

**CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1**  
**Isolating Measurement Probe**  
User's Guide



## Copyright

---

The data in this document may not be altered or amended without special notification from ETAS GmbH. ETAS GmbH undertakes no further obligation in relation to this document. The software described in it can only be used if the customer is in possession of a general license agreement or single license. Using and copying is only allowed in concurrence with the specifications stipulated in the contract.

Under no circumstances may any part of this document be copied, reproduced, transmitted, stored in a retrieval system or translated into another language without the express written permission of ETAS GmbH.

© **Copyright 2016** ETAS GmbH, Stuttgart

The names and designations used in this document are trademarks or brands belonging to the respective owners.

CBN101.1/CBN103.1/CBN105.1/CBN107.1 - User's Guide R04 EN - 02.2016

---

## Contents

|              |                                                 |    |
|--------------|-------------------------------------------------|----|
| <b>1</b>     | General                                         | 5  |
| <b>1.1</b>   | Basic Safety Instructions                       | 5  |
| <b>1.1.1</b> | Labeling of Safety Instructions                 | 5  |
| <b>1.1.2</b> | General safety information                      | 5  |
| <b>1.1.3</b> | Requirements for users and duties for operators | 5  |
| <b>1.1.4</b> | Correct Use                                     | 6  |
| <b>1.2</b>   | Identifications on the product                  | 8  |
| <b>1.3</b>   | CE marking                                      | 8  |
| <b>1.4</b>   | Product return and recycling                    | 8  |
| <b>1.5</b>   | RoHS conformity                                 | 9  |
| <b>1.5.1</b> | European Union                                  | 9  |
| <b>1.5.2</b> | China                                           | 9  |
| <b>1.6</b>   | About this manual                               | 9  |
| <b>1.6.1</b> | Organization                                    | 9  |
| <b>1.6.2</b> | Working with the manual                         | 10 |
| <b>1.7</b>   | Scope of supplies                               | 10 |
| <b>2</b>     | Hardware description                            | 11 |
| <b>2.1</b>   | Overview                                        | 11 |
| <b>2.1.1</b> | Combined use with measuring modules             | 11 |
| <b>2.1.2</b> | Product variants                                | 11 |
| <b>2.1.3</b> | Properties                                      | 12 |
| <b>2.2</b>   | Assemblies and function                         | 13 |
| <b>2.2.1</b> | Design of the Isolating Measurement Probe       | 13 |
| <b>2.2.2</b> | Measuring channel                               | 14 |
| <b>2.2.3</b> | Housing of measuring channel                    | 14 |
| <b>2.2.4</b> | Connections and cabling                         | 14 |
| <b>2.2.5</b> | Operating voltage                               | 15 |
| <b>2.2.6</b> | Serial number                                   | 15 |

|       |                                                                                                                 |    |
|-------|-----------------------------------------------------------------------------------------------------------------|----|
| 2.3   | Notes about commissioning                                                                                       | 15 |
| 2.3.1 | Use of the Isolating Measurement Probe CBN101.1/ CBN103.1/<br>CBN105.1/ CBN107.1                                | 15 |
| 2.3.2 | Expanded functions when using the TEDS information of the Isolating<br>Measurement Probes CBN101.1 and CBN107.1 | 16 |
| 2.4   | Applications                                                                                                    | 17 |
| 3     | Technical data                                                                                                  | 19 |
| 3.1   | General data                                                                                                    | 19 |
| 3.1.1 | Standards and guidelines met                                                                                    | 19 |
| 3.1.2 | Type check                                                                                                      | 20 |
| 3.1.3 | Application                                                                                                     | 20 |
| 3.1.4 | Ambient conditions                                                                                              | 20 |
| 3.2   | Power supply                                                                                                    | 20 |
| 3.3   | Electrical data                                                                                                 | 21 |
| 3.4   | Mechanical data                                                                                                 | 23 |
| 3.5   | Pin assignment                                                                                                  | 24 |
| 3.5.1 | High-voltage side (CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1)                                                      | 24 |
| 3.5.2 | Low-voltage side                                                                                                | 24 |
| 4     | Ordering Information                                                                                            | 27 |
| 4.1   | Isolating Measurement Probe                                                                                     | 27 |
| 4.1.1 | CBN101.1                                                                                                        | 27 |
| 4.1.2 | CBN103.1                                                                                                        | 27 |
| 4.1.3 | CBN105.1                                                                                                        | 27 |
| 4.1.4 | CBN107.1                                                                                                        | 28 |
| 4.2   | Calibration Service                                                                                             | 28 |
| 5     | ETAS Contact Addresses                                                                                          | 29 |
|       | Figures                                                                                                         | 31 |
|       | Index                                                                                                           | 33 |

## 1 General

---

The introductory chapter informs you about the basic safety information, product return and recycling, the use of this manual, the scope of delivery and other information.

### 1.1 Basic Safety Instructions

---

#### 1.1.1 Labeling of Safety Instructions

---

The safety instructions contained in this manual are identified by the general danger symbol shown below:



The safety instructions shown below are used for this purpose. They provide notes about extremely important information. Please read this information very carefully.

**DANGER!**

*Identifies an immediate danger with high risk, which could result in death or severe bodily injury if it is not avoided.*

**WARNING!**

*Identifies a possible danger with medium risk, which could result in death or (severe) bodily injury if it is not avoided.*

**CAUTION!**

*Identifies a danger with low risk that could result in slight or moderate bodily injuries or property damage if it is not avoided.*

#### 1.1.2 General safety information

---

Please observe the product safety advice ("ETAS Safety Advice CBN" and the subsequent safety instructions to avoid any impact on your health or damages to the device.

