ETAS ES165.1

Media Converter

User Guide

www.etas.com

ES165.1 I User Guide R04 EN I 12.2025

Contents

1 Introduction

1.1 About ES165.1 - Media Converter

The ES165.1 Media Converter 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.

1.1.1 Scope of Application

The ES165.1 can be used for the following tasks:

- Recording and capturing of communication data as well as calibration of ECUs
- ECU diagnostics

1.1.2 Properties

The most important properties of the ES165.1 Media Converter:

- 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 state
- 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 ECU

1.2 Target audience and intended use

Target audience

For the safe and efficient use of the product, the user is expected to have comprehensive expertise and practical experience in the following automotive domains:

- Electrical and electronic system architectures in motor vehicles
- Sensor technology and control engineering
- Bus systems and communication protocols
- Electronic control unit (ECU) development and calibration
- Safety guidelines and regulatory requirements for the development and validation of vehicle systems

Intended use

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

The interface modules are designed for the following applications:

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

Application Areas

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

Technical Condition

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

1.3 Safety instructions and classification

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

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

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

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

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

ETAS products, made available as beta versions or prototypes of firmware, hardware and/or software, are to be used exclusively for testing and evaluation purposes. These products may not have sufficient technical documentation and not fulfill all requirements regarding quality and accuracy for market-released series products. The product performance may therefore differ from the

product description. Only use the product under controlled testing and evaluation conditions. Do not use data and results from beta versions without prior and separate verification and validation and do not share them with third parties.

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

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

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

1.3.1 Classification of Safety Messages

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

DANGER

DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates a situation that, if not avoided, could result in damage to property.

1.3.2 Assembly

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

1.3.2.1 Assembly location

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.

1.3.2.2 Securing the Product

The housing must not be damaged while securing the product.

WARNING

Risk of injury due to inadequate fastening

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

1.3.2.3 Ventilation

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

1.3.3 Operation

Only operate the product with the latest firmware. You can find information about updating the firmware in the chapter "Firmware and software update".

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

WARNING

Risk due to undefined vehicle behavior during an ECU reset

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

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

1.3.4 Electrical connection

Electrical Safety and Power Supply

– Only connect the product to electric circuits with safety extra-low voltage in accordance with IEC 61140 (devices of class III) within the voltage limits for accessible parts as per IEC 61010-1.
– Observe the connection and setting values.
– The power supply for the product must be safely disconnected from the supply voltage. For example, use a car battery or a suitable lab power supply.
– Only use lab power supplies with dual protection for the supply network (with double/reinforced insulation (DI/RI)).
– The power supply must be suitable for use according to the ambient conditions for the product.
– It is possible to discharge the vehicle battery in regular operation and long standby operation.
– Central load-dump protection is required for operation.

Connection to the Power Supply

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

To de-energize the Product

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

1.3.5 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.

Accessories

Use ETAS accessories, accessories recommended by ETAS or other accessories certified for the application.

1.4 Unpacking

1. Prepare Workspace

   Unpack in a clean, dry, well-lit area with enough space for the equipment and avoid static damage or physical harm.
2. Open Package

   Use appropriate tools to carefully open the box without damaging the contents.
3. Verify Contents

   Compare the items with the packing list "Contents of Package" to ensure all components are present.
4. Inspect for Damage

   Visually check each item for physical damage. If found, document and report it to customer support.

2 Product overview

2.1 Graphical overview of elements

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

2.2 Compatibility

2.2.1 System requirements

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

INCA	starting with Version 7.5.3
HSP	starting with Version 14.3.0

2.2.2 Compatible products

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

- ES523.1
- ES600.2
- ES8xx

3 Hardware setup

3.1 Transportation and packaging

Transport

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

3.2 Mounting and placement

WARNING

Risk of injury due to inadequate fastening

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

3.3 Connection to the power supply

The ES165.1 is powered by a connected ETAS product.

