HV AD CAN TBM Series

User Guide

Version 02.00

Innovative Measurement and Data Technology

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Trademarks

Product disposal/recycling

If this symbol (crossed-out wheeled bin) appears on the device, this means that the European Directive 2012/19/EU applies to this device.

The correct disposal of old equipment will protect the environment and people from possible negative consequences.

Become familiar with local regulations for separate collection of electrical and electronic equipment.

Follow local regulations and do not dispose of old equipment with household waste.

Contact information

CSM offers support for its products over the entire product life cycle. Updates for the individual components (e.g. documentation, configuration software and firmware) are made available on the CSM website. To keep up to date, it is therefore recommended that you check the download area of the CSM website for updates at least once a month.

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Contents

1 Introduction

1.1 About this user guide

This user guide contains important information for handling the product. Please read the entire document carefully before installation and initial operation.

1.2 Symbols and writing conventions

Symbol/note	Meaning	Example of application
☞	User instruction	☞ Click on **OK** to confirm the entry.
⇨	Result of an action	⇨ The following dialog opens:
→	Cross reference to further information	→ *See chapter 1.6 "Warranty and exclusion of warranty".*
	This pictogram indicates important hints or additional information on a specific topic.	
Options | Interface	**Menu selection** Menu options, options and buttons are highlighted in bold. The vertical bar "|" separates the menu from the menu command. The example to the right means: Click on the **Options** menu and select **Interface.**	☞ Select **Options | Interface.**
(→ **Options | Interface**)	A menu option integrated into the text.	The CAN interface is selected via the **Interface** dialog (→ **Options | Interface**).
(→ **Ctrl + I**)	**Shortcut** Key shortcuts are highlighted in bold and are mentioned in addition to the menu option, if applicable. The example to the right means: As an alternative to the menu selection, the option can also be called up by using the key sequence **Ctrl + I.**	☞ Select **Options | Interface** (→ **Ctrl + I**).

Tab. 1-1: Symbols and writing conventions

1.3 Warning

A warning indicates specifically or potentially dangerous situations. Failure to follow a warning could result in injury or death to persons and/or damage to property.

This guide contains warnings that the user must observe to ensure safe operation and to prevent injury to persons and damage to property.

Warning design

A warning sign consists of the following components:

- Warning symbol
- Signal word
- Source/type of hazard
- Possible consequences of non-compliance
- Measures to avert the hazard

Warning symbols

Symbol	Meaning
	General risk This symbol indicates a general hazard.
	High voltage! This symbol indicates a risk due to hazardous electrical voltage.
	Hot surface! This symbol indicates a possible risk of burns from hot surfaces.

Tab. 1-2: Warning signs

Signal words

In this user guide, warnings containing the following signal words are applied:

Signal word	Meaning
WARNING	... indicates a potential hazard. Failure to follow this warning may result in serious injury, or possibly death.
CAUTION	... indicates a potential hazard. Failure to follow this warning may result in minor injuries.

Tab. 1-3: Signal words

If there are several potential hazards from one source, the warning (signal word/symbol) which indicates the greater potential hazard is used. For example, a warning of serious injury or life-threatening hazard will also indicate the potential risk of property damage.

1.4 Directive

A directive contains important information about the product described in the guide. Failure to observe a directive may result in malfunction and/or damage to property and material. A directive is indicated by the blue symbol and the signal word **NOTE**.

Example

NOTE!	
	This symbol indicates important information. Failure to observe this information can impair the function or result in damage to the module. ☞ Read the information carefully.

Symbols

Symbol	Meaning
	This symbol indicates important information. Failure to observe this information can impair the function or result in damage to the measurement module.
	Wear suitable safety gloves.
	Disconnect the device before starting to work.

Tab. 1-4: Symbols used in mandatory signs

1.5 Legal disclaimer

This guide and other documents are part of the product and contain important information for its safe and efficient use. To maintain the high quality level the product is continuously being developed, which may result in the product's technical details changing at short notice. As a result, the contents of this documentation may differ from the technical specifications of the product. No claims against the manufacturer can therefore be derived from the contents of the product documentation.

CSM GmbH is not liable for technical or editorial errors or missing information.

CSM GmbH assumes no liability for damage resulting from improper use of the product and/or non-observance of the product documentation, in particular the safety instructions.

→ *See chapter 2 "Safety Instructions".*

1.6 Warranty and exclusion of warranty

The warranty covers the safety and functionality of the product within the warranty period. Excluded from the warranty are claims based on possible consequential damages caused by malfunction or non-function of the product.

The warranty shall become invalid if:

- the product is handled improperly,
- prescribed maintenance intervals are not observed,
- the product is modified by the end-user,
- the user does not observe the safety instructions and the product documentation,
- the product is operated with accessories or parts which are not explicitly approved for operation by the manufacturer of the product.

→ *See chapter 2 "Safety Instructions".*

1.7 ESD Information

The manufacturer of the product declares that HV AD CAN TBM Series modules comply with the requirements of EU Directive 2014/30/EU.

NOTE!	
	Special care should be taken regarding electrostatic discharge (ESD). ☞ Make sure that no electrostatic discharge occurs through the inner contacts of the inputs. ☞ Avoid electrostatic discharge when handling or mounting modules.

1.8 List of abbreviations

The following abbreviations are used in the user guide:

Abbreviation	Meaning
ADMM / AD-TBM	Measurement modules for the acquisition of analog voltages: - **AD** **M**ini**M**odule: measurement module in MiniModule housing - **AD**-**T**est **B**ench **M**odule: measurement module in 19'' housing
CAN	**C**ontroller **A**rea **N**etwork Serial bus system, developed by Bosch for networking ECUs in vehicles
DAQ	**D**ata **A**c**Q**uistion, e. g. DAQ software
ESD	**E**lectro**S**tatic **D**ischarge
HV	**H**igh**V**oltage
MC Tool	**M**easurement & **C**alibration Tool

Tab. 1-5: List of abbreviations

2 Safety Instructions

This chapter contains important safety information. Please read the following sections carefully.

2.1 General Safety Instructions

The manufacturer complies with all applicable safety standards during the development and production of HV AD CAN TBM Series measurement modules. Nevertheless the risk to the life of users and of property damage cannot be excluded.

WARNING!	
	HV AD CAN TBM Series measurement modules are used in high-voltage applications. **Improper use can be life-threatening due to high voltage.** ☞ Make sure that this work is only carried out by qualified and trained personnel. ☞ Observe safety instructions.

WARNING!	
	The behavior of the CAN bus can be influenced by connecting a CAN bus measurement module to an existing CAN bus system. **Improper handling of a CAN bus system may endanger life or cause damage to property.** ☞ Always connect CAN bus measurement modules to a separate CAN bus system (measurement bus). ☞ Ensure that this work is only carried out by qualified and trained personnel.

CAUTION!		
	The surface of the measurement module can become very hot if it is operated in specific operating environments (e.g. engine compartment). **Touching the surface can cause severe burns.** ☞ Let the measurement module cool down before handling. ☞ Wear suitable safety gloves if necessary.	

NOTE!	
	HV AD CAN TBM Series measurement modules comply with the safety standard EN 61010-1:2010. All input channels are insulted against each other as well as against supply voltage and CAN signals. Power supply is galvanically insulated against CAN. This functional insulation is designed for 30 V DC. ☞ Before connecting any cable, make sure that the applied signals (power supply and thermocouples) are within the allowed voltage ranges. → *See "HV AD CAN TBM Series" datasheets.*

NOTE!

The M6 threaded mounting hole in the top side of the housing (protective bracket) is designed to connect the device to the vehicle chassis or to protective ground in a laboratory, if necessary.

☞ Don't use the M6 threaded mounting hole for any other purpose, e.g. for mounting the device.

NOTE!

The isolation barrier can be damaged due to aging, overvoltage, bipolar voltage, high temperature and mechanical wear! In order to assure the proper functioning and the electrical safety of the measuring module, periodical tests of the reinforced insulation every 12 months are required! If there is reason to assume that the isolation might be defective, a test should be carried out immediately before putting the device in operation again.

☞ Make sure that a high-voltage isolation test according to EN 61010-1:2010 is carried out at least every 12 months.

☞ If there is reason to assume that the isolation barrier is defective, a HV isolation test needs to be carried out immediately.

NOTE!

Differences in the potential between the measurement module (= shielding of the interface cable) and the mounting position can falsify measurement results or destroy the measurement module.

☞ Ensure that there are no differences in potential during installation.

☞ If necessary, isolate the measurement module from the mounting position.

NOTE!

Trouble-free operation and electrical safety can only be ensured if the measurement module is correctly installed.

☞ Make sure that the measurement module is correctly installed.

☞ Operate the device only within the specified operating environment.

→ *See "HV AD CAN TBM Series" datasheets.*

2.2 Obligations of the operator

- The operator must ensure that only qualified and authorized personnel are entrusted with handling the product. This applies to assembly, installation and operation.
- In addition to the product's technical documentation, the operator may also have to provide operating instructions in accordance with the Occupational Safety and Health Act and the Ordinance on the Use of Working Materials.

2.3 Intended use

- HV AD CAN TBM Series measurement modules have been designed for measuring analog voltages in high-voltage environments.
- These modules may only be used for the above-mentioned purpose and under the operating conditions stated in the technical specifications.

  → *See "HV AD CAN TBM Series" datasheets.*
- Operational safety can only be ensured if the module is is operated in accordance with its intended use.
- Compliance with the intended use also includes that this user guide must be carefully read and the instructions contained must be observed.
- Inspection and repair work must only be carried out by CSM.
- The operator is solely responsible if the measurement module is used in a way that does not comply with its intended use.

3 Product Description

The following paragraphs contain general information on the product. Specific technical information can be found in the datasheets.

→ *See "HV AD CAN TBM Series" datasheets.*

HV AD CAN TBM Series measurement modules are robust and compact CAN-based devices for analog voltage measurements in high-voltage environments. In combination with special cables, the HV AD4 IF20 allows universal sensors which are normally applied in low-voltage applications to be safely operated in a high-voltage environment. Designed as 19" slide-in modules, all versions are ideally suited for the use in test benches. These measurement modules cover a wide range of application for the acquisition of analog signals (voltage, humidity, pressure, flow, etc.).