**Note**

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

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

#### 1.1.3 Requirements for users and duties for operators

---

The Isolating Measurement Probe product may be commissioned and used only by qualified electricians for high-voltage systems (BGI/GUV-I 8686 of the DGUV, minimum Level 2).

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

#### *General safety at work*

---

The existing regulations for safety at work and accident prevention must be followed.

#### 1.1.4 Correct Use

---

This product has been developed and released for use in automotive applications. For usage in other domains please contact your ETAS representative.

#### *Requirements for Operation*

---

**WARNING!**

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

**WARNING!**

*Check before each use of the product in high-voltage systems its function by measuring a known extra-low voltage.*

The following requirements are put in place for safe operation:

- The Isolating Measurement Probe product meets the requirements of protection class IP65. Observe the notes for the ambient conditions (see chapter 3.1.4 on page 20).
- Use the product only according to the specifications in the corresponding user's guide. For any other use, the product safety is not ensured.
- This product must not be used for measuring of mains supply circuits.
- Observe the regulations concerning electrical safety and the laws and regulations concerning occupational safety applicable at the application site!
- Observe the rules for working on equipment with dangerous voltages!
- Carefully attach the high-voltage measuring cables.
- Keep the high-voltage measuring lines short to minimize the risks of injuries from pinching, contracting, scoring or shearing.
- Do not use the product in a wet or humid environment.
- Do not use the product in a potentially explosive atmosphere.
- Keep the surfaces of the product clean and dry.

#### *Requirements for the technical State of the Product*

---

The product is designed in accordance with state-of-the-art technology and recognized safety rules. The product may be operated only in a technically flawless condition and according to the intended purpose and with regard to safety and

dangers as stated in the respective product documentation. If the product is not used according to its intended purpose, the protection of the product may be impaired.

**DANGER!*****Risk of electric shock with damaged housing of a measuring channel or damaged insulation of a high-voltage cable!***

*Electric shock upon touching energized components of the Isolating Measurement Probe leads to injuries, heart failure or death.*

*A damaged Isolating Measurement Probe must be decommissioned **immediately!***

***Ensure that the damaged Isolating Measurement Probe is not longer being used!***

*A repair of the Isolating Measurement Probe is not possible, attempts to repair are not permissible!*




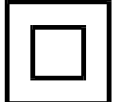



#### *Maintenance and cleaning*

---

The product is maintenance-free. For cleaning, use a clean and dry cloth.

## 1.2 Identifications on the product

The high-voltage side of the housings of the measuring channels of the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe is identified in orange. The following symbols are used for identifying the product:

| Symbol                                                                              | Description                                                   |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------|
|    | Before using the product, carefully read the user's guide!    |
| 840 V                                                                               | Maximum input voltage 840 V                                   |
|    | Measuring input, minus                                        |
|    | Measuring input, plus                                         |
|   | Housing protected with double insulation (acc. to EN 61010-1) |
|  | Identification for CE, see chapter 1.3 on page 8              |
|  | Identification for RoHS, see chapter 1.5.1 on page 9          |
|  | Identification for China RoHS, see chapter 1.5.2 on page 9    |

Observe the information in chapter "Technical data" on page 19.

## 1.3 CE marking

ETAS confirms that the product meets the product-specific applicable European Directives with the CE marking affixed to the product or its packaging. The CE Declaration of Conformity for the product is available upon request.

## 1.4 Product return and recycling

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



This ensures that the equipment is recycled in a resource-saving manner that does not represent any risk for the health and safety of humans and the environment.



**Fig. 1-1** WEEE symbol

The WEEE symbol (see Fig. 1-1 on page 9) on the product or its packaging identifies that the product may not be disposed of together with garbage.

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

The WEEE directive relates to all ETAS equipment, but not to external cables or batteries.

Additional information about the recycling program of ETAS GmbH can be obtained from the ETAS sales and service branch offices (see chapter 5 on page 29).

## 1.5 RoHS conformity

---

### 1.5.1 European Union

---

The EU Directive 2002/95/EU limits the use of certain dangerous materials for electrical and electronic devices (RoHS conformity).

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

### 1.5.2 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.

## 1.6 About this manual

---

This manual describes the startup and technical data of the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe product.

### 1.6.1 Organization

---

The manual consists of four chapters and one index.

- **Chapter 1: "General"**

The "General" chapter (this chapter) informs you about the basic safety information, product return and recycling, the use of this manual, the scope of delivery and other information.

- **Chapter 2: "Hardware Description"**

The "Hardware description" chapter provides an overview of the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe and information about the power supply, the measuring channels and their housing, the connections and cabling, the cable identification and the serial number.

- **Chapter 3: "Technical Data"**

The "Technical data" chapter describes the standards and guidelines that have been met, the ambient conditions, the application area, the system requirements for operating the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe, the electrical data, the mechanical data, and the mapping of the measuring channels.

- **Chapter 4: "Ordering Information"**

The "Ordering Information" chapter includes the ordering information for the available cables and the accessories.

The concluding chapter "ETAS Contacts" gives you information about the international ETAS sales and service branch offices.

## 1.6.2 Working with the manual

---

### *Typographical conventions*

---

The following typographical conventions are used:

|                |                                      |
|----------------|--------------------------------------|
| <b>Bold</b>    | Labels of the device                 |
| <i>Italics</i> | Particularly important text passages |

Important notes for the user are represented as follows:

**Note**

*Important note for users.*

## 1.7 Scope of supplies

---

Before the initial startup of your CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe, please verify that the device has been delivered with all the required parts (see the chapter "Ordering Information" on page 27).

