

# ETAS XETK-S20.1B

Emulator Probe for the Infineon  
AURIX Microprocessor Family



User Guide

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XETK-S20.1BI User Guide R14 EN - 03.2024

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# 1 Safety Information

This chapter contains information about the following topics:

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Refer to the following safety instructions and the technical documentation available to download from the ETAS website [www.etas.com](http://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](http://www.etas.com/hotlines)
- ETAS contact partners by region: [www.etas.com/contact](http://www.etas.com/contact)

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

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

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

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

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

## 1.1 Intended Use

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

An emulator probe (ETK) is an electronic assembly that is installed in a vehicle control unit (ECU) to exchange data with ECUs.

### Application Areas

- The product is approved for use in the following areas:
  - ECUs
- 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. The product cannot be repaired. Dispose of the product properly. Do not open or alter the product. Only ETAS may make changes to the product.

## 1.2 Classification of Safety Messages

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



### DANGER

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 Safety Information

### 1.3.1 Assembly

The product must only be removed from the ESD packaging and installed in a workplace that is protected against static discharges.

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

When installing the product, make sure that the fastening elements do not damage the product's printed circuit board or cause a short circuit.

### Installation 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 Operation

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

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.

### 1.3.3 Electrical Connection

#### Electrical Safety and Power Supply

- Only connect the product to electric circuits with safety extra-low voltage in accordance with IEC 61140 (devices of class III) within the voltage limits for accessible parts as per IEC 61010-1.
- Comply with the connection and setting values (see "Technical Data" on page 34).
- The power supply for the product must be safely disconnected from the mains power. For example, use a car battery or a suitable lab power supply.
- Only use lab power supplies with dual protection for the supply network (with double/reinforced insulation (DI/RI)).
- The power supply must be suitable for use according to the ambient conditions for the product.



- It is possible to discharge the vehicle battery in regular operation and long standby operation.
- Central load-dump protection is required for operation.

### Connection to the power supply



#### **DANGER**

##### **Undefined vehicle behavior due to an ECU reset**

If the external power supply to the ETK is interrupted (e.g. cut, disconnected, etc.), this may lead to the ECU being reset.

- Connect the internal power supply of the ECU to the ETK in addition to the external power supply.
- If this is not possible, ensure that the external power supply to the ETK is not interrupted during operation.



#### **WARNING**

Risk to life from electric shock

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

- Use a power supply that is permitted for the product.

- Ensure that the connections of the power supply are easily accessible.

### De-energizing the product

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

## 1.3.4 Cables and Accessories

### Cables

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

### Accessories

Use ETAS accessories, accessories recommended by ETAS or other accessories certified for the application. For detailed information about accessories, see "Cables and Accessories" on page 48.

#### 1.3.5 Transport

- Only transport and store the product in ESD packaging.
- Only transport the product individually.
- Do not transport the product by the connected cables.

#### 1.3.6 Maintenance







The product is maintenance-free.

#### Cleaning

- Only clean the product when it is de-energized.
- Make sure that no moisture enters the product.
- Carefully vacuum off dust particles and loose foreign bodies.

### 1.4 Identifications on the Product

The following symbols are used for identifications of the product:

Symbol	Description
	The User Guide must be read prior to the startup of the product!
	Symbol for WEEE, see chapter 1.5 on page 11
	Symbol for CE conformity, see chapter 1.6.1 on page 11
	UKCA conformity symbol (Great Britain), see chapter 1.6.2 on page 11)
	Symbol for China RoHS, see chapter 1.7.2 on page 12
	Symbol for electrostatic sensitive components
XETK-S14.0A	Product designation (example)
F 00K 110 722	Order number of the product (example)
SN: yyxxxxx	Serial number (7-digit)
XXXX/YY	Product version
ZZZZ	Year of manufacture
ETAS GmbH,...	Manufacturer's address



**NOTE**

For symbols and product information one or several adhesive labels can be used.

## 1.5 Taking the Product Back and Recycling

The European Union has passed a directive called Waste Electrical and Electronic Equipment, or WEEE for short, to ensure that systems are setup throughout the EU for the collection, treating and recycling of electronic waste.

This ensures that the devices are recycled in a resource-saving way representing no danger to health or the environment.



**Fig. 1-1** WEEE-Symbol

The WEEE symbol (see Fig. 1-1 on page 11) on the product or its packaging shows that the product must not be disposed of as residual garbage.

The user is obliged to collect the old devices separately and return them to the WEEE take-back system for recycling. The WEEE directive concerns all ETAS devices but not external cables or batteries.

For more information on the ETAS GmbH Recycling software, contact the ETAS sales and service locations.

## 1.6 Declaration of Conformity

### 1.6.1 CE Declaration of Conformity (European Union)

With the CE mark attached to the product or its packaging, ETAS confirms that the product corresponds to the applicable product-specific European Directives. The CE Declaration of Conformity for the product is available upon request.

### 1.6.2 UKCA Declaration of Conformity (Great Britain)

With the UKCA mark attached to the product or its packaging, ETAS confirms that the product corresponds to the product-specific, applicable standards and directives of Great Britain. The UKCA declaration of conformity for the product is available on request.

## 1.7 RoHS Conformity

### 1.7.1 European Union

The EU Directive 2011/65/EU limits the use of certain dangerous materials for electrical 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 exceptions 7C-I in Annex III of this Directive.

ETAS confirms that the product corresponds to this directive which is applicable in the European Union.

### 1.7.2 People's Republic of China

ETAS confirms that the product meets the product-specific applicable guidelines of the China RoHS (Management Methods for Controlling Pollution. Caused by Electronic Information Products Regulation) applicable in China with the China RoHS marking affixed to the product or its packaging.

## 1.8 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](http://www.etas.com/Reach)). This information is continuously being updated.

## 1.9 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](http://www.etas.com)).

## 2 Introduction

This chapter contains information about the following topics:

- Applications..... 13
- Features ..... 14

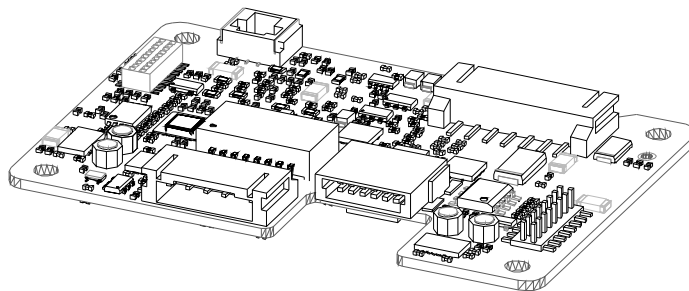
**i** **NOTE**  
 The XETK-S20.1 is the successor of the XETK-S20.0 and includes DAP debugger arbitration."

### 2.1 Applications

The XETK-S20.1B is an emulator probe for the Infineon AURIX microcontroller family.

**i** **NOTE**  
 For supported microcontrollers, refer to chapter 7.1.3 on page 35.

It is a typical serial XETK with an Infineon specific DAP interface.



**Fig. 2-1** XETK-S20.1B

	XETK-S20.1B
ECU connectors	12 pin ERNI plus 7 pin JST
Power supply for ED devices (VDDS-BRAM)	min. 1.3 V
SBRAM sense	Yes, no extra pin
Pinless triggering	Yes
Timer triggering	Yes

The XETK-S20.1B supports the standard full duplex 100Base-T Ethernet interface and can be connected directly or via ES51x/ES59x/ES600 modules to the PC. No additional ETAS modules are required for the access to the ECU. The XETK-S20.1B can be used for rapid prototyping applications (bypass) as well as for measurement and calibration applications.

## 2.2 Features

- Measurement interface:
  - For use with serial processor interface DAP (Infineon)
  - DAP interface clock speed: 50 MHz/ 100 MHz
  - 3.3 V ECU interface voltage level
- Supports special coldstart mechanism ("Calibration Wake Up"):
  - Calibration Wake Up: Wake up mechanism to wake up the power supply of the ECU via the Calibration Wake up pin
  - Pull CalWakeUp until Startup Handshake: duration of the Wake up mechanism is configurable
- Pinless startup protocol for XETK recognition and data acquisition triggering
- DAP debugger interface:
  - XETK provides additional connector for external debug hardware
  - Simultaneously use XETK and debugger
- ECU Flashing via XETK:
  - Brainedead flashing under ProF control
- Calibration:
  - Microcontroller capability of internal Flash emulation can be used
  - XETK powers Emulation Device RAM (for calibration purpose)
  - Supports "Start on Any Page"
- Permanent storage of configuration in EEPROM
- Fast Ethernet Interface:
  - Direct connection to PC
  - Open XCP on Ethernet Protocol
  - Supports a variety of standard applications
- "ETK Drivers and Tools" update to support ETAS software tools (INCA, XCT)
- Firmware update (programming of the logic device) through software; removal of XETK or ECU is not necessary
- Mounting possibilities inside or on top of ECU
- Temperature range suitable for automotive application

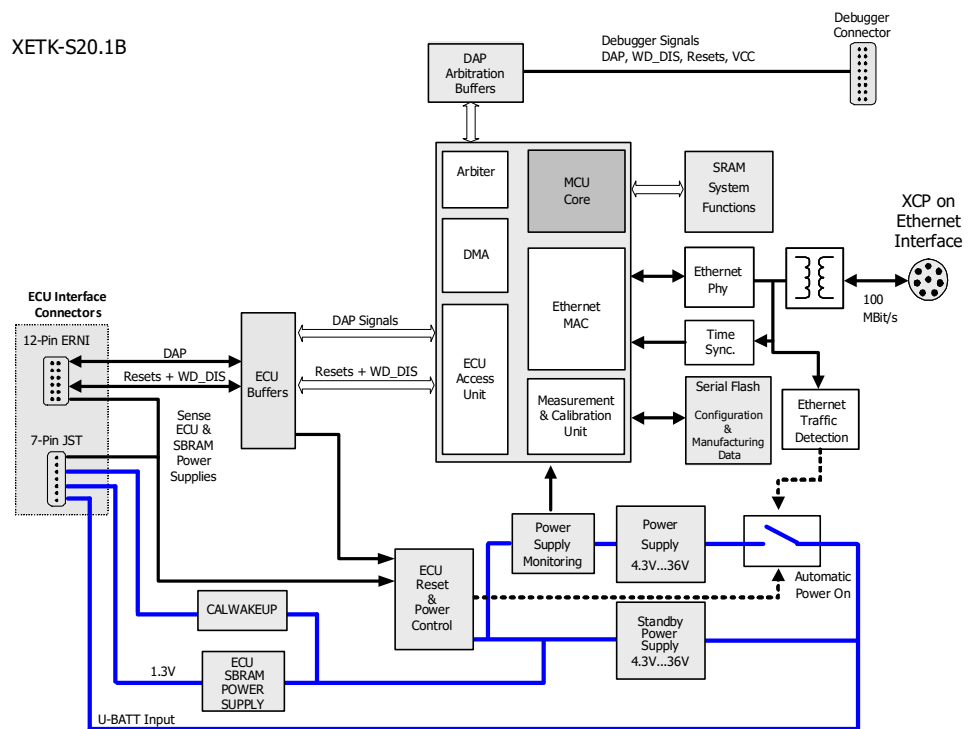
For more technical data on the XETK-S20.1B consult the chapter "Technical Data" on page 34.

### 3 Hardware Description

This chapter contains information about the following topics:

#### 3.1 Architecture

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- Power Supply ..... 19
- ECU Voltage Supervisor ..... 19
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- Timer Triggering ..... 24
- Reset ..... 25
- Pull CalWakeUp until Startup Handshake ..... 25



**Fig. 3-1** XETK-S20.1B Architecture

While the microcontroller accesses the program data (not the program code) out of the data emulation memory provided by the microcontroller, the content of the data emulation memory can simultaneously be modified by the calibration and development system through the XETK Ethernet interface. This process enables

adjustments of parameters, characteristic lines and maps through the calibration and development system. Using an additional measurement data memory area, the ECU microcontroller can provide data to the calibration and development system by buffering the data (DISTAB) and triggering the XETK to read the data via DAP. The XETK then reads, buffers, processes and sends this measured data to the PC.

If no additional measurement data memory is available, the XETK-S20.1B can alternatively read the data to be measured directly from the microcontroller's memory. This process is Triggered Direct Measurement (TDM).

