFF	Flashing green	Standby
ON OFF	Flashing green	Module booting or Firmware update initial- ized
ON OFF	Lit green	Boot procedure complete, ready for operation

Data Loss

LED code	Display	State
ON OFF	Off	No data loss detected
ON OFF	Lit red	Data loss detected. Restart or acknowledg- ment in the web interface required

Error

LED code	Display	State
ON OFF	Off	Operational
ON OFF	Lit red	Interface error, restart required

3.3.3 Connection Speed

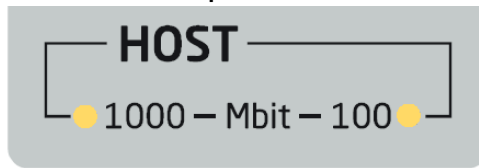


Fig. 3-7 LED display for connection speed to host (example of ES160.1)

1000 Mbit (only ES160.1 and ES162.1)

LED code	Display	State
ON OFF	Off	No host connected
ON OFF	Lit yellow	Host connected, no traffic
ON OFF	Irregular flashing yellow	Host connected, traffic-dependent flashing yellow

100 Mbit

LED code	Display	State
ON OFF	Off	No host connected
ON OFF	Lit yellow	Host connected, no traffic
ON OFF	Irregular flashing yellow	Host connected, traffic-dependent flashing yellow

3.4 Functions

3.4.1 Block Diagram ES160.1

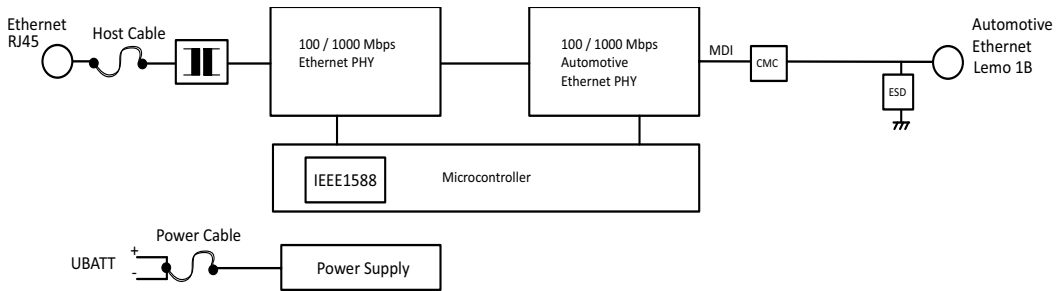


Fig. 3-8 Block diagram ES160.1

The Media Converter ES160.1 has an Automotive-Ethernet interface (100/1000 Mbit/s) at the Lemo connection, a Standard-Ethernet interface (100/1000 Mbit/s according to IEEE 802.3) at the RJ45 connector as well as connections for an external power supply.

3.4.2 Block Diagram ES162.1

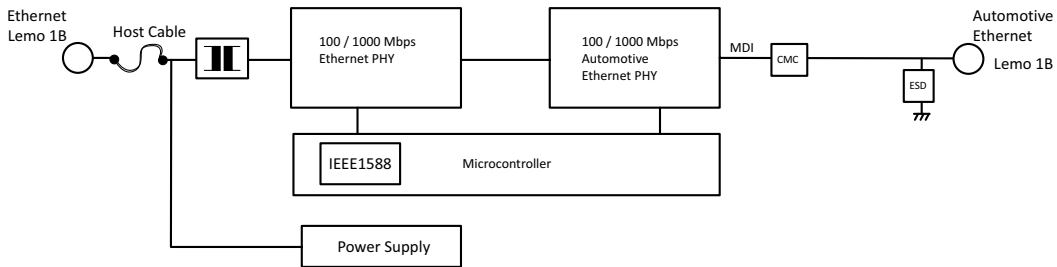


Fig. 3-9 Block Diagram ES162.1

Media Converter ES162.1 has an Automotive-Ethernet interface (100/1000 Mbit/s) at the Lemo connection and a Lemo connection with Standard-Ethernet interface (100/1000 Mbit/s according to IEEE 802.3) and integrated power supply via the connected ETAS module.