## 2 Hardware description

This chapter provides an overview of the Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 and information about housing, serial number and connections.

### 2.1 Overview

#### 2.1.1 Combined use with measuring modules

The Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 is a signal conditioning cable with an active voltage measuring channel integrated in the cable for the combined use with A/D modules from external providers.

The combination of the measurement modules with the Isolating Measurement Probe expands their application range by the **potential-free** measurement of voltages up to 10 V, e.g. in the high-voltage electrical system of hybrid and electric vehicle systems. The electrical isolation between the voltage in the high-voltage electrical system and the measurement module occurs close to the measuring point in the measuring channel of the isolating measurement probe.

The Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 provides an efficient solution for measuring voltages during the development, application and validation of ECUs of the electric drive.

#### 2.1.2 Product variants

The Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 was developed for these applications and is available in four different assembled variants:

| Isolating Measurement Probe | Connection to measurement module |                                               |
|-----------------------------|----------------------------------|-----------------------------------------------|
|                             | Assembly                         | Application example                           |
| CBN101.1                    | Open Wire                        | Adaptation to measurement setup by the user   |
| CBN103.1                    | Lemo FGA.0B.306                  | with A/D module<br>CSM ADMM 4/ 8 classic/ pro |
| CBN105.1                    | Lemo FGG.1B.306                  | with A/D module<br>IPETRONIK M-SENSE 4        |
| CBN107.1                    | Lemo FGG.1B.310                  | with A/D module<br>Softing MA08.1             |

#### Note

*The complete technical data of the Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 is located in the chapter "Technical data" on page 19.*

**Note**

*Unless otherwise indicated, the descriptions, properties and technical data in this manual apply to all variants of the Isolating Measurement Probe (CBN101.1, CBN103.1, CBN105.1 and CBN107.1). In these text segments, the common short name "CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1" is being used.*

**Note**

*Except for the assembly of the connectors at the low-voltage side, the four variants of the Isolating Measurement Probe feature an identical electrical and mechanical design.*

### 2.1.3 Properties

---

The most important properties of the Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1:

- Use in combination with A/D modules from external providers
- Compact isolating measurement probes for measuring voltages in high-voltage electrical systems of hybrid or electric vehicles
- High level of safety through electrical isolation near the measuring point
- Electrical isolation for up to 840 V potential difference
- 10 V measurement range for acquiring battery cell voltages
- Voltage supply integrated in the measuring cable
- Automatic functions possible for procedures in accordance with TEDS standard (Isolating Measurement Probes CBN101.1 and CBN107.1 only)
- Automotive-capable product that is suitable for use in the development environment and in the vehicle on test courses.
  - Immune to ambient conditions (temperature, EMC)
  - High level of mechanical stability and robustness
- Product safety through type inspection and certification by accredited test lab

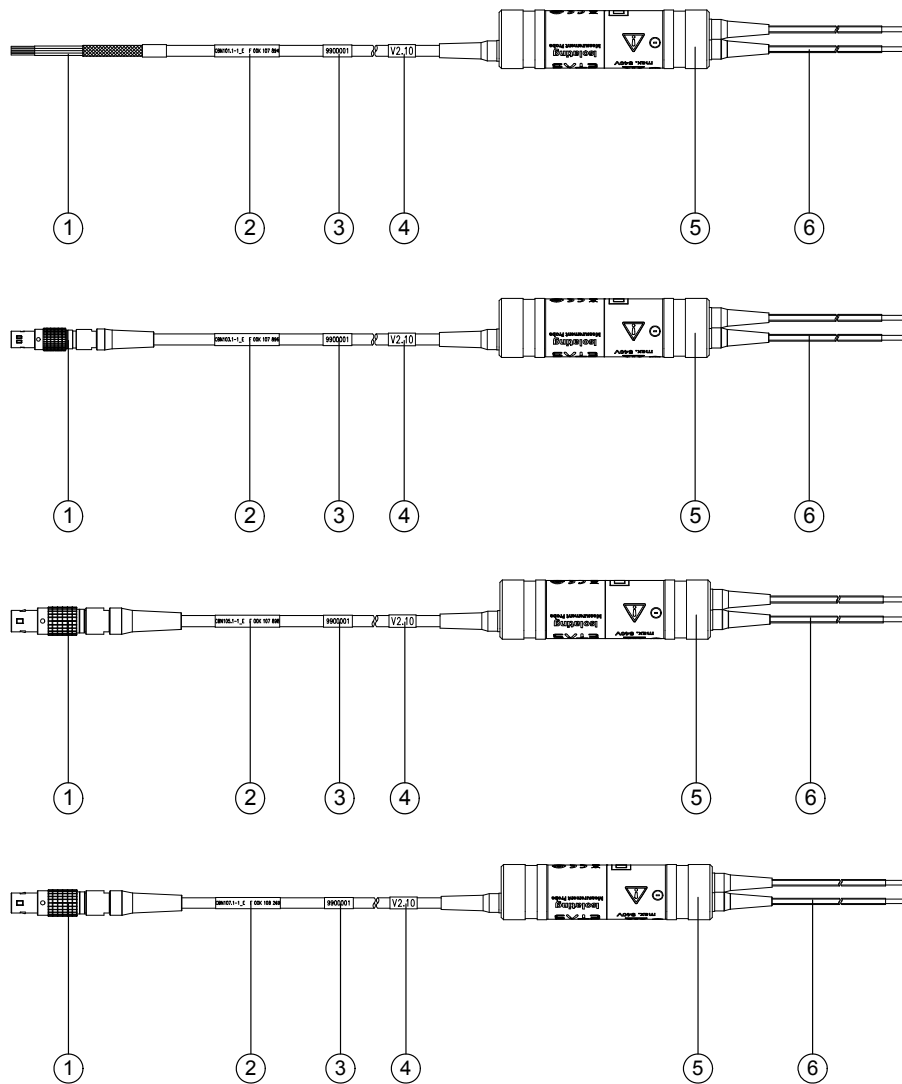
The complete technical data of the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 is located in the chapter "Technical data" on page 19.