3.4 Connection with other products

NOTICE

Damage to the electronics due to potential equalization

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

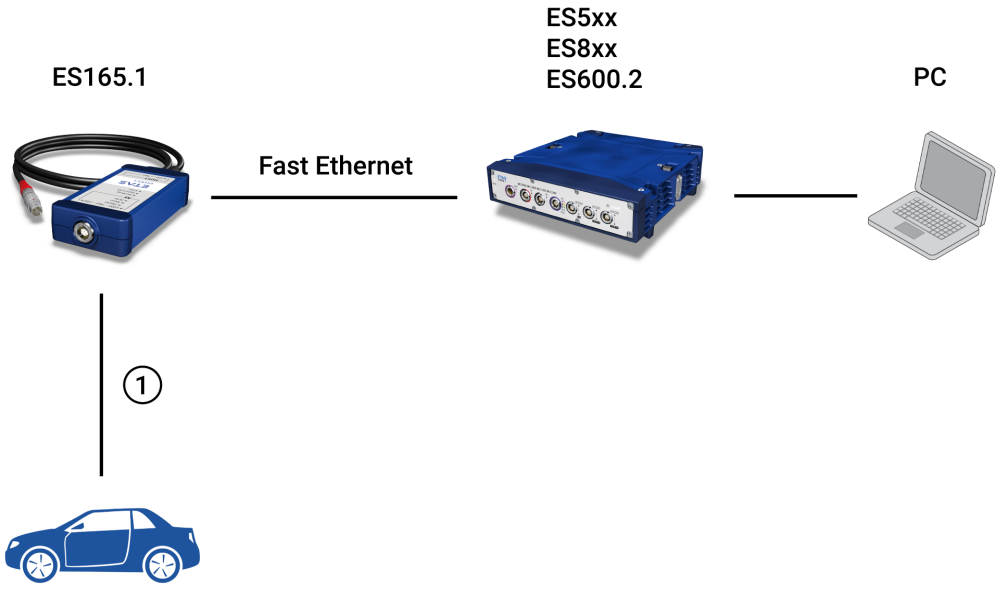
Note

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

Note

Please ensure that the device is installed and operated as described in the user manual to maintain the specified EMC properties in the respective application. Deviation from the specified installation and operation instructions or connecting the device with other devices may result in a deviation from the specified EMC properties.

The ES165.1 is designed to connect to an Automotive Ethernet Network, a PC and an external power supply.



Cables in Fig.	Function	Short name
1	Cables for connection to the Automotive Ethernet Network	CBEB310.1-3
		CBEB311.1-3
		CBEB312.1-0m5
		CBEB313.1-0m5
		CBEB122.1-3

4 Basic operation

4.1 Status indicator

The ES165.1 displays the connection status to the Automotive Ethernet (AE), the device status and the connection speed to the host with colored LEDs.

4.1.1 Connection Status of Automotive Ethernet (AE)

Default connection mode and connection speed after a restart: Auto

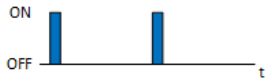
Master (Automatic Configuration)

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

Slave (Automatic Configuration)

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

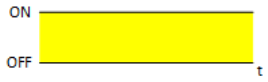
Master and Slave (Automatic Configuration)

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

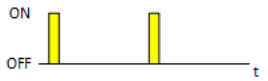
1000 Mbit (Automatic Configuration)

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

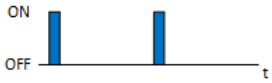
100 Mbit (Automatic Configuration)

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

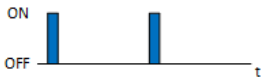
1000 Mbit and 100 Mbit (Automatic Configuration)

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

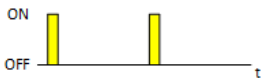
Master (Manual Configuration)