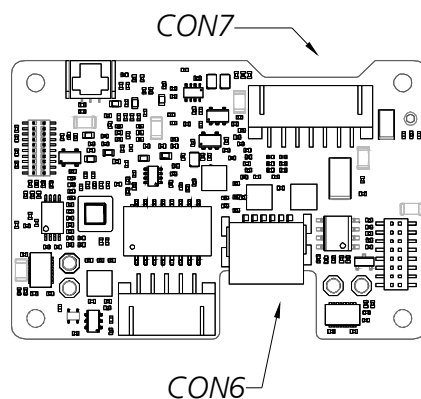
The 100 Mbit/s XETK Ethernet interface provides communication with the PC.

The power supply for the XETK-S20.1B is provided by a switch mode power supply, to minimize power dissipation.

### 3.2 ECU Interface

The XETK-S20.1B is connected via connectors CON6 and CON7 to the ECU with two adapter cables (refer to Fig. 3-2 on page 16). The pin definition depends on the application and the microcontroller type. In general the ECU interface consists of

- 1 ECU voltage line, which is not used for XETK power supply, but only for detection of the ECU status, therefore the power consumption on this line is negligible (refer to chapter 3.5 on page 19)
- 1 Reset line which allows the XETK to control the system reset of the ECU
- 1 Reset line which allows the XETK to monitor the system reset of the ECU
- 3 Debug line interfaces for the communication between the XETK-S20.1B and the microcontroller (/TRST, DAP0, DAP1)
- 2 ground lines for proper shielding of the ECU interface lines



**Fig. 3-2** Location of the ECU Interfaces



### 3.3 XETK Ethernet Interface

The XETK Ethernet interface shown in Fig. 3-3 can be directly connected to the PC. No additional ETAS module is required for the access to the ECU.

The interface is a standard full duplex 100Base-TX Ethernet interface using the XCP protocol. The XETK Ethernet interface is integrated in the ETAS IP world with automatic IP management and supports the open automotive "Universal Measurement and Calibration" standard "XCP on Ethernet" (TCP/IP, UDP/IP). The open XCP on Ethernet interface allows for connecting to the XETK-S20.1B with third party application software.



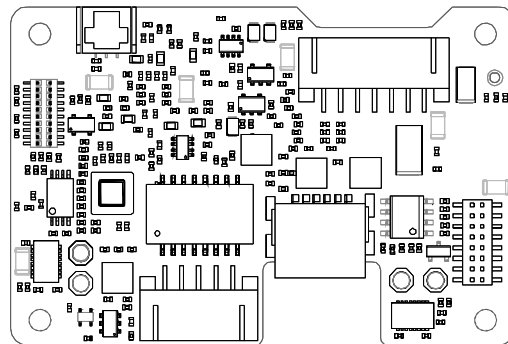
#### NOTE

The XETK Ethernet interface is not compatible with the ETK interfaces in modules like e.g. ES910, ES590, ES591, ES592, ES593-D, ES595, ES1232-A. The XETK Ethernet interface is compatible with the ECU interface of the ES910 module and the Ethernet interfaces of the ES592/ ES593-D/ ES595/ ES600/ ES8xx modules.



#### NOTE

Please see chapter 7.1.2 on page 34 for additional information regarding PC requirements for the Ethernet interface.

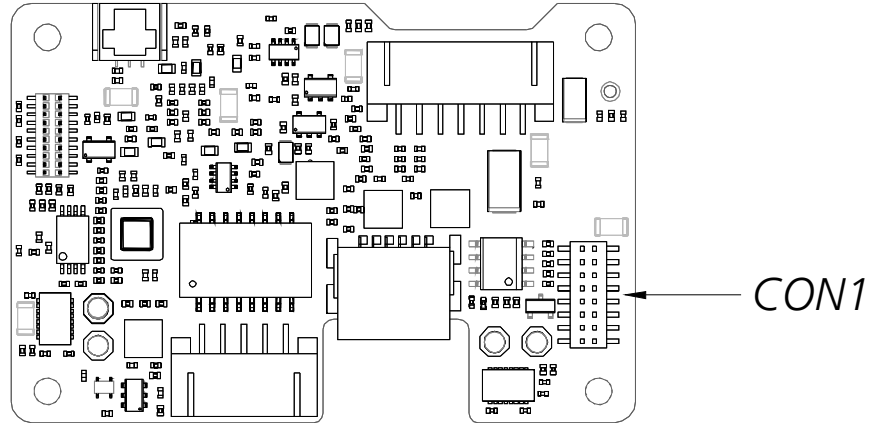


CON5

**Fig. 3-3** Location of the XETK Ethernet Interface connector (CON5)

### 3.4 Debug Interface

The XETK-S20.1B features a DAP debugging interface connector CON1 (Samtec 16 pin). This connector can be used to attach debug tools (e.g. Lauterbach or PLS debugger for Infineon TC27x-ED and TC29x-ED).



**Fig. 3-4** Location of the Debugger Interface (XETK-S20.1B)

By using the debug interface at the ECU board for serial ETK connection, it is not available for debugging tools any longer. Arbitration mechanisms are required to simultaneously work e.g. with measurement and calibration tools as well as with debugging tools. The XETK-S20.1B provides a hardware arbitration unit for the DAP interface. This enables parallel use of tools for debugging and ETAS tools for measurement and calibration

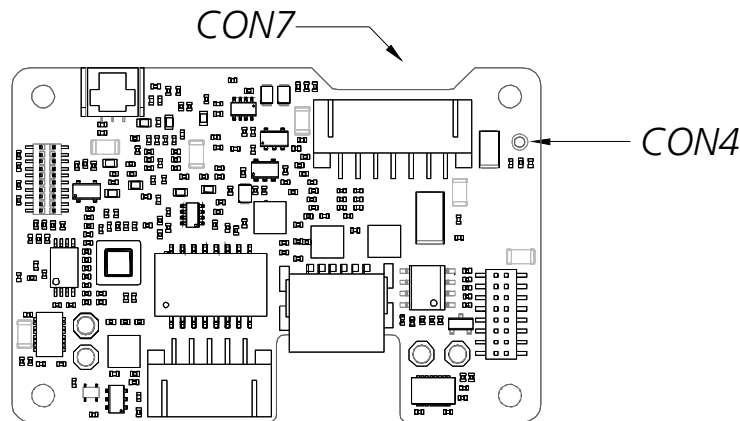
### 3.5 Power Supply

The XETK-S20.1B requires a permanent power supply. It is typically powered directly from the car battery. The input voltage may vary between 4.3 V and 36 V. In case of higher input voltages to the XETK, additional voltage protection is required. The XETK-S20.1B will also accept voltage dips down to 3V, for a maximum duration of 15ms (for additional details of low voltage operation, see ISO standard 16750).

From the input battery voltage, the XETK-S20.1B creates all necessary voltages through switching power supplies on the XETK-S20.1B. The power supply of the ECU is not affected by the XETK-S20.1B. An automatic switch ensures that the power supply of the XETK-S20.1B is automatically switched on and off when the XETK enters and leaves its standby (sleep) mode.

The XETK-S20.1B can be supplied with power through the seven pin connector, CON7. The through-hole solder pad CON4 can be used additionally to connect a power supply  $U_{\text{Batt2}}$ .

The power supply on CON4 must use the GND of CON7 pin 3.



**Fig. 3-5** Location of the XETK-S20.1B Power Supply Connectors

### 3.6 ECU Voltage Supervisor

The ECU voltage (VDDP) is monitored by the XETK to recognize whether the ECU is switched on or off.

Additionally the ECU RAM standby voltage (VDDSB RAM) is monitored to determine if the standby RAM content is still valid. These two signals are only used for monitoring therefore the load current is negligible.

The XETK-S20.1B supplies the ECU EDRAM using the pin VDDSB RAM and monitors this voltage using a sense pin on board the XETK. The microcontrollers standby power supply pin must be connected to the XETK pin VDDSB RAM.

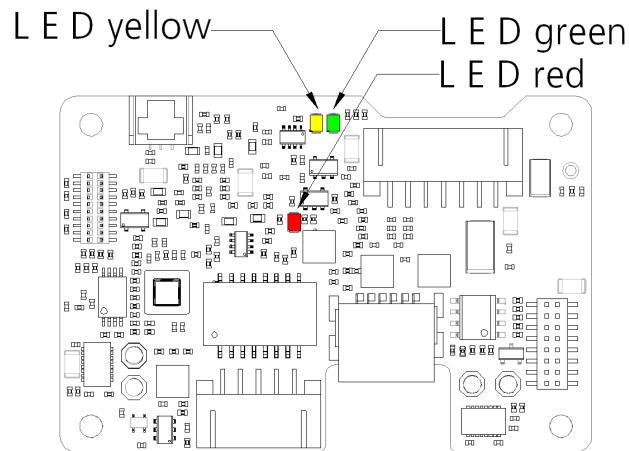


#### NOTE

The XETK-S20.1B only allows switching between reference page and working page if there is a valid voltage at the sense pin and the working page has been initialized by the calibration and development system.

### 3.7 Status LEDs

There are three LEDs displaying the operating status of the XETK-S20.1B (Fig. 3-6 on page 20).



**Fig. 3-6** Status LEDs of the XETK-S20.1B

LED	State	Definition
Red	On	XETK-S20.1B is supplied with power and active (i.e. the ECU is switched on or the 100 Mbit/s link to the calibration system is established)
Green	Off	Working page may be different from reference page. Calibration and development system has downloaded data since the last power failure. Switching between the Reference Page and Working Page is possible.
	On	Power supply has dropped under selected threshold: - data retention of the calibration data manager in the ECU is no longer ensured - as soon as the XETK-S20.1B switches on again, the ECU switches to the Reference Page. Green LED stays on until the calibration and development system downloads data into the calibration data memory. Otherwise switching to the Working Page is not possible.
Yellow	Flashing	Communication active
	On	100 Mbit/s link to calibration system established

### 3.8 Data Emulation and Data Measurement

The XETK-S20.1B is a serial XETK using DAP as the primary microcontroller interface. Typical of all serial (X)ETKs, the RAM used for data emulation and data measurement is not accessible by the XETK until the microcontroller is powered up and the startup handshake is performed.

Serial XETKs use the ETAS two page concept, consisting of both a Reference and a Working page.

The Reference Page is located in the ECU flash and can not be modified by a simple write access. All changes to the Reference Page must be done via Flash programming.

The Working Page is located within the microcontroller's ED RAM. The Working Page may be a portion of or the entire size of the ED RAM. The ED RAM used for the emulation of calibration data must not be used by the ECU software directly as general-purpose RAM. It is recommended that the ED RAM is permanently powered by the XETK. The XETK/INCA has the complete control over the RAM used as Working Page and its contents. When enabling data emulation, the XETK establishes a basic start-up configuration of the data in the Working Page by copying the corresponding data in the Flash to the emulation space.



#### NOTE

With serial ETKs such as the XETK-S20.1B, there is an important restriction that no access to the memory is possible, while the ECU is not running. To enable a cold start measurement (measurement during ECU power-up) in spite of this restriction, the cold start measurement procedure is defined to give the user the feeling of a parallel XETK. Please inquire further if you would like additional details for the cold start measurement procedure.

#### 3.8.1 Page Switching

To enable calibration, the Working Page must be activated. The process of switching from the Reference Page to the Working Page and vice versa is known as page switching. The XETK-S20.1B supports two methods of page switching; however one method is only available for certain controllers.

The XETK-S20.1B can access both the Reference Page and the Working Page, regardless of which is active from the microcontroller's point of view and which page switch method is used. The two types of page switching methods are described next.

##### Protocol Based Page Switching

The XETK-S20.1B supports Protocol Based page switching for all supported microcontrollers. Page switching is implemented in microcontroller software by switching the overlay memory on (Working Page) and off (Reference Page) using microcontroller overlay registers. The XETK-S20.1B does not directly control the microcontroller overlay registers. Instead, the XETK-S20.1B and microcontroller software use a simple communication method with a shared mailbox in RAM. The

XETK uses this mailbox to request and monitor page switching; the microcontroller software is responsible to service this mailbox and perform the page switches. Using an overlay modification description, also in RAM, the XETK provides the necessary information of how the overlay registers need to be modified to realize the page switch which is requested.

