HV DTemp Measurement System

User Guide

Version 01.00

Innovative Measurement and Data Technology

Copyright

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.

	Germany (headquarters)	**USA**
Address	**CSM Computer-Systeme-Messtechnik GmbH**	**CSM Products, Inc.**
	Raiffeisenstrasse 36 70794 Filderstadt, Germany	1920 Opdyke Court, Suite 200 Auburn Hills, MI 48326
Phone	+49 711 77 96 40	+1 248 836 4995
Email	info@csm.de	info@csmproductsinc.com
Website	www.csm.de	www.csmproductsinc.com

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	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 also chapter 1.6 "Warranty and exclusion of warranty".*
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 the **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 injury to persons and damage to property.

Warning design

A warning 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 used

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

Tab. 1-2: Warnings

Signal words

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

Signal word	Meaning
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 used

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

Tab. 1-4: Symbols for directives

1.5 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".*

1.6 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 DTemp Measurement System 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 Abbreviations and module designations

1.8.1 General abbreviations

Abbreviation	Meaning
ASAM	**A**ssociation for **S**tandardization of **A**utomation and **M**easuring Systems: registered association coordinating the development of technical standards → *asam.net*
CAN	**C**ontroller **A**rea **N**etwork: serial bus system developed by Bosch for networking ECUs in vehicles
CoE	**C**ANopen **o**ver **E**therCAT®: protocol for use of the CANopen family of profiles over EtherCAT®
DAQ	**D**ata **A**c**Q**uisition, e.g. DAQ software
STG	**ST**rain **G**auge
DTemp	**D**igital **Temp**erature measurement → HV DTemp: measurement system for **D**igital **Temp**erature measurements in HV environments
EMC	**E**lectro**M**agnetic **C**ompatibility
ESD	**E**lectro**S**tatic **D**ischarge
ECAT	**E**ther**CAT**®: an Ethernet-based field bus system developed by Beckhoff company and the EtherCAT® Technology Group → ethercat.org
HV	**H**igh **V**oltage
MC Tool	**M**easurement & **C**alibration Tool
TEDS	**T**ransducer **E**lectronic **D**ata**S**heet: sensor with integrated memory for electronic data sheet
XCP	e**X**tended **C**alibration **P**rotocol → *asam.net*

Tab. 1-5: List of abbreviations

1.8.2 Module designation

The CSM product portfolio offers CAN- and ECAT-based measurement modules for standard and high-voltage (HV) measurements. These measurement modules are mounted in either MiniModule [1] or 19-inch slide-in housings. Standard MiniModules for CAN feature gold-anodized, ECAT measurement modules feature silver-anodized module housings.

Measurement module housings

	
TH8 pro	STG6 BK20
	
HV TH8 evo	HV AD4 OW1000

Tab. 1-6: Measurement module housings

Abbreviations

Measurement module type	
AD	Measurement module for measuring analog voltages
CNT	**C**ou**NT**er measurement module
BM	Measurement module for the acquisition of current and voltage on live high-voltage cables (**B**reakout **M**odule)
HV DTemp	Measurement module for **H**igh-**V**oltage **D**igital **Temp**erature measurements
OUT	Signal output module for the generation of analog quantities
PC	CAN-based **P**ower **C**ontrol module designed as central power supply for distributed measurement applications.
PT	Measurement module for high-precision temperature measurements with PT100 and PT1000 resistor elements

1 MiniModule housings are available in various designs and sizes. See chapter 3, "Housing variants" for further information.

Measurement module type	
STG	Measurement module for the acquisition of mechanical strain using **ST**rain **G**auges
TH	**TH**ermo measurement module for temperature measurements with type K, J or T thermocouples
Bus system	
CAN	**CAN** bus measurement module
ECAT	**E**ther**CAT**® measurement module
Housing type	
MM	**M**ini**M**odule
TBM	**T**est**B**ench **M**odule

Tab. 1-7: Abbreviations for module designations

Typology

As for newer measurement modules, the designation of a module series uses the following pattern:

- It starts with the abbreviation **HV** if it is a high-voltage measurement module
- Indicator for the module type (e.g. **TH** for thermo measurement module).
- A number indicating the amount of measurement channels
- Bus system **CAN** or **ECAT**
- Housing type **MM** or **TBM**

Example

- **HV AD4 ECAT MM** Series: High-voltage ECAT measurement modules in MiniModule housings for measuring analog voltages.
- **HV AD CAN TBM** Series: High-voltage CAN measurement modules in 19 inch test bench housings for measuring analog voltages.