The following versions are avaialble:

Type	HV AD4 IF20	HV AD-TBM 8LI	HV AD4 XW20
			
Analog inputs	4	8	4
Measurement range	up to ±20 V	up to ±90 V	up to ±1,000 V
Sensor excitation	Galvanically isolated, adjustable per channel	—	—
Measurement data rate	max. 20 kHz		
Protection class	IP65		
Operating temperature	-40 °C to +85 °C		

Tab. 3-1: Basic technical data

3.1 Connectors and components

The following figures display the module versions HV AD4 IF20 and HV AD8 OW20.[1]
HV AD4 XW20 is equipped with only one multi connector ③ and four measurement channel LEDs ⑥. Otherwise it is identical to the HV AD8 OW20.

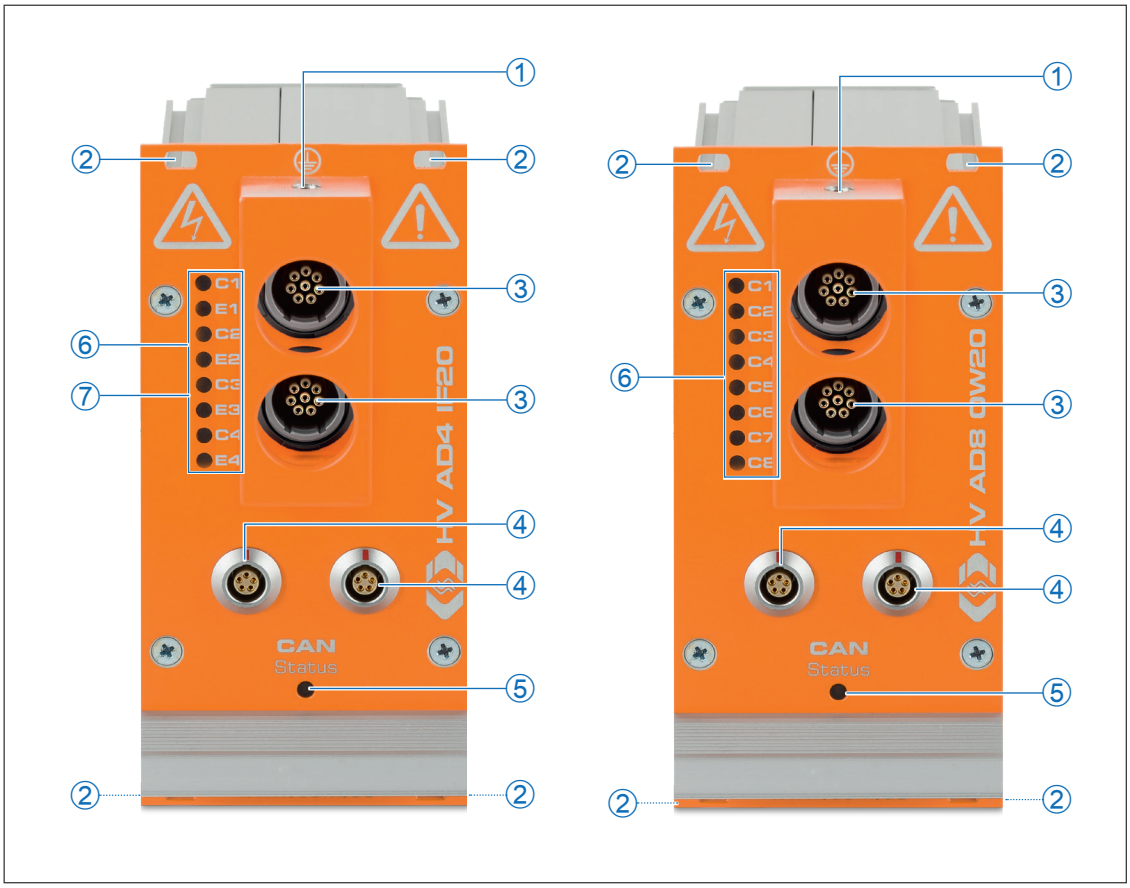


Fig. 3-1: HV AD4 IF20 (left) and HV AD8 OW20 (right)

1. M6 threaded hole for ground connection (→ *chapter 4.3.2.3 "Ground connection"*)
2. Mounting holes
3. 8-pin multi-connector LEMO Redel 2P (→ *chapter 4.3.2.2 "8-pin multi connectors LEMO Redel"*)
4. CAN/power supply connectors (→ *chapter 4.3.2.1 "CAN sockets"*)
5. CAN bus LED indicator (→ *chapter 3.2.1 "CAN bus LED indicator"*)
6. Measurement channel LED indicators (HV AD4 IF20 : C1 - C4, HV AD8 OW20: C1 - C8) (→ *chapter 3.2.2 "Measurement channel LED indicators"*)
7. Sensor excitation LED indicators E1 - E4 (HV AD4 IF20 only) (→ *chapter 3.2.3 "Sensor excitation LED indicators"*)

1 The measurement inputs of the device in Fig. 3-1 are equipped with LEMO 0B, 5-pole sockets. There may be customer-specific solutions regarding the sockets. All further technical specification remain unaffected.

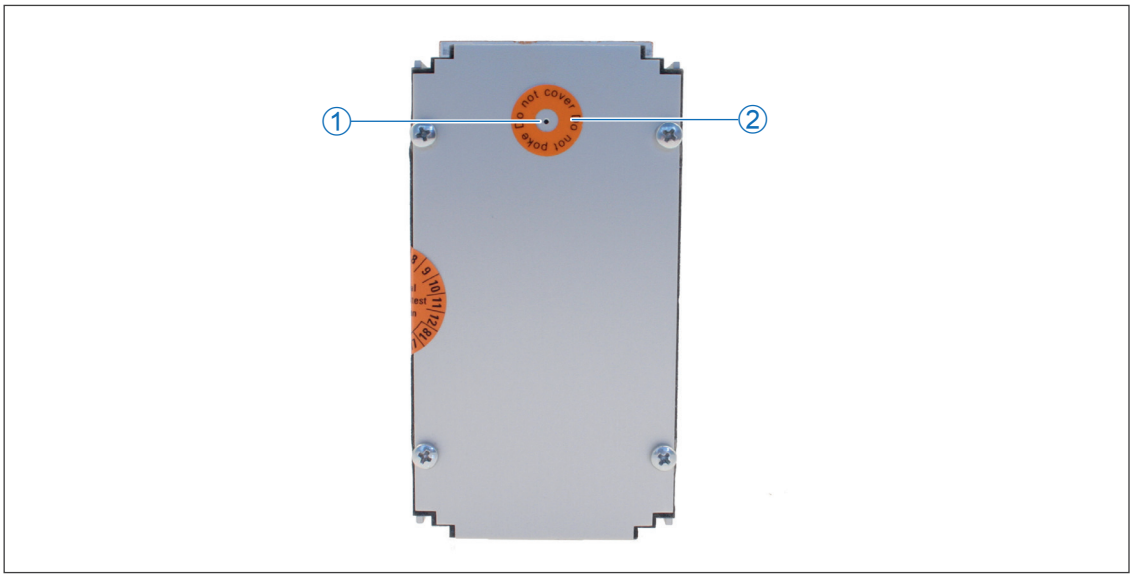


Fig. 3-2: HV AD CAN TBM: rear side of the housing

1. Ventilation inlet GORE™ membrane
2. "Do not poke – Do not cover" sticker

→ *See chapter 4.1 "Before mounting" for further information.*

3.2 Functional description of LED indicators

3.2.1 CAN bus LED indicator

The LED mounted between the CAN connectors (see Fig. 3-1) provides information on the measurement module's operating status.

LED		Meaning
Color	**Status**	
–	off	Measurement module not connected or power supply switched off
green	permanently lit	normal function
green	flashing	Measurement module has been selected via configuration software.
red	permanently lit	Measurement module is in idle mode, either because the configuration has stopped the data acquisition (no error) ore due to a CAN bus or a configuration problem.
red	flashing	Measurement module has been selected via configuration software and is in idle mode.
green/red	flashing	Firmware download in progress

Tab. 3-2: CAN bus LED indicator

3.2.2 Measurement channel LED indicators

The channel LEDs provide information on the status of the corresponding channel.

LED	Meaning	Error code in measurement software
50 % green 50 % off	Channel has been selected via configuration software	
50 % red 50 % off	Deactivated channel has been selected via configuration software	
off	Normal measurement function	
80 % red 20 % off	Measured value is out of the measurement range	INPUT_RANGE_UNDERFLOW or INPUT_RANGE_OVERFLOW
100 % red	Invalid measurement range	MEASUREMENT_RANGE_UNDERFLOW or MEASUREMENT_RANGE_OVERFLOW

Tab. 3-3: Channel LED indicators

3.2.3 Sensor excitation LED indicators

These LEDs provide information on the status of the sensor excitation (only HV AD4 IF20).

LED	Meaning
off	Sensor excitation switched off
100 % green	Sensor excitation switched on
100 % red	Overload: Power consumption exceeds the maximum value.

Tab. 3-4: Sensor excitation LED indicators

4 Mounting and Installation

To ensure fault-free operation and a long product life, please follow the instructions in the following sections.

4.1 Before mounting

HV AD CAN TBM Series measurement modules are provided with a GORE™ membrane. This membrane is needed to regulate pressure and humidity. To ensure proper operation of the device, never block, clog, or insert anything into the ventilation opening in the back of the housing (see Fig. 3-2). If this happens, condensate will accumulate inside the housing and damage the device.

	NOTE!
	The GORE™ membrane is required to regulate pressure and humidity. ☞ Do not block the ventilation inlet for the GORE™ membrane when mounting the device.

	NOTE!
	Trouble-free operation and electrical safety can only be ensured if the device is correctly installed. ☞ Ensure correct installation. ☞ Operate the measurement module exclusively within the specified operating environment. → *See "HV AD CAN TBM Series" datasheets.*

4.2 Mounting HV AD CAN TBM

	NOTE!
	Strong magnetic fields, such as those induced by permanent magnets, may impair the trouble-free operation of the measurement module. ☞ Never attach the device to a permanent magnet.

	NOTE!
	Making mechanical modifications to the housing, such as by drilling additional holes, can impair the function of the measurement module or destroy it. Additionally this would invalidate the warranty. ☞ Never drill additional holes in the housing.

Requirements

- The mounting location must provide sufficient space to plug and unplug the cables without clamping or pinching them.

Mounting the measurement module

☞ Fix the measurement module at the mounting position using the four screws.

4.3 Installing HV AD CAN TBM

4.3.1 Before installation

WARNING!	
	HV AD CAN TBM Series measurement modules are used in high-voltage applications. **Improper use can be life-threatening due to high voltage.** ☞ Make sure that this work is only carried out by qualified and trained personnel. ☞ Observe safety instructions.

