AD CAN MM Series

User Guide

Version 01.00

Innovative Measurement and Data Technology

Trademarks

All trademarks mentioned in this document are the property of their respective owners.

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 guide contains important information on mounting, installation and configuration of the product. The complete document should be read carefully before installation and initial start-up.

1.2 Symbols and writing conventions

Symbol/note	Meaning	Application example
☞	User instruction	☞ Click on **OK** to confirm the entry.
⇨	Result of an action	⇨ The following dialog opens.
→	Cross-reference to further information	→ *See also chapter 1.6 "Warranty and warranty exclusion".*
i	This pictogram refers to important notes or additional information on a specific topic	**i** CSM offers a mounting kit for devices in standard housings. For further information please contact our sales department.
Options | Interface	**Menu selection** Menu items, options and buttons are highlighted in bold. The vertical bar "|" separates the menu from the menu command. The example on the right means: Click on the **Options** menu and select **Interface** option.	☞ Select **Options | Interface.**
(→ Options | Interface)	A menu selection integrated in the text	The CAN interface is selected via the **Interface** dialog (→ **Options | Interface**).
(→ **Ctrl + I**)	**Key combination** Key names are shown bold in the text and in some cases listed in addition to the menu commands. The example on the right means: Alternatively to selection via the menu, the option can also be called via the key combination **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 damage to persons and objects.

Warning design

A warning consists of the following components:

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

Warning symbols used

Symbol	Meaning
	General hazard! This symbol indicates a general hazard.
	Hot surface! This symbol indicates a possible risk of burns from hot surfaces.

Tab. 1-2: Warnings

Signal words

Two categories of warnings with the following signal words are used in this guide:

Signal word	Meaning
WARNING	...indicates a potential hazard. Failure to follow this warning may result in death or serious injuries.
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. A warning that warns, for example, of life threatening hazards or the risk of injury may 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 measurement module. ☞ Read the information carefully.

Symbols used

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

Tab. 1-4: Symbols for directives

1.5 List of abbreviations

Abbreviation	Meaning
AD / ADMM	**AD** Scan **M**ini**M**odule: measurement module for the acquisition of analog voltages
CAN	**C**ontroller **A**rea **N**etwork: serial bus system developed by Bosch for networking ECUs in vehicles
DAQ	**D**ata **A**c**Q**uisition, e.g. DAQ software
ESD	**E**lectro**S**tatic **D**ischarge
HV	**H**igh **V**oltage
MC Tool	**M**easurement & **C**alibration Tool
MM	**M**ini**M**odule
TEDS	**T**ransducer **E**lectronic **D**ata **S**heet: sensor with integrated memory

Tab. 1-5: List of abbreviations

1.6 Liability 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".*

1.7 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 changed,
- the information in the documentation belonging to the product, in particular the safety instructions, is not observed,
- 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".*

1.8 ESD information

The manufacturer of the product declares that measurement modules of the AD CAN MM Series 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 sensors.

2 Safety instructions

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

2.1 General safety instructions

All of the applicable safety standards were taken into account during the development and production of measurement modules of the AD CAN MM Series. Nevertheless, the risk to the life of users and other persons as well as property damage cannot be excluded.

	WARNING!
	The behaviour 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 can be a danger to life for persons and cause damage to property.** ☞ Always connect CAN bus measurement modules to a separate CAN bus system (measurement bus). ☞ Ensure that the 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 working 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!
	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 guaranteed if the measurement module is correctly installed. ☞ Make sure that the measurement module is correctly installed. ☞ Operate the measurement module exclusively within the specified working environment. → *See "ADMM" datasheets for further information.*

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

- Measurement modules of the AD CAN MM Series were developed for measuring analog voltages and may only be used for this purpose.
- These measurement modules may only be used for the above purpose and under the operating conditions defined in the technical specifications.

  → *See "ADMM" datasheets for further information.*
- Operational safety can only be guaranteed if the measurement module is operated in accordance with its intended use.
- Compliance with the intended use also means that this user guide must be carefully read and the instructions contained must be observed.
- Inspection and maintenance work must be carried out at the prescribed intervals and may 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 sections contain general information about the product. Specific technical information can be found in the datasheets.

→ *See "ADMM" datasheets for further information.*

Measurement modules of the AD CAN MM Series are rugged and compact CAN-based measurement modules.

- Four or eight measurement inputs for analog voltage measurements
- Measurement ranges up to ±60 V, adjustable per channel
- Very low power consumption

The modules offer a wide range of applications for the acquisition of analog signals (voltage, humidity, pressure, flow, etc.).

Important technical data

<table>
<tr><th>Designation</th><th>Inputs</th><th>Measurement data rate</th><th>Measurement channel LEDs</th><th>Protection class</th><th>Operating temperature</th></tr>
<tr><td>ADMM 4 classic HS / AD4 MC10</td><td rowspan="2">4</td><td rowspan="2">max. 10 kHz</td><td>✗</td><td rowspan="6">IP67</td><td rowspan="6">-40 °C to +125 °C</td></tr>
<tr><td>ADMM 4 pro HS / AD4 pro MC10</td><td>✓</td></tr>
<tr><td>ADMM 4 / AD4 MX2</td><td rowspan="5">max. 2 kHz

(CANopen: max. 1 kHz)</td><td>✗</td></tr>
<tr><td>ADMM 8 classic / AD8 MC2</td><td rowspan="3">8</td><td rowspan="3">✓</td></tr>
<tr><td>ADMM 8 pro / AD8 pro MC2</td></tr>
<tr><td>ADMM 8 pro2 / AD8 pro MD2</td></tr>
<tr><td>ADMM 8 Ind (BNC) / AD8 MW2 (BNC)</td><td>✗</td><td>IP50</td><td>-40 °C to +85 °C</td></tr>
</table>

Tab. 3-1: Important technical data of the AD CAN MM Series

Sensor excitation

The measurement modules of the AD CAN MM Series are also different with regard to their sensor excitation:

Designation	Sensor excitation	Isolation	Polarization	Max. voltage	Setting range
ADMM 4 classic HS / AD4 MC10	✓	✗	bipolar	±15 V	per channel
ADMM 4 pro HS / AD4 pro MC10					
ADMM 4 / AD4 MX2			unipolar	15 V	per module
ADMM 8 classic / AD8 MC2			bipolar	±15 V	per channel
ADMM 8 pro / AD8 pro MC2					
ADMM 8 pro2 / AD8 pro MD2		✓ [1]			
ADMM 8 Ind (BNC) / AD8 MW2 (BNC)	✗	–	–	–	–

Tab. 3-2: Sensor excitation of the AD CAN MM Series

NOTE!

Certain measurement modules of the AD CAN MM Series support TEDS. This means that configuration data from connected sensors with a TEDS chip can be transferred to the channel configuration automatically.

→ *See: https://s.csm.de/en-teds*

1 Isolated from one another by channel and electrically isolated from the module power supply

Housing variants

Measurement modules of the AD CAN MM Series are available in the following housing variants:

Designation	Case eXtra Small (CXS)	Case Small (CS)	Slide Case Small (SCS)	Case Large (CL)	Slide Case Large (SCL)
ADMM 4 classic HS / AD4 MC10		✓	✓		
ADMM 4 pro HS / AD4 pro MC10		✓	✓		
ADMM 4 / AD4 MX2	✓				
ADMM 8 classic / AD8 MC2				✓	✓
ADMM 8 pro / AD8 pro MC2				✓	✓
ADMM 8 pro2 / AD8 pro MD2				✓	✓
ADMM 8 Ind (BNC) / AD8 MW2 (BNC)				✓	✓

Tab. 3-3: Housing variants of the AD CAN MM Series

The dimensions of the various housing variants can be found in Fig. 3-1. The housing depth of the (Slide) Case Large (CL/SCL) corresponds to the (Slide) Case Small (CS/SCS).