Examples for the designation of older measurement modules

- **ECAT STGMM 6**: ECAT measurement module for measurements with strain gauges with six measurement channels in a MiniModule housing.
- **HV TH-TBM 8**: High-voltage measurement module for temperature measurements with eight channels in a test bench housing.
- **THMM 8 pro**: Thermo measurement module with eight measurement channels in a MiniModule housing. The abbreviation "pro" is for the module version "Professional".

If the module name contains no reference to the bus system, it is usually a CAN measurement module.

Where applicable, further product characteristics are indicated in the name of the individual module types (measurement range, sensor supply, measurement data rate).

→ *Further information can be found on the CSM website in the "Products" section.*

2 Safety Instructions

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

2.1 General Safety Instructions

HV DTemp measurement systems are designed and manufactured to comply with the relevant safety standards. Nevertheless the risk to the life of users and of property damage cannot be excluded. Especially when work on HV-battery systems is carried out, there is a considerable potential for danger. This also applies to the assembly and installation of controllers and sensors of an HV DTemp measurement system in HV batteries.

WARNING!	
	HV DTemp measurement systems are used in high-voltage applications. **Working under voltage (e.g. when handling HV batteries) carries the risk of life-threatening electrical shocks.** ☞ Make sure that work is only carried out by qualified and trained electricians (DIN VDE 1000-10). ☞ Observe safety instructions.

WARNING!	
	HV DTemp-P central units are applied 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 this work is only carried out by qualified and trained personnel.

CAUTION!		
	The surface of the module may become very hot when operated in specific environments (e. g. engine compartment). **Touching the surface can cause serious burns.** ☞ Let the device cool down before handling. ☞ Wear appropriate safety gloves, if required.	

NOTE!

HV DTemp-P central units 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. This reinforced isolation is designed for a maximum of 1000 V RMS. Power supply is galvanically insulated against CAN. This functional insulation is designed for 60 V DC.

☞ Before connecting any cable, make sure that the applied signals (power supply and themperature sensors) are within the allowed voltage ranges.

→ *See "HV DTemp" datasheet for further information.*

NOTE!

The isolation barrier can be damaged due to aging, overvoltage, bipolar voltage, high temperature and mechanical wear! In order to ensure the proper functioning and the electrical safety of the 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 potential between the module (= shield of the interface cable) and the mounting location can falsify measurement results or destroy the device.

☞ Make sure that no differences in potential occur when mounting the device.

☞ Isolate the module from the mounting location, if required.

NOTE!

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

☞ Make sure that the measurement module is correctly installed.

☞ Operate the module only within the specified operation environment.

→ *See "HV DTemp" datasheet 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 technical product documentation, the operator may have to provide further operating instructions in compliance with the Act on Occupational Safety and Health.

2.3 Intended use

- HV DTemp measurement systems were developed for temperature measurements in high-voltage environments.
- These measurement systems may only be used for the above-mentioned purpose and under the operating conditions stated in the technical specifications.

  → *See "HV DTemp" datasheet for further information.*
- Operational safety can only be ensured if the module is used 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 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 sections contain general information about the product. Specific technical information can be found in the datasheet.

→ *See "HV DTemp" datasheet for further information.*

The HV DTemp measurement system from CSM has been developed for the precise, digital and thus interference-free recording of up to 512 temperature measurement points via a single cable connection to the HV DTemp-P central unit. A HV DTemp measurement system consists of a HV DTemp-P central unit, at least one HV DTemp-M controller and the required sensors (sensor assemblies or single sensors).