2.2 Assemblies and function

2.2.1 Design of the Isolating Measurement Probe

**Note**

*Except for the assembly of the connectors at the low-voltage side, the four variants of the Isolating Measurement Probe feature an identical electrical and mechanical design.*



**Fig. 2-1** Design of the Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 (top down)

| No. in Fig. 2-1 | Designation                                                                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1               | Connection to the measurement module (low-voltage side):<br>Open Wire (CBN101.1), Lemo FGA.0B.306 (CBN103.1), Lemo FGG.1B.306 (CBN105.1) and Lemo FGG.1B.310 (CBN107.1) |
| 2               | Short name and type-part number of product                                                                                                                              |
| 3               | Serial number of product                                                                                                                                                |
| 4               | Hardware version number of product                                                                                                                                      |
| 5               | Housing of measuring channel                                                                                                                                            |
| 6               | Measuring leads (high-voltage side)                                                                                                                                     |

### 2.2.2 Measuring channel

The measuring channel is encased in an isolating cylindrical housing that contains the electronics and the electrical isolation of the measuring channel (see Fig. 2-1 on page 13).

Inside the housing of the measuring channel, the signal conditioning, voltage reduction and electrical isolation of the high-voltage signals from the low-voltage side.

### 2.2.3 Housing of measuring channel

#### *Identification of the high-voltage side*

The high-voltage side of the measuring channel housing is marked in orange.

#### *Mechanical damage of the housing*

In case of mechanical damage of the outside **blue** layer of the measuring channel housing, the underlying **black** sealing compound in this area is visible.



#### **DANGER!**

***Danger of an electric shock with damaged housing of the measuring channel or with damaged insulation of high-voltage cable!***

*Electric shock upon contact with energized components of the isolating measurement probe leads to injuries, heart failure or death.*

*A damaged Isolating Measurement Probe must be taken out of operation **immediately!***

***Ensure that the damaged Isolating Measurement Probe is not used any more!***

*A repair of the isolating measurement probe is not possible, any repair attempts are not allowed!*

### 2.2.4 Connections and cabling

#### *Low-voltage side*

The low-voltage side of the isolating measurement probe is connected to an A/D module and is assembled differently depending on the design:

- Open Wire (CBN101.1),

- Lemo FGA.0B.306 (CBN103.1),
- Lemo FGG.1B.306 (CBN105.1) and
- Lemo FGG.1B.306 (CBN107.1).

#### *High-voltage side*

---

The leads on the high-voltage side are marked in red/orange (input "+") and black/orange input "-").

To minimize dangers from long cables on the high-voltage side, short cable ends are used as connections to the housings of the measuring channels. This allows implementing longer connections in the measurement setup on the electrically isolated low-voltage side.

For the contacting in the measurement setup, the user can shorten or assemble the measuring channels on the high-voltage side upon demand (part 6 in Fig. 2-1 on page 13). The most compact design in the high-voltage range allows a high level of operational safety.

#### **Note**

*Observe the regulations and rules for working on high-voltage systems in this context.*

#### 2.2.5 Operating voltage

---

The Isolating Measurement Probe requires a direct-current voltage as power supply which can be provided by an external power supply or the A/D module used. For this application, the output voltage of the A/D module (sensor supply voltage of the module) is used as power supply of the Isolating Measurement Probe.

#### 2.2.6 Serial number

---

The serial number is located on the low-voltage side of the Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 (no. 3 in Fig. 2-1 on page 13). It is required when you contact the technical customer service of ETAS.

### 2.3 Notes about commissioning

---

#### 2.3.1 Use of the Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1

---

If the Isolating Measurement Probe is operated in combination with an A/D module, the following settings are required:

- The output voltage of the A/D module (sensor supply voltage of the module) or the voltage that is used as the power supply of the Isolating Measurement Probe, must be manually set to 12 V. The following screenshot shows this setting when INCA is used as application software:

| Channels |        |                          |                    | Sensor Supply |  | TEDS Information |  |
|----------|--------|--------------------------|--------------------|---------------|--|------------------|--|
| No.      | Name   | Output Voltage Selection | Output Voltage [V] | GUI           |  |                  |  |
| 1        | Phase1 | predefined               | 12.00              |               |  |                  |  |

- Adjustment and calibration values for the combination of Isolating Measurement Probe and A/D module must be manually entered by the user in the application software for every Isolating Measurement Probe.

ETAS provides these values in a calibration certificate for every Isolating Measurement Probe. In the supplied calibration certificate, which is uniquely assigned to each unit of the measurement probe via the serial number, the following adjustment and calibration values can be found:

- Actual output voltage +10 V at input voltage of 10.00455 V
- Actual output voltage -10 V at input voltage of -10.00275 V

The following screenshot shows this setting of the sample values when using INCA as application software:

| TEDS Information |       |        |            |                |                  |             |          |                   |                |
|------------------|-------|--------|------------|----------------|------------------|-------------|----------|-------------------|----------------|
|                  | Units | Rate   | A.A-Filter | Digital Filter | Filter Frequency | Phys bottom | Phys top | Sensor bottom [v] | Sensor top [v] |
|                  | V     | 0.01ms | On         | On             | CIC auto         | -10.0028    | 10.0046  | -10.00            | 10.00          |

- The measuring range required for the Isolating Measurement Probe must be set manually.