3.4.3 Block Diagram ES165.1

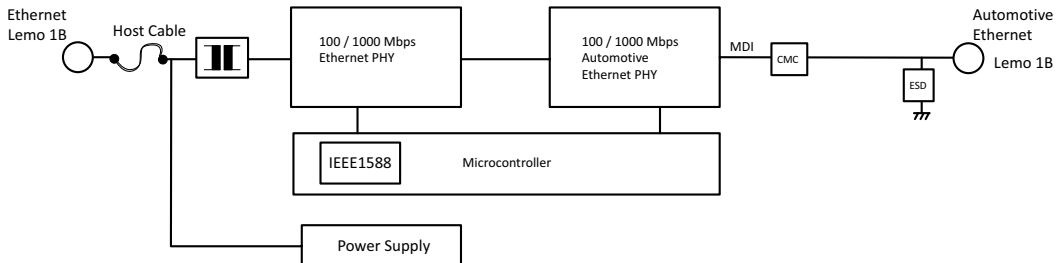


Fig. 3-10 Block Diagram ES165.1

Media Converter ES165.1 has an Automotive-Ethernet interface (100/1000 Mbit/s) at the Lemo connection and a Lemo connection with Standard-Ethernet interface (10/100 Mbit/s according to IEEE 802.3) and integrated power supply via the connected ETAS module.

4 Commissioning

This chapter contains information about the following topics:

- Cabling 23
- Failsafe Automotive Ethernet Operation..... 23
- Web Interface..... 27

4.1 Cabling

NOTE

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

4.2 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.

4.2.1 Cabling ES160.1.

NOTICE

The ES160.1 Media Converter has internal load dump protection for max. 12 V DC input voltages. With higher input voltages, please ensure that adequate external protection is in place if load dump situations can occur in your system.

The ES160.1 Media Converter is designed for connection to an Automotive Ethernet Network, a PC and for connection to an external power supply.

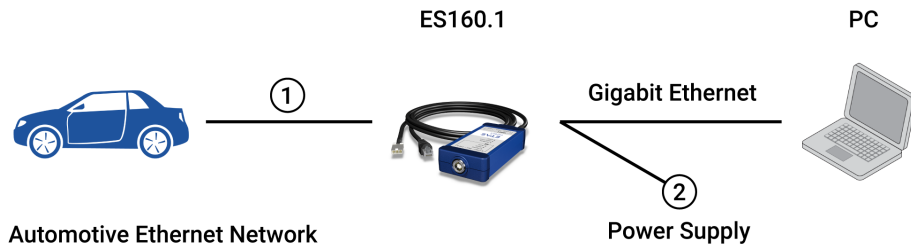
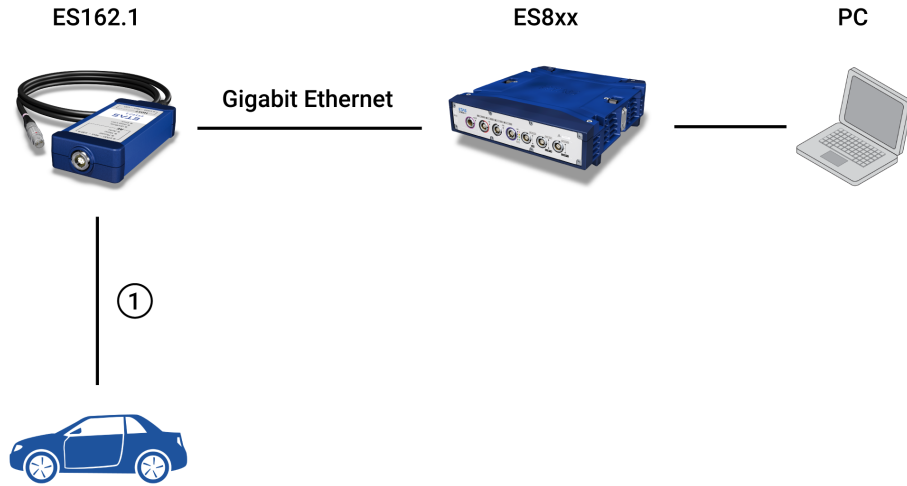


Fig. 4-1 Cabling ES160.1

Cables Fig. 4-1	Function	Short name
1	Connection for connection to the Automotive Ethernet Network	CBEB310.1-3 (shielded, open cable end)
		CBEB311.1-3 (unshielded, open cable end)
		CBEB312.1-0m5 (shielded, DSUB connector)
		CBEB313.1-0m5 (unshielded, DSUB connector)
		CBEB122.1-3 (shielded, Lemo connector)
2	Cable for connection to external power supply	CBP160.1-0m5 (banana connector)
		CBP1605.1-0m5 (safety banana connector)

4.2.2 Cabling ES162.1

The ES162.1 Media Converter is designed for connection to an Automotive Ethernet Network and to an ES8xx system. Power is supplied by the connected ETAS product.