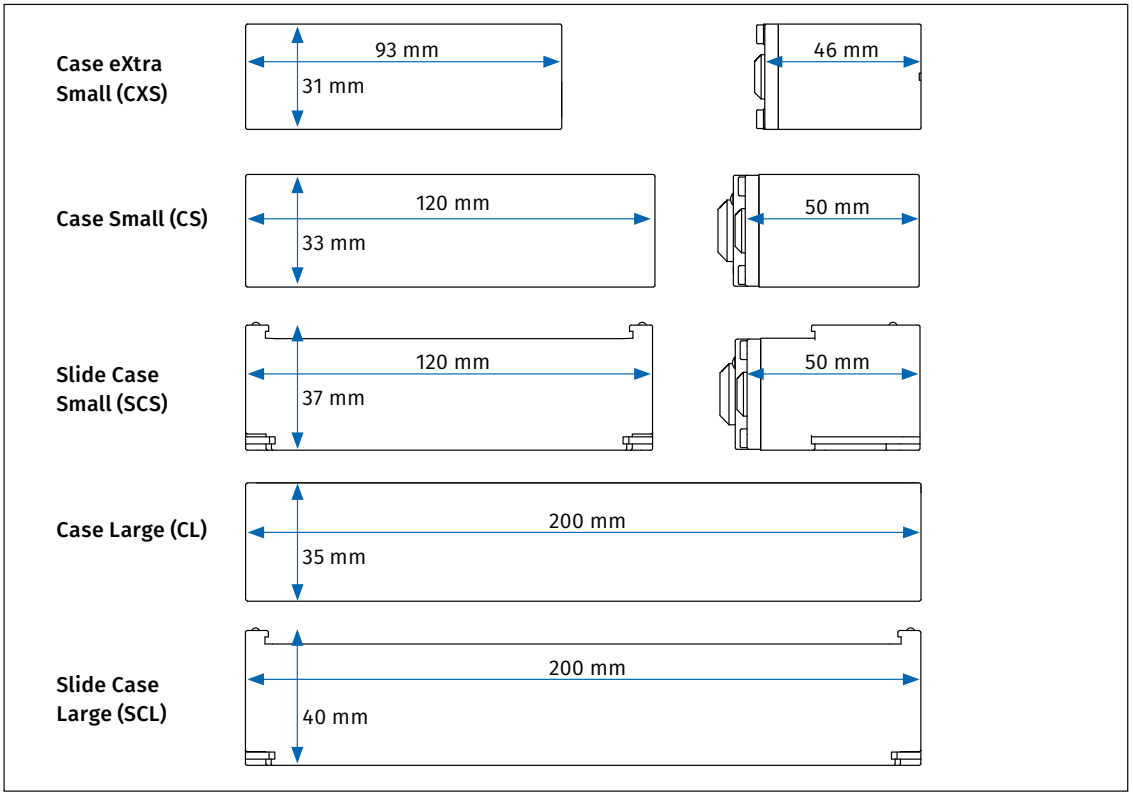


Fig. 3-1: Dimensions of the housing variants

3.1 Connections and components

The following images show the connectors of a measurement module of type ADMM 4 pro HS[2] in a Slide Case housing (SCS).

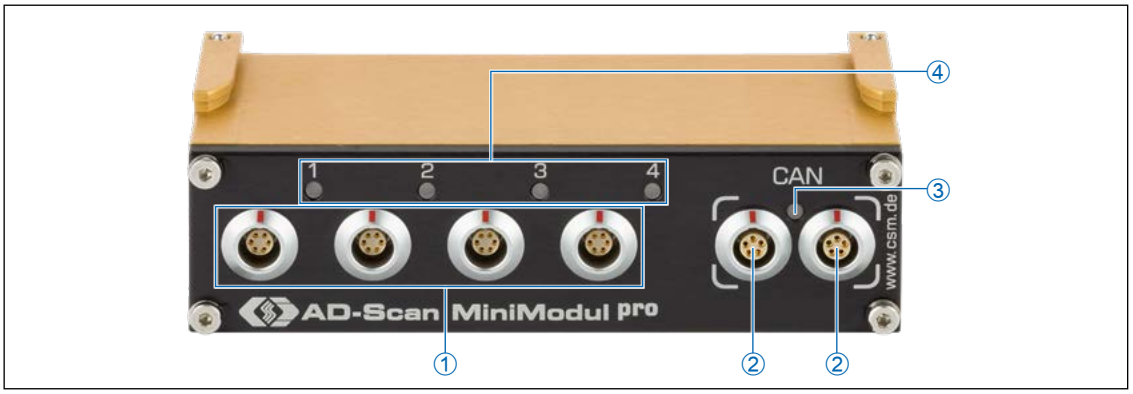


Fig. 3-2: ADMM 4 pro HS, front view

1. Measurement inputs 1 - 4 (→ *chapter 4.3.2.2 "Measurement input socket"*)
2. CAN/power supply connectors (→ *chapter 4.3.2.1 "CAN sockets"*)
3. Indicator LED for CAN bus (→ *chapter 3.2.1 "Indicator LED CAN bus"*)
4. Measurement channel LEDs 1 - 4 (→ *chapter 3.2.2 "Measurement channel LEDs"*)

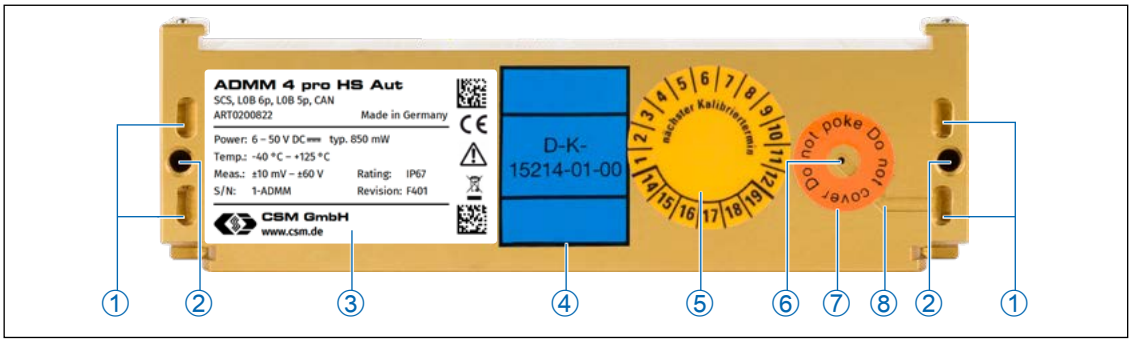


Fig. 3-3: ADMM 4 pro HS, back of the housing

1. Cable tie eyelets (for cable ties with a width of max. 4 mm)
2. Threaded holes for fixing screws[3]
3. Type label (→ *chapter 6.1 "Type label"*)
4. Sticker "DKD calibration"
5. Sticker "Next calibration date"
6. Ventilation opening GORE™ membrane
7. Sticker "Do not poke - Do not cover"
8. Venting groove

→ *Further information can be found in chapter 4.1 "Before mounting".*

2 The CAN/power supply connectors in Fig. 3-2 are equipped with 5-pole LEMO 0B sockets. Customer-specific solutions are possible in this respect. Further technical specifications remain unaffected.
3 Either 2 (slide case housing) or 4 (standard housing) screws are required depending on the module version.

3.2 Functional description of LED indicators

3.2.1 Indicator LED CAN bus

The LED (③, see Fig. 3-2) between the two CAN connectors provides information about the operating status of the measurement module.

LED		Meaning
Color	Status	
–	off	Measurement module not connected or power supply switched off
green	permanently lit	Normal operation
red	permanently lit	Measurement module is in idle mode, either because the configuration software has stopped data acquisition (no error), or because there is a CAN bus or configuration problem.
red	blinking	The measurement module has been selected via the configuration software and is in idle mode.
green/red	blinking	A firmware download is in progress

Tab. 3-4: Indicator LED CAN

3.2.2 Measurement channel LEDs

The measurement channel LEDs (④, see Fig. 3-2) above the measurement inputs provide information about the status of the respective measurement channel and the sensor excitation. Only the module versions "pro" and "pro2" have measurement channel LEDs (see Tab. 3-1).

LED		Meaning
Color	Status	
–	off	Sensor excitation is switched off
green	permanently lit	Sensor excitation is switched on
red	permanently lit	Overload: The power is above the max. permissible value
green	blinking	Channel selected via the configuration software (single LED) Module selected via the configuration software (all LEDs)
red	blinking	Channel selected via the configuration software and overload of sensor excitation

Tab. 3-5: Measurement channel LEDs

4 Mounting and installation

For trouble-free operation and a long product life, certain requirements for mounting and installation must be taken into account.

4.1 Before mounting

AD CAN MM Series measurement modules are provided with a GORE™ membrane and a venting groove. These are needed to regulate pressure and humidity. To ensure proper operation of the device, never block or clog the ventilation opening and vent groove in the back of the housing (see Fig. 3-3). If this happens, condensate can accumulate inside the housing and damage the measurement module.

	NOTE!
	The GORE™ membrane is required to regulate pressure and humidity. ☞ Do not block the ventilation opening for the GORE™ membrane during installation.

	NOTE!
	Trouble-free operation and electrical safety can only be guaranteed if the measurement module is correctly installed. ☞ Ensure correct installation. ☞ Operate the measurement module exclusively within the specified working environment. → *See "ADMM" datasheets for further information.*

4.2 Mounting AD CAN MM

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

	CSM offers a mounting kit for devices in standard housings. For further information please contact our sales department.

Requirements

- The venting groove and the ventilation opening of the GORE™ membrane must not blocked or clogged by mounting at the intended position.
- The mounting position must have a solid base. Mounting on a soft surface (e.g. cellular rubber) can block the venting groove and cause damage to the unit.
- When selecting the mounting position, make sure that the ventilation opening is not permanently covered by water or any other liquid.
- The mounting position must offer sufficient space to connect and disconnect the cables without kinking or clamping them.
- A mounting position in which the modules are subjected to continuous strong vibrations and shocks should be avoided.