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

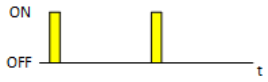
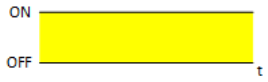
Slave (Manual Configuration)

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 100Mbit 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)

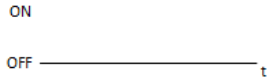
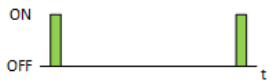
LED code	Display	State
	Off	Manual 1000Mbit set.
	Flashing yellow	Connection to target lost or being established
	Irregular flashing yellow	Target connected, traffic-dependent flashing yellow
	Lit yellow	Target connected, no traffic

Auto (Automatic and Manual Configuration)

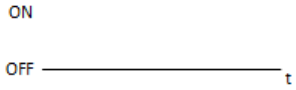
LED code	Display	State
	Off	Manual Master/Slave mode selected
	Lit blue	Auto mode selected

4.1.2 Device Status

On/Busy

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

Data Loss

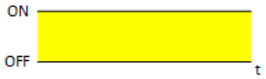
LED code	Display	State
	Off	No data loss detected
	Lit red	Data loss detected. Restart or acknowledgment in the web interface required

Error

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

4.1.3 Connection Speed

100 Mbit

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

5 Commissioning

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).

5.1 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.

5.1.1 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.

5.1.2 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 **AEMODE**.
5. Click Save to confirm the input.

5.1.3 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 **AESPEED**.
5. Click **Save** to confirm the input.

5.1.4 Resetting Data Loss Errors

If different speed settings exist in the two interfaces of the converter due to the system configuration, with higher data through puts 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”).

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.

6 Technical specification

6.1 Hardware specifications

6.1.1 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)	95%
Max. altitude	5000m / 16400ft.
Degree of contamination (IEC 60664-1, IEC 61010-1)	2
Protection rating (IEC 60529) (when closed)	IP42

6.1.2 Electrical data

Operating voltage range	6 V to 32 V DC
Max. current consumption	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
Fuse	Max. 20 A
Overvoltage category (mains supply, IEC 60664-1)	II

6.1.3 Mechanical data

Dimensions (H x W x D)	128 x 60 x 27 mm 5.02 x 2.36 x 1.06 in
Dimensions (H x W x D) with cable	3128 x 60 x 27 mm 123.13 x 2.36 x 1.06 in
Weight	0.27 kg / 0.60 lb

6.2 Product markings

Symbol	Description
	Please read the user manual before starting up the product.
SN: xxxxxxx	Serial number
F 00K xxxxxxx	Order number
x-xx V⎓	Operating voltage range DC
xxx mA	Max. current consumption
	**China RoHS** With the China RoHS identification attached to the product or its packaging, ETAS confirms that the product meets the guidelines of the “China RoHS” (Management Methods for Controlling Pollution Caused by Electronic Information Products Regulation) applicable in the People's Republic of China.

Symbol	Description
CE	**CE Conformity** With the CE mark attached to the product or its packaging, ETAS confirms that the product corresponds to the applicable, product-specific Directives of the European Union. The EU Declaration of Conformity for the product is available upon request. **European Union** The EU Directive 2011/65/EU limits the use of certain dangerous materials for electric and electronic devices (RoHS conformity). This product does not contain any of the prohibited substances listed in EU Directive 2011/65/EU and does not exceed the maximum authorized concentrations specified. There are currently no equivalent alternative substances for individual electronic components used in our products. We are therefore making use of exemptions 7.a-I, 7.c-I and 6.c (for accessory cables) in Annex III of this Directive. ETAS confirms that the product meets this directive applicable in the European Union.
KC	**KCC Conformity** With the KC mark attached to the product or its packaging, ETAS confirms that the product has been registered in accordance with the applicable, product-specific KCC guidelines of the Republic of Korea.
CMIM	**CMIM Conformity** With the CMIM mark attached to the product or its packaging, ETAS confirms that the product corresponds to the product-specific, applicable directives of the Kingdom of Morocco. The CMIM Declaration of Conformity for the product is available upon request.