### Direct Register Access Page Switching

The XETK-S20.1B supports Direct Register Access page switching for microcontrollers which provide additional internal registers for page switching. Switching between the Reference Page and Working Page is done in microcontroller hardware by redirecting accesses to calibration data between either the Flash (Reference Page) or the RAM (Working Page) using microcontroller internal registers. The XETK-S20.1B has direct access to control these registers.

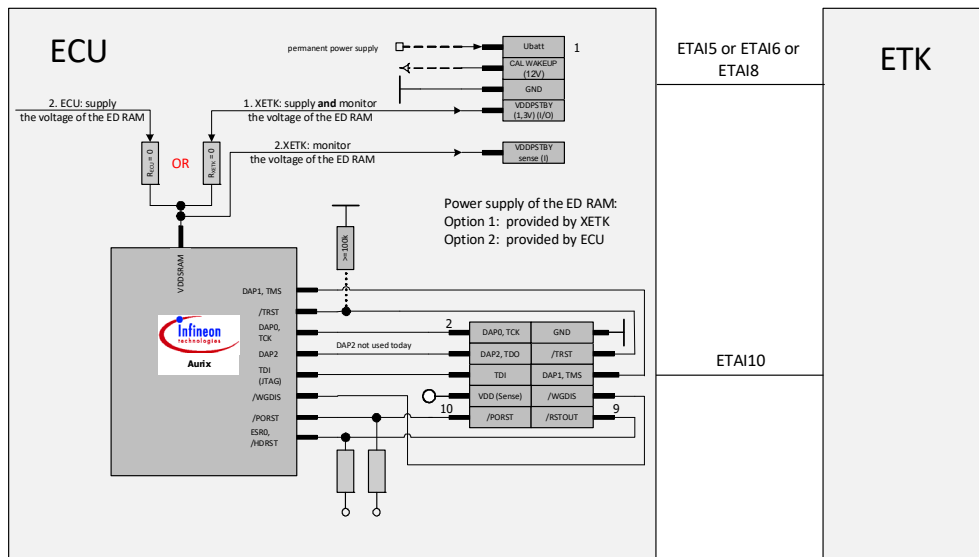
To use Direct Register Access page switching, the microcontroller software could initialize the necessary registers; however, it must not change the values after the XETK startup handshake has taken place.



#### NOTE

The XETK-S20.1B can use the Direct Register Access page switch method only with the TC3xx variants of the Aurix microcontrollers. Additional Aurix microcontrollers can be supported on request.

### 3.9 DAP Interface



**Fig. 3-7** Equivalent Circuitry of the ECU DAP Interface (ECU)

The ECU part of the DAP XETK interface is depicted in Fig. 3-7. The XETK-S20.1B incorporates 22 Ohm series resistors for the DAP1, DAP0, and /TRST lines on the ECU interface. Hence, no additional termination resistors are required on the ECU for these signals.

Additionally, if a pull-down resistor is present on the line /TRST, the ECU must use a value no smaller than 100K ohm as shown in Fig. 3-7 on page 23.

### 3.10 Trigger Modes: Overview

The XETK-S20.1B supports the following trigger modes:

- "Pinless Triggering" uses an internal register for triggering. See also chapter "Pinless Triggering" on page 24.
- "Timer Triggering" uses four internal timers of the XETK for triggering. See also chapter "Timer Triggering" on page 24.

### 3.11 Pinless Triggering



#### NOTE

The XETK-S20.1B uses the pinless startup and triggering feature with all supported microcontrollers.

#### 3.11.1 Startup Handshake

The COMDATA trigger register is used to generate an ETK startup handshake. The ECU must ensure that all memory ECC initializations have been completed prior to the start-up handshake.

#### 3.11.2 XETK Trigger Generation

##### Initialization

After the startup handshake and measurement is enabled, the XETK is waiting for triggers from the ECU software.

##### Application running

To generate triggers, the ECU software sets bits in the trigger register "CBS\_TRIG" by writing the associated bits in the trigger setting register "CBS\_TRIGS".

Each bit of the trigger setting register "CBS\_TRIGS" corresponds to a bit in the same position in the trigger register "CBS\_TRIG", each of them corresponding to an XETK hardware trigger.

The XETK periodically polls the trigger register "CBS\_TRIG" via IO\_READ\_TRIG for detecting triggers. The polling rate is determined by the fastest measurement raster and is configurable with a 50 µs default.

Active bits in trigger register "CBS\_TRIG" are automatically cleared by the CPU when the register is read by the XETK-S20.1B via IO\_READ\_TRIG. For generating triggers, the ECU software sets bits in the trigger register "CBS\_TRIG" by writing the associated bits in the trigger setting register "CBS\_TRIGS".

### 3.12 Timer Triggering

The trigger mode "Timer Triggering" uses four internal timers of the XETK-S20.1B for triggering. A fixed configurable period is used for triggering. The time intervals between trigger events are in accordance with the configured timer values. This values and their resolution have to be defined in the A2L file.

Available settings are:



- Minimum time interval 100  $\mu$ s
- Maximum period duration 1 s
- Timer resolution 1  $\mu$ s

The timers work in an asynchronous manner to the ECU.

### 3.13 Reset

The requirement for the XETK-S20.1B reset mechanism is to ensure that power-up and power-down behavior of ECU is clean and smooth. The XETK-S20.1B normally drives /PORST low during XETK power up or upon INCA request.

The signals /HDRST and /PORST of the microcontroller are used by the XETK-S20.1B to detect when the ECU is in reset.

The XETK-S20.1B senses the switched ECU power supply. This allows it to detect when the ECU is off and forward this information to INCA. In addition, it allows the XETK to enter the power save mode with the calibration system unplugged.

### 3.14 Pull CalWakeUp until Startup Handshake

The XETK has the ability to wake up the ECU by applying voltage to the CalWakeUp pin of the ECU connector. This allows the XETK to configure a measurement while the ECU is off.

When waking up the ECU via the CalWakeUp pin, it can be configured if the pin is driven high until the microcontroller core voltage (VDDP) is high or if the pin should be driven high until the start-up handshake between ECU and XETK is complete.

## 4 Installation

This chapter contains information about the following topics:

- Connection to the ECU..... 26
- Connection to the Debugger..... 27
- Wiring..... 28

**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.

### 4.1 Connection to the ECU

**NOTE**

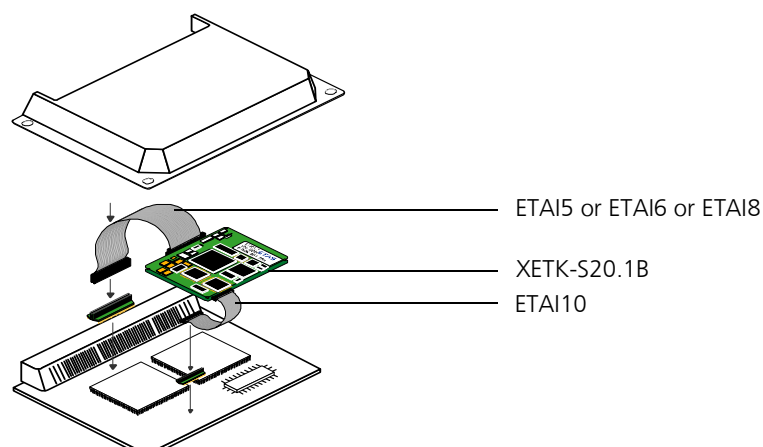
When you mount the FETK to the ECU, you must ensure that the screws and washers used will not penetrate the FETK printed circuit board.

For connecting the XETK-S20.1B to the ECU two XETK adapter cables are recommended:

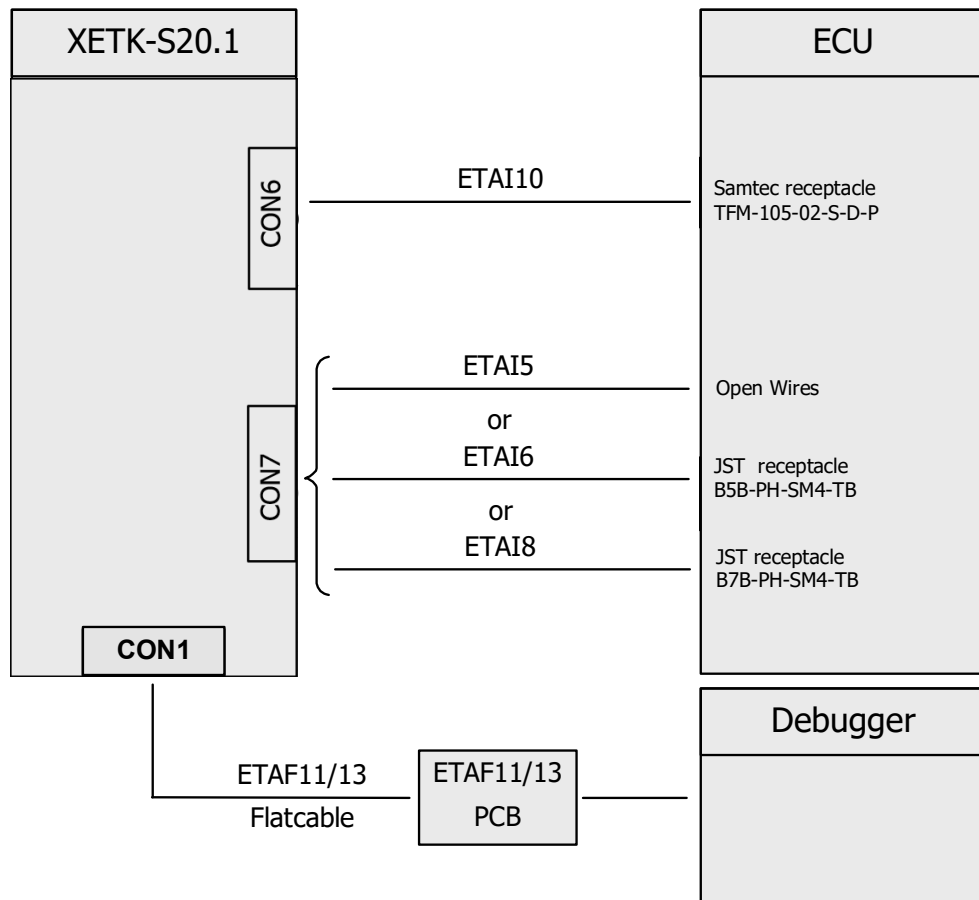
- at CON6 adapter ETAI10
- at CON7 adapter ETAI5 or ETAI6 or ETAI8

The adapter cables are to be ordered separately (refer chapter "Ordering Information" on page 60).

The suitable connectors JST-7 and ERNI-12 (see Fig. 4-2 for additional connector details) should have been populated onto the ECU PCB for adapters ETAI10 and ETAI5/ ETAI6/ ETAI8.



**Fig. 4-1** XETK-S20.1B Connection to the ECU



**Fig. 4-2** XETK-S20.1B Connection to the ECU

#### 4.2 Connection to the Debugger

**i** NOTE  
 For connecting the XETK-S20.1B to the debugger refer to Fig. 4-2 on page 27.

To connect the XETK-S20.1B to the debugger two ETK adapters are available:

- ETAF11 (including ETAF11 PCB and ETAF11 flat cable)
- AS\_ETAF13 (including AS\_ETAF13 PCB and AS\_ETAF13 flat cable).