Required parts/materials

- M4 screws[1] and a suitable screwdriver or wrench
- if necessary, further mounting material such as mounting angles

or

- 4 suitable cable binders

Mounting the measurement module

☞ Fasten the measurement module to the mounting position with the screws.

NOTE!	
	Making mechanical modifications to the housing, such as by drilling additional holes, can impair the function of the measurement module or even destroy it. ☞ Never drill additional holes in the housing. ☞ Observe mounting instructions.

Mounting of measurement modules using the Slide Case mechanism

If several measurement modules are used in an application, Slide Case housings offer the advantage that not every device has to be mounted individually. After mounting the first module, further measurement modules can be connected to each other via the guide rails on the upper side of the housing and the mounts on the underside of the housing to form compact measurement module packages without the need for tools or mounting materials. Adapter plates are available for connecting Slide Case housings of different sizes. The first and the last module of a measurement module package are fixed with one mounting angle each.

→ *See "CAN accessories" datasheet for further information.*

1 The thread depth in the module is 8 mm. The screw length must be chosen according to the thickness of the mounting material. Either 2 (slide case housing) or 4 (standard housing) screws are required depending on the module version.

4.3 Installing AD CAN MM

4.3.1 Before installation

WARNING!	
	The behaviour 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 can be a danger to life for persons and cause damage to property.** ☞ Always connect CAN bus measurement modules to a separate CAN bus system (measurement bus). ☞ Ensure that the work is only carried out by qualified and trained personnel.

	CSM offers several cables for the connection of 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 connectors embedded on the right in the front of the housing are used both for the transmission of the CAN signals and for the power supply. The interface cable connects the measurement module to the data acquisition system (PC) and to the power supply.

NOTE!	
	Take special care when connecting third-party devices to a measurement bus with measurement modules of the AD CAN MM Series. ☞ Ensure that the configuration settings are compatible with all devices (same CAN bit rate, different CAN identifiers). ☞ Ensure that the work is only carried out by qualified and trained personnel.

NOTE!	
	The 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. ☞ Ensure that the work is only carried out by qualified and trained personnel.

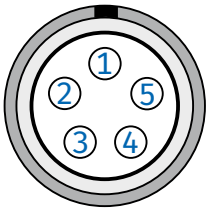
The sensors are connected to the measurement module via sockets 1 to 4 or 1 to 8.

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 CAN OUT as well as for CAN IN. This enables simple cabling with only one cable between two measurement modules. At the end of such an arrangement, a CAN termination resistor is plugged into the free CAN socket.

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

- **FGG.0B.305.CLA xxxxx** [2]

CAN socket	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

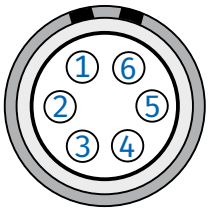
Tab. 4-1: CAN socket: pin assignment

i	The LEMO 0B type socket is the standard version. To equip the measurement module with other sockets, please contact the sales department.

4.3.2.2 Measurement input socket

LEMO 0B sockets are used as standard for the measurement inputs. The following plug with plug insert is required for connecting a cable to this socket:

- **FGA.0B.306.CLA xxxxx** [2]

Measurement input socket	Pin	Signal	Description
	1	V_{IN} +	Measured voltage, positive
	2	V_{IN} -	Measured voltage, negative
	3	–	Not connected
		TEDS Data	TEDS data line [3]
	4	V_{OUT} +	Sensor excitation, positive
	5	GND	Sensor excitation, ground
		TEDS GND	TEDS ground line (additional) [3]
	6	V_{OUT} -	Sensor excitation, negative
		–	Not connected [4]

Tab. 4-2: Measurement input socket: pin assignment

i	The LEMO 0B type socket is the standard version. To equip the measurement module with other sockets, please contact the sales department.

2 "xxxxx" is a placeholder here. The actual designation depends on the diameter of the cable used.
3 Only for measurement modules with TEDS support, see: https://s.csm.de/en-teds
4 Only for measurement modules ADMM 4 / AD4 MX2.

	For the BNC socket of the **ADMM 8 Ind / AD8 MW2**, the following applies: V_{IN} + Measured voltage, positive = Inner contact V_{IN} - Measured voltage, negative = Socket housing

4.3.2.3 Connecting the power supply

The power supply of a measurement module of the AD CAN MM Series 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 most cases the installation of these measurement modules is simple and uncomplicated when using the connection cables from CSM and due to their compact design. However, in order to ensure trouble-free operation, the following aspects must be taken into account 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 decisive. 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, it must always be ensured 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 a connection cable 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 the cable. The voltage at the last measurement module in a supply chain must be within the specified voltage range (min. 6 V).

	For typical applications CSM recommends the following installation: Power supply ≥ 12 V, total cable length ≤ 10 m: → up to 8 measurement modules per power supply Power supply ≥ 8 V, total cable length ≤ 10 m: → up to 5 measurement modules per power supply

	NOTE!
	If more measurement modules are daisy-chained with the corresponding cable length and supply voltage, an additional intermediate supply is required. An intermediate power supply is also required if, due to correspondingly higher power consumption, measurement modules of the AD CAN MM Series require more current than the existing power supply can provide.

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

Information regarding the available cables can be found in the datasheet.

→ *See "CAN Accessories" datasheet.*

5 Using AD CAN MM

5.1 Application example

The following figure shows a series connection consisting of three measurement modules of the AD CAN MM Series, a power supply, a CAN interface and a PC with the required software for CAN data acquisition and configuration, as well as the required connection cables.

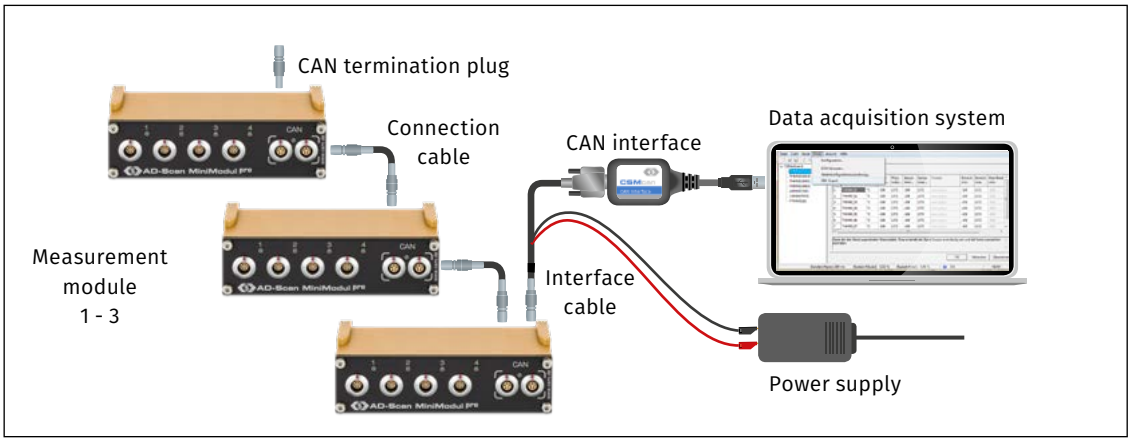


Fig. 5-1: Measurement setup with three measurement modules of the AD CAN MM Series

The installation consists of the following components:

- 3 measurement modules of the AD CAN MM Series
- 1 power supply
- 1 data acquisition system (PC) with CSMconfig configuration software
- 1 interface cable with connector for power supply
- 2 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 PC.
☞ Connect the other end of the interface cable to the PC via the CAN interface.
☞ Connect the banana plugs of the interface cable to the power supply.

5.2 Configure AD CAN MM

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

	NOTE!
	We recommend always using the latest version of CSMconfig. Old versions may not support all module variants and functions. The most current 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 whether there is a new program version during each startup.

The following sections describe how to create a simple configuration with CSMconfig and finally how to save it to a configuration file.

A configuration in CSMconfig can be executed online or offline. Different views are available for configuration: "Tree view", "Device list" or "Channel list". The following details the basic steps for configuration in online and offline mode in the tree view.

5.2.1 Dialogs and windows

	The particular windows and dialogs which are displayed during configuration depends, among other things, on the settings defined in the **Program Settings** dialog.

Example

If a new configuration file is created (→ **File** | **New**), the **Select document type** dialog is displayed by default. The file type required for the configuration must be selected here. A document of type "DBC" is required for measurement applications using CAN measurement modules.