Symbol	Description
UK CA	**UKCA Conformity** With the UKCA mark attached to the product or its packaging, ETAS confirms that the product meets the applicable, product-specific British standards and directives. The UKCA Declaration of Conformity for the product is available upon request.
	**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. The WEEE symbol (see Fig.4-2) on the product or its packaging identifies that the product may not be disposed of together with the remaining trash. The user is obligated to separately collect old devices and provide them to the WEEE return system for recycling. The WEEE Directive applies to all ETAS devices, but not to external cables or batteries. Additional information about the recycling program of ETAS GmbH is available from the ETAS sales and service locations.

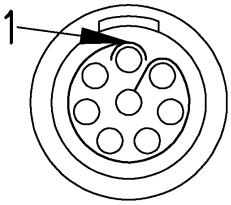
6.3 Connectors

Note

All connections are shown with view of the module interfaces.

6.3.1 Terminal assignment of cables

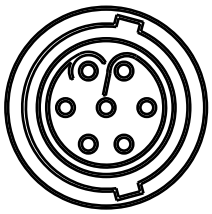
LEMO connector (male)



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

6.3.2 Terminal assignment of sockets

LEMO Socket



Pin	Signal
1	MDI+
2	GNDCASE[1)]
3	NC
4	NC

Pin	Signal
5	GNDCASE[1)]
6	MDI-
7	GNDCASE[1)]

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

7 Maintenance

7.1 Cleaning

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

7.2 Firmware and software update

7.2.1 Updating the Firmware

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

7.3 Repair service

If repairs are required, send the product to ETAS.

8 Accessories and order information

8.1 Module

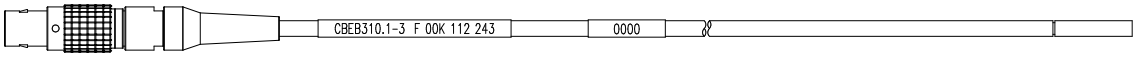
Order name	Short name	Order number
ES165.1 Media Converter with Lemo-plug (Gigabit Ethernet and power supply)	ES165.1	F 00K 112 184

8.2 Cables

8.2.1 Automotive-Ethernet Cable

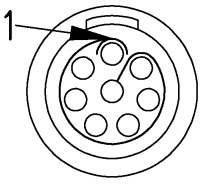
> **Note**
>
> Ensure that the test setup is EMC-compliant. A test setup that uses shielded and unshielded components at the same time can lead to impairment of the signal quality and is not recommended by ETAS.

8.2.1.1 CBEB310.1-3 (shielded)



CBEB310.1-3 is a shielded Automotive-Ethernet cable with an open cable end for connection of the ES165.1 module to a shielded Automotive Ethernet Network.

Pin assignment Lemo Connector



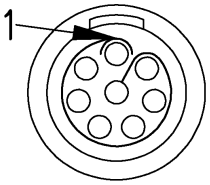
Pin	Signal
1	MDI +
6	MDI -
Housing	GNDCASE

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

8.2.1.2 CBEB311.1-3 (unshielded)

CBEB311.1-3 is an unshielded Automotive-Ethernet cable with an open cable end for connection of the ES165.1 module to an unshielded Automotive Ethernet Network.

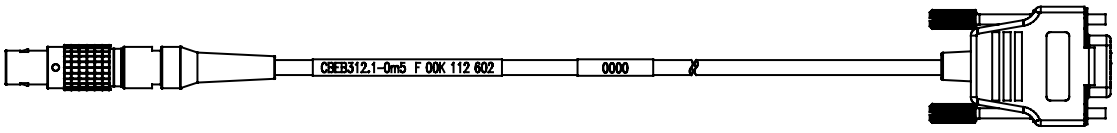
Pin assignment Lemo Connector



Pin	Signal
1	MDI +
6	MDI -

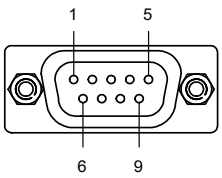
Order name	Length	Order number
CBEB311.1-3	3 m	F 00K 112 507

8.2.1.3 CBEB312.1-0m5 (shielded)



Shielded Automotive Ethernet connection cable with Lemo connector for connection to the ES165.1 module and a 9 pin DSUB connector for connection to a signal source.