Automotive Ethernet Network

Fig. 4-2 Cabling ES162.1

Cables Fig. 4-2	Function	Short name
1	Connection for connection to the Automotive Ethernet Network	CBEB310.1-3 (shielded, open cable end)
		CBEB311.1-3 (unshielded, open cable end)
		CBEB312.1-0m5 (shielded, DSUB connector)
		CBEB313.1-0m5 (unshielded, DSUB connector)
		CBEB122.1-3 (shielded, Lemo connector)

4.2.3 Cabling ES165.1

Connection ES165.1 to the Automotive Ethernet Network and ETAS modules of the ES5xx/ES8xx family or the ES600.2. The power supply is via the connected ETAS module.

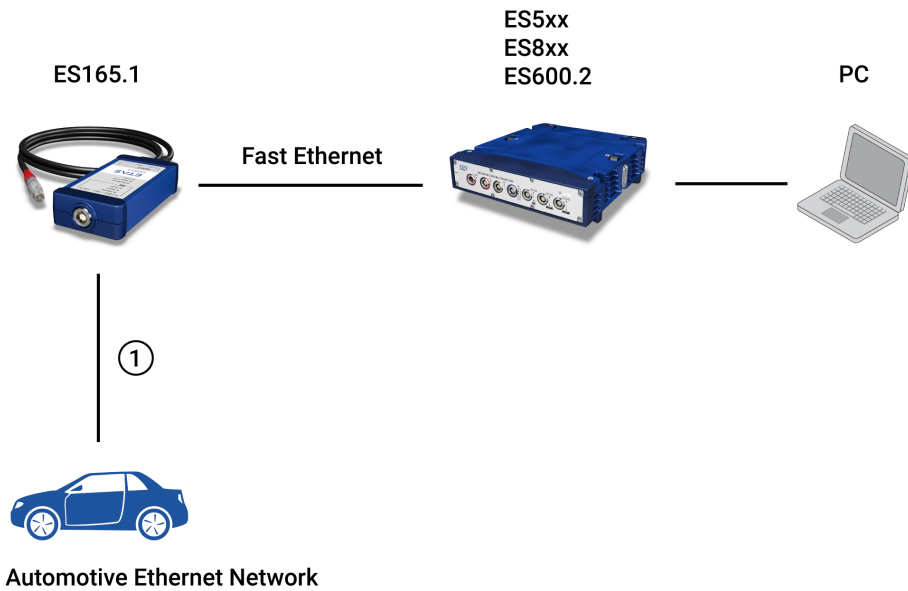


Fig. 4-3 Cabling ES165.1

Cables Fig. 4-3	Function	Short name
1	Connection for connection to the Automotive Ethernet Network	CBEB310.1-3 (shielded, open cable end)
		CBEB311.1-3 (unshielded, open cable end)
		CBEB313.1-0m5 (unshielded, DSUB connector)
		CBEB122.1-3 (shielded, Lemo connector)
		CBEB313.1-0m5 (unshielded, DSUB connector)

4.3 Web Interface

The connection mode (**Master/Slave/Auto**) and the connection speed (**100/1000 Mbit/Auto**) to the Automotive Ethernet can be configured via a web interface. An Internet connection is not required.



NOTE

The settings in the web interface are not saved permanently. If the module is disconnected from the power supply, all settings are set back to the default value.

4.3.1 Determining IP Address

You can determine the IP address of the module with the **HSP Update Tool**. You can find the tool in the Download Center on the ETAS web page.

1. Start the **HSP Update Tool**.
2. Search for the hardware with **<CTRL> + <H>**.
3. In the **Hardware** window, mark the desired module.
4. Open the **Properties** window with **<ALT> + <ENTER>**.
- > In the **Properties** window under **Communication > Communication Parameters**, you will find the IP address of the module.

4.3.2 Manual Master-Slave Configuration

The Master-Slave configuration of the Automotive Ethernet connection can be set manually via a web interface.