#### Note

*The adjustment and calibration values used here are sample values. The values for your measurement probe variant can be found in the supplied calibration certificate of the measurement probe.*

### 2.3.2 Expanded functions when using the TEDS information of the Isolating Measurement Probes CBN101.1 and CBN107.1

The following information is implemented in the TEDS of the measuring channel of the Isolating Measurement Probes CBN101.1 and CBN107.1:

- Magnitude of operating voltage of the Isolating Measurement Probe CBN101.1/CBN107.1,

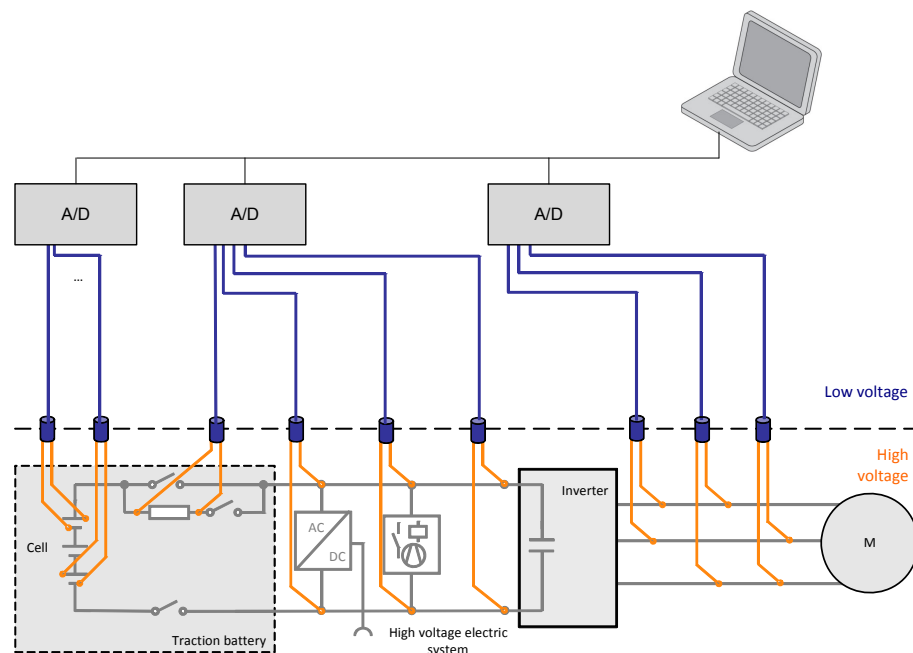


- Adjustment and calibration values of the Isolating Measurement Probe CBN101.1/CBN107.1,
- Information about the required measuring range.

If the Isolating Measurement Probe CBN101.1 or the Isolating Measurement Probe CBN107.1 is operated with a customer-specific application software that uses procedures in accordance with TEDS standard and if the application software is adjusted accordingly, the following automatic functions can be implemented:

- automatic setup of the power supply of the Isolating Measurement Probe by the supplying A/D module,
- automatic transfer of the individual adjustment and calibration values for the combination consisting of Isolating Measurement Probe and A/D module,
- automatic setup of measuring range for the Isolating Measurement Probe in the customer-specific application software.

## 2.4 Applications



**Fig. 2-2** Use of the Isolating Measurement Probe

Typical applications are the monitoring of voltages in the high-voltage electrical system, e.g. at the drive battery, at individual cells of the drive battery or at DC links (see Fig. 2-2 on page 17). With the help of the voltage measurements, it is possible, for example, to measure the charge state of the drive battery, the behavior of the battery under load, fluctuations in the high-voltage electrical system or the targeted discharge of the battery in safety-critical situations independent of the ECU.



### 3 Technical data

This chapter describes the standards and guidelines that have been met, the ambient conditions, mechanical data, system requirements for operating the Isolating Measurement Probe and the electrical data.

#### **Note**

*Except for the assembly of the connectors at the low-voltage side, the four variants of the Isolating Measurement Probe feature an identical electrical and mechanical design.*

#### 3.1 General data

#### **Note**

*The power supply used for the Isolating Measurement Probe must be permanent protected against overload and short circuit.*

##### 3.1.1 Standards and guidelines met

The Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 corresponds to the following standards and guidelines:

| Standard     | Test                                                                                |
|--------------|-------------------------------------------------------------------------------------|
| EN 61010-1   | Safety regulations for electrical measurement, control and laboratory use           |
| EN 61326     | Electrical equipment for measurement, control and laboratory use - EMC requirements |
| EN 61000-6-2 | Interference immunity (industrial environment) <sup>1)</sup>                        |
| EN 61000-6-4 | Interference emission (industrial environments)                                     |

<sup>1)</sup>: The module must be supplied by a DC power supply or a battery with operating voltage. Between module and voltage source, cables with a maximum length of 30 m are allowed.

The Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 is designed only for use in industrial environments in accordance with EN 61000-6-4. When using the module outside of industrial environments avoid possible radio disturbances by additional shielding measures!



#### **WARNING!**

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

3.1.2 Type check

The CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe was checked by an accredited test lab with respect to type and certified. Information about the type check of the product are available from ETAS upon request.