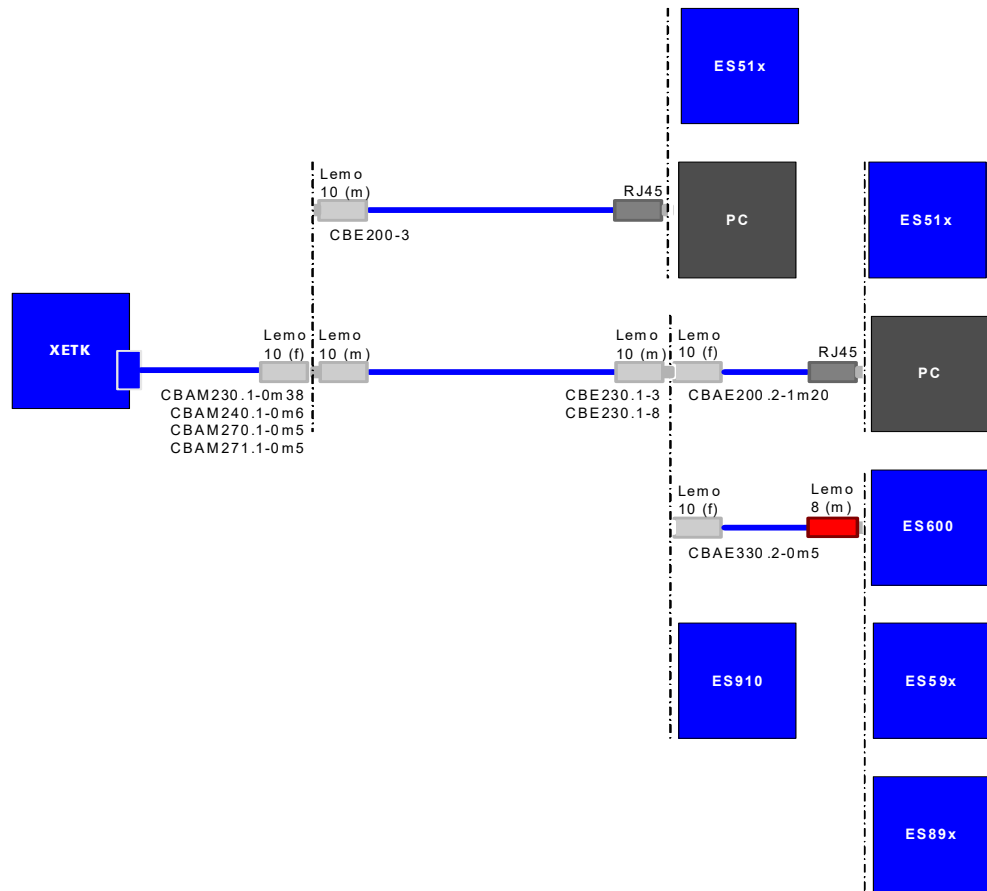
**i** NOTE  
 If the watchdog disable feature is required, an AS\_ETAF13 adapter for debugger connection must be used.

For detailed information about the debugger adapters see chapter “Debug Adapter ETAF11” on page 55 and “Debug Adapter AS\_ETAF13.0” on page 57.

The adapter needs to be ordered separately (refer chapter “Ordering Information” on page 60).

### 4.3 Wiring

#### 4.3.1 XETK Ethernet Interface



**Fig. 4-3** Wiring - XETK Ethernet Interface


The XETK Ethernet interface can be directly connected to the PC. No additional ETAS module is required for the access to the ECU.



**NOTE**

The XETK Ethernet interface is compatible with the Ethernet interfaces of the ES59x/ES600/ES89x/ES910 module.


### 4.3.2 Power Supply

 **DANGER**

**Undefined vehicle behavior due to an ECU reset**

If the external power supply to the ETK is interrupted (e.g. cut, disconnected, etc.), this may lead to the ECU being reset.

- Connect the internal power supply of the ECU to the ETK in addition to the external power supply.
- If this is not possible, ensure that the external power supply to the ETK is not interrupted during operation.

 **WARNING**

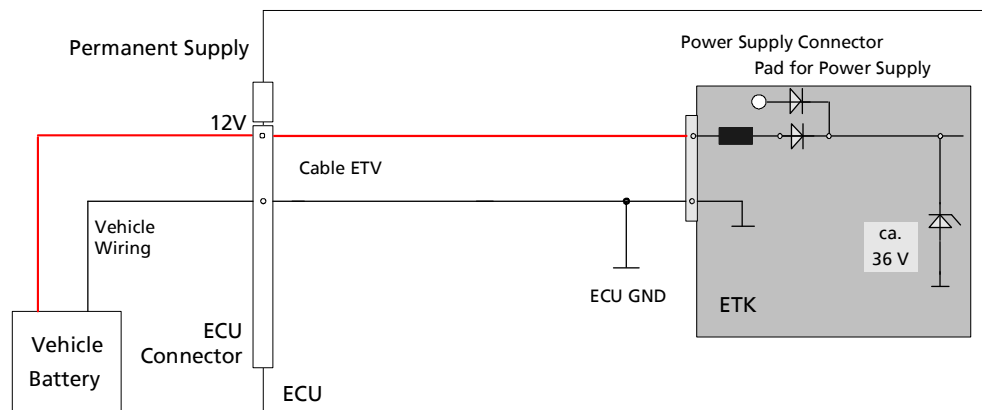
**Risk to life from electric shock**

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

- Use a power supply that is permitted for the product.

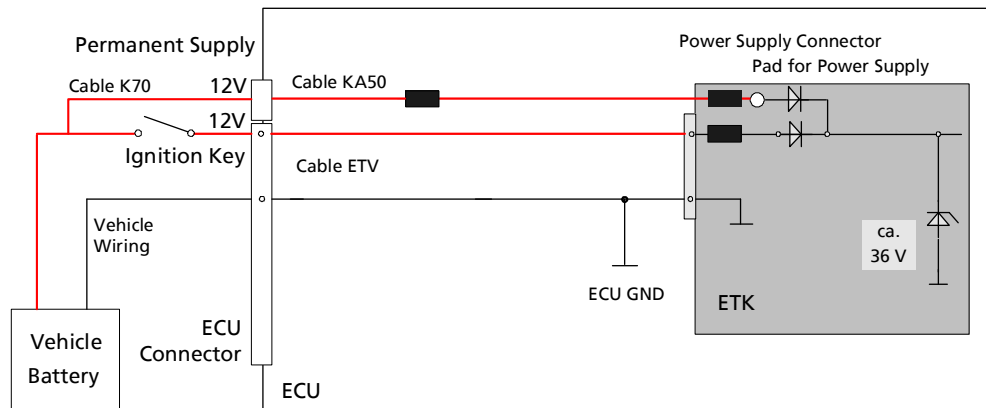
The XETK-S20.1B needs a permanent power supply (refer chapter “Power Supply” on page 19). There are different versions to ensure it.

#### Permanent Power Supply inside ECU available



**Fig. 4-4** Permanent Power Supply inside ECU available

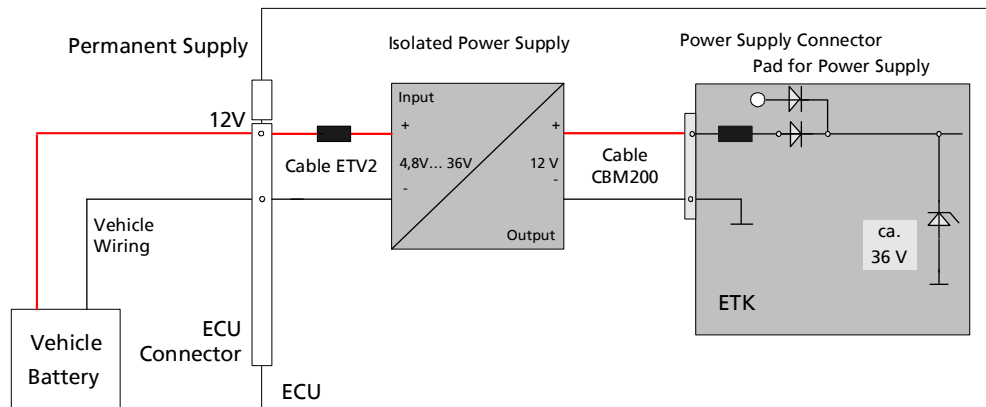
### Permanent Power Supply inside ECU not available



**Fig. 4-5** Permanent Power Supply inside ECU not available

### Isolated Power Supply inside ECU

The XETK-S20.1B does not require a galvanically isolated power supply. For special applications ETAS offers the isolated power supply ETP2.



**Fig. 4-6** Isolated Power Supply inside ECU

## 5 ETK Configuration

This chapter contains information about the following topics:

- Overview ..... 31
- Configuration Parameter ..... 32

### 5.1 Overview

As already mentioned in previous chapters, some project-specific adjustments are necessary. Configuration data is stored permanently in a serial Flash.

Generating a valid configuration data set is supported by the "(X)ETK Configuration Tool" (XCT Tool). The "(X)ETK Configuration Tool" contains information on all available XETKs. The user is supported through a graphical interface.

The configuration is done in two steps:

1. Generation of the special address offset for the emulation and measurement data memory.  
The location of data areas, measured data output areas, trigger segment addresses etc. are familiar to the ECU software developer, or can be generated automatically. If an ECU description database (ASAP, ...) with the corresponding input exists, these inputs can be downloaded from this database. If necessary, a plausibility check is performed.
2. Connection of the ETK to the ECU.  
The ECU hardware developer defines the connection of the ETK to the ECU. The corresponding signals usually have to be adjusted for each microcontroller. All inputs are checked for plausibility, to make sure that a valid configuration is generated.

The "(X)ETK Configuration Tool" can create the following output:

- Direct ETK configuration
- Storage of the configuration in a data file
- The corresponding ASAP2 input

The most important outputs are the entries for the ASAP2 file. All A2L definitions necessary for configuring an ETK will be created. These are:

- Overlay Region definitions
- Memory Segment definitions
- ETK configuration features
- Raster definitions

If these parameters are entered correctly in the corresponding ECU description file, it guarantees that every time the calibration system is started, the ETK is checked for the appropriate configuration. If necessary, the ETK will be configured appropriately to the corresponding project.

## 5.2 Configuration Parameter

The "(X)ETK Configuration Tool" provides support concerning hardware configuration parameters and their possible values.

They are described for the different ETK types in the help document of the "(X)ETK Configuration Tool".

### Starting the "(X)ETK Configuration Tool" help

1. Start the "(X)ETK Configuration Tool" XCT.  
The main window of the XCT tool opens.
2. Select in the menu bar > **Contents**.  
The "(X)ETK Configuration Tool" help window opens.
3. Choose Reference to User Interface > **(X)ETK Hardware Configuration Parameters**.
4. Choose the topic XETK-S20.1B.  
The topic XETK-S20.1B contains information about the XETK-S20.1B hardware configuration parameters and their possible values.



## 6 Troubleshooting

### 6.1 Problems and Solutions

#### 6.1.1 No communication between the ECU and ETK

**Cause:** No permanent powersupply at the XETK-S20.1B.

It is possible, that if ECU and ETK are switched-on simultaneously, no communication between the ECU and ETK can be established.

**Workaround:** Trigger an ECU reset by application tool.



#### NOTE

The XETK-S20.1B requires a permanent power supply. It is typically powered directly from the car battery. Refer to chapter "Power Supply" on page 29.

## 7 Technical Data

This chapter contains information about the following topics:

- System Requirements ..... 34
- Data Emulation Memory and Microcontroller Support ..... 36
- Measurement Data Memory ..... 36
- Configuration ..... 36
- XETK Ethernet Interface ..... 37
- Environmental Conditions ..... 37
- Power Supply ..... 38
- Test Characteristics ..... 39
- DAP Timing Characteristics ..... 39
- Electrical Characteristics ..... 41
- Pin Assignment ..... 44
- Mechanical Dimensions ..... 46

### 7.1 System Requirements

#### 7.1.1 ETAS Compatible Hardware

ES592, ES593-D, ES595, ES600, ES8xx, ES910 (INCA)

#### 7.1.2 PC with one Ethernet Interface

A PC with one open Ethernet interface (1 Gbit/s or 100 Mbit/s, full duplex) with RJ-45 connection is required. Ethernet interfaces that are implemented with an additional network card in the PC must feature a 32-bit data bus.



#### NOTE

Half Duplex mode and Half Duplex Ethernet interfaces are not supported.