1. Open a browser and enter the IP address of the module.
2. Click **Configure**.
3. Remove the checkmark at **Auto Config** in the area **AE**.
4. Mark the desired mode (**Master/Slave**) in the area **AE MODE**.
5. Click **Save** to confirm the input.

4.3.3 Manual Configuration of the Connection Speed (Automotive Ethernet)

The connection speed of the Automotive Ethernet interface can be set manually via a web interface.

1. Open a browser and enter the IP address of the module.
2. Click **Configure**.
3. Remove the checkmark at **Auto Config** in the area **AE**.
4. Mark the desired connection speed (**1000/100**) in the area **AE SPEED**.
5. Click **Save** to confirm the input.

4.3.4 Resetting Data Loss Errors

If different speed settings exist in the two interfaces of the converter due to the system configuration, with higher data throughputs this can result, in principle, to data losses. This is not a device error. The devices display these losses via the **Data Loss** LED (see Chapter "LEDs" on page 16).

1. Open a browser and enter the IP address of the module.
 2. Click **Configure**.
 3. Click **Clear Data Loss**
- or
4. Disconnect the module from the power supply.

5 Troubleshooting

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 "Contact Information" on page 48).

Issue	Diagnostics questions	Possible solution
No network connection to ES160.1 after temporarily disconnecting the network cable from the PC.	Was the PC network adapter configured correctly?	<ol style="list-style-type: none"> 1. Open the Windows Device Manger. 2. Expand the entry Network Adapter. 3. Locate the network adapter connected to the ES160.1 and double-click it to open its adapter properties. 4. Navigate to the tab Advanced. 5. Set the property Energy Efficient Ethernet to the value On. 6. Set the property Link Speed Battery Saver to the value Disabled. 7. Confirm with OK. 8. Connect the ES160.1 to the customized network adapter.

6 Technical Data







This chapter contains information about the following topics:

- General Data 30
- RoHS Conformity 33
- Declarable Substances 33
- CE conformity 33
- UKCA conformity 33
- KCC conformity 33
- Product Return and Recycling 34
- Use of Open Source software 34
- System Requirements 34
- Terminal Assignment 36
- Electrical Data 38

6.1 General Data

6.1.1 Identification on the Product

The following symbols are used for identifying the product:

Symbol	Description
	Prior to operating the product, be sure to read the user manual.
SN: 1234567	Serial number (seven digits)
F 00K 123 456	Order number of the product (see Chapter "Order Information" on page 45)
6-32 V DC	Operating voltage
1 A	Current consumption
	Marking for RoHs conformity (see Chapter 6.2 on page 33)
	Marking for CE conformity (Chapter 6.4 on page 33)
	Marking for UKCA conformity (Chapter 6.5 on page 33)
	Marking for KCC conformity (Chapter 6.6 on page 33)
	Marking for WEEE, see Chapter 6.7 on page 34

6.1.2 Standards and Norms

The Media Converter complies with the following standards and norms:

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

6.1.3 Ambient Conditions

Operating temperature range	-40 °C to +70 °C -40 °F to +158 °F
Storage temperature range	-40 °C to +85 °C -40 °F to +185 °F
Relative humidity (non-condensing)	15 % to 95 %
Altitude (max.)	5000 m / 16400 ft.
Degree of protection	IP42
Degree of contamination	2

6.1.4 Cleaning the Product

Use a dry or lightly moistened, soft, lint-free cloth for cleaning the product housing. Sprays, solvents or abrasive cleaners, which could damage the housing, should be avoided. Do not spray any cleaning agent directly onto the product for cleaning. It must be ensured that no moisture enters the housing.

6.1.5 Mechanical Data

Dimensions ES160.1 (without cables)

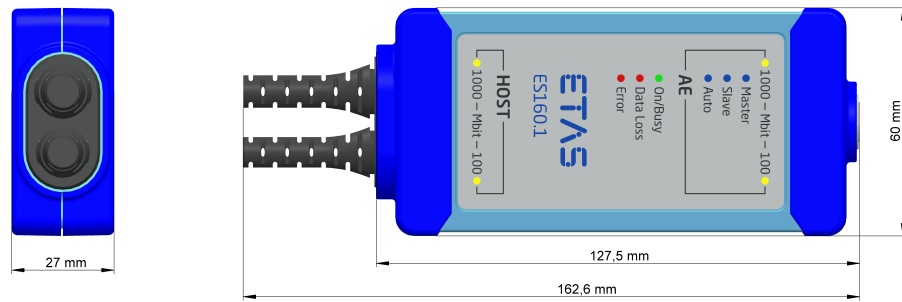


Fig. 6-1 Dimensions without cables (ES160.1)