WARNING!	
	Connecting CAN bus measurement modules to an existing CAN bus system may affect the CAN bus behavior. **Improper handling of a CAN bus system may endanger life or cause damage to property.** ☞ Always connect CAN bus measurement modules to a separate CAN bus system (measurement bus). ☞ Make sure that the work is only carried out by qualified and trained personnel.

In order to protect the user and in accordance with safety standard EN 61010-1:2010, the signal inputs of HV AD CAN TBM Series measurement modules feature reinforced insulation against each other as well as against CAN interfaces, power supply and housing.

NOTE!	
	CSM recommends the use of measurement cables with insulated sensors. ☞ Only use sensor cables that meet the requirements of the respective application, the device will be integrated into.

NOTE!	
	The isolation barrier can be damaged due to aging, overvoltage, high temperature and mechanical wear. ☞ If a damaged insulation barrier is suspected, contact CSM immediately and do not put the device into operation or continue using it.

	CSM offers a wide range of cables for connecting CAN measurement modules. → *See "CAN Accessories" datasheet.* For further details please contact our sales department.

	CSM offers maintenance and repair packages for CAN measurement modules. → *See chapter 6.2 "Maintenance services"*

4.3.2 Connectors

The CAN connectors embedded in the lower half of the front panel are used for both CAN signal communication and power supply. The interface cable connects the measurement module to the data acquisition system (PC) and to the power supply. The multi connectors in the upper half of the front panel are designed for connecting the sensor cables to the measurement module. If required, the measurement modules can be connected to ground by using the M6 threaded mounting hole in the top side of the housing.

4.3.2.1 CAN sockets

The CAN sockets are connected in parallel so that the signals are always present at both sockets. Both sockets can be used for either **CAN IN** or **CAN OUT**. This enables simple cabling with only one cable between two measurement modules. At the end of the measurement chain, a CAN termination resistor is plugged into the open CAN socket.

	NOTE!
	Be particularly careful when connecting third-party devices to a measurement bus with HV AD CAN TBM Series measurement modules. ☞ Make sure that the configuration settings are compatible for all devices (same CAN bit rate, different CAN identifiers). ☞ Make sure that this work is only carried out by qualified and trained personnel.

	NOTE!
	The CAN sockets for CAN signals and power supply are connected in parallel and have identical pin assignments. The signal applied to a specific pin is therefore always available at both sockets ☞ Make sure that this work is only carried out by qualified and trained personnel.

CSM uses LEMO 0B sockets as standard for the CAN sockets. The following plug with plug insert is required for connecting a cable to this socket:

- **FGG.0B.305.CLA xxxxx** [4]

	Pin	Signal	Description
	1	Power +	Power supply, plus
	2	Power GND	Power supply, ground
	3	CAN_H	CAN high
	4	CAN_L	CAN low
	5	CAN_GND	CAN ground
	Housing	Shield	Cable shield

Tab. 4-1: Plug (front view) for CAN socket: pin assignment

	The default socket for this module applied by CSM is LEMO 0B. To have the device equipped with another type of socket, please contact CSM.

4 "xxxxx" is a placeholder. The actual designation depends on the diameter of the cable being used.

4.3.2.2 8-pin multi connectors LEMO Redel

Two sensors with sensor excitation (HV AD4 IF20) or four sensors without sensor excitation (HV AD8 OW20 und HV AD4 XW20) can be connected to an 8-pin multi connector.

LEMO 2P sockets are used as standard for the measurement inputs.

Two plugs with socket insert (female) are currently available for connecting a sensor cable to an HV AD CAN TBM measurement module:

- **CFC.H08.TLA.Cxxx** (code C for HV AD4 IF20)
- **CFB.H08.TLA.Cxxx** (code B for HV AD8 OW20)
- **CFD.H08.TLA.Cxxx** (code D for HV AD4 XW20)

In addition, an orange-colored bend relief is available for these plugs:

- **GMA.2B.xxx.DS** (orange for HV AD4 IF20 and HV AD8 OW20)
- **GMA.2B.xxx.DR** (red for HV AD4 XW20)

Pin assignment for two measurement channels and sensor excitation (HV AD4 IF20)

	Pin	Signal	Description
 Code C	1	$V1_{IN}$ +	Channel 1 measuring voltage, plus
	2	$V1_{IN}$ -	Channel 1 measuring voltage, minus
	3	$V1_{OUT}$ +	Channel 1 sensor excitation, plus
	4	$V1_{OUT}$ -	Channel 1 sensor excitation, minus
	5	$V2_{IN}$ +	Channel 2 measuring voltage, plus
	6	$V2_{IN}$ -	Channel 2 measuring voltage, minus
	7	$V2_{OUT}$ +	Channel 2 sensor excitation, plus
	8	$V2_{OUT}$ -	Channel 2 sensor excitation, minus

Tab. 4-2: Plug (front view) for socket with pin assignment for two measurement channels and sensor excitation

Pin assignment for four measurement channels (HV AD8 OW20 and HV AD4 XW20)

	Pin	Signal	Description	
 Code B (generic)	1	$V1_{IN}$ +	Channel 1 measuring voltage, plus	(K1 +)
	2	$V1_{IN}$ -	Channel 1 measuring voltage, minus	(K1 -)
	3	$V2_{IN}$ +	Channel 2 measuring voltage, plus	(K2 +)
	4	$V2_{IN}$ -	Channel 2 measuring voltage, minus	(K2 -)
	5	$V3_{IN}$ +	Channel 3 measuring voltage, plus	(K3 +)
	6	$V3_{IN}$ -	Channel 3 measuring voltage, minus	(K3 -)
	7	$V4_{IN}$ +	Channel 4 measuring voltage, plus	(K4 +)
	8	$V4_{IN}$ -	Channel 4 measuring voltage, minus	(K4 -)

Tab. 4-3: Plug (front view) for socket with pin assignment for four measurement channels

4.3.2.3 Ground connection

The housing of an HV AD CAN TBM Series measurement module can be connected to ground as an additional safety measure in order to have the device controlled by the leakage monitor. For this purpose, the measurement module is equipped with a threaded mounting hole in the top side of the protective bracket (see Fig. 3-1). This threaded mounting hole must only be used for this purpose.

	NOTE!
	The M6 threaded mounting hole is designed to connect the device housing to the vehicle chassis or to protective ground in a laboratory, if necessary. ☞ Do not use the M6 threaded mounting hole for any other purpose than connecting the device housing to ground.

Parts/material required

- suitable ground cable

  The cross section of the ground cable depends on the cross section of the measuring cable (multi-connector cable). For multi-connector cables with a total cross section of 2.5 mm²DIN VDE 0100-540 recommends ground cables with cross sections as follows:

  - insulated copper conductor: min. 2.5 mm²
  - non-insulated copper conductor: min. 4.0 mm²

  Measurement cables with two or four measurement channels can be connected to an HV AD CAN TBM. The following measurement cables are available:

Measurement module	Measure-ment cable	Cross section per cable	Total cross section (2 measurement cables)	required cross section for ground cable
HV AD4 IF20	K920-xxxx	0.65 mm²	1.30 mm²	isolated: 2.5 mm² non-isolated: 4.0 mm²
HV AD8 OW20	K900-xxxx	0.65 mm²	1.30 mm²	isolated: 2.5 mm² non-isolated: 4.0 mm²
	K901-xxxx			
	K902-xxxx			
HV AD4 XW20	K910-xxxx	0.65 mm²	—	isolated: 2.5 mm² non-isolated: 4.0 mm²
	K912-xxxx			

Tab. 4-4: Ground cable cross sections

- M6 x 10 mm screw (plus washer, if required)
- suitable tool (wrench, screwdriver, socket wrench, etc.)

Connecting the cable

☞ Insert the M6 screw and tighten it carefully to fix the ground cable at the housing.

4.3.2.4 Connecting the power supply

The power supply of an HV AD CAN TBM Series measurement module and any other measurement modules connected to it is achieved via the interface cable, which also connects the measurement module to the PC/data acquisition system.

The measurement modules are designed for low power consumption. In combination with the connection cables from CSM, these modules can in most cases be easily installed. However, in order to ensure trouble-free operation, consider the following when selecting the appropriate power supply.

Minimum power supply voltage

The minimum power supply voltage is the minimum voltage delivered by a power supply. For automotive applications, this is usually the vehicle's on-board power supply voltage (e.g. 12 V for cars). Note that this minimum value is required for proper operation of the module. For example, with a 12 V vehicle electrical system this value may drop below the minimum value specified for a measurement module for a short time (a few milliseconds) when starting the engine.

When operating these measurement modules, always ensure that the voltage applied to the last measurement module in a power supply chain does not drop below the minimum value of 6 V.

Cable lengths

The resistance of the connection cables causes a voltage drop in the cable. The extent of the voltage drop depends on the length of the cable and the current flowing through it. The voltage at the last measurement module in a supply chain must be within the specified voltage range (min. 6 V).

i	For typical applications, CSM recommends the following installation: Supply voltage ≥ 12 V, total cable length ≤ 10 m: →up to 8 devices per power supply Supply voltage ≥ 8 V, total cable length ≤ 10 m: →up to 5 devices per power supply

	NOTE!
	If more measurement modules are linked and the same cable length and supply voltage are applied, an additional intermediate power supply is required. An intermediate power supply is also needed if, due to correspondingly higher power consumption of individual measurement modules, more current is required than the already available power supply can provide.

i	For further technical information concerning the daisy-chaining of measurement modules, please contact our sales department.

Information on available cables can be found in the datasheet.

→ *See "CAN Accessories" datasheet.*

5 Using HV AD CAN TBM

5.1 Application example

Fig. 5-1 shows a series connection consisting of four HV AD CAN TBM Series measurement modules, a power supply, a CAN interface and a computer with the software required for CAN data acquisition and configuration, as well as the connection cables.