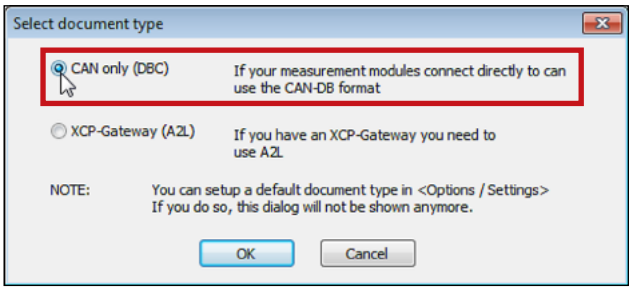


Fig. 5-2: **Select document type** dialog

The settings that are relevant for creating a new configuration file can also be changed in the **Program settings** dialog (→ **Options** | **Settings**). The **Default document type** option offers the following options for creating configuration files:

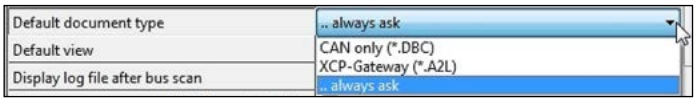


Fig. 5-3: **Program settings** dialog, options for **Default document type**

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

→ *See online help for more information.*

5.2.2 Offline configuration

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 another tool such as vMeasure CSM, CANape® or INCA.

	The following sections describe the steps for configuration in **Offline mode**.

☞ Start CSMconfig.

⇨ The CSMconfig program window opens.

☞ Select **File** | **New** (→ **Ctrl** + **N**).

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

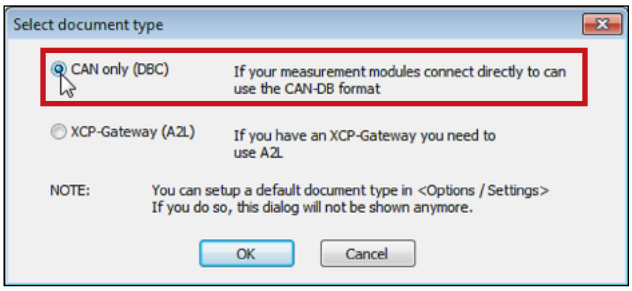


Fig. 5-4: **Select document type** dialog

☞ 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 **CSMconfig1.dbc – Tree view**).

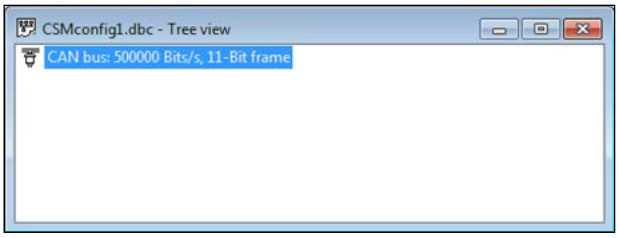


Fig. 5-5: **CSMconfig1.dbc – Tree view** window

☞ Move the mouse pointer to the window and click with the right mouse button.

⇨ The context menu opens.

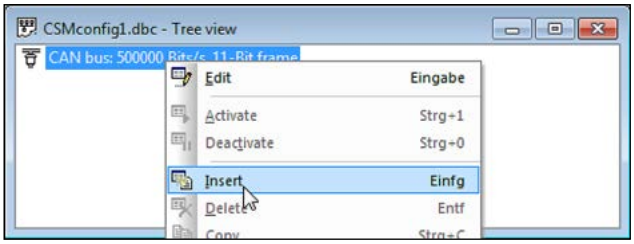


Fig. 5-6: **CSMconfig1.dbc – Tree view** window, context menu

☞ Select **Insert** (→ **Insert**).

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

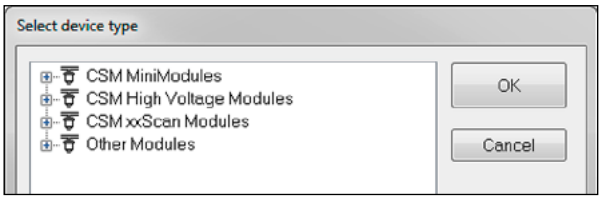


Fig. 5-7: **Select device type** dialog

	NOTE!
	The module series (e.g. ADMM or HV THMM) can be selected in this mode, but not specific module variants (e.g. ADMM 8 pro or HV THMM 4). The options in the device and channel configuration dialogs 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 on the ✚ sign in front of the appropriate category.

⇨ The submenu opens.

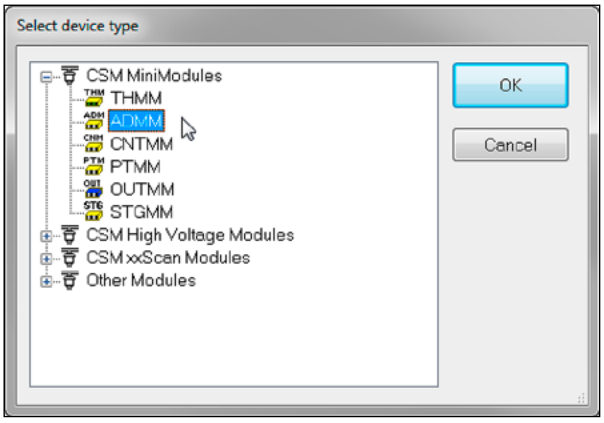


Fig. 5-8: **Select device type** dialog, submenu is opened

☞ Select the module series (here: ADMM) and confirm selection with **OK**.

⇨ The module configuration dialog is displayed.

⇨ The **CSMconfig1.dbc - Tree view** window appears in the background.

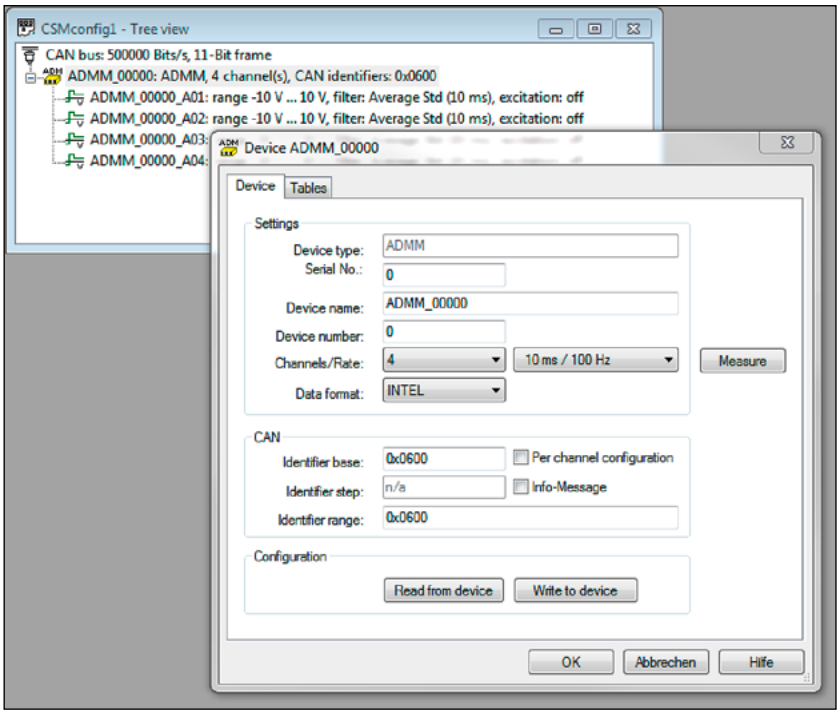


Fig. 5-9: Device configuration dialog, **CSMconfig1.dbc – Tree view** window in the background

Notes on the configuration of measurement channels and the measurement module can be found in the corresponding chapters in the Online configuration section.

→ *see chapter 5.2.3.6 "Setting measurement channels" or chapter 5.2.3.7 "Setting measurement module".*

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".*

5.2.3 Online configuration

5.2.3.1 Preparing configuration

☞ Before starting an online configuration, make sure that

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

5.2.3.2 Starting CSMconfig and selecting the communication Interface

☞ Start CSMconfig.