3.1.3 Application



**WARNING!**

*Check before each use of the product in high-voltage systems its function by measuring a known extra-low voltage.*



**WARNING!**

**Dependency of the maximum permissible input voltage of the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe on the application altitude!**

*The maximum permissible input voltage of the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe depends on its application altitude above MSL (see chapter 3.3 on page 21)!*

3.1.4 Ambient conditions

|                                    |                                       |
|------------------------------------|---------------------------------------|
| Operating temperature range        | -40 °C to +75 °C<br>-40 °F to +167 °F |
| Altitude                           | max. 5,000 m / 16,400 ft              |
| Relative humidity (non-condensing) | 0 to 95%                              |
| Protection class                   | IP65                                  |

3.2 Power supply

**Note**

*The power supply used for the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe must be permanent protected against overload and short circuit.*

|                               | Min.             | Typ. | Max. | Unit |
|-------------------------------|------------------|------|------|------|
| Supply voltage                | 11.5             | 12.0 | 12.5 | V DC |
| Current consumption (at 12 V) | +25 °C           | 15   |      | mA   |
|                               | -40 °C to +75 °C |      | 20   | mA   |

### 3.3 Electrical data

#### **Note**

ETAS guarantees that the measuring accuracy of the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe is maintained for one year.

#### **Note**

Unless specified otherwise, all data apply at 25 °C.



#### **WARNING!**

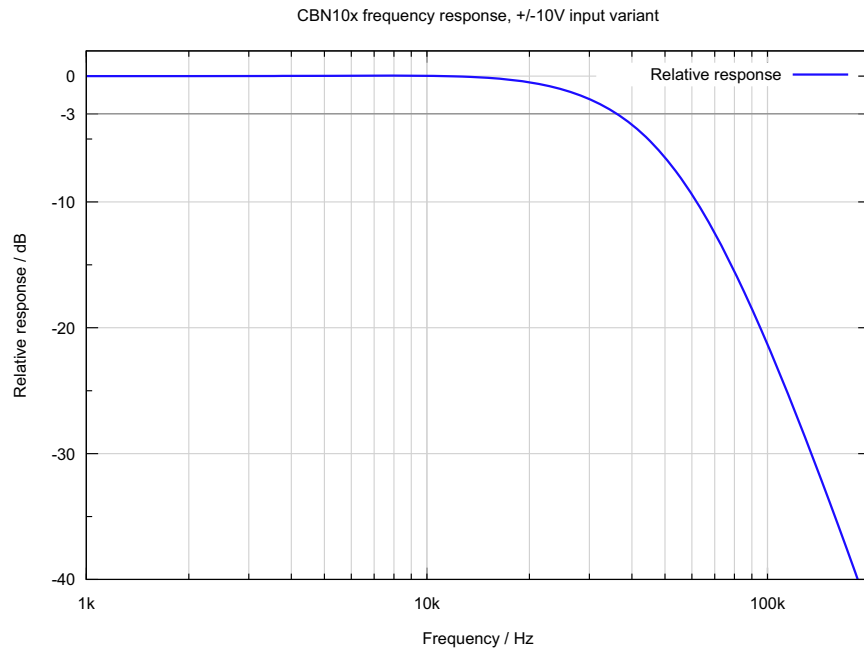
**Dependency of the maximum permissible input voltage of the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe on the application altitude!**

The maximum permissible input voltage of the CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 Isolating Measurement Probe depends on its application altitude above MSL!

| Property                | Description                                                                                                         |
|-------------------------|---------------------------------------------------------------------------------------------------------------------|
| Number of channels      | 1                                                                                                                   |
| Measuring range         | ±10 V                                                                                                               |
| Input voltage (max.)    | ±840 V<br>(below 4,000 m AMSL)<br>±600 V<br>(between 4,000 m and 5,000 m AMSL)                                      |
| Insulation test voltage | ±1,500 V DC<br>(input against output)                                                                               |
| Insulation voltage      | ±840 V DC<br>(input against Ubatt-)                                                                                 |
| Transient overvoltage   | 2,500 V                                                                                                             |
| Transient resistance    | ±800 V/μs                                                                                                           |
| Input impedance         | 12 MΩ                                                                                                               |
| Input capacitance       | 4 pF<br>(with straight cable with a length of 20 cm at 10 kHz)                                                      |
| Coupling capacitance    | 10 pF<br>(input against output)                                                                                     |
| Max. measurement error  | ±(1 mV +  U <sub>in</sub>   * 0.05%)<br>(at +25 °C)<br>±(5 mV +  U <sub>in</sub>   * 0.2%)<br>(at -40 °C to +75 °C) |