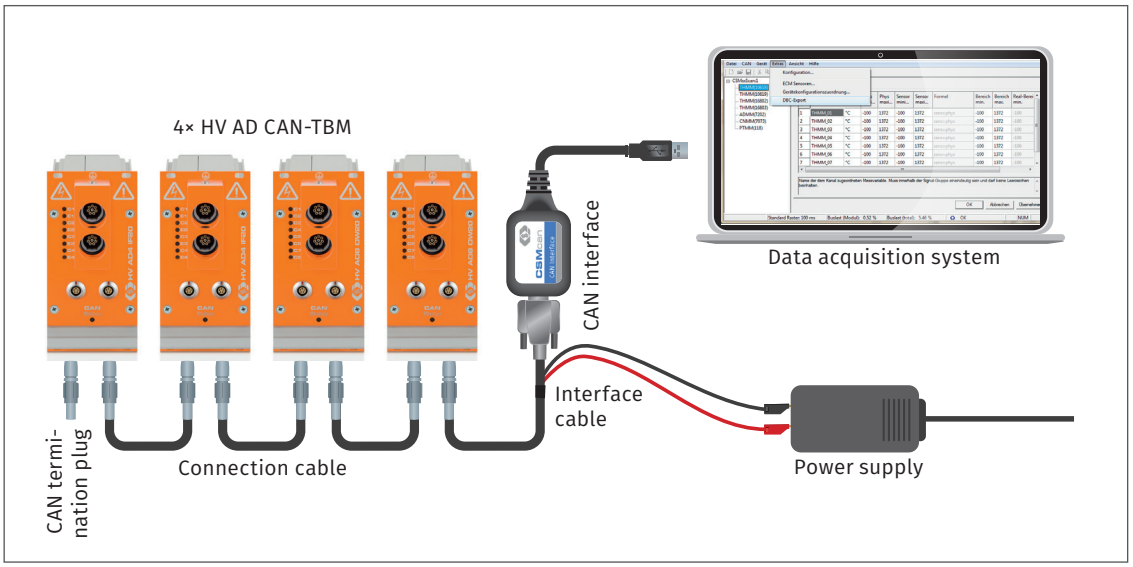


Fig. 5-1: Measurement setup with four HV AD CAN TBM

The installation consists of the following components:

- 4 HV AD CAN TBM
- 1 power supply
- 1 data acquisition system (computer) with CSMconfig configuration software
- 1 interface cable with connector for power supply
- 3 connecting cables
- 1 CAN termination plug
- 1 CAN interface

Connecting the components

☞ Connect the interface cable to the first measurement module.
☞ Daisy-chain the measurement modules with the connection cables.
☞ Plug the CAN termination plug into the free CAN socket of the last measurement module.
☞ Connect the CAN interface to the computer.
☞ Connect the other end of the interface cable to the computer via the CAN interface.
☞ Connect the banana plugs of the interface cable to the power supply.

5.2 CSMconfig user interface

The CSMconfig user interface consists of the following sections:

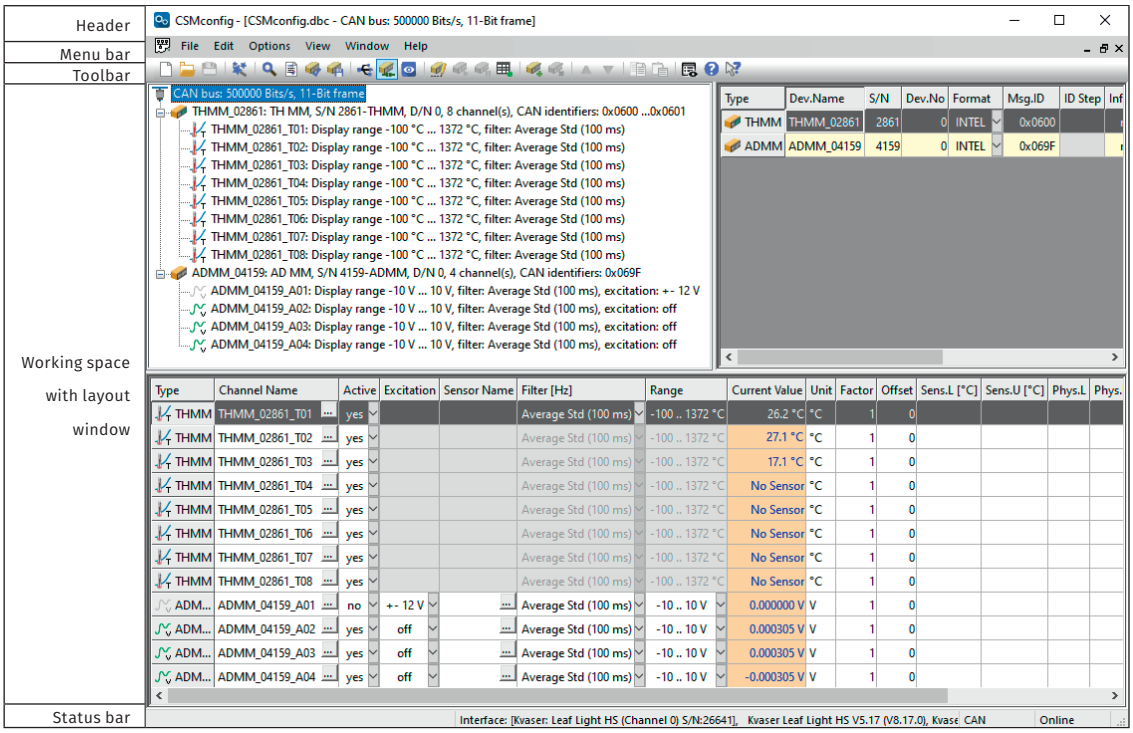


Fig. 5-2: CSMconfig user interface

5.2.1 Header

Clicking the program icon on the left opens the program menu.

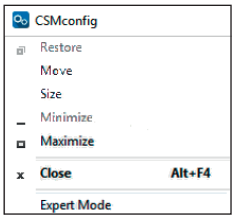


Fig. 5-3: Program menu

In addition to the functions for modifying the position and resizing of the program window, it also contains the option **Expert Mode**.

→ *See CSMconfig online help for further information on the Expert Mode.*

5.2.2 Menu bar

The commands are arranged in the following menus:

Fig. 5-4: Menu bar

→ *See CSMconfig online help for further information on the menu commands.*

5.2.3 Toolbar

The toolbar contains the most frequently used menu commands. A command is executed by clicking on the corresponding icon.

Fig. 5-5: Toolbar

→ *See CSMconfig online help for further information on the toolbar commands.*

5.2.4 Working space

The configuration data is stored in a configuration document. Depending on the bus system, the configuration document is either saved as a DBC file (CAN) or an A2L file (XCP-Gateway/ECAT).

→ *See CSMconfig online help for further information on the configuration documents.*

CSMconfig provides various configuration views to create or process a configuration document:

- **Tree view**
- **Device list**
- **Channel list**

These views are integrated in a higher-level window, the layout window. The **Select view layout** dialog offers a number of layouts with different combinations of configuration views.

☞ Select **Window** | **Select view layout**.

⇨ The **Select view layout** dialog opens.

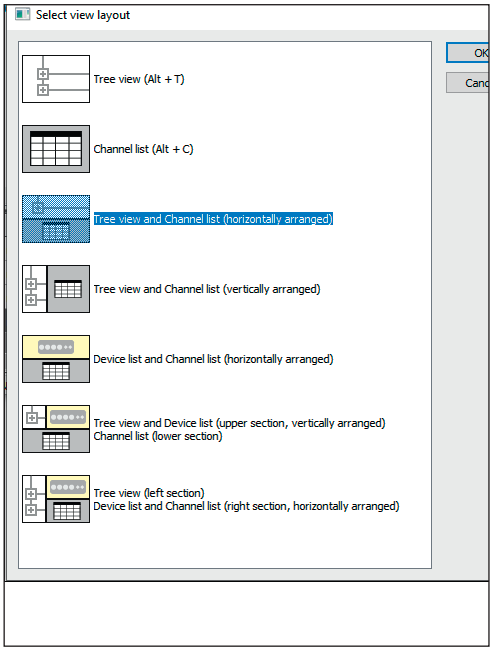


Fig. 5-6: **Select view layout** dialog

☞ Select the matching layout and confirm your choice by clicking on **OK**.

→ *See CSMconfig online help, section "Configuration views and layout window" for further information.*

5.2.5 Status bar

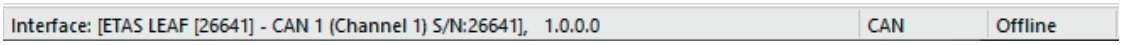


Fig. 5-7: Status bar

The status bar provides the following information:

- The interface currently connected to the PC or the message “No valid interface selected”
- The bus system of the active configuration.
- The configuration status: "Online" or "Offline"

5.3 HV AD CAN TBM Series configuration

The CSMconfig software is used for the configuration of HV AD CAN TBM Series measurement modules.

	NOTE!
	We recommend always using the latest version of CSMconfig. Old versions may not support all module variants and functions. The most recent version of CSMconfig can be found in the download area of the CSM website. → *See: https://s.csm.de/en-cfg* Starting with version 8.8.0, CSMconfig also checks at each startup whether a new program version is available.

The following sections contain information on the following topics:

- HV AD CAN TBM Series settings
- Creating a standard CAN configuration in CSMconfig

In CSMconfig, configurations can be created both *online* and *offline*.

Online configuration

- The measurement modules are linked to the configuration software.
- A configuration can be transferred to a single or to all measurement modules of a measurement chain in CSMconfig immediately after completion.

Offline configuration

- There is no connection between configuration software and measurement chain. The configuration document is created "offline", which means without connection to the measurement chain.
- The configuration is transferred to the measurement chain at a later time:
  - via CSMconfig, after an online connection to the measurement chain has been established
  - by transferring the configuration document to the measurement application on-site

Configuration views

The user can choose from three different views (windows) for configuration: **Tree view**, **Device list** or **Channel list**. As of program version 8.12 these configuration views are integrated in a higher-level window to form configuration layouts.

→ *See chapter 5.2.4 "Working space" for further information.*

The following sections contain the basic steps for a configuration using the **Tree view** window.

5.3.1 Dialogs and windows

	Which views are displayed during configuration depends on the configuration layout specified in the **Select view layout** dialog.

Example

If a new configuration file is created (→ **File** | **New**), the **Select document type** dialog is displayed by default. Select the file type required for the configuration here. Use document type **CAN only (DBC)** for measurement applications using CAN measurement modules.

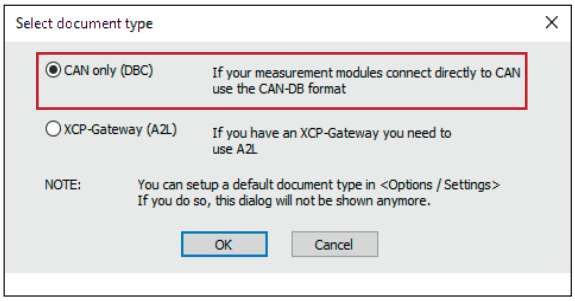


Fig. 5-8: **Select document type** dialog, **CAN only (DBC)** selected

The settings used to create a new configuration file can also be changed in the **Program Settings** dialog (→ **Options** | **Settings**). The **Default document type** menu provides the following options:

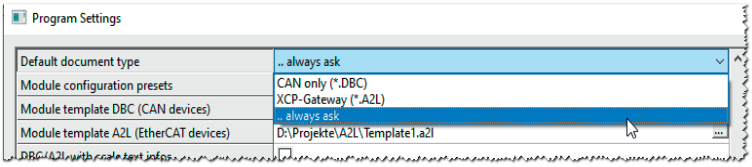


Fig. 5-9: **Program Settings** dialog, options for **Default document type**

- **... always ask** (default): The **Select document type** dialog is used.
- **CAN only (*.DBC)**: Each time a new configuration file is created, the file type **DBC** will be used.
- **XCP-Gateway (*.A2L)**: Each time a new configuration file is created, the file type **A2L** will be used.