Dimensions ES162.1/ES165.1 (without cables)

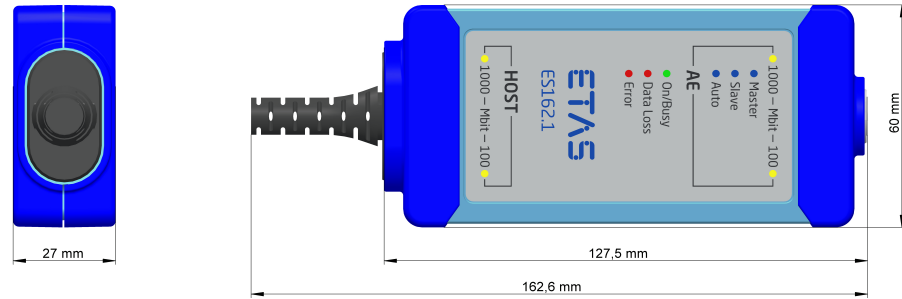


Fig. 6-2 Dimensions ES162.1/ES165.1 (example of ES162.1)

Dimensions (H x W x D)		127,5 mm x 60 mm x 27 mm 5,02 in x 2,36 in x 1,06 in
Dimensions (H x W x D) with cable		3127,5 mm x 60 mm x 27 mm 123,13 in x 2,36 in x 1,06 in
Weight with cable	ES160.1	ca. 0,3 kg / 0,66 lb
	ES162.1	ca. 0,27 kg / 0,6 lb
	ES165.1	

6.2 **RoHS Conformity**

6.2.1 **European Union**

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

This product does not contain any of the restricted substances specified in the EU-Directive 2011/65/EU or exceeds the maximum concentrations stipulated therein. For individual electronic components used in our products, there are currently no equivalent alternative substances, which is why we make use of the exception 7A, 7C-I and 6C (accessory cables) in Annex III of this Directive. ETAS confirms that the product meets this directive applicable in the European Union.

6.2.2 **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.

6.3 **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.

6.4 **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.

6.5 **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.

6.6 **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.

6.7 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. 6-3 WEEE symbol

The WEEE symbol (see Fig. 6-3) on the product or its packaging identifies that the product may not be disposed of together with the remaining trash.

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

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

Additional information about the recycling program of ETAS GmbH is available from the ETAS sales and service locations (see "Contact Information" on page 48).

6.8 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 must be made to the use of the software in order to fulfill OSS licensing terms. Additional information is available in the document "OSS Attributions List" on the ETAS web page www.ETAS.com.

6.9 System Requirements

For configuration of the ES16x modules and for control and data acquisition, you need ETAS software in the following versions and higher:

INCA	min. Version 7.3.3
HSP	min. Version 12.3.0

6.9.1 ES160.1

The Media Converter ES160.1 can be connected directly to a PC with RJ45 network interface.

6.9.2 ES162.1

The Media Converter ES162.1 can be connected to modules with Lemo Gigabit-Ethernet connection and integrated power supply, e.g.: ES8xx

6.9.3 ES165.1

The Media Converter ES165.1 can be connected to modules with Lemo-Fast-Ethernet connection and integrated power supply, e.g.:

- ES8xx
- ES5xx
- ES600.2

6.10 Terminal Assignment

6.10.1 Lemo Socket

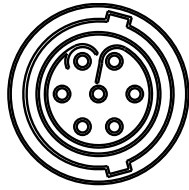


Fig. 6-4 Terminal assignment of Lemo socket

Pin	Signal	Description
1	MDI +	MDI, positive
2	GNDCASE	Shield ¹⁾
3	NC	Not connected
4	NC	Not connected
5	GNDCASE	Shield ¹⁾
6	MDI -	MDI, negative
7	GNDCASE	Shield ¹⁾

¹⁾ Connected with socket housing. In the case of shielded cables (1000Base-T1, e.g. CBEB310) connected to the cable shield.