### Requirement to ensure successful Initialization of the Module



#### NOTE

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

### To deactivate the Power saving Mode

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

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

Example:

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

### 7.1.3 Software Support

You need following software versions to support the XETK-S20.1B:

Micro-controller	HSP	INCA	ETK Tools	ASCET	INTECRIO
TC23x-PD	V11.10.0	V7.2.10	V4.1.11	V6.4.3	V4.6.2
TC26x-PD	V11.2.0	V7.2.2	V4.1.3	A: V6.4 B: V6.4	A: V4.6 B: V4.6
TC26x-ED	V11.2.0	V7.2.2	V4.1.3	A: V6.4 B: V6.4	A: V4.6 B: V4.6
TC27x-PD	V11.2.0	V7.2.2	V4.1.3	A: V6.4 B: V6.4	A: V4.6 B: V4.6
TC27x-ED (A-Step)	V11.0.1	V7.2	V4.1.0	A: V6.4 B: V6.1.4	A: V4.6 B: V4.2.2
TC27x-ED (B/ C-Step) <sup>1)</sup>	V11.0.1	V7.2	V4.1.0	A: V6.4 B: V6.1.4	A: V4.6 B: V4.2.2
TC29x-PD	V11.8.0	V7.2.8	V4.1.9	A: V6.4 B: V6.3	A: V4.6 B: V4.3
TC29x-ED	V11.0.1	V7.2	V4.1.0	A: V6.4 B: V6.3	A: V4.6 B: V4.3
TC33x-PD	V12.0.0	V7.3.0	V4.2.0	A: V6.4 B: V6.4	A: V4.6 B: V4.6
TC37x-ED	V11.12.0	V7.2.12	V4.1.13	A: V6.4.3 B: V6.4.3	A: V4.6.2 B: V4.6.2
TC38x-PD	V11.8.0	V7.2.8	V4.1.9	A: V6.4 B: V6.3	A: V4.6 B: V4.3
TC39x-ED (A-Step)	V11.2.1	V7.2.2	V4.1.3	A: V6.4 B: V6.3	A: V4.6 B: V4.3
TC39x-ED (B-Step)	V11.8.0	V7.2.8	V4.1.9	A: V6.4 B: V6.3	A: V4.6 B: V4.3
TC37x-XX	V12.3.0	V7.3.3	V4.2.3	C: V6.4.3	C: V4.6.2
TC39x-XX	V12.3.0	V7.3.3	V4.2.3	C: V6.4.3	C: V4.6.2

<sup>1)</sup>: and higher versions (microcontroller steps) if they support the B/C-step specifications

A: SBB V2.1

B: HBB [DISTAB13]

C: HBB [DISTAB17]

Operating the XETK-S20.1B with older software versions is not possible.

The configuration instructions for the XETK-S20.1B under INCA and HSP are contained in the relevant software documentation.

## 7.2 Data Emulation Memory and Microcontroller Support

The XETK-S20.1B uses a portion of or up to the entire size of the ED RAM, to emulate data in internal flash. The following table lists the supported microcontrollers, the size of the ED RAM, and states if the ED RAM is capable of being powered using a standby supply.

Microcontroller	Max. ED RAM	Standby powered
TC26x-ED	0.5 MByte	Yes
TC27x-ED	1 MByte	Yes
TC29x-ED	1 MByte	Yes
TC37x-ED	3 MByte	Yes
TC39x-ED	4 MByte	Yes

## 7.3 Measurement Data Memory

Item	Characteristics
Location	Typically located within the emulation memory when using DISTAB13 hooks. Measurement data memory can be located in internal RAM if EMEM is needed for calibration.

## 7.4 Configuration

Item	Characteristics
Configuration	Project-specific configuration for - different microcontrollers or - memory configurations stored in EEPROM
Update	Logic devices updated using HSP software

## 7.5 XETK Ethernet Interface

Item	Characteristics
Connection	- 100 MBit/s Ethernet, Full Duplex - PC Card 32 bit
Protocol	XCP on TCP/IP or UDP/IP
IP address	Dynamic (standard, for INCA) or static (e.g. for Rapid Prototyping) by using the XETK Configuration Tool (default IP address: 192.168.40.16)
Cable length	max. 30 m / 100 ft
Ethernet Interface	DC decoupling Max. Isolation Voltage 60 V DC, according IEC 61010-1 "Limit values for accessible parts" in normal, dry condition.



### NOTE

To ensure successful initialization of the network card of your PC, refer to chapter 7.1.2 on page 34

## 7.6 Environmental Conditions

Item	Characteristics
Operating temperature range	- 40 °C to +110 °C/ - 40 °F to +230 °F
Storage temperature range (without packaging)	0 °C to +50 °C/ +32 °F to +122 °F
Max. relative humidity (non-condensing)	95%
Max. altitude	5000 m/ 16400 ft
Degree of contamination (IEC 60664-1, IEC 61010-1)	2
Protection rating (when closed)	Determined by installation in ECU
Overvoltage category (mains supply)	II

## 7.7 Power Supply

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Permanent power supply (car battery)	$U_{\text{Batt}}$	Vehicle usage <sup>1)</sup>	4.3	12	36	V
[all values $\pm 0\%$ ]						
Standby current <sup>2)</sup>	$I_{\text{STBY}}$	$U_{\text{Batt}} = 12 \text{ V}$ ; ECU off; no load from ECU; $T = 20 \text{ }^\circ\text{C}$		35	40	mA
Operating current	$I_{\text{Batt}}$	$U_{\text{Batt}} = 12 \text{ V}$ ; $I = 0 \text{ mA}$ at pin ECU_SBRAM; $T = 20 \text{ }^\circ\text{C}$		135	200	mA
Operating current	$I_{\text{Batt}}$	$U_{\text{Batt}} = 12 \text{ V}$ ; $I = 600 \text{ mA}$ at pin ECU_SBRAM; $T = 20 \text{ }^\circ\text{C}$		240	300	mA
Power dissipation	$P_{\text{Batt}}$	$U_{\text{Batt}} = 12 \text{ V}$ ; $I = 0 \text{ mA}$ at pin ECU_SBRAM; $T = 20 \text{ }^\circ\text{C}$		1.62		W
Power dissipation	$P_{\text{Batt}}$	$U_{\text{Batt}} = 12 \text{ V}$ ; $I = 600 \text{ mA}$ at pin ECU_SBRAM; $T = 20 \text{ }^\circ\text{C}$		2.88		W
Fuse in the ETK $U_{\text{batt}}$ supply line. Only required if the power supply or ECU is not protected accordingly.			MINI vehicle blade-type fuse, fast-acting, 2 A 58V DC, e.g. Littelfuse 0997002.WXN			

<sup>1)</sup> The XETK-S20.1B implements reverse voltage protection in the same range and may be used only with central load dump protection.  
24 V vehicles require  $U_{\text{Batt}}$  disturbing pulse reduction to 12 V vehicle system.  
12 V vehicles don't require special disturbing pulse reductions.

**NOTE**

The XETK-S20.1B will accept permanent power supply voltage dips (for additional details of 3 V low voltage operation, see ISO standard 16750).

## 7.8 Test Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Reset delay 1 <sup>1)</sup>	$t_{\text{Reset1}}$	$U_{\text{Batt}} = 12 \text{ V}$ $V_{\text{DDP}} = 0 \text{ V} \uparrow 3.3 \text{ V} / 5.0 \text{ V}$ without transferring FPGA	29		40	ms
Reset delay 2 <sup>2)</sup>	$t_{\text{Reset2}}$	$U_{\text{Batt}} = 0 \text{ V} \uparrow 12 \text{ V}$ transfer FPGA	200		340	ms

<sup>1)</sup> Delay of ECU reset through the XETK without transferring the FPGA ( $U_{\text{Batt}}$  present,  $V_{\text{DDP}}$  will be switched on)

<sup>2)</sup> max. delay of ECU reset through the XETK ( $U_{\text{Batt}}$  and  $V_{\text{DDP}}$  will be switched on)

## 7.9 DAP Timing Characteristics

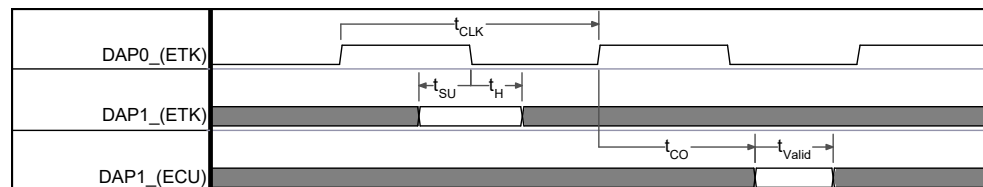
The following diagrams show the timings the XETK-S20.1B can process.

**i** NOTE

DAP timing parameters in this chapter refer to the DAP interface (CON1/ CON6) of the XETK-S20.1B. The DAP wiring to the ECU (ETA10 and ETA15/ ETA16/ ETA18) must be taken account additionally.

All timings are measured at a reference level of 1.5 V. Output signals are measured with 20 pF to ground and 50  $\Omega$  to 1.5 V.

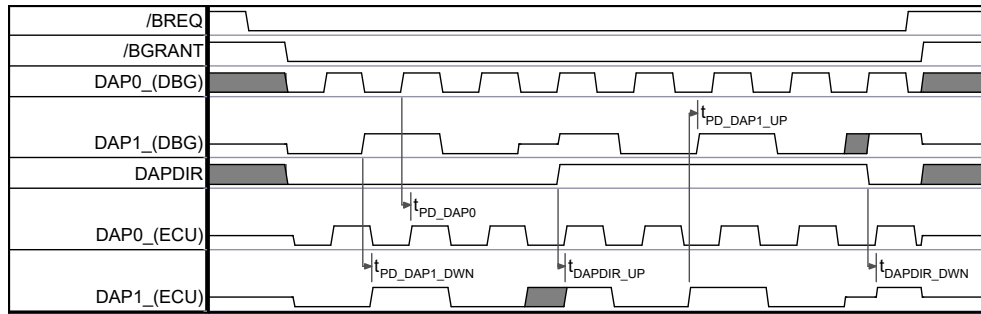
### 7.9.1 DAP Timing Diagram



### 7.9.2 DAP Timing Diagram DAP Timing Parameter

Parameter	Symbol	Value [ns]	Comment
DAP0 Clock Period (ETK --> Target)	$t_{\text{CLK}}$	10	100 MHz DAP Clock Frequency
		20	50 MHz DAP Clock Frequency
DAP1 Set-Up Time (ETK --> Target)	$t_{\text{SU}}$	4	
DAP1 Hold Time (ETK --> Target)	$t_{\text{H}}$	2	
DAP1 Clock-to-Out Time (Target --> ETK)	$t_{\text{CO}}$	~	Undetermined, ETK automatically determines optimum sampling point
DAP1 Valid Window (Target --> ETK)	$t_{\text{Valid}}$	8	

### 7.9.3 Debugger Arbitration Timing Diagram



**Fig. 7-1** Debugger Arbitration Timing Diagram

### 7.9.4 Debugger Arbitration Parameter

Parameter	Value [ns]
DAP0 (Debugger --> Target)	23
DAP1 (Debugger --> Target)	23
DAP1 (Target --> Debugger)	23
DAPDIR (Debugger --> Target)	23
DAPDIR (Target --> Debugger)	23



## 7.10 Electrical Characteristics

## 7.10.1 ECU Interface Characteristics

Parameter	Symbol	Condition <sup>1)</sup>	Min	Typ	Max	Unit
CalWakeup Output Voltage	CALWAKEUP	$U_{\text{Batt}} = 6 - 18 \text{ V};$ load 0 - 50 mA	$U_{\text{Batt}} - 1 \text{ V}$		$U_{\text{Batt}}$	V
ECU Power Supply Supervision Voltage (3.3 V selected)	VDDP	VDDP $\uparrow$	2.48	2.58	2.68	V
		VDDP $\downarrow$	2.33	2.43	2.53	V
	$I_{\text{VDDP}}$	VDDP = 3.3 V			200	$\mu\text{A}$
ECU Standby RAM Supervision Voltage ([1.00 V - 1.22 V] selected)	VDDSB RAM	VDDSB RAM $\uparrow$	1.00	1.10	1.20	V
		VDDSB RAM $\downarrow$	1.02	1.12	1.22	V
	$I_{\text{VDDSB RAM}}$	VDDSB RAM = 1.4 V			85	$\mu\text{A}$
ECU Standby RAM Output Voltage (1.3V) <sup>2)</sup>	VDDSB RAM	max. 600 mA load	1.23	1.3	1.33	V

- <sup>1)</sup>: VDDP  $\uparrow$ : ECU Power Supply off  $\rightarrow$  ECU Power Supply on  
VDDP  $\downarrow$ : ECU Power Supply on  $\rightarrow$  ECU Power Supply off  
VDDSB RAM  $\uparrow$ : ECU Standby RAM Power off  $\rightarrow$  ECU Standby RAM Power on  
VDDSB RAM  $\downarrow$ : ECU Standby RAM Power on  $\rightarrow$  ECU Standby RAM Power off  
<sup>2)</sup>: Current drawn from XETK VDDSB RAM supply must not exceed 600 mA