→ *See CSMconfig online help for further information.*

5.3.2 Offline configuration

The following sections describe the steps for configuration in **offline mode**. The configuration data is stored in a DBC file when configuring CAN measurement modules offline. This configuration file can be transferred to a measurement module at a later time or made available for further use in other tools such as vMeasure CSM, CANape® or INCA.

☞ Start CSMconfig.

⇨ The CSMconfig program window opens.

☞ Select **File | New (→ Ctrl + N).**

⇨ The **Select document type** dialog (Fig. 5-8) opens.

☞ For configurations with CAN measurement modules, select the **CAN only (*.DBC)** option and confirm selection with **OK**.

⇨ The window displaying the **Tree view** opens (here **CSMconfig.dbc**).

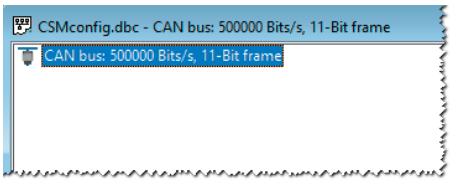


Fig. 5-10: **CSMconfig.dbc** window, **Tree view**

☞ Move the mouse pointer to the window and right-click.

⇨ The context menu opens.

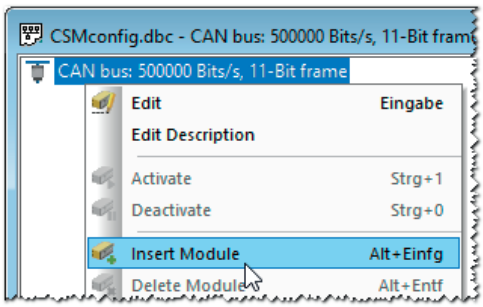


Fig. 5-11: **CSMconfig.dbc** window, **Tree view**, context menu

☞ Select **Insert (→ Insert).**

⇨ The **Select device type** dialog opens.

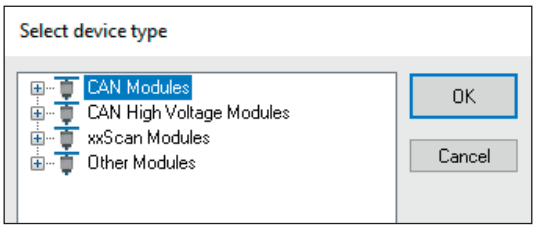


Fig. 5-12: **Select device type** dialog

	NOTE!
	This dialog is designed to select a module series (e.g. AD MM series or HV TH MM series) but not specific module variants (e.g. ADMM 8 pro or HV THMM 4). The options available in the dialogs for device and channel configuration correspond to the highest configuration level of a measurement module series. When transferring the configuration file to the measurement module, if some of the settings are not compatible, an error message appears indicating the incorrect setting (e.g. measurement data rate too high).

If the desired measurement module is not displayed in the selection window, click the ✚ symbol in front of the appropriate category.

⇨ The submenu opens.

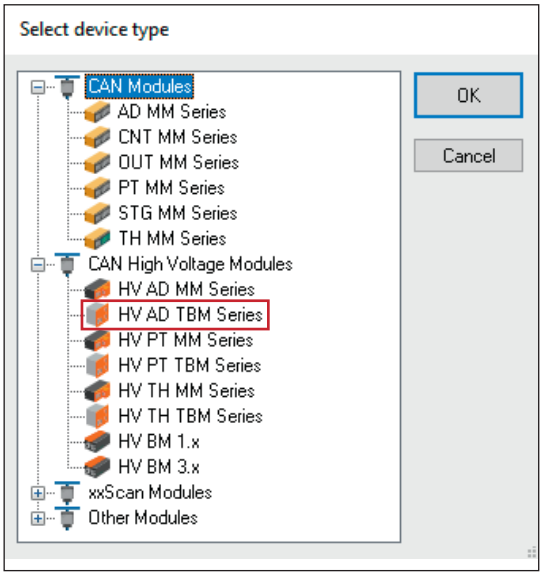


Fig. 5-13: **Select device type** dialog, subentries faded in

☞ Select the module series (e.g. **CAN High Voltage Modules** | **HV AD CAN TBM Series Series**) and
confirm selection with **OK**.

⇨ The **Device configuration dialog** is displayed.

⇨ The layout window **CSMconfig.dbc** appears in the background.

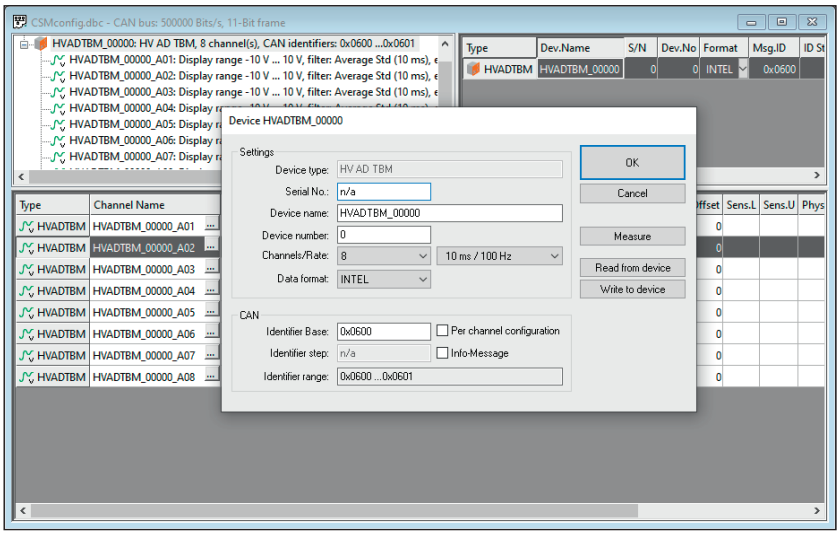


Fig. 5-14: **Device configuration dialog**, **CSMconfig.dbc** window in the background

Information on the configuration of measurement channels and the measurement module can be found in the online configuration section.

→ *See chapter 5.3.3.7 "Measurement channel settings" or chapter 5.3.3.8 "Device settings".*

When a connection to the measurement setup has been established, the configuration must still be transferred to the corresponding measurement module.

→ *See section "Transferring configuration data to the measurement module".*

5.3.3 Online configuration

5.3.3.1 Preparing configuration

☞ Before starting an online configuration, make sure that

- measurement module and computer are correctly connected via an appropriate CAN interface
- CSMconfig is installed on the computer.

5.3.3.2 Starting CSMconfig

☞ Start CSMconfig.

⇨ The program window opens (the previously loaded configuration may be displayed).

☞ If an interface is displayed in the status bar (Fig. 5-15), continue with chapter 5.3.3.4 "Creating a new configuration file".

Fig. 5-15: Status bar: CAN interface connected

☞ If no interface is displayed in the status bar (Fig. 5-16), continue with chapter 5.3.3.3 "Selecting a communication interface".

Fig. 5-16: Status bar: "No valid interface selected"

5.3.3.3 Selecting a communication interface

After program start, CSMconfig checks the communication interfaces for existing connections. These are listed in the **Interface** dialog.

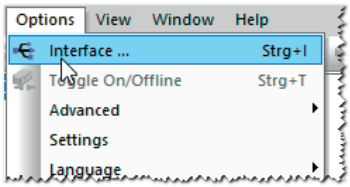


Fig. 5-17: **Options | Interface**

☞ Select **Options** | **Interface** (→ **Ctrl** + **I**).

⇨ The **Interface** dialog opens.

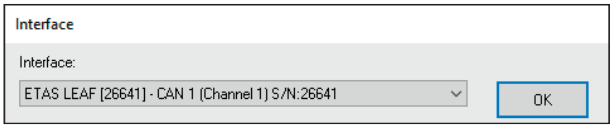


Fig. 5-18: **Interface** dialog

☞ If the required interface is not displayed, click on the arrow ▼ to the right.

⇨ The pull-down menu opens.

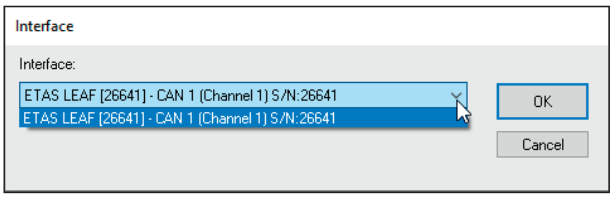


Fig. 5-19: **Interface** dialog, pull-down menu expanded

☞ Select the required interface.

☞ Click on **OK** to confirm the selection.

5.3.3.4 Creating a new configuration file

i	The procedure described in the following section is not required if the configuration is performed using the option **Auto-Configuration**.

→ *See chapter 5.3.3.6 "Scan Bus and Auto-Configuration".*

☞ Select **File | New (→ Ctrl + N).**

⇨ The **Select document type** dialog (Fig. 5-8) opens.

☞ For configurations via CAN interface, select the **CAN only (DBC)** option and confirm by clicking **OK.**

⇨ The **CSMconfig.dbc** window opens.

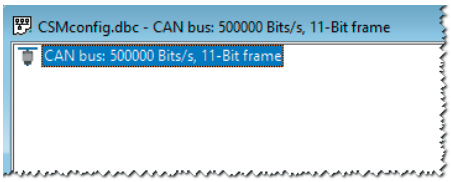


Fig. 5-20: **CSMconfig.dbc** window, **Tree view**

5.3.3.5 CAN parameter settings

i	There is usually no need to adjust the CAN parameter settings manually if a new DBC file was created via **Auto-Configuration** or **Scan Bus**.

→ *See chapter 5.3.3.6 "Scan Bus and Auto-Configuration".*

A change of the CAN parameters may be necessary, for example, if

- high-speed measurement modules with higher measurement data rates (e.g. ADMM pro HS) are used in the application.
- data acquisition software requiring other CAN parameters is used.