6.10.2 Cable Pin Assignment (ES160.1)

RJ45 Connector

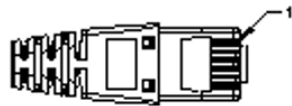


Fig. 6-5 Terminal assignment of RJ45 connector

Pin	Signal	Description
1	BI_DA+	Gigabit Ethernet
2	BI_DA-	Gigabit Ethernet
3	BI_DB+	Gigabit Ethernet
4	BI_DC+	Gigabit Ethernet
5	BI_DC-	Gigabit Ethernet
6	BI_DB-	Gigabit Ethernet
7	BI_DD+	Gigabit Ethernet
8	BI_DD-	Gigabit Ethernet

Power Supply

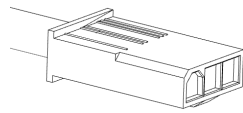


Fig. 6-6 Terminal assignment of VAL-U-LOK connector

Pin	Signal	Description
1	UBATT+	Supply voltage, positive
2	NC	Not connected
2	UBATT-	Supply voltage, negative

6.10.3 Cable Pin Assignment (ES162.1)

LEMO Connector

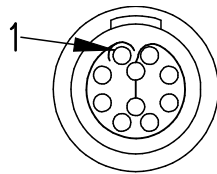


Fig. 6-7 Terminal assignment of LEMO connector

Pin	Signal	Description
1	BID0 +	Gigabit Ethernet
2	BID2 -	Gigabit Ethernet
3	BID2 +	Gigabit Ethernet
4	BID1 -	Gigabit Ethernet
5	BID1 +	Gigabit Ethernet
6	BID3 -	Gigabit Ethernet
7	BID3 +	Gigabit Ethernet
8	BID0 -	Gigabit Ethernet
9	UBATT+	Supply voltage, positive
10	UBATT-	Supply voltage, negative

6.10.4 Cable Pin Assignment (ES165.1)

LEMO Connector

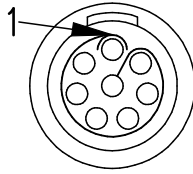


Fig. 6-8 Terminal assignment of LEMO connector

Pin	Signal	Description
1	UBATT+	Supply voltage, positive
2	UBATT+	Supply voltage, positive
3	UBATT-	Supply voltage, negative
4	RX_D2 +	Receiving data, positive
5	TX_D1 -	Transmitting data, negative
6	RX_D2 -	Receiving data, negative
7	UBATT-	Supply voltage, negative
8	TX_D1 +	Transmitting data, positive

6.11 Electrical Data

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

7 Cables and Accessories

This chapter contains information about the following accessories:

- ES160.1 Power Cord. 39
- Automotive-Ethernet Cable. 40

7.1 ES160.1 Power Cord

7.1.1 CPB160.1-0m5 with Banana Connector

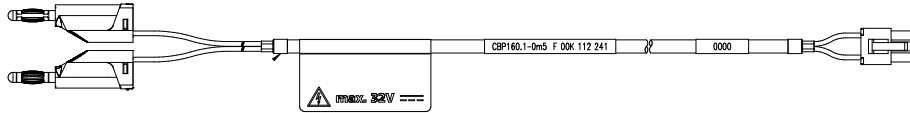


Fig. 7-1 Power cord CPB160.1-0m5 for ES160.1

CPB160.1-0m5 is a power cord with banana connector for connection of the ES160.1 to an external power supply (e.g. lab power supply).

Product	Length	Order number
CPB160.1-0m5	0.5 m	F-00K-112-241

7.1.2 CPB1605.1-0m5 with Safety Banana Connector

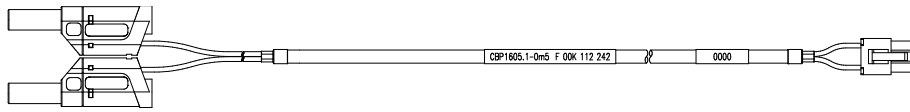


Fig. 7-2 Power cord CPB1605.1-0m5 for ES160.1

CPB1605.1-0m5 is a power cord with safety banana connector for connection of the ES160.1 to an external power supply (e.g. lab power supply).

Product	Length	Order number
CPB1605.1-0m5	0.5 m	F-00K-112-242

7.2 Automotive-Ethernet Cable

7.2.1 Automotive-Ethernet Cable CBEB310.1-3

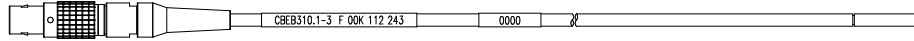


Fig. 7-3 Shielded Automotive-Ethernet cable CBEB310.1-3

CBEB310.1-3 is a shielded Automotive-Ethernet cable with an open cable end for connection of the ES16x module to a shielded Automotive Ethernet Network.