## 7.10.2 ECU Interface Connector CON6

Signal	Pin Type	$V_{OH}$ (min) [V]	$V_{OH}$ (max) [V]	$V_{IL}$ (max) [V]	$V_{IH}$ (min) [V]	$V_{IH}$ (max) [V]	Leakage current [ $\mu$ A]	Additional Load by XETK (typ) [pF] <sup>1)</sup>
/TRST	O	2.2	3.3	-	-	-	+/-44	12
DAP0	XO	2.2	3.3	-	-	-	+3390/ -2390	12
DAP1	XIO	2.2	3.3	0.8	2	3.8	+3300/ -890	12
DAP2	I			0.8	2	3.8	+/-44	12
/PORST	XIOD <sup>2)</sup>	-	-	0.8	2	5.5	+/-3	10
/HDRST	I	-	-	0.8	2	5.5	+/-3	10
/WDGDIS	XO	2.2	3.3	-	-	5.5	+/-22	6

Pin Type: I: Input, X: Tristate, O: Output, OD: Open Drain

<sup>1)</sup> Adapter cable and Samtec connector not considered; PCB 1 pF/cm

<sup>2)</sup> Open Drain FET;  $I_{Dmax} = 0.2$  A

## 7.10.3 Interface and Power Supply Connector CON7

Signal	Pin Type	$V_{OH}$ (min) [V]	$V_{OH}$ (max) [V]	$V_{IL}$ (max) [V]	$V_{IH}$ (min) [V]	$V_{IH}$ (max) [V]	Leakage current [ $\mu$ A]	Additional Load by XETK (typ) [pF] <sup>1)</sup>
Reserved1	I <sup>2)</sup>	-	-	0.8	2.0	5.5	+/-28	46
Reserved2	I <sup>2)</sup>			0.8	2.0	5.5	+/-3	10
Reserved3	I	-	-	0.8	2.0	5.5	+/-3	10

Pin Type: I: Input, X: Tristate, O: Output, OD: Open Drain

<sup>1)</sup> Adapter cable and JST connector not considered; PCB 1 pF/cm

<sup>2)</sup> Open Drain FET;  $I_{Dmax} = 500$   $\mu$ A

## 7.10.4 Debugger Interface Connector CON1

Signal	Pin Type	V <sub>OL</sub> (min) [V]	V <sub>OH</sub> (min) [V]	V <sub>OH</sub> (max) [V]	V <sub>IL</sub> (max) [V]	V <sub>IH</sub> (min) [V]	V <sub>IH</sub> (max) [V]	Leakage current [μA]	Additional load by ETK (typ) [pF] <sup>1)</sup>
VREF	XO <sup>2)</sup>	-	2.3	3.3	-	-	-	-	-
DAP1	IXO <sup>2)</sup>	0.7	2.3	3.3	0.5	2	5.5	+370 <sup>3)/</sup> +200 <sup>4)</sup>	25
DAP2	IXO <sup>2)</sup>	0.7	2.3	3.3	0.5	2	5.5	-370 <sup>3)/</sup> -195 <sup>4)</sup>	25
/BREQ, DAP0, WGDIS, RSV1, DAPDIR, RSV4	I	-	-	-	0.5	2	5.5	-350 <sup>3)/</sup> -215 <sup>4)</sup>	10
/BGRANT	XO <sup>2)</sup>	0.7	2.3	3.3	0.8	2	4.6	-350 <sup>3)/</sup> -215 <sup>4)</sup>	12
/PORST	connected to /POR ECU connector B4 (pass-thru signal)								
RSV2	connected to /BRKOUT ECU connector A3 (pass-thru signal)								
RSV3	connected to /BRKIN ECU connector B1 (pass-thru signal)								

Pin Type:

I: Input, X: Tristate, O: Output, OD: Open Drain

1) Adapter cable and Samtec connector not considered; PCB 1 pF/cm

2) max 12 mA

3) max

4) min

## 7.11 Pin Assignment

### 7.11.1 ECU Interface Connector CON6

Pin	Signal	Direction	Comment
A1	/TRST	Out	DAP signal
A2	DAP0	Out	DAP signal
A3	/BRKOUT	In	Debugger break signal (currently unused)
A4	Reserved	Out	Driving Ground
A5	DAP2	In	DAP signal (currently unused)
A6	WGDIS	Out	Watchdog disable signal
B1	/BRKIN	Out	Debugger break signal (currently unused)
B2	GND		Signal Ground
B3	DAP1	BIDIR	DAP signal
B4	/PORST	BIDIR	ECU Reset signal (open drain) for Reset assertion Switched Pull-Down, 5V tolerant
B5	VDDP (Sense)	In	Comparator Input Switched power supply of ECU (ignition)
B6	/HDRST		ECU Reset signal for supervision

### 7.11.2 Interface and Power Supply Connector CON7

Pin	Signal	Direction	Comment
1	UBATT	In	Power supply (permanent)
2	CAL Wakeup	Out	Wakeup functionality (12 V output) <sup>1)</sup>
3	GND	-	Ground
4	VDDSBRAM, opt. SENSE	Out	Backup voltage (1.3 V) of ECU standby RAM provided by the XETK
5	Reserved3	-	N.C.
6	Reserved1	-	N.C.
7	Reserved2	-	N.C.

## 7.11.3 Debugger Interface Connector CON1

Pin	Signal	Direction	Comment
1	DAP1	Bidir	DAP Signal
2	VREF	Out	Target supply for sensing
3	DAP2	Bidir	DAP Signal
4	GND		Signal Ground
5	WGDIS	In	Watchdog disable signal
6	GND	Bidir	Signal Ground
7	RSV1	In	Reserved Input
8	/PORST	Bidir	ECU Reset signal (open drain) for Reset assertion and supervision
9	DAPDIR	In	DAP Direction Signal
10	RSV2	Out	Reserved Output
11	DAP0	In	DAP Signal
12	GND		Signal Ground
13	RSV3	In	Reserved Input
14	/BREQ	In	Bus Request to XETK
15	/BGRANT	Out	Bus Grant From XETK
16	RSV4	In	Reserved Input

### 7.12 Mechanical Dimensions

The reference measure for all drawings is millimeters. The reference measure for all drawings is millimeters.

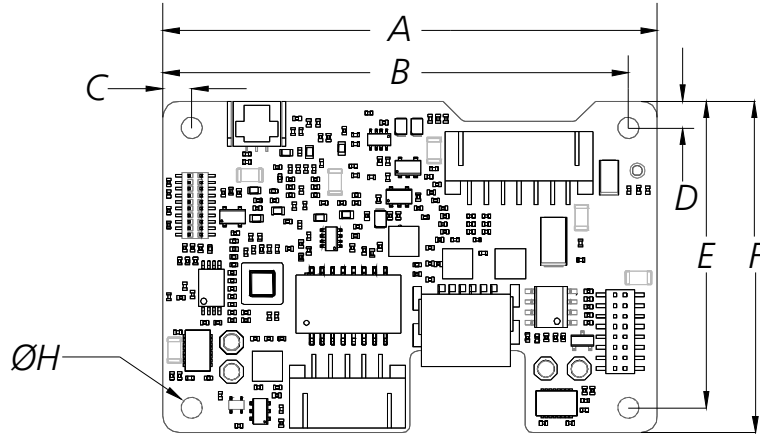
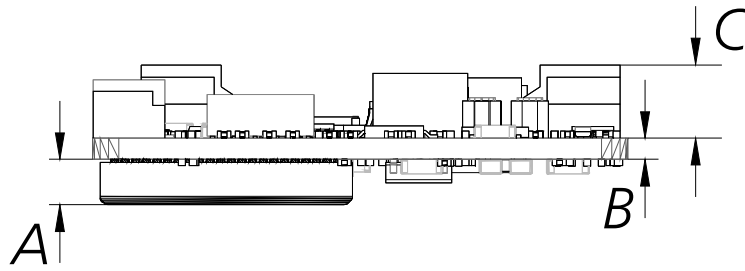


Fig. 7-2 XETK-S20.1B Dimensions - Top View

Item	Dimension [Millimeters]	Tolerance [Millimeters]	Dimension [Inches]	Tolerance [Inches]
A	60.00	+/- 0.20	2.362	+/- 0.008
B	56.50	+/- 0.20	2.224	+/- 0.008
C	3.50	+/- 0.10	0.138	+/- 0.004
D	3.25	+/- 0.10	0.128	+/- 0.004
E	37.25	+/- 0.20	1.466	+/- 0.008
F	40.25	+/- 0.20	1.585	+/- 0.008
H	2.60	+/- 0.20	0.102	+/- 0.008



**Fig. 7-3** XETK-S20.1B Dimensions - Side View

Item	Dimension [Millimeters]	Tolerance [Millimeters]	Dimension [Inches]	Tolerance [Inches]
A	3.00	+/- 0.20	0.118	+/- 0.008
B	1.57	+/- 0.16	0.062	+/- 0.006
C	6.12	+/- 0.10	0.241	+/- 0.004

## 8 Cables and Accessories

This chapter contains information about the following topics:

- ECU Adapter Cable..... 48
- Combined Interface and Power Supply Cable..... 50
- PC Interface Cable ..... 51
- ETAS Module Interface Adapter Cable..... 52
- Power Supply Cables..... 53
- ECU Interface Adapters ..... 54
- Waterproof Case ETKS\_C3..... 59

**i** **NOTE**

We recommend to use ETAS cables or any other cables certified by the standards for the application. Adhere to the maximum permissible cable lengths!

**i** **NOTE**

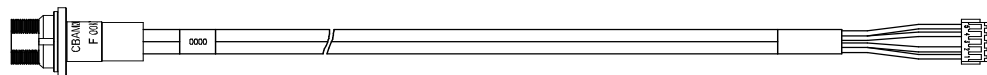
Application-specific cables are available from ETAS. Please contact your ETAS contact partner or e-mail [sales.de@etas.com](mailto:sales.de@etas.com).

### 8.1 ECU Adapter Cable

**i** **NOTE**

The screws for mounting ECU adapter cables are not included in the cable delivery, they need to be ordered separately. For detailed information on mounting accessories contact ETAS technical support.

#### 8.1.1 CBAM230 Adapter Cable



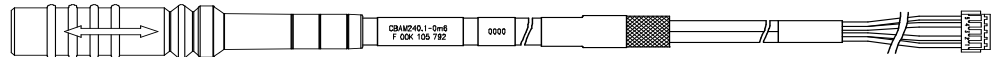
**Fig. 8-1** CBAM230 Adapter Cable

XETK ECU Adapter Cable, 100 MBit/s, suitable for ECU flush mounting (M12), 0.38 m length, shield connected to socket. Usable for ECUs with shielded housing.

Product	Length	Order Number
CBAM230.1-0m38	0.38 m	F 00K 105 791



### 8.1.2 CBAM240 Adapter Cable

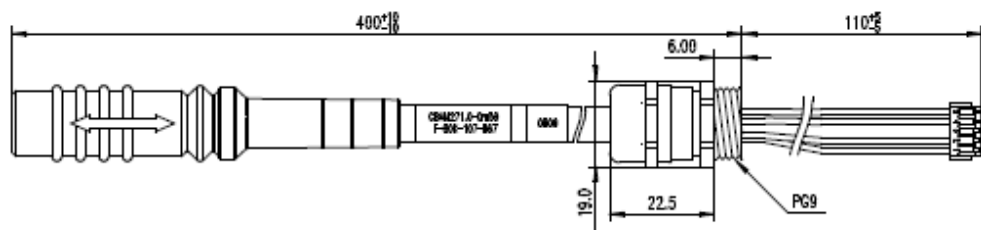


**Fig. 8-2** CBAM240 Adapter Cable

XETK ECU Adapter Cable, 100 MBit/s, shield connected to ECU-housing (lead-through diameter for cable: 10 mm), 0.6 m length, shield bare for cable gland, isolated to the XETK. Usable for ECUs with shielded housing.

Product	Length	Order Number
CBAM240.1-0m6	0.6 m	F 00K 105 792

### 8.1.3 CBAM271 Adapter Cable



**Fig. 8-3** CBAM271 Adapter Cable

XETK ECU Adapter Cable, 100 Mbit/s, pre-assembled into PG9 screwing, shield on ECU-housing, Lemo 1B PHE - JST PHR (10fc-5fc), 0.5 m length. Fits for ETKS\_C3 case.