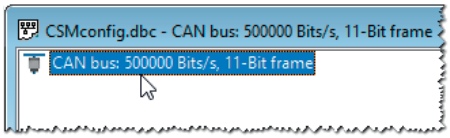


Fig. 5-21: **CSMconfig.dbc** window, **Tree view**, setting CAN Parameters

☞ Double-click on the CAN bus entry using the left mouse button.

or

☞ Mark the CAN bus entry and press the **Enter** key.

⇨ The **CAN Bus** dialog opens.

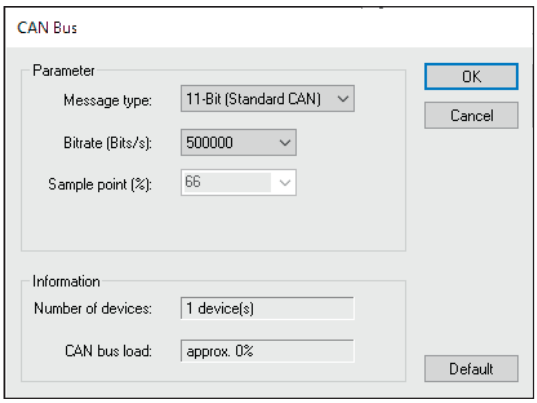


Fig. 5-22: **CAN Bus** dialog

Select the required setting and click **OK** to close the dialog.

→ *See CSMconfig online help for further information.*

If the process was successful, the following message appears:

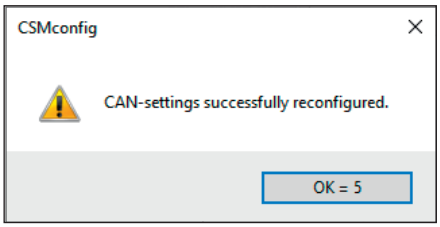


Fig. 5-23: Message "CAN settings successfully reconfigured"

☞ Click **OK** to close the window.

5.3.3.6 Scan Bus and Auto-Configuration

Check which measurement modules are connected to the bus. You can do this by using the commands **Scan Bus** and **Auto-Configuration**.

Measurement modules connected to the bus can be identified and the stored configurations can be read out using both functions. In addition to pure module recognition, **Auto-Configuration** can also resolve any existing conflicts (e.g. CAN-ID conflicts or conflicts during name assignment). **Auto-Configuration** applies only at module level, the channels themselves must be set individually.

	To create an initial configuration with multiple new **CAN measurement modules**, CSM recommends using **Auto-Configuration** because all new measurement modules are set to the same CAN ID.

Running Scan Bus

Scan Bus searches the bus for connected measurement modules. The configuration data is collected in order to be finally saved in a configuration document.

	NOTE!
	A new configuration document must be created in order to perform **Scan Bus**. ☞ Select **File | New (→ Ctrl + N).**

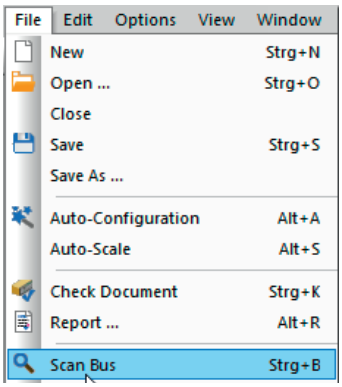


Fig. 5-24: **File | Scan Bus**

☞ Select **File | Scan Bus (→ Ctrl + B).**

⇨ The bus is checked for connected measurement modules.

⇨ Detected measurement modules are listed below the bus level.

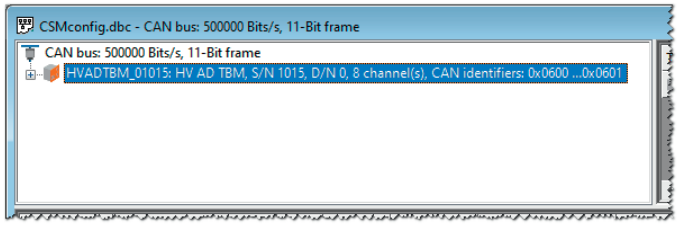


Fig. 5-25: **CSMconfig.dbc** window, **Tree view**, detected measurement module(s)

Running Auto-Configuration

Siminlar to **Scan Bus**, the **Auto-Configuration** function checks the bus for connected measurement modules. **Auto-Configuration** additionally provides the means to detect and resolve, possible conflicts (e.g. CAN-ID conflicts or conflicts during naming).

If **Auto-Configuration** is used, a configuration file will be automatically created, which means there is no need to create a new configuration file manually beforehand. Upon process completion, the new configuration file needs to be named accordingly and stored in the required folder.

→ *See chapter 5.3.3.9 "Saving a configuration".*

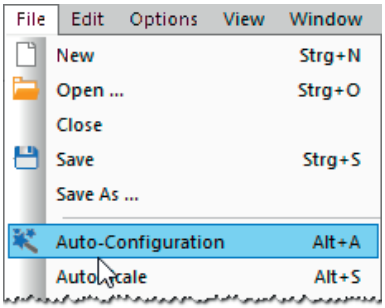


Fig. 5-26: **File | Auto-Configuration**

☞ Select **File** | **Auto-Configuration** (→ **Alt** + **A**).

⇨ The bus is checked for existing measurement modules and any conflicts.

⇨ The **AutoConfig** window opens.

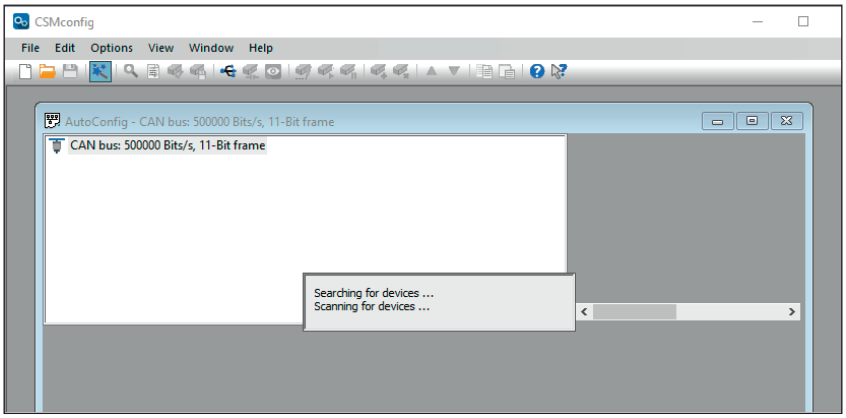


Fig. 5-27: **AutoConfig** window: "Searching for devices..."

⇨ **Auto-Configuration** is executed, the message "Searching for devices..." is displayed.

⇨ When the process is complete, the following windows are displayed:

- The **AutoConfig** window displaying the connected measurement modules.

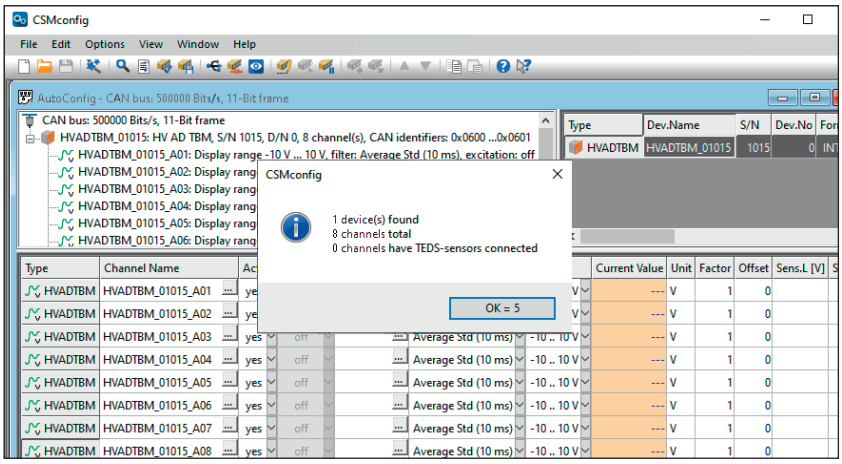


Fig. 5-28: **Auto-Configuration** is executed

- A message box is displayed indicating how many measurement modules, channels and, if applicable, TEDS sensors have been detected.

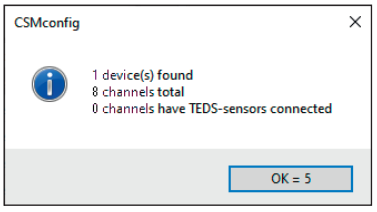


Fig. 5-29: Message box displayed upon the completion of **Auto-Configuration**

The **OK** button features an automatic counter counting from "5" to "0". The window closes automatically as soon as the counter has reached "0". The window can be closed immediately by clicking on **OK**.

→ *Information on how to save a configuration can be found in chapter 5.3.3.9 "Saving a configuration".*

5.3.3.7 Measurement channel settings

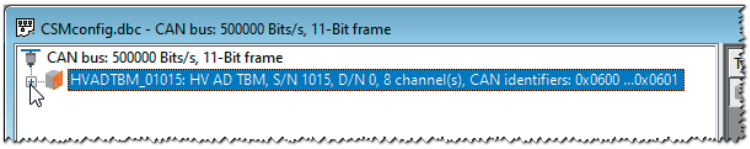


Fig. 5-30: **CSMconfig.dbc** window, **Tree view**, channel list faded out

☞ If the list of measurement channels is not displayed, click on the ✚ symbol to the left of the device entry to open the directory tree.

⇨ The list of measurement channels opens.

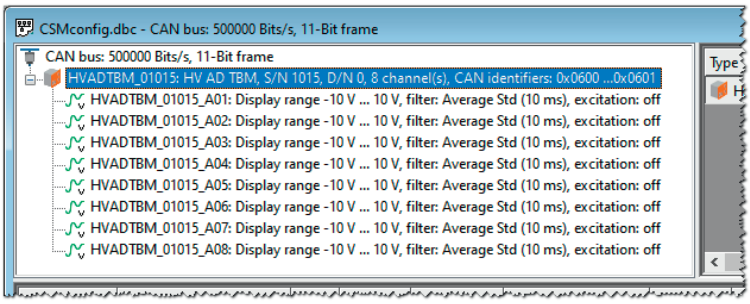


Fig. 5-31: **CSMconfig.dbc** window, **Tree view**, channel list faded in

☞ Double-click on the selected channel entry.

⇨ The **Channel configuration dialog** opens.