Product	Length	Order number
CBEB310.1-3	3 m	F-00K-112-243

Pin assignment Lemo Connector

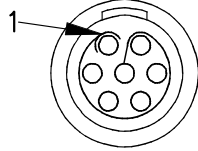


Abb. 7-4 Terminal assignment of Lemo connector

LEMO		Description
PIN	Signal	
1	MDI +	BR + Cable, blue
6	MDI -	BR - Cable, white
Housing	GNDCASE	Shield

7.2.2 Automotive-Ethernet Cable CBEB311.1-3

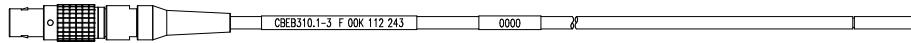


Fig. 7-5 Unshielded Automotive-Ethernet cable CBEB311.1-3

CBEB311.1-3 is an unshielded Automotive-Ethernet cable with an open cable end for connection of the ES16x module to an unshielded Automotive Ethernet Network.

Product	Length	Order number
CBEB311.1-3	3 m	F-00K-112-507

Pin assignment Lemo Connector

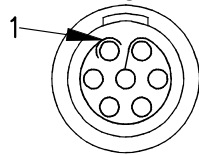


Abb. 7-6 Terminal assignment of Lemo connector

LEMO		Description
PIN	Signal	
1	MDI +	BR + Cable, blue
6	MDI -	BR - Cable, white

7.2.3 Automotive-Ethernet Cable CBEB312.1-0m5

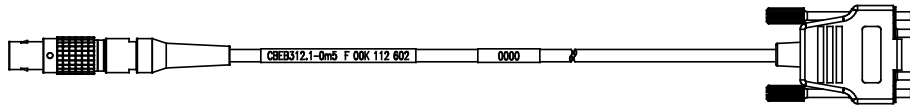


Abb. 7-7 Shielded Automotive-Ethernet cable CBEB312.1-0m5

Shielded Automotive Ethernet connection cable with Lemo connector for connection to an ES16x module and a 9 pin DSUB connector for connection to a signal source.

Product	Length	Order number
CBEB312.1-0m5	0,5 m	F-00K-112-602

Pin Assignment DSUB Connector

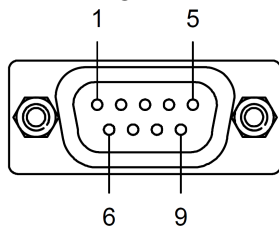



Abb. 7-8 Terminal assignment of DSUB connector

 **NOTE**

Recommended maximum data transmission rate: 100 Mbit/s (100Base-T1)
At higher data transfer rates, signal loss may occur.

LEMO		DSUB	
PIN	Signal	PIN	Signal
1	MDI +	4	BR +
6	MDI -	5	BR -
Housing GNDCASE		Housing GNDCASE	

7.2.4 Automotive-Ethernet Cable CBEB313.1-0m5

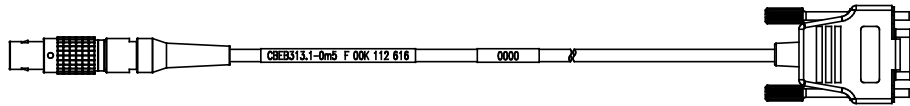


Abb. 7-9 Unshielded Automotive-Ethernet cable CBEB313.1-0m5

Unshielded Automotive Ethernet connection cable with Lemo connector for connection to an ES16x module and a 9 pin DSUB connector for connection to a signal source.

Product	Length	Order number
CBEB313.1-0m5	0,5 m	F-00K-112-616

Pin Assignment DSUB Connector

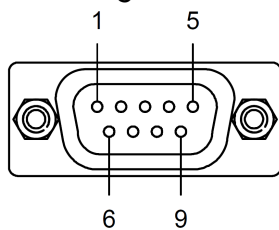


Abb. 7-10 Terminal assignment of DSUB connector

NOTE
 Recommended maximum data transmission rate: 100 Mbit/s (100Base-T1)
 At higher data transfer rates, signal loss may occur.