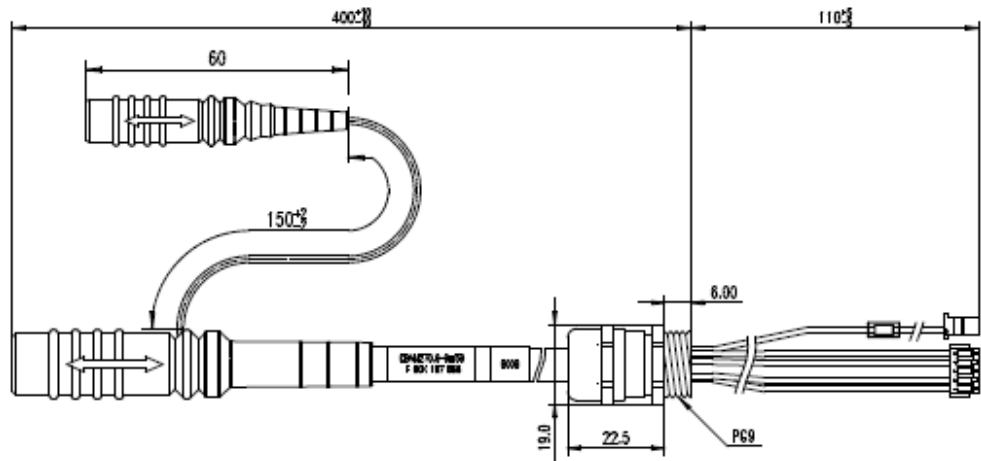


**NOTE**

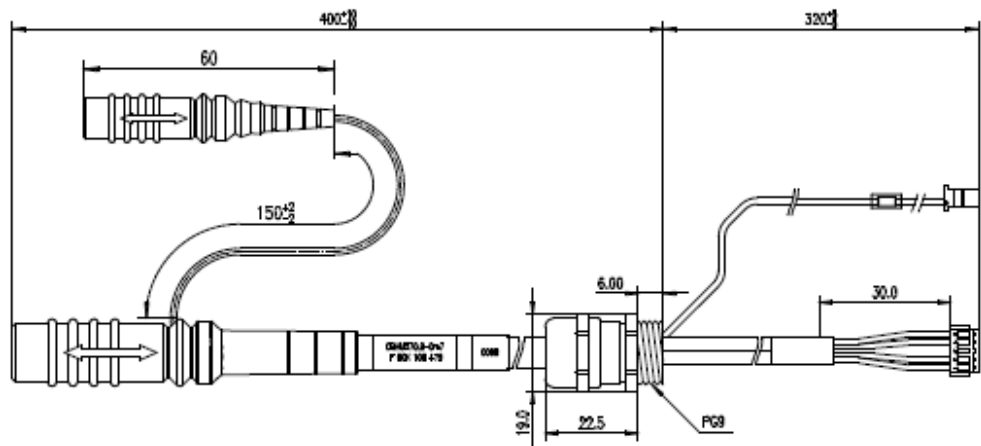
For mounting the cable, cut a PG9 thread into the ECU housing. For thin walled housings use a nut SM-PE 9. Available from Lapp, Order number: 52103210.

Product	Length	Order Number
CBAM271.1-0m5	0.5 m	F 00K 107 867

## 8.2 Combined Interface and Power Supply Cable



**Fig. 8-4** CBAM270 Cable (0.5 m length)



**Fig. 8-5** CBAM270 Cable (0.7 m length)

XETK ECU Adapter and Power Supply Cable, pre-assembled into PG9 screwing, shield on ECU-Housing, Lemo 1B PHE - JST PHR (10fc-5fc) / Lemo 0B PHG - JST PAP (2fc-2fc), 0.5 m and 0.7 m length.

**i** NOTE

For using the cable with an ETK with solder pad, cut the plug and solder the wire direct to the solder pad.

**i** NOTE

It is recommended for safety reasons to connect the external permanent voltage and the switched voltage inside the ECU!



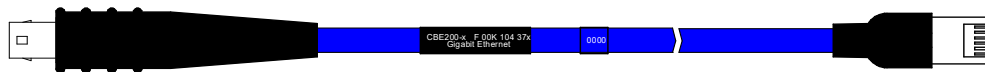
**NOTE**

For mounting the cable, cut a PG9 thread into the ECU housing. For thin walled housings use a nut SM-PE 9. Available from Lapp, Order number: 52103210.

Product	Length	Order Number
CBAM270.1-0m5	0.5 m	F 00K 107 866
CBAM270.1-0m7	0.7 m	F 00K 108 479

8.3 PC Interface Cable

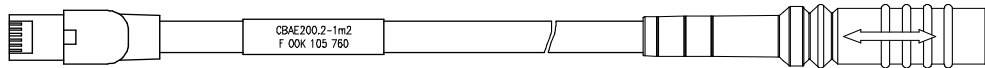
8.3.1 CBE200-3 Cable



**Fig. 8-6** CBE200-3 Cable

Product	Length	Order Number
CBE200-3	3 m	F 00K 104 373

8.3.2 CBAE200 Adapter Cable



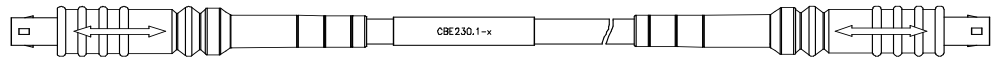
**Fig. 8-7** CBAE200 Adapter Cable

Cable adapter to connect CBE230 cable to the PC over an RJ45 connector. The CBAE200.2-1m20 supports Gigabit Ethernet.

Product	Length	Order Number
CBAE200.2-1m20	1.20 m	F 00K 105 760

## 8.4 ETAS Module Interface Adapter Cable

### 8.4.1 CBE230 Cable

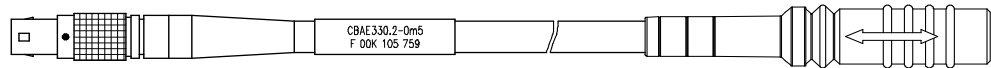


**Fig. 8-8** CBE230 Cable

Gigabit Ethernet connection cable for ETAS devices. IP67 rated Lemo connectors on both sides. Gigabit Ethernet cable with power supply.

Product	Length	Order Number
CBE230.1-3	3 m	F 00K 105 757
CBE230.1-8	8 m	F 00K 105 758

### 8.4.2 CBAE330 Adapter Cable



**Fig. 8-9** CBAE330 Adapter Cable

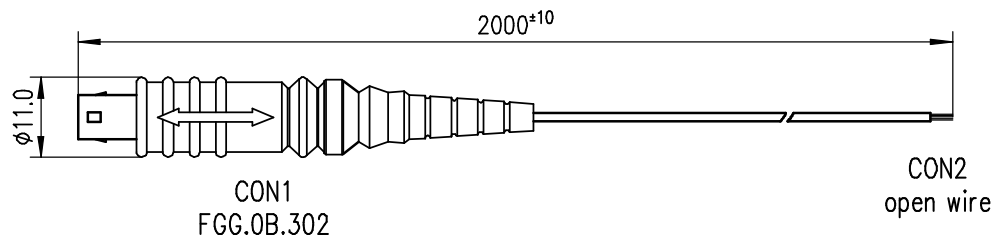
Gigabit to 100 MBit/s Ethernet Adapter for connection of CBE230 to ES600.

Cable adapter to connect CBE230 cable with the ES600. Power supply over the CBAE330.2 cable adapter is not supported.

Product	Length	Order Number
CBAE330.2-0m5	0.5 m	F 00K 105 759

## 8.5 Power Supply Cables

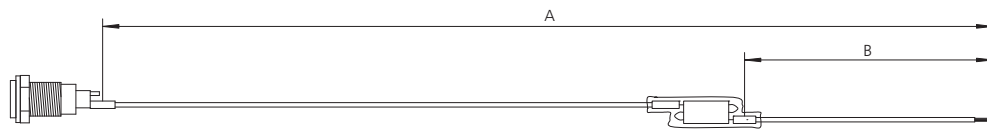
### 8.5.1 Cable K70



**Fig. 8-10** Power Supply Cable K70

Dim	Millimeters	Inches
A	2000	78.74

### 8.5.2 Cable KA50

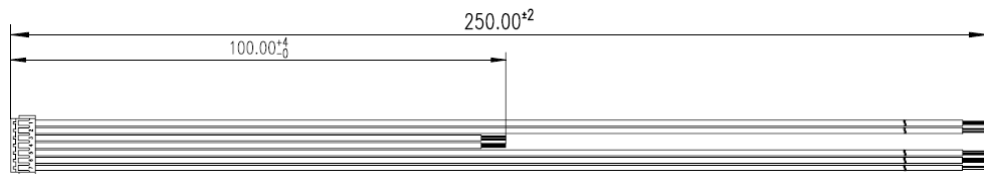


**Fig. 8-11** Power Supply Cable KA50

Dim	Millimeters	Inches
A	200	7.87
B	50	1.97

## 8.6 ECU Interface Adapters

### 8.6.1 XETK - ECU Adapter ETAI5



**Fig. 8-12** XETK - ECU Adapter ETAI5

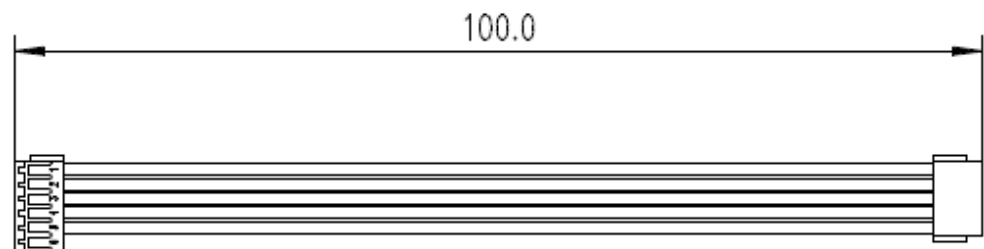
Dim	Millimeters	Inches
A	250	9.84



#### NOTE

See Fig. 4-2 on page 27 for details on mating connector to the ETAI5

### 8.6.2 XETK - ECU Adapter ETAI6



**Fig. 8-13** XETK - ECU Adapter ETAI6

Dim	Millimeters	Inches
A	100.00	3.94



#### NOTE

See Fig. 4-2 on page 27 for details on mating connector to the ETAI6

### 8.6.3 XETK - ECU Adapter ETAI8

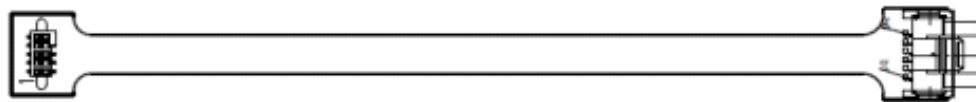


**Fig. 8-14** XETK - ECU Adapter ETAI8

Dim	Millimeters	Inches
A	100.0	3.94

**i** NOTE  
 See Fig. 4-2 on page 27 for details on mating connector to the ETAI8

### 8.6.4 XETK - ECU Adapter ETAI10



**Fig. 8-15** XETK - ECU Adapter ETAI10

Dim	Millimeters	Inches
A	136	5.35

**i** NOTE  
 See Fig. 4-2 on page 27 for details on mating connector to the ETAI10

### 8.6.5 Debug Adapter ETAF11

The ETAF11.0 adapts OCDS1 or Unified Automotive Debug Cable for debugger connection. The ETAF11 bottom side is isolated (no parts and vias).