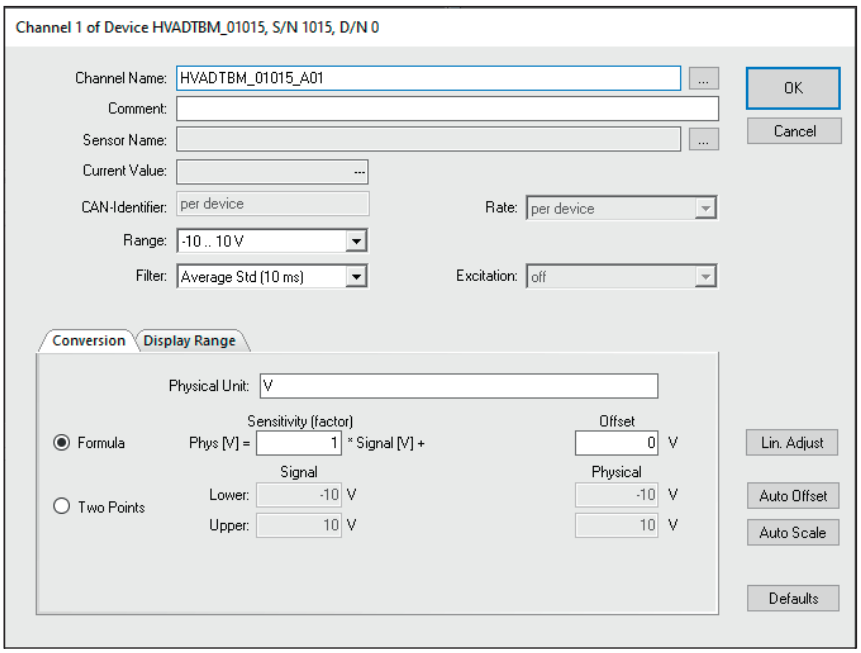


Fig. 5-32: **Channel configuration dialog** (HV AD CAN TBM Series)

☞ Select the required settings (see table "Channel configuration options HV AD CAN TBM Series").

☞ Click on **OK** to close the dialog.

☞ To configure further measurement channels, proceed as described above.

Channel configuration options HV AD CAN TBM Series

Field	Function
General settings	
Channel Name	Entry field for channel name. This name is stored in the DBC file and will be used by the DAQ software as identifier. Allowed characters: [a...z], [A...Z], [0...9] and [_] (max. 32 characters) It is possible to integrate a signal database in CSMconfig. The signal database is called up by clicking the … button. This database allows signal names (channel names) to be selected and assigned to the measurement channel. A comment may have been assigned to the signal name. If so, it will be displayed in the **Comment** field after the signal name has been selected. If the button is greyed-out, no signal database is available. → *See CSMconfig online help, section "Channel configuration dialog" for further information.*
Comment	Input field for additional text, e.g. channel-specific notes/comments; Any character may be used (max. 100 characters)
Sensor Name	The … button opens a dialog for selecting sensor definitions. By selecting a sensor definition, the corresponding parameters (calibration, sensor excitation, measurement range) will be applied to the configuration document. → *See CSMconfig online help, sections "Channel configuration dialog" and "Sensor database" for further information.*
Current Value	This filed indicates the current measured value of the channel.
CAN-Identifier	The channel-specific CAN identifier is defined with this option. This option is only available if the **Per channel configuration** option in the **Device configuration dialog** is enabled.
Rate	The channel-specific send rate is defined with this option. This option is only available if the **Per channel configuration** option in the **Device configuration dialog** is enabled.
Range	Pull-down menu for setting the measurement range: HV AD4 IF20: **±1, ±2, ±5, ±10, ±20 V** HV AD8 OW20: **±5, ±10, ±20, ±45, ±90 V** HV AD4 XW20: **±50, ±100, ±200, ±500, ±1.000 V.**
Filter	HV AD CAN TBM Series measurement modules have a switchable 6th order Butterworth filter. The options available in the pull-down menu depend on the sampling rate or measurement data rate. The recommended value for the filter frequency is displayed under **Std.** (e.g. **Std. (1500 Hz)**). The filter is deactivated with the option **SW-Filter off**. The value for the standard filter is adjusted accordingly when the measurement data rate is changed.
Excitation	Only module version HV AD4 IF20: The sensor excitation voltage can be set here, if applicable **10 V**, **12 V**, **15 V** and **off** option.
Buttons	
Auto-Offset	Calls up the **Auto-Offset** function of the **Auto-Scale** wizard.
Auto-Scale	Calls up the **Auto-Scale** function of the **Auto-Scale** wizard.
Defaults	Resets the settings in the dialog to the factory defaults. The content of specific fields, such as **Channel Name**, remain unchanged, however.

Field	Function
Conversion tab	
Using physical scaling, the measured values supplied by a sensor can be scaled into any measured variable using downstream DAQ software (e.g. vMeasure CSM, INCA or CANape®). CSMconfig offers the **Formula** (scaling as a linear function) and **Two Points** (scaling over two points) functions here.	
Physical Unit	Input field for the channel measurement unit. Allowed characters: [a...z], [A...Z], [0...9], [_] and [°] (max. 32 characters) The unit entered here is automatically displayed as measurement unit in the **Conversion** and **Display Range** tabs.
Formula	This function provides the means to create a formula for the conversion into another measured variable using the variables **Sensitivity (factor)** and **Offset**.
Sensitivity (factor)	Field for entering the scaling parameter
Offset	Field for entering the offset value
Two Points	The **Two Points** function converts sensor readings into another measured variable by defining two points on one axis.
Signal	Measured values supplied by the sensor
Lower	Lower sensor reading
Upper	Upper sensor reading
Physical	Scaled measured values in the measured variable set under **Physical Unit**.
Lower	Lower value to be defined by the user
Upper	Upper value to be defined by the user
Display Range Tab	
The default values for the measured value display can be defined in a downstream MC or DAQ tool here.	
Device	The lower and upper limit values of the scaled measurement range are displayed in the greyed-out fields.
Minimum	Display of the lower limit value of the scaled measurement range
Maximum	Display of the upper limit value of the scaled measurement range
User	These parameters are used to set the lower and upper limits for the display of the measured value range in the downstream MC or DAQ software. By default, the minimum value or maximum value of the measurement range, which is displayed under **Device**, is displayed here.
Minimum	Minimum value to be defined by the user and used in the MC or DAQ software.
Maximum	Maximum value to be defined by the user and used in the MC or DAQ software.

Tab. 5-1: Channel configuration options (HV AD CAN TBM Series)

5.3.3.8 Device settings

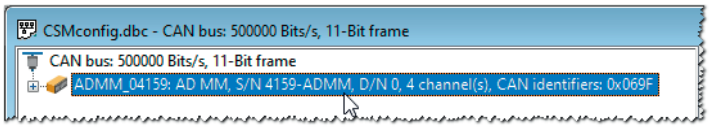


Fig. 5-33: **CSMconfig.dbc** window, **Tree view**, module selected

☞ Double-click on the device entry.

⇨ The **Device configuration dialog** is displayed.

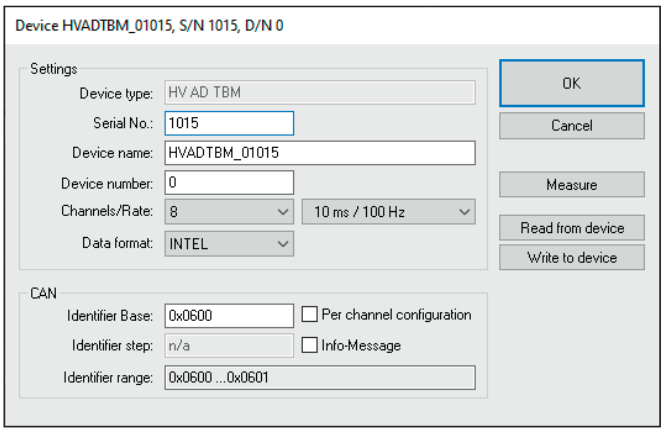


Fig. 5-34: **Device configuration dialog** (HV AD CAN TBM Series)

Settings section

After the completion of **Scan Bus** or **Auto Configuration** in an online configuration, the device type is displayed in the **Device type** field and the serial number is displayed in the **Serial No.** field.

In an offline configuration, the **Device type** is displayed as selected in the **Select device type** dialog (Fig. 5-12). The serial number of the measurement device for which the configuration is created must be entered manually in the **Serial No.** field.

A default name is displayed in the **Device name** field consisting of the name of the device type and the serial number. Alternatively, an individual, user-defined name can be entered.

The following conditions/limitations must be observed when assigning names:

- The maximum length of the name is 24 characters.
- Allowed characters: [a...z], [A...Z], [0...9] and [_].
- The name must start with a letter or [_].
- The name must be unique. It may only be used once per configuration (DBC file).

If the default name remains unchanged, it will be automatically modified as soon as the serial number is changed. The name entered in this field is also used as a component for the channel designation (see Fig. 5-34).

The **Device number** field is provided for entering a device number. It is not mandatory to use this number. This option is not available for ECAT modules, which is why the field is grayed out here.

The number of available measurement channels is specified in the **Channels** selection menu (left).

The value is "4" (HV AD4 IF20 and und HV AD4 XW20) or "8" (HV AD8 OW20), depending on the module version.

The selection menu **Rate** (right) is used to specify the measurement data rate valid for all measurement channels.

The selection menu **Data format** (right) provides two formats for the transmission of CAN messages (not available and greyed out for ECAT measurement modules):

- INTEL (LSB first, Little Endian)
- MOTOROLA (MSB first, Big Endian)

CAN section

This dialog section is only available for CAN measurement modules.

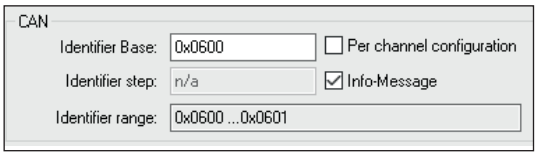


Fig. 5-35: **Device configuration dialog**, **CAN** section

The start identifier is displayed in the **Identifier base** field. The initial value displayed here depends on the settings made in the **Program Settings** dialog in section **CAN: Identifier base**. If required (e.g. in case of a CAN-ID conflict), this value can be modified accordingly.

For HV AD CAN TBM Series measurement modules, the **Identifier step** field has no function. The field is greyed out and the value "n/a" is displayed.

The range of the CAN identifiers used is displayed in the **Identifier range** field.

By default, CAN identifiers and transmission rate are specified per device. The option **Per channel configuration** enables CAN identifier and transmission rate to be set individually for each channel. If enabled, the pull-down menu **Rate** and the **Identifier base** field will be disabled. Both options can then be set for each channel in the **Channel Configuration Dialog**. A list of the measurement modules supporting this functionality can be found in the online help.