Pin assignment DSUB Connector



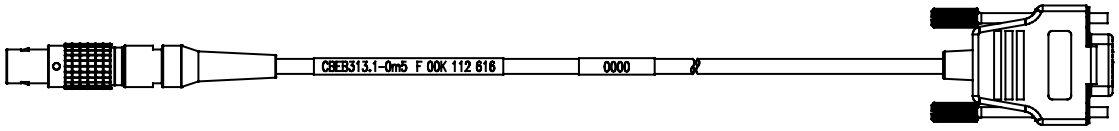
Note

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

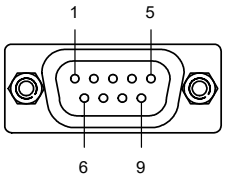
Order name	Length	Order number
CBEB312.1-0m5	0.5 m	F 00K 112 602

8.2.1.4 CBEB313.1-0m5 (unshielded)



Unshielded Automotive Ethernet connection cable with Lemo connector for connection to the ES165.1 module and a 9 pin DSUB connector for connection to a signal source.

Pin assignment DSUB Connector



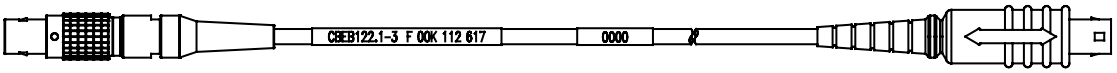
Note

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

Order name	Length	Order number
CBEB313.1-0m5	0.5 m	F 00K 112 616

8.2.1.5 CBEB122.1-3 (shielded)



Shielded Automotive Ethernet connection cable with Lemo connector for connection to the ES165.1 module and a Lemo connector for connection to an ETAS BR_XETK equipped with the adapter cable CBAM290.1 or similar.

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

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

9 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/hotlines

ETAS offers trainings for its products:

www.etas.com/academy

ETAS Headquarters

ETAS GmbH		
Borsigstraße 24	Phone:	+49 711 3423-0
70469 Stuttgart	Fax:	+49 711 3423-2106
Germany	Internet:	www.etas.com

10 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.

11 Legal information

11.1 Use of Open Source Software

The product might use Open Source Software (OSS). This software is installed on the product at shipment and does not need to be installed or updated by the user. If OSS is used, see the accompanying "OSS Attributions Document" for more information.

11.2 Certification and conformity

11.2.1 Declarable Substances

European Union

Some products from ETAS GmbH (e.g. modules, boards, cables) use components with materials that are subject to declaration in accordance with the REACH regulation (EC) no.1907/2006. The REACH Declaration is available online at www.etas.com/reach and is continuously updated.

11.3 Standards and norms

The ES165.1 complies with the following standards and norms:

Standards	Title	Further Information
IEC 61010-1:2010, IEC 61010-1:2010/AMD1:2016	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements	
IEC 61326-1:2020	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements	Electromagnetic Environment: Industrial
CISPR 11:2015, CISPR 11:2015/AMD1:2016, CISPR 11:2015/AMD2:2019	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement	Class of the equipment: Class B Group of the equipment: 1

11.3.1 EMC Class B

USA

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Responsible Party – U.S. Contact Information
ETAS Inc.
15800 N. Hagerty Road
Plymouth, MI
48170
www.etas.com/ww/en/contact/etas-in-the-united-states/

11.3.2 Failsafe Automotive Ethernet Operation

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