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

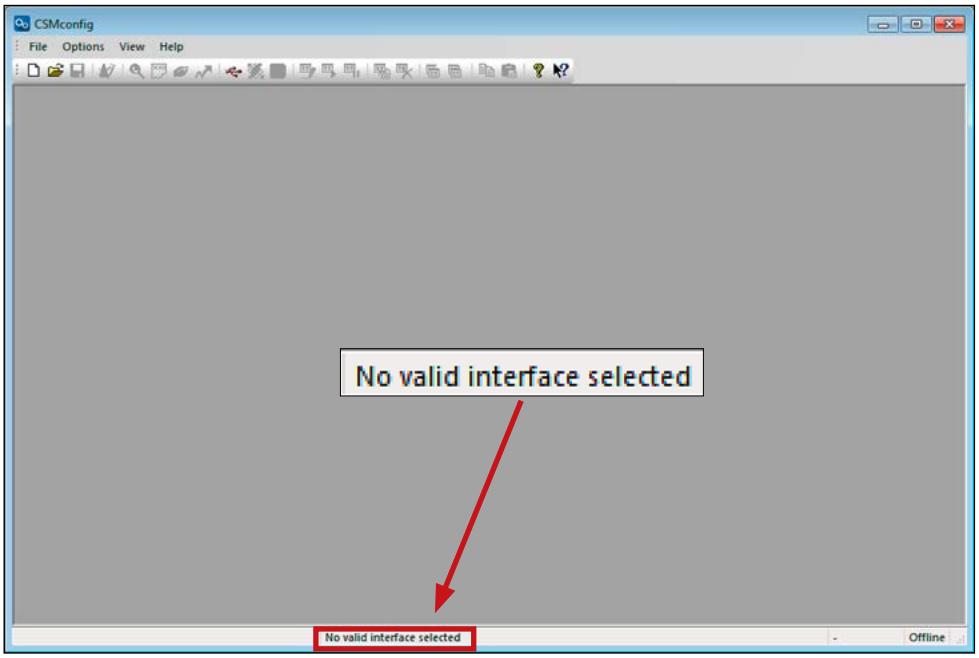


Fig. 5-10: CSMconfig program window

If no communication interface has been selected, the message **No valid interface selected** (see Fig. 5-10) appears at the bottom in the status line.

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

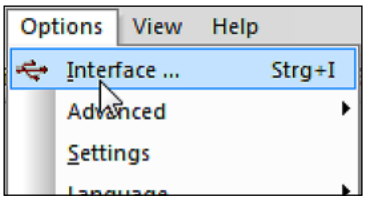


Fig. 5-11: **Options** menu, **Interface** option

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

⇨ The **Interface** dialog opens.

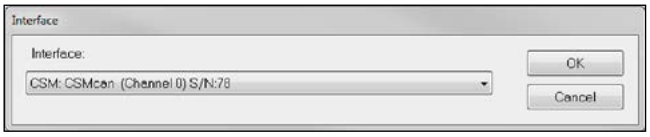


Fig. 5-12: **Interface** dialog

☞ If the desired interface is not displayed, click on the arrow ▼ to the right.
⇨ The pull-down menu opens.

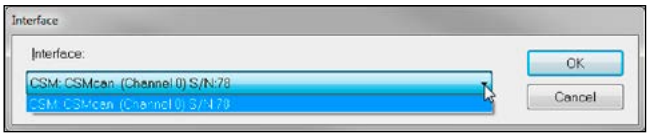


Fig. 5-13: **Interface** dialog, pull-down menu open

☞ Select the desired CAN interface.
☞ Click on **OK** to confirm the selection.

5.2.3.3 Creating a new configuration file

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

→ *See chapter 5.2.3.5 "'Scan Bus' and 'Auto-Configuration'" for this purpose.*

☞ Select **File** | **New** (→ **Ctrl** + **N**).
⇨ The **Select document type** dialog opens.

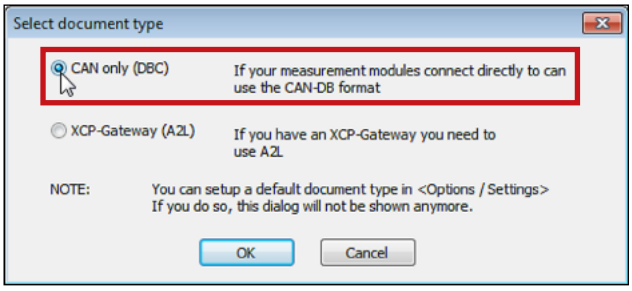


Fig. 5-14: **Select document type** dialog

☞ For configurations via CAN interface, select the **CAN only (DBC)** option and confirm selection with **OK**.
⇨ The **CSMconfig1.dbc – Tree view** window opens.

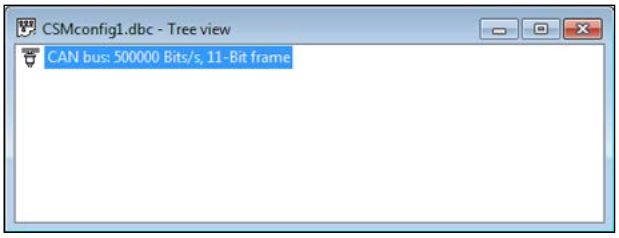


Fig. 5-15: **CSMconfig1.dbc – Tree view** window

5.2.3.4 Setting CAN parameters

	If a new DBC file was created via **Auto configuration** or **Scan bus**, a manual setting of the CAN parameters is usually not required.

→ *See chapter 5.2.3.5 "'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.

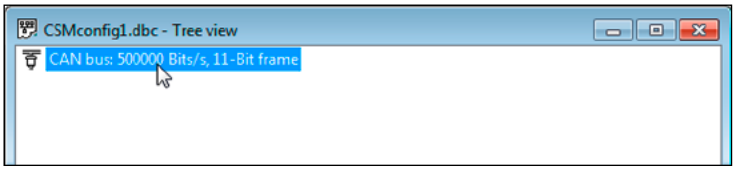


Fig. 5-16: **CSMconfig1.dbc – tree view** window, set CAN Parameters

☞ Move the mouse pointer over the CAN bus entry and double-click with the left mouse button

or

☞ Mark the CAN bus entry with the mouse pointer and press the Enter key.

⇨ The **CAN Bus** dialog opens.

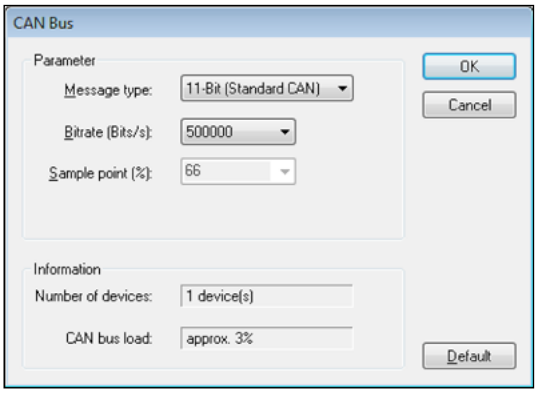


Fig. 5-17: **CAN Bus** dialog

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

→ *See online help for more information.*

If the process was successful, the following message appears:

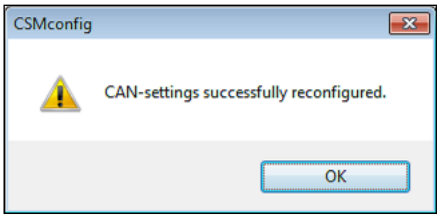


Fig. 5-18: "CAN settings successfully reconfigured" message

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

5.2.3.5 'Scan Bus' and 'Auto-Configuration'

The next step is to check which measurement modules are connected to the bus. The functions **Scan Bus** and **Auto-Configuration** are available for this.

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** also offers the possibility of resolving any existing conflicts (e.g. CAN-ID conflicts or conflicts during name assignment). However, the channels are not configured automatically in the actual sense (e.g. setting the measurement range).

For creating an initial configuration with multiple new measurement modules, it is recommended to use the **Auto-Configuration** function, because the same CAN ID is set for measurement modules in the delivery state.

Running 'Scan Bus'

The CAN bus is scanned for connected measurement modules using **Scan Bus**. The configuration data is summarized and can then be saved in a DBC file.

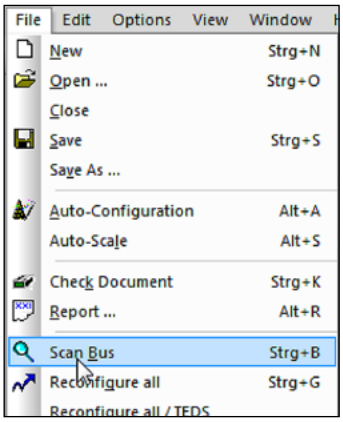


Fig. 5-19: **File** menu, **Scan Bus** option

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

⇨ The bus is checked for connected measurement modules.

⇨ Detected measurement modules are listed in the **CSMconfig1.dbc - Tree view** window below the level for the CAN interface.

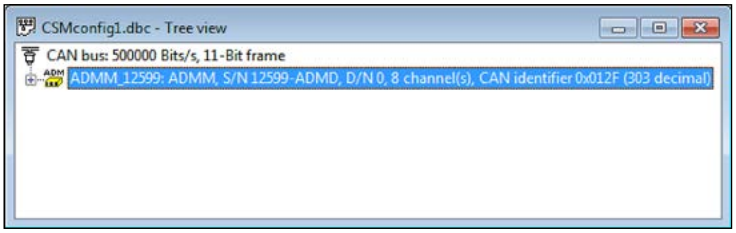


Fig. 5-20: **CSMconfig1.dbc - Tree view** window, detected measurement modules are listed

Running 'Auto-Configuration'

The **Auto-Configuration** function checks the bus for connected measurement modules in a similar way to **Scan Bus**. With **Auto-Configuration** possible conflicts (e.g. CAN-ID conflicts or conflicts during naming) are also detected and eliminated.