→ *See CSMconfig online help, section "Set CAN ID and Send Rate per Channel".*

Info Message provides the means to send signals with additional data in a separate message. These signals contain information on the device type, device status, software version, serial number and the internal temperature of the measurement module. If **Info Message** is enabled, another CAN identifier is required.

Example

If "4" has been set in the **Channels** pull-down menu (e.g. for an ADMM module), the **Identifier Range** consists of one CAN identifier (e. g. "`0x0600`"). If **Info-Message** is enabled in addition, another CAN identifier will be added to the Identifier range ("`0x0600` … `0x0601`") (Fig. 5-35).

i	Normally **info messages** cannot be sent if **Per channel configuration** is enabled. However, some modules provide the option to use **Info-Message** and **Per channel configuration** simultaneously if the required firmware is installed. A list of the measurement modules supporting this functionality can be found in the online help. → *See CSMconfig online help, section "Set CAN ID and Send Rate per Channel".*

Buttons

- **Read from device** reads the configuration from a measurement module. The firmware version and the hardware revision number are also taken into account.
- **Write to device** writes a configuration to a measurement module.

→ *See CSMconfig online help for further information.*

Transferring configuration data to the measurement module

Once the channels and measurement modules are configured, the data must still be transferred to the measurement module.

	NOTE!
	This step is required for both offline and online configurations.

☞ Click on the **Write to device** button.

⇨ The following safety prmessage is displayed:

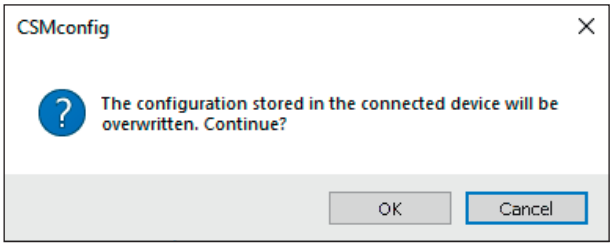


Fig. 5-36: Safety prompt before overwriting the old configuration

☞ Click on **OK** to save the configuration.

⇨ A message indicates the successful reconfiguration of the measurement module.

or

☞ Click on **Cancel** to keep the old configuration.

Check measured values

Finally, the **Measure** function in the **Device configuration dialog** provides the means to check the plausibility of measurements.

☞ Click on the **Measure** button (see Fig. 5-34).

⇨ The **Measurement Values** window opens.

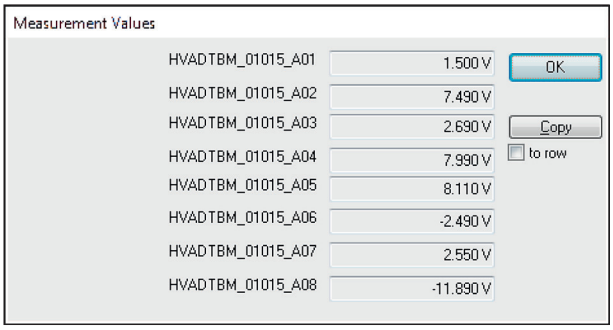


Fig. 5-37: **Measurement Values** window

☞ Click on **OK** to close the **Measurement Values** window.

☞ Click on **OK** to close the **Device configuration dialog**.

5.3.3.9 Saving a configuration

The configuration must finally be saved in a DBC file. The default path for storing configuration files refers to the CSMconfig installation directory. If user rights are restricted, the program prompts the user to save the file in the corresponding user directory.

Changing the path for file storage

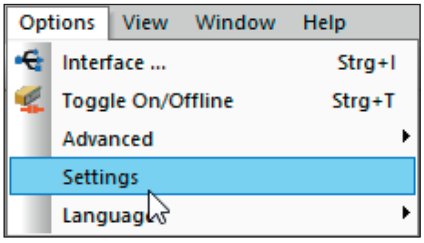


Fig. 5-38: **Options | Settings**

☞ Select **Options | Settings**.

⇨ The **Program Settings** dialog opens.

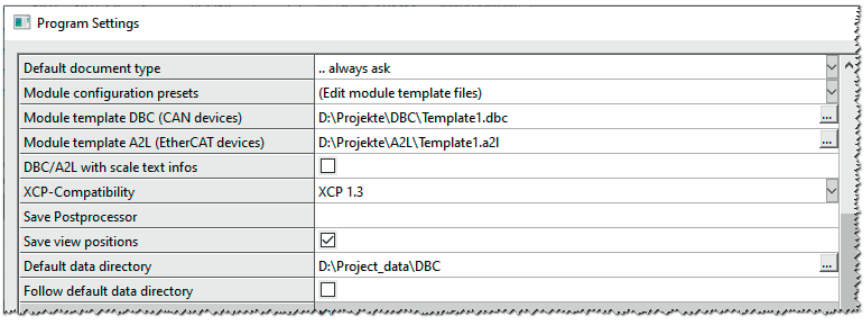


Fig. 5-39: **Program Settings** dialog, **Default data directory** option

☞ Enter the new path in the **Default data directory** field.

☞ Click on **OK** to close the **Program Settings** dialog.

ℹ	If the option **Follow default data directory** is enabled, CSMconfig always sets the path previously applied by the user for storing a DBC or A2L file in the **Default data directory** path.

Save DBC file

☞ Select **File | Save (→ Ctrl + S).**

⇨ The **Save as** dialog opens.

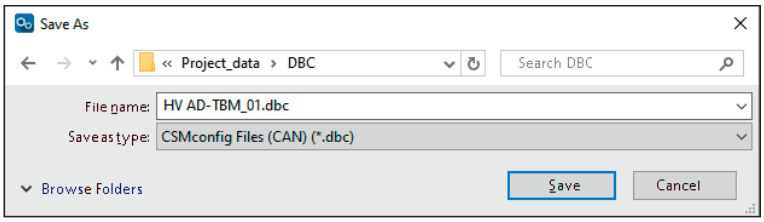


Fig. 5-40: **Save as** dialog

NOTE!

The **Save as** dialog only opens when a configuration file is saved for the first time with the **Save** menu command. For all further saving operations using **Save**, the existing configuration file is overwritten. If a configuration file is to be saved under a different name or in a different folder, the **Save as...** menu command must be used.

☞ Select a directory, enter the required name in the **File name** field and confirm with **Save**.

⇨ The configuration file with the file extension `*.dbc` is saved in the current folder.

⇨ The name of the newly created configuration file appears in the header of the **Tree View** window (here: HV AD CAN TBM Series_01.dbc).

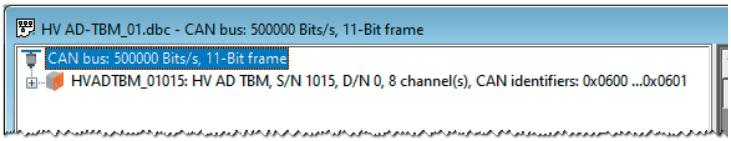
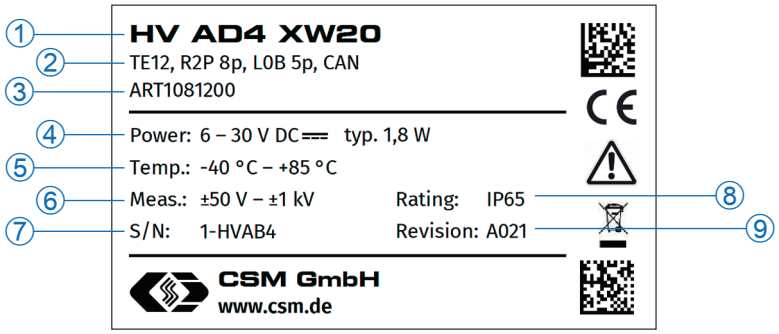


Fig. 5-41: New file name in header: **HV AD CAN TBM Series_01.dbc**

6 Maintenance and Cleaning

6.1 Type label

The type label contains the following information:



①	HV AD4 XW20	Device type
②	TE12, R2P 8p, L0B 5p, CAN	Device details: ▸ TE12 - housing type: 19-inch slide-in unit, 12 HU (GER: TE) wide ▸ R2P 8p - measurement input sockets: LEMO REDEL 2P, 8-pole ▸ L0B 5p – CAN/power supply sockets: LEMO 0B, 5-pole ▸ CAN - bus system
③	ART1081200	Part number of the measurement module
④	Power: 6 - 30 V DC, typ. 1.8 W	Power supply range, typical power consumption
⑤	Temp.: -40 °C to +85 °C	Operating temperature range
⑥	Meas.: ±50 V – ±1 kV	Measurement range
⑦	S/N: 1-HVAB4	Serial number of the measurement module
⑧	Rating: IP65	Protection class
⑨	Revision: A021	Hardware revision number

Tab. 6-1: Type label

6.2 Maintenance services

Upon delivery, the following test documents are issued for HV AD CAN TBM series measurement modules:

Module version	Test documents
HV AD TBM 4LI+ HV AD TBM 8LI	▸ Test certificate (HV isolation test) ▸ Calibration certificate from the certified CSM calibration laboratory
HV AD4 XW20	▸ Test certificate (HV isolation test) ▸ Calibration certificate

Tab. 6-2: Test documents

This is documented by corresponding stickers attached to the right side of the device housing.

		
Next calibration date sticker	DKD calibration sticker [1]	HV isolation test sticker [2]

Tab. 6-3: Stickers

To ensure operational safety and functionality, regular maintenance of the measurement module is required. For this purpose CSM offers maintenance packages and a repair service.

- High-voltage isolation test (functionality testing included)
- Calibration test (functionality testing included)
- Repair service

	NOTE!
	A high-voltage isolation test needs to be carried out on a regular basis to ensure operational safety. ☞ Make sure that a high-voltage isolation test according to EN 61010-1:2010 is carried out at least every 12 months.

1 Only for DKD-calibrated measurement modules
2 Only for HV measurement modules

6.3 Cleaning instructions

WARNING!	
	HV AD CAN TBM Series measurement modules are used in high-voltage applications. **Improper use can be life-threatening due to high voltage.** ☞ Make sure that this work is only carried out by qualified and trained personnel. ☞ Observe safety instructions.

NOTE!	
	☞ Disconnect the device before starting to work.

NOTE!	
	The housing's finish is sensitive to harsh detergents, solvents and abrasive media. ☞ Never use harsh detergents or solvents for cleaning the device. ☞ Use only a slightly moistened cloth.

Requirements

- All cable connections have been removed.

Parts/material required

- soft cloth
- some mild detergent, if required

Cleaning the device

☞ Clean the measurement module with a moist cloth. Add some mild detergent, if required.

7 Appendix

7.1 List of figures

7.2 List of tables

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