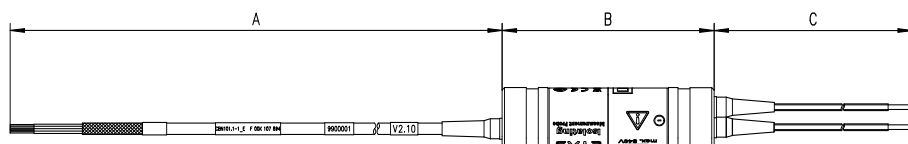
*Frequency Response*

---

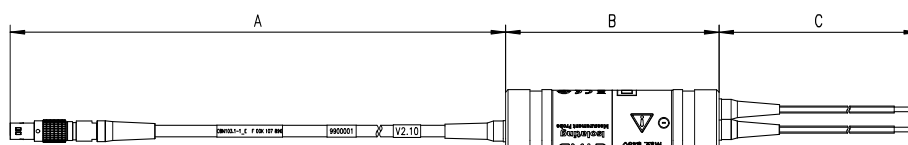


**Fig. 3-1** Isolating Measurement Probe Frequency Reponse

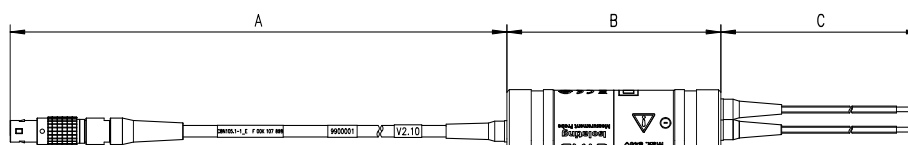
### 3.4 Mechanical data



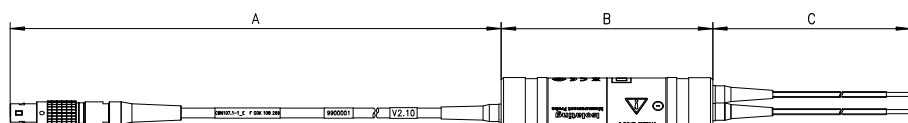
**Fig. 3-2** Dimensions CBN101.1



**Fig. 3-3** Dimensions CBN103.1



**Fig. 3-4** Dimensions CBN105.1



**Fig. 3-5** Dimensions CBN107.1

|                                |                                                           |
|--------------------------------|-----------------------------------------------------------|
| Dimensions (see figures above) | A: 800 mm<br>(stretched length; connection at A/D module) |
|                                | B: 88 mm (diameter: 25 mm)                                |
|                                | C: 200 mm (high-voltage connection)                       |
| Weight                         | approx. 105 g (without plug)                              |

### 3.5 Pin assignment

#### 3.5.1 High-voltage side (CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1)

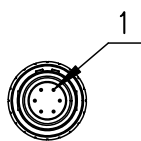
| Color        | Signal | Description |
|--------------|--------|-------------|
| red/orange   | IN+    | Input „+“   |
| black/orange | IN-    | Input „-“   |

#### 3.5.2 Low-voltage side

##### *CBN101.1 (Open wire)*

| Color  | Signal     | Description                                    |
|--------|------------|------------------------------------------------|
| Brown  | Supply     | Supply voltage, plus                           |
| Pink   | Supply_GND | Supply voltage, ground                         |
| Green  | Out+       | Output voltage of the measurement probe, plus  |
| Yellow | Out-       | Output voltage of the measurement probe, minus |
| Gray   | TEDS+      | TEDS                                           |
| White  | TEDS-      | TEDS, GND                                      |
|        |            | Cable shield                                   |

##### *CBN103.1 (Lemo plug)*



**Fig. 3-6** Lemo FGA.0B.306.CLA

| Pin | Signal     | Description                                    |
|-----|------------|------------------------------------------------|
| 1   | Out+       | Output voltage of the measurement probe, plus  |
| 2   | Out-       | Output voltage of the measurement probe, minus |
| 4   | Supply     | Supply voltage, plus                           |
| 5   | Supply_GND | Supply voltage, ground                         |

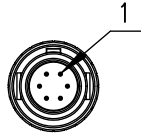
**Note**

*Cable shield is connected with Lemo plug housing.*



CBN105.1 (Lemo plug)

---



**Fig. 3-7** Lemo FGG.1B.306.CLA

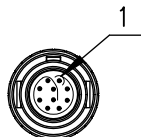
| Pin | Signal     | Description                                    |
|-----|------------|------------------------------------------------|
| 1   | Out+       | Output voltage of the measurement probe, plus  |
| 2   | Out-       | Output voltage of the measurement probe, minus |
| 4   | Supply     | Supply voltage, plus                           |
| 5   | Supply_GND | Supply voltage, ground                         |

**Note**

*Cable shield is connected with Lemo plug housing.*

CBN107.1 (Lemo plug)

---



**Fig. 3-8** Lemo FGG.1B.310.CLA

| Pin        | Signal     | Description                                    |
|------------|------------|------------------------------------------------|
| 1          | Out-       | Output voltage of the measurement probe, minus |
| 2          | N.C.       | No connection                                  |
| 3          | Supply_GND | Supply voltage, ground                         |
| 4          | Out+       | Output voltage of the measurement probe, plus  |
| 5          | N.C.       | No connection                                  |
| 6          | N.C.       | No connection                                  |
| 8          | TEDS-      | TEDS, GND                                      |
| 9, Housing |            | Cable shield                                   |
| 10         | TEDS+      | TEDS                                           |

**Note**

*Cable shield is connected with Lemo plug housing.*



## 4 Ordering Information

---

### 4.1 Isolating Measurement Probe

---

#### 4.1.1 CBN101.1

---

| Order name                                                                                                           | Short name | Order number  |
|----------------------------------------------------------------------------------------------------------------------|------------|---------------|
| CBN101.1 Isolating Measurement Probe, 840 V Isolation, 1 Channel, 10 V Range, Open Wires - Open Wires (6c - 2c), 1 m | CBN101.1-1 | F 00K 107 888 |

#### Scope of supply

CBN101.1 Isolating Measurement Probe (10 V), Routine Test Certificate CBN1xx, ETAS Safety Advice, Calibration Certificate, China-RoHS-leaflet\_Compact\_green\_cn, CDROM ES4xx\_DRV\_SW\_CD (driver and tools for ES4xx)

#### 4.1.2 CBN103.1

---

| Order name                                                                                                                | Short name | Order number  |
|---------------------------------------------------------------------------------------------------------------------------|------------|---------------|
| CBN103.1 Isolating Measurement Probe, 840 V Isolation, 1 Channel, 10 V Range, Lemo FGA.0B.306 - Open Wires (6m - 2c), 1 m | CBN103.1-1 | F 00K 107 890 |

#### Scope of supply

CBN103.1 Isolating Measurement Probe (10 V), Routine Test Certificate CBN1xx, ETAS Safety Advice, Calibration Certificate, China-RoHS-leaflet\_Compact\_green\_cn, CDROM ES4xx\_DRV\_SW\_CD (driver and tools for ES4xx)