If **Auto-Configuration** is used, it is not necessary to create a new configuration file in advance, because this is generated automatically when the function is executed. After the process is completed the new configuration file must be named accordingly and saved in the desired folder.

→ *See chapter 5.2.3.8 "Saving configuration to a DBC file".*

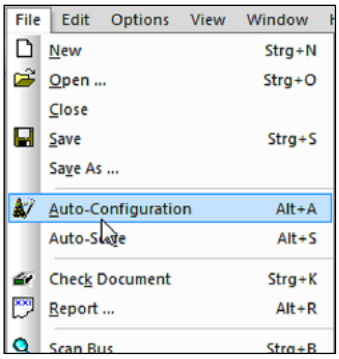


Fig. 5-21: **File** menu, **Auto configuration** option

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

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

⇨ The **AutoConfig.dbc – Tree view** window opens.

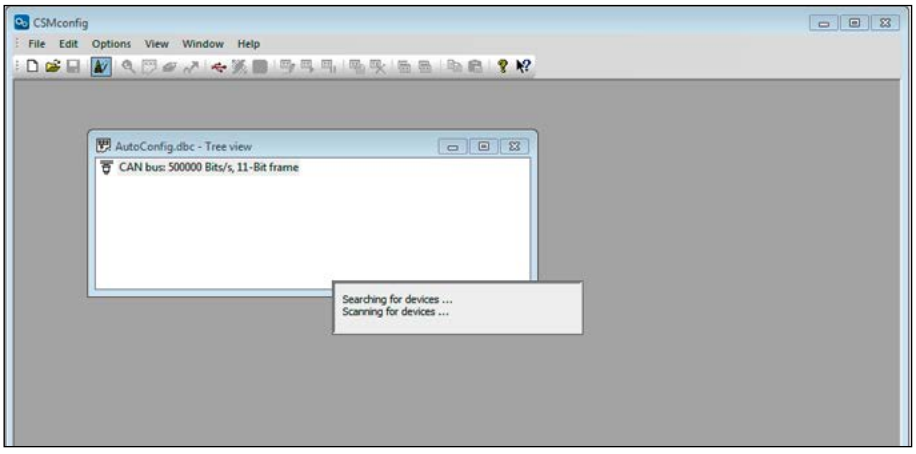


Fig. 5-22: **AutoConfig.dbc – Tree view** window, "Searching for devices..."

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

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

- **AutoConfig.dbc – Tree view**: The connected measurement modules are displayed.

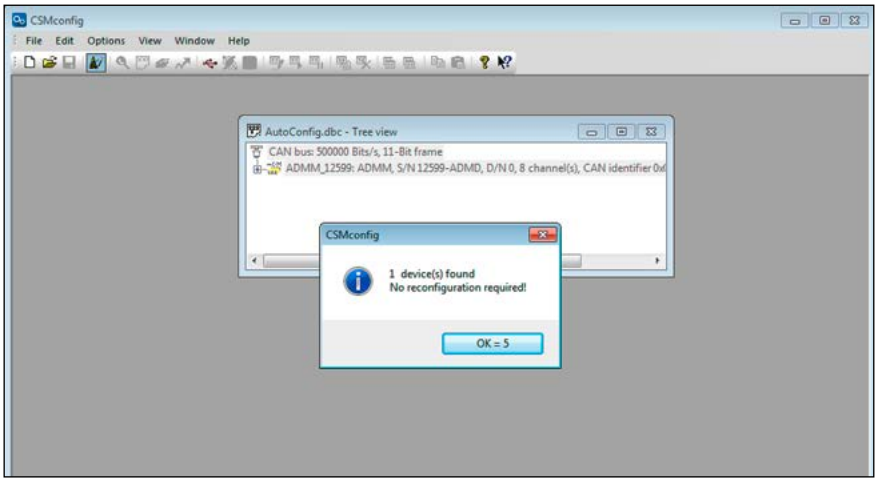


Fig. 5-23: **Auto-Configuration** is executed

- A message appears in another window indicating how many measurement modules have been detected and whether any changes have been made to the configuration.

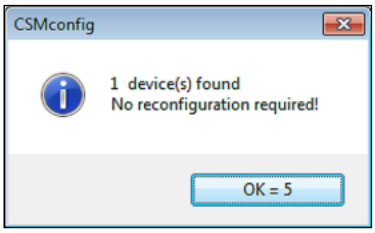


Fig. 5-24: "No reconfiguration required" message

The **OK** button in this window contains an automatic counter that counts down from "5" to "0". The window closes automatically as soon as the counter reaches "0". The window can be closed prematurely by clicking on **OK**.

The **Save as** dialog opens to save the configuration in a DBC file. Enter a file name in **File name** field (default name is **`AutoConfig`**).

→ *See chapter 5.2.3.8 "Saving configuration to a DBC file".*

5.2.3.6 Setting measurement channels

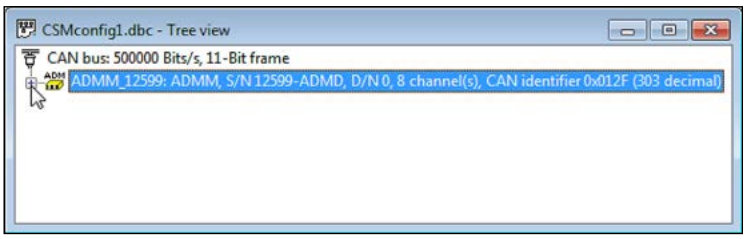


Fig. 5-25: **CSMconfig1.dbc – Tree view** window

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

⇨ The list of measurement channels opens.

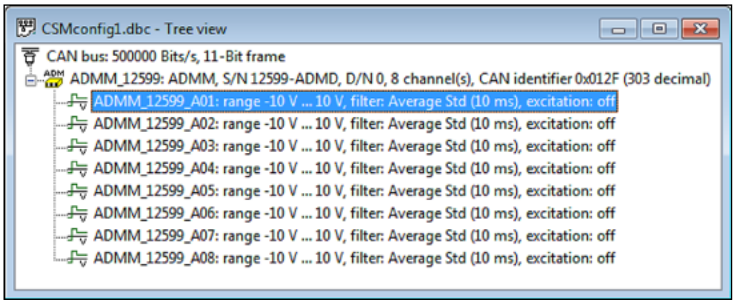


Fig. 5-26: **CSMconfig1.dbc – Tree view** window, channel list open

☞ Double-click on the selected channel entry with the mouse pointer.

or

☞ Mark the channel entry with the mouse pointer and press the Enter key.

⇨ The channel configuration dialog is displayed.

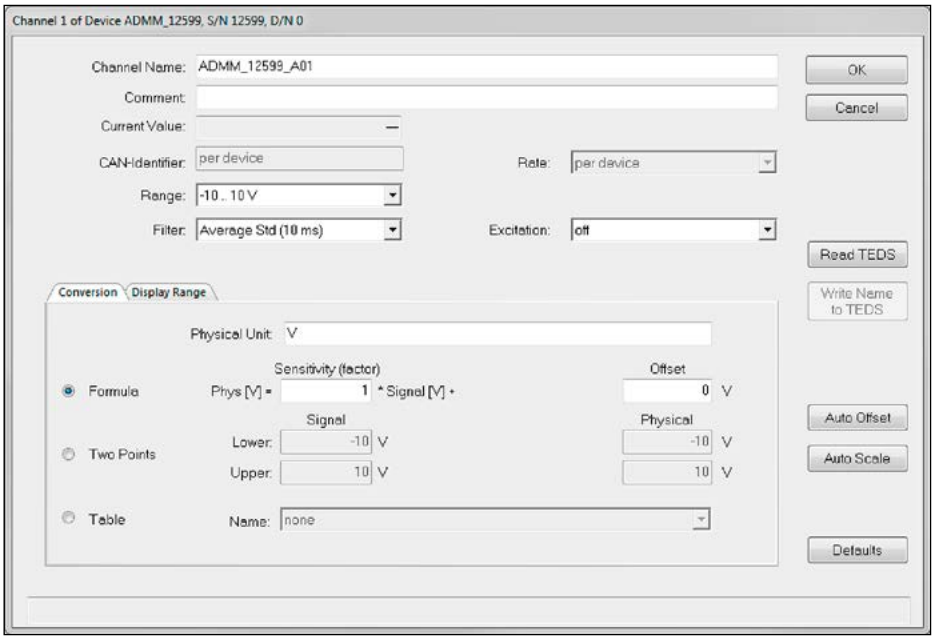


Fig. 5-27: Channel configuration dialog (ADMM)

☞ Make the necessary settings (see table "Channel configuration options AD CAN MM").