LEMO		DSUB	
PIN	Signal	PIN	Signal
1	MDI +	4	BR +
6	MDI -	5	BR -
Housing	GNDCASE	Housing	GNDCASE

7.2.5 Automotive-Ethernet Cable CBEB122.1-3

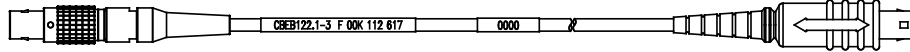


Abb. 7-11 Shielded Automotive-Ethernet cable CBEB122.1-3

Shielded Automotive Ethernet connection cable with Lemo connector for connection to ES16x modules and a Lemo connector for connection to an ETAS BR_XETK equipped with the adapter cable CBAM290.1 or similar.

Product	Length	Order number
CBEB122.1-3	3 m	F-00K-112-617



NOTE

Recommended maximum data transmission rate: 100 Mbit/s (100Base-T1)
At higher data transfer rates, signal loss may occur.

8 Order Information

This chapter contains information about the following topics:

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- ES160.1-S..... 45
- ES162.1..... 46
- ES165.1..... 46
- Accessories..... 46

8.1 ES160.1

Order name	Short name	Order number
ES160.1 Media Converter (1xAE) with RJ45-plug (Gigabit Ethernet) and external power connection with banana connectors	ES160.1	F-00K-112-181
Package Contents		
- ES160.1 Media Converter - CBP160.1-0m5 - List "Content of this Package" - ETAS Safety Advice ES16x - CBP-Banana_SAV - China_RoHS-leaflet_Compact_green_cn		

8.2 ES160.1-S

Order name	Short name	Order number
ES160.1 Media Converter (1xAE) with RJ45-plug (Gigabit Ethernet) and external power connection with safety banana connectors	ES160.1-S	F-00K-112-182
Package Contents		
- ES160.1 Media Converter - CBP1605.1-0m5 - List "Content of this Package" - ETAS Safety Advice ES16x - CBP-Banana_SAV - China_RoHS-leaflet_Compact_green_cn		

8.3 ES162.1

Order name	Short name	Order number
ES162.1 Media Converter (1xAE) with Lemo-plug (Gigabit Ethernet and power supply)	ES162.1	F-00K-112-183
Package Contents		
<ul style="list-style-type: none"> - ES162.1 Media Converter - List "Content of this Package" - ETAS Safety Advice ES16x - China_RoHS-leaflet_Compact_green_cn 		

8.4 ES165.1

Order name	Short name	Order number
ES165.1 Media Converter with Lemo-plug (Gigabit Ethernet and power supply)	ES165.1	F-00K-112-184
Package Contents		
<ul style="list-style-type: none"> - ES165.1 Media Converter - List "Content of this Package" - ETAS Safety Advice ES16x - China_RoHS-leaflet_Compact_green_cn 		

8.5 Accessories



NOTE

We recommend the use of ETAS cables. Observe the maximum permissible cable lengths.

8.5.1 Cables

Order name	Short name	Order number
Power adapter cable for ES160.1 with banana connectors, adapter - banana (3mc - 2mc), 0.5 m	CBP160.1-0m5	F-00K-112-241
Power adapter cable for ES160.1 with safety banana connectors, adapter - safety banana (3mc - 2mc), 0.5m	CBP1605.1-0m5	F-00K-112-242
Gigabit Automotive Ethernet connection cable, Lemo 1B FGI - 1 x Open Wire (7mc - 1x 2c), 3m	CBEB310.1-3	F-00K-112-243
Gigabit Automotive Ethernet connection cable unshielded, Lemo 1B FGI - 1 x Open Wire (7mc - 1x 2c), 3m	CBEB311.1-3	F-00K-112-507

Order name	Short name	Order number
Automotive Ethernet connection cable shielded, Lemo 1B FGI - 1 x DSUB (7mc - 9mc), 0m5	CBEB312.1-0m5	F-00K-112-602
Automotive Ethernet connection cable unshielded, Lemo 1B FGI - 1 x 1 x DSUB (7mc - 9mc), 0m5	CBEB313.1-0m5	F-00K-112-616
Automotive Ethernet connection cable shielded, Lemo 1B FGI - 1 x Lemo FGA 1B (8mc - 2fc), 3m	CBEB122.1-3	F-00K-112-617

9 Contact Information

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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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