#### 4.1.3 CBN105.1

---

| Order name                                                                                                                | Short name | Order number  |
|---------------------------------------------------------------------------------------------------------------------------|------------|---------------|
| CBN105.1 Isolating Measurement Probe, 840 V Isolation, 1 Channel, 10 V Range, Lemo FGG.1B.306 - Open Wires (6m - 2c), 1 m | CBN105.1-1 | F 00K 107 892 |

#### Scope of supply

CBN105.1 Isolating Measurement Probe (10 V), Routine Test Certificate CBN1xx, ETAS Safety Advice, Calibration Certificate, China-RoHS-leaflet\_Compact\_green\_cn, CDROM ES4xx\_DRV\_SW\_CD (driver and tools for ES4xx)

## 4.1.4 CBN107.1

| <b>Order name</b>                                                                                                                                                                                                  | <b>Short name</b> | <b>Order number</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------|
| CBN107.1 Isolating Measurement Probe, 840 V Isolation, 1 Channel, 10 V Range, Lemo FGG.1B.310 - Open Wires (6m - 2c), 1 m                                                                                          | CBN105.1-1        | F 00K 108 262       |
| <b>Scope of supply</b>                                                                                                                                                                                             |                   |                     |
| CBN107.1 Isolating Measurement Probe (10 V), Routine Test Certificate CBN1xx, ETAS Safety Advice, Calibration Certificate, China-RoHS-leaflet_Compact_green_cn, CDROM ES4xx_DRV_SW_CD (driver and tools for ES4xx) |                   |                     |

## 4.2 Calibration Service

| <b>Order name</b>                                              | <b>Short name</b> | <b>Order number</b> |
|----------------------------------------------------------------|-------------------|---------------------|
| Calibration Service for CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 | K_CBN1xx          | F 00K 107 912       |

## 5 **ETAS Contact Addresses**

---

### *ETAS HQ*

---

ETAS GmbH

Borsigstraße 14

70469 Stuttgart

Germany

Phone: +49 711 3423-0

Fax: +49 711 3423-2106

WWW: [www.etas.com](http://www.etas.com)

### *ETAS Subsidiaries and Technical Support*

---

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

ETAS subsidiaries WWW: [www.etas.com/en/contact.php](http://www.etas.com/en/contact.php)

ETAS technical support WWW: [www.etas.com/en/hotlines.php](http://www.etas.com/en/hotlines.php)



---

## Figures

|                 |                                                                                                  |    |
|-----------------|--------------------------------------------------------------------------------------------------|----|
| <b>Fig. 1-1</b> | WEEE symbol.....                                                                                 | 9  |
| <b>Fig. 2-1</b> | Design of the Isolating Measurement Probe CBN101.1/ CBN103.1/ CBN105.1/ CBN107.1 (top down)..... | 13 |
| <b>Fig. 2-2</b> | Use of the Isolating Measurement Probe.....                                                      | 17 |
| <b>Fig. 3-1</b> | Isolating Measurement Probe Frequency Reponse .....                                              | 22 |
| <b>Fig. 3-2</b> | Dimensions CBN101.1 .....                                                                        | 23 |
| <b>Fig. 3-3</b> | Dimensions CBN103.1 .....                                                                        | 23 |
| <b>Fig. 3-4</b> | Dimensions CBN105.1 .....                                                                        | 23 |
| <b>Fig. 3-5</b> | Dimensions CBN107.1 .....                                                                        | 23 |
| <b>Fig. 3-6</b> | Lemo FGA.0B.306.CLA .....                                                                        | 24 |
| <b>Fig. 3-7</b> | Lemo FGG.1B.306.CLA .....                                                                        | 25 |
| <b>Fig. 3-8</b> | Lemo FGG.1B.310.CLA .....                                                                        | 25 |





---

## Index

**A**

Accident prevention 6  
Ambient temperature 20  
Applications 17

**C**

Calibration Service 28  
CBN100.1 27  
CBN102.1 27  
CBN104.1 27  
CE Declaration of Conformity 8  
Charge state 17  
Cleaning 7  
Commissioning 15  
Customer service 15

**D**

Damage, mechanical 14  
Data  
    mechanical 23  
    Technical 19  
Documentation 5  
Drive battery 17

**E**

Electrical data 21  
Electrical isolation 14  
Electrical safety 6  
ETAS Contact Addresses 29

**H**

High-voltage electrical system 11, 17  
High-voltage side 15  
Housing 14

**I**

Identification 14  
Isolation, electrical 11

**L**

Low-voltage side 14

**M**

Measuring accuracy, maintaining the  
    21  
Measuring channel 14  
Mechanical data 23

**O**

Occupational safety 6  
Operating voltage 15  
Operation  
    Conventions 10  
Operation, requirements for 6  
Organization 9

**P**

Power supply 20  
Product return 8  
Product variants 11

**Properties** 12**Q**

Qualification, required 6

Qualified electricians for high-voltage systems 5

**R**

Recycling 8

RoHS conformity

China 9

European Union 9

**S**

Safety at work 6

Safety instructions, basic 5

Safety instructions, labeling 5

Safety precautions 5

Scope of supplies 10

Serial number 15

Settings 15

Signal conditioning 14

Signal conditioning cable 11

Standards and guidelines 19

**T**

Technical data 19

TEDS 16

Test lab, accredited 12, 20

Type check, information about the 20

**U**

Use, correct 6

**V**

Voltage reduction 14

**W**

Waste Electrical and Electronic Equipment - WEEE 8

WEEE return system 9