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

☞ To configure the other measurement channels, proceed as described above.

Channel configuration options AD CAN MM

Field	Function
General settings	
Channel Name	Entry field for channel names. This name is stored in the DBC file and used by the DAQ software as an identifier. Allowed characters: [a...z],[A...Z],[0...9] and [_] (max. 32 characters)
Comment	**Applies only to the module versions "pro"/"pro2":** Input field for free text, e. g. note/comment on channel configuration; no limitation of allowed characters (max. 100 characters)
Current Value	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 activated.
Rate	The channel-specific send rate is defined with this option. This option is only available if the option **Per channel configuration** in the **device configuration dialog** is activated.
Range	Pull-down menu for setting the measurement range: **±10, ±20, ±50,** ±100, ±200, ±500 mV and **±1, ±2, ±5,** ±10, ±20, ±60 V **The highlighted measurement ranges apply only to the module versions "pro"/"pro2".**
Filter	Measurement modules of the AD CAN MM Series 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	Pull-down menu for setting the (bipolar) excitation voltage for a sensor: "±5 V", "±8 V", "±10 V", "±12 V", "±15 V" and "off" option, selectable per channel. **Exception: ADMM 4 / AD4 MX2** (unipolar excitation voltage only): "5 V", "8 V", "10 V", "12 V", "15 V" and "off" option, selectable per module.
Buttons	
Auto Offset	Calls up the **Auto Offset** function of the assistant for **Auto Scale Channel**.
Auto Scale	Calls up the **Auto Scale** function of the assistant for **Auto Scale Channel**.
Defaults	Resets the settings in the dialog to the factory defaults. The content of specific fields, such as **Channel Name**, remain unchanged, however.
The following buttons are only available if the module supports the TEDS function.	
Read TEDS	Reads out the TEDS connected to this channel and shows the differences between the current channel configuration and TEDS parameters in a table. The TEDS parameters can be copied to the channel configuration by clicking **OK**.
Write Name to TEDS	This is not supported by all TEDS sensors. To show this option, it first needs to be enabled in the Program Settings dialog (Allow adding channel name to TEDS). The button is deactivated if the function is not available.

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. With module versions "pro" and "pro2", **Tables** are also possible.	
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	Under **Formula** a formula can be created 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 **2-point scaling** offers the possibility to convert 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
Table	**Applies only to the module versions "pro"/"pro2":** Depending on the module version, four or eight tables with up to 32 nodes each can be defined using the **Table** function.
'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 grayed-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 (AD CAN MM)

5.2.3.7 Setting measurement module

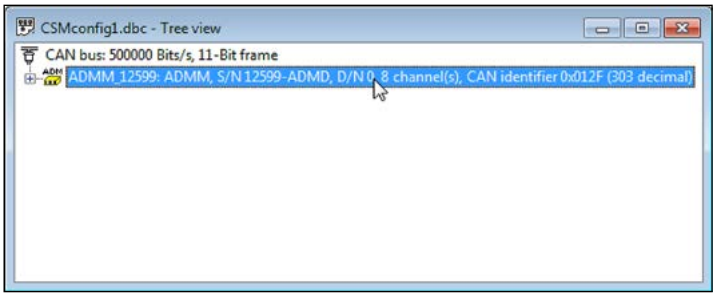


Fig. 5-28: **CSMconfig1.dbc - Tree view** window

☞ Double-click on the device entry with the left mouse button.

or

☞ Mark the device entry with the mouse pointer and press the Enter key.

⇨ The device configuration dialog is displayed.

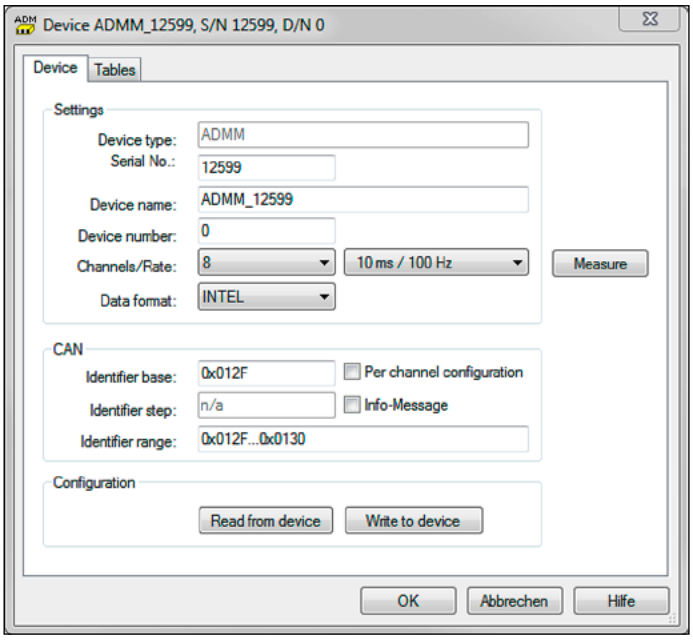


Fig. 5-29: Device configuration dialog (ADMM)

With an online configuration, after executing **Scan Bus** or **Auto-Configuration** the determined device type is displayed under **Device type** and the determined serial number is display in the field **Serial No**.

In an offline configuration, the **Device type** is displayed as selected via the **Select device type** dialog (Fig. 5-7). 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 under **Device name** which consists of the name of the device type and the serial number. Alternatively, an individual, user-defined name can be entered.

The following conditions must be taken into account 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 is retained, it is automatically adjusted when the serial number is changed. The name in this field is also used as a component for the channel names (see Fig. 5-27).

The **Device number** field is intended for entering a device number. However, the use of this number is not mandatory.

The number of available measurement channels is specified in the **Channels** selection menu (left). The specified default settings are "4" and "8". For an ADMM 4 pro HS (AD4 pro MC10), the number of channels can also be set to "1", "2" or "3" to reduce the bus load.

An ADMM 8 classic / pro / pro2 (AD8 MC2 / AD8 pro MC2 / AD8 pro MD2) can be operated with 4 or 8 channels. As only one CAN message is required in operation with four channels (instead of two CAN messages), the bus load is cut in half.

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

The selection menu **Data format** provides two formats for the transmission of CAN messages:

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

The start identifier is displayed in the **Identifier base** field. The value displayed here depends on the setting made in the **Program Settings** dialog under **CAN: Identifier base**. If necessary (e.g. CAN-ID conflict), it can be changed as required.

For measurement modules of the AD CAN MM Series, the **Identifier step** field has no function. The field is grayed out and the value "0" is displayed.

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

The **Per channel configuration** option is only supported by certain measurement modules. It determines whether CAN identifiers and measurement data rate are specified per module or per channel. If the option is activated, the **Rate** selection menu and the **Identifier base** field are hidden. Both can then be individually set for each channel in the channel configuration dialog. A complete list of all supported modules can be found in the online help.

→ *See online help page "Setting of CAN ID and send rate per channel" for more information.*

Signals with additional data can be sent in a separate message using the **Info-Message** option. These signals contain information about the device type, device status, software version, serial number and internal temperature of the measurement module. If the **Per channel configuration** option is activated, no **Info-Message** can be sent.

Example

If the value "4" is set under **Channels** the **Identifier range** consists of one CAN-Identifier (e. g. "**0x0600**"). If the **Info-Message** option is activated, the range is extended by a further identifier ("**0x0600 … 0x0601**").

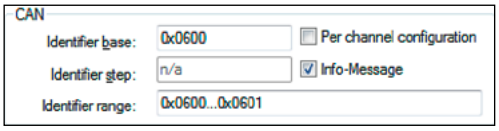


Fig. 5-30: Device configuration dialog, CAN area

The **Configuration** area contains two 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 online help for more information.*

The **Tables** tab (only visible for module versions "pro" and "pro2") contains elements for managing sensor characteristics tables.

→ *See online help for more information.*

Transferring configuration data to the measurement module

When the configuration of channels and measurement module has been completed, 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 message is displayed:

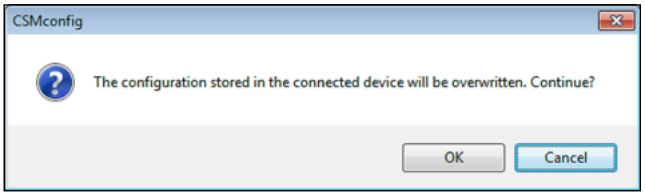


Fig. 5-31: "The configuration stored in the connected device..." confirmation

☞ 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

The measurement module configuration dialog also offers the possibility to check the plausibility of measurements using the **Measure** function.

☞ Click on the **Measure** button (see Fig. 5-29).

⇨ The **Measurement Values** window opens.