There are two specific applications:

- adapt the ECU-ETK connector to the Debugger
- adapt the ETK-Debugger connector to the Debugger

**i** NOTE  
 If the watchdog disable feature is required, an AS\_ETAF13 adapter for debugger connection must be used.

ETAF11 Flatcable

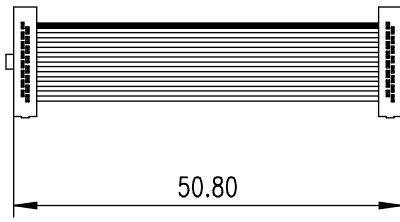


Fig. 8-16 ETAF11 Flatcable



### ETAF11 Component Placement

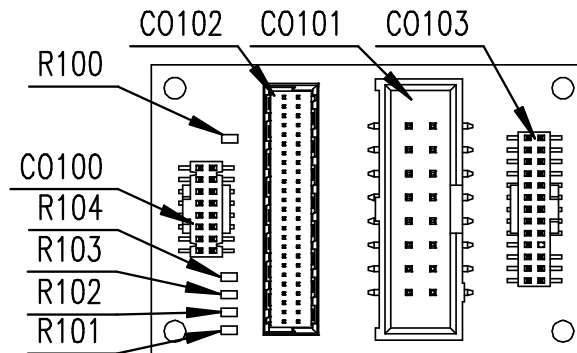


Fig. 8-17 ETAF11 Component Placement

### ETAF11 PCB

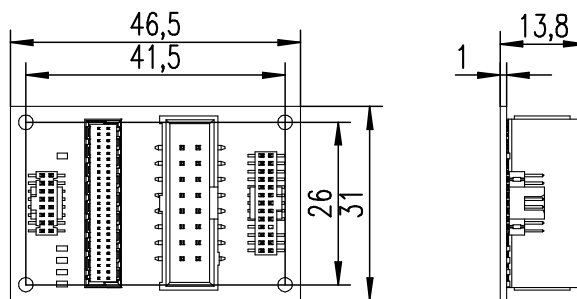


Fig. 8-18 ETAF11 - Mechanical Dimensions and Component Placement

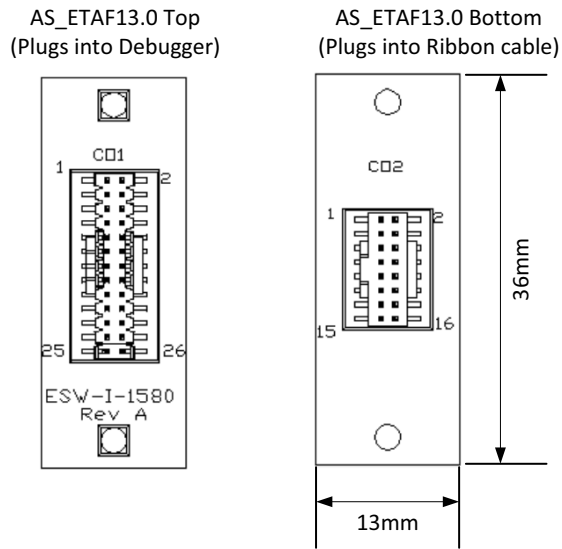
#### 8.6.6 Debug Adapter AS\_ETAF13.0

The AS\_ETAF13.0 adapts the Lauterbach Auto-26 cable (26 pin Samtec) to the XETK-S20.1 debug connector (16 pin Samtec). The board and the cable are delivered as one item.

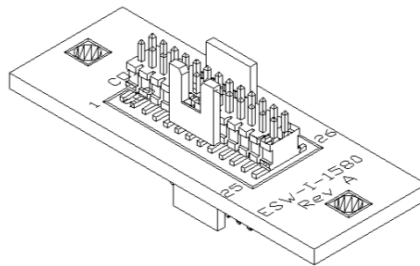
**i** NOTE

If the watchdog disable feature is required, an AS\_ETAF13 adapter for debugger connection must be used.

### AS\_ETAF13.0 Debug Adapter



AS\_ETAF13.0 Debugger  
Adapter Board 3D view



AS\_ETAF13.0  
Ribbon Cable

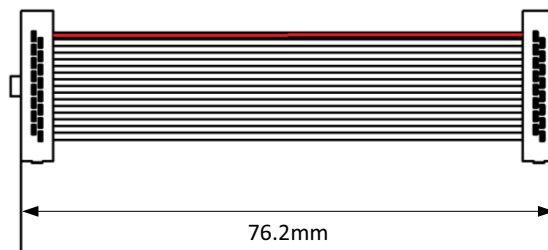


Fig. 8-19 AS\_ETAF13.0 Debug Adapter

### 8.7 Waterproof Case ETKS\_C3

For mounting the XETK-S20.1B on top of ECUs, an external case is available. It is small, robust and waterproof (IP65).

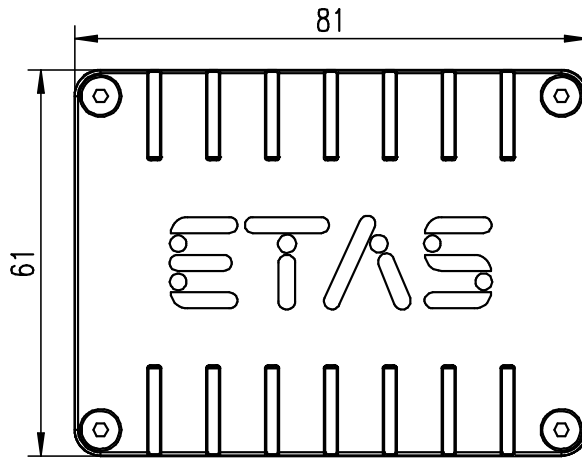


Fig. 8-20 ETKS\_C3 Top View

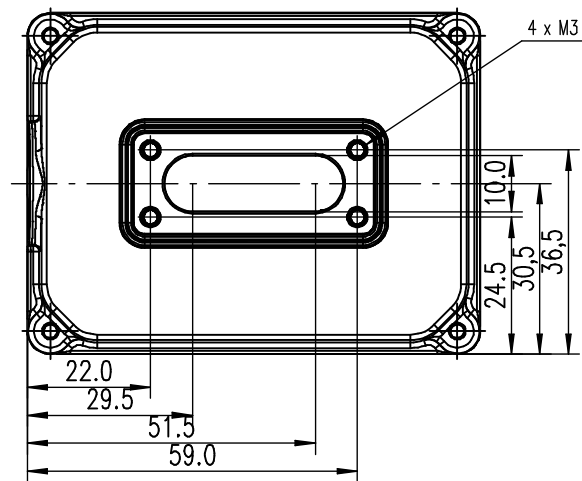


Fig. 8-21 ETKS\_C3 Bottom View

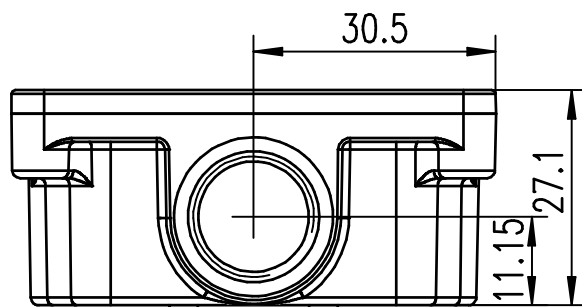


Fig. 8-22 ETKS\_C3 Side View

## 9 Ordering Information

### 9.1 XETK-S20.1B

Order Name	Short Name	Order Number
XETK-S20.1B Emulator Probe for the Infineon AURIX Microprocessor Family	XETK-S20.1B	F 00K 110 093
<b>Package Contents</b>		
<ul style="list-style-type: none"> <li>- XETK-S20.1B Emulator Probe for the Infineon AURIX Microprocessor Family</li> <li>- List "Content of this Package"</li> <li>- ETK Safety Advice</li> <li>- China-RoHS-leaflet_Compact_cn</li> </ul>		

### 9.2 XETK - ECU Adapter

Order Name	Short Name	Order Number
ETAI5 ETK ECU Adapter with short ED supply and GND lines, JST PHR - open wires (7fc - 2c+5c), 0m25	ETAI5	F 00K 106 773
ETAI6 ETK ECU Adapter, JST PHR - JST PHR (7fc - 5fc), 0m1	ETAI6	F 00K 107 195
ETAI8 XETK ECU Adapter, JST PHR - 7 to - JST PHR - 7(7fc - 7fc), 0m10	ETAI8	F 00K 107 757
ETAI10 ETK ECU Flex Adapter, Erni - Samtec (12fc - 10fc), 0m136	ETAI10	F 00K 107 954

### 9.3 Debug Adapter

Order Name	Short Name	Order Number
Debug Adapter from Debugger to ETK	ETAF11	F 00K 107 682
Debug Adapter from Debugger to XETK-S2x	AS_ETAF13.0	F 00K 110 451

### 9.4 Cables



#### NOTE

We recommend to use ETAS cables or any other cables certified by the standards for the application. Adhere to the maximum permissible cable lengths!



#### NOTE

Application-specific cables are available from ETAS. Please contact your ETAS contact partner or e-mail [sales.de@etas.com](mailto:sales.de@etas.com).

Please contact your local ETAS representative for further cable information.



#### NOTE

The cables showed in chapter "Cables and Accessories" on page 48 are not included in the XETK-S20.1B delivery.

### 9.4.1 ECU Adapter Cables



#### NOTE

The screws for mounting ECU adapter cables are not included in the cable delivery, they need to be ordered separately. For detailed information on mounting accessories contact ETAS technical support.

Order Name	Short Name	Order Number
XETK ECU Adapter Cable, 100 Mbit/s, Shield on ECU-Housing, Lemo 1B HME - JST PHE (10fc-5fc), 0m38	CBAM230.1-0m38	F 00K 105 791
XETK ECU Adapter cable, 100 Mbit/s, Lemo 1B HME - JST PHE (10fc-5fc), 0m6	CBAM240.1-0m6	F 00K 105 792
XETK ECU Adapter Cable, pre-assembled into PG9 screwing, shield on ECU-Housing, Lemo 1B PHE - JST PHR (10fc-5fc), 0m50	CBAM271.0-0m5	F 00K 107 867

### 9.4.2 Combined ECU Adapter and Power Supply Cables

Order Name	Short Name	Order Number
XETK ECU Adapter and Power Supply Cable, pre-assembled into PG9 screwing, shield on ECU-Housing, Lemo 1B PHE - JST PHR (10fc-5fc) / Lemo 0B PHG - JST PAP (2fc-2fc), 0m50	CBAM270.0-0m5	F 00K 107 866
XETK ECU Adapter and Power Supply Cable, pre-assembled into PG9 screwing, shield on ECU-Housing, Lemo 1B PHE - JST PHR (10fc-5fc) / Lemo 0B PHG - JST PAP (2fc-2fc), 0m70	CBAM270.0-0m7	F 00K 108 479

### 9.4.3 Ethernet Cables

#### PC Interface Cable

Order Name	Short Name	Order Number
Ethernet PC Connection Cable 1GBit/s, Lemo 1B FGE - RJ45 (10mc-8mc), 3 m	CBE200-3	F 00K 104 373
Ethernet Connection Adapter Cable 1 GBit/s, Lemo 1B PHE - RJ45 (10fc- 8mc), 1m2	CBAE200-1m20	F 00K 105 760

#### ES600 / ES910 Interface Cable

Order Name	Short Name	Order Number
Ethernet Connection Cable 1 GBit/s, Lemo 1B FGE - Lemo 1B FGE (10mc- 10mc), 3 m	CBE230.1-3	F 00K 105 757
Ethernet Connection Cable 1 GBit/s, Lemo 1B FGE - Lemo 1B FGE (10mc- 10mc), 8 m	CBE230.1-8	F 00K 105 758

#### ES600 Interface Adapter Cable

Order Name	Short Name	Order Number
Ethernet Connection Adapter Cable 1 GBit/s to 100 MBit/s, Lemo 1B PHE - Lemo 1B FGF (10fc-8mc), 0m5	CBAE330.2-0m5	F 00K 105 759

### 9.4.4 Power Supply Cable

Order Name	Short Name	Order Number
External Power Supply Cable for XETKs, Lemo 0B FGG - open wires (2fc-1c), 2 m	K70.1	F 00K 109 270
XETK Power Supply Cable for External Supply, with Filter Coil, Lemo 0B EGG - open wire (2fc-1c), 0m2	KA50	F 00K 000 940

### 9.5 Waterproof Case

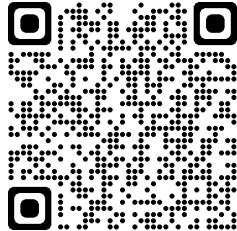
Order Name	Short Name	Order Number
Waterproof case, designed for ETK-S4.x, ETK-S6.x, ETK-S2x, and XETK-S2x	ETKS_C3	F 00K 107 683

## 10 Contact Information

### Technical Support

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

[www.etas.com/en/hotlines.php](http://www.etas.com/en/hotlines.php)



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