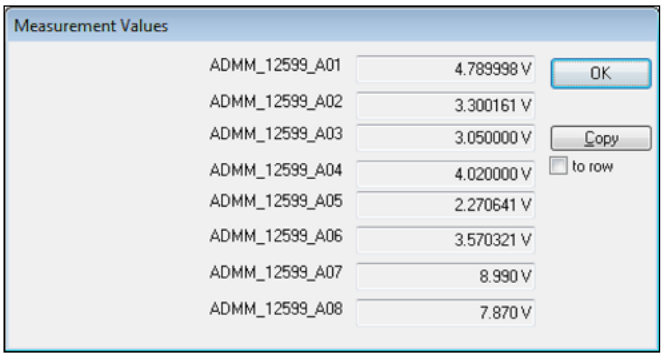


Fig. 5-32: **Measurement Values** window

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

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

5.2.3.8 Saving configuration to a DBC file

The configuration must then 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

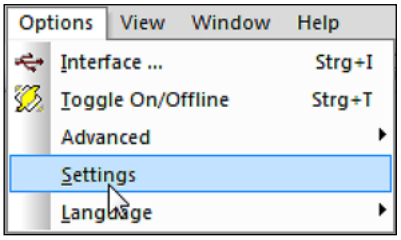


Fig. 5-33: **Options** menu, **Settings** option

☞ Select **Options** | **Settings**.

⇨ The **Program Settings** dialog opens.

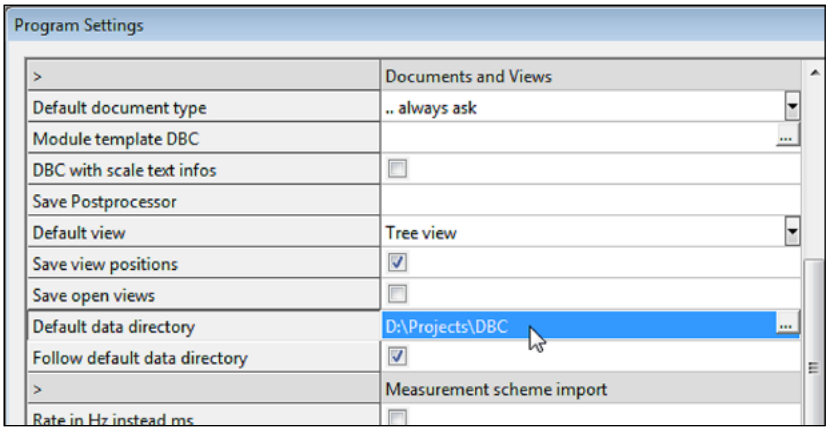


Fig. 5-34: **Program Settings** dialog, **Default data directory** option

☞ Enter the new path in the **Default data directory** field.
☞ Click on **OK** to close the **Program Settings** dialog.

i	As of version 8.4.0, the **Program Settings** dialog contains the **Follow default data directory** option. If this option is enabled, CSMconfig always sets the path that the user last used for storing a DBC or A2L file under **Default data directory.**

Save DBC file

☞ Select **File** | **Save** (→ **Ctrl** + **S**).
⇨ The **Save as** dialog opens.

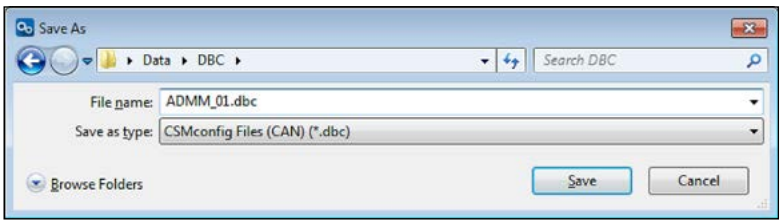


Fig. 5-35: **Save as** dialog

NOTE!	
	The **Save as** dialog opens only 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 desired 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: **`ADMM_01.dbc`**).

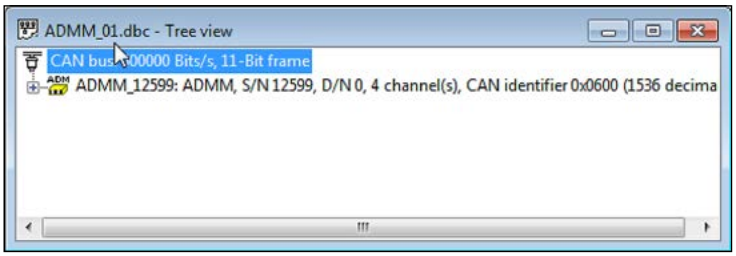
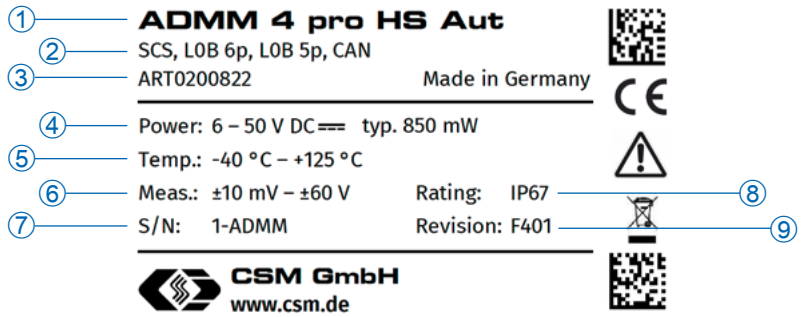


Fig. 5-36: New file name in header line: **ADMM_01.dbc – Tree view**

6 Maintenance and cleaning

6.1 Type label

The type label on the measurement module contains, among other things, the technical data of the measurement module listed below.



①	ADMM 4 pro HS Aut	Device type
②	SCS, L0B 6p, L0B 5p, CAN	Device details: ▸ SCS - housing type "**S**lide **C**ase **S**mall" ▸ L0B 6p - measurement channel sockets: LEMO 0B, 6-pole ▸ L0B 5p - CAN/power supply sockets: LEMO 0B, 5-pole ▸ CAN - bus system
③	ART0200822	Part number of the measurement module
④	Power: 6 – 50 V DC, typ. 850 mW	Power supply range, typical power consumption
⑤	Temp.: -40 °C – +125 °C	Operating temperature range
⑥	Meas.: ±10 mV – ±60 V	Measurement range
⑦	S/N: 1-ADMM	Measurement module serial number
⑧	Rating: IP67	Protection class
⑨	Revision: F401	Hardware revision number

Tab. 6-1: Type label

6.2 Maintenance services

Upon delivery, each measurement module of the AD CAN MM Series is issued with a calibration certificate from our DKD calibration laboratory. This is documented by an appropriate sticker, which is applied either to the back (Slide Case) or the top (Standard) of the module housing, depending on the housing design.

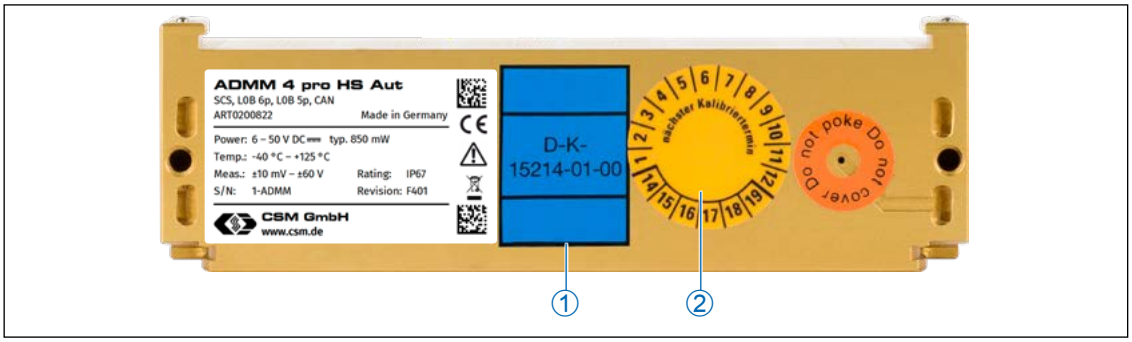


Fig. 6-1: Back of the housing (Slide Case Small) with stickers for calibration date

1. Sticker "DKD calibration"
2. Sticker "Next calibration date"

To ensure reliability and functionality, a measurement module should be checked at least every 12 months. CSM offers maintenance packages and a repair service for this purpose.

- DKD calibration (including function test)
- Repair service

6.3 Cleaning instructions

	NOTE!
	☞ Disconnect the measurement module before starting work.

	NOTE!
	The surface of the housing is sensitive to aggressive cleaning agents, solvents and abrasive media. ☞ Do not use aggressive cleaning agents or solvents to clean the measurement module. ☞ Use only a slightly damp cloth.

Requirements

- All cable connections have been removed.

Required parts/materials

- Soft cloth
- Mild detergent, if necessary.

Cleaning the measurement module

☞ Clean the measurement module with a damp cloth. Use mild detergent if necessary.

7 Attachment

7.1 List of figures

7.2 List of tables

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