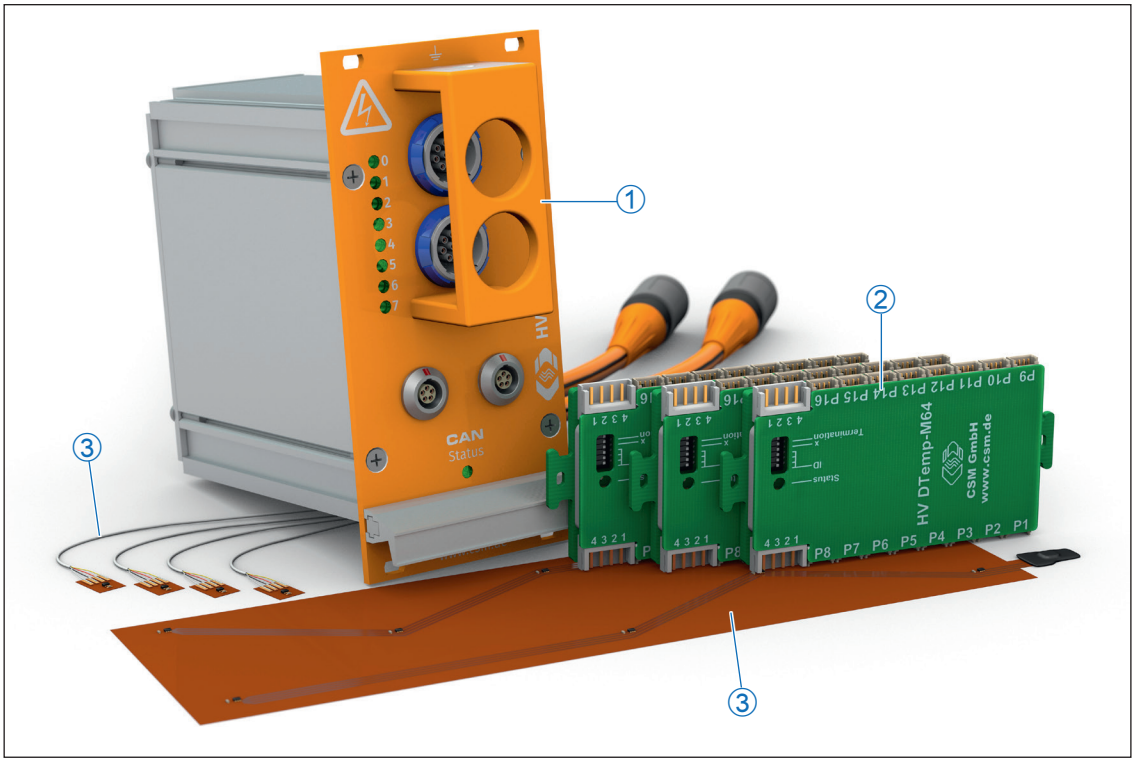


Fig. 3-1: HV DTemp Measurement System

1. HV DTemp-P central unit
2. HV DTemp-M64 or HV DTemp-M16 controller
3. Sensor assemblies and single sensors

3.1 Connections and components

3.1.1 HV DTemp-P central unit

The HV DTemp-P central unit features two galvanically isolated inputs which allow temperatures to be recorded from two different high-voltage areas (HV batteries).

A maximum of eight controllers can be connected to the measurement inputs of an HV DTemp-P central unit. The controllers can be distributed to both measurement inputs or connected to only one of them. A controller has 16 digital inputs for a maximum of 64 measuring points. Thus, up to 512 (8 x 64) measuring points can be connected to one HV DTemp-P central unit.

→ *See chapter 3.1.2 "HV DTemp-M controller".*

Communication between the HV DTemp-P central unit and the configuration software or data acquisition system is performed via CAN bus. Each measuring point is assigned its own CAN ID and this is documented in a DBC description file. The temperature sensors can thus be uniquely assigned and identified. Data transmission on the CAN bus is potential-free in "free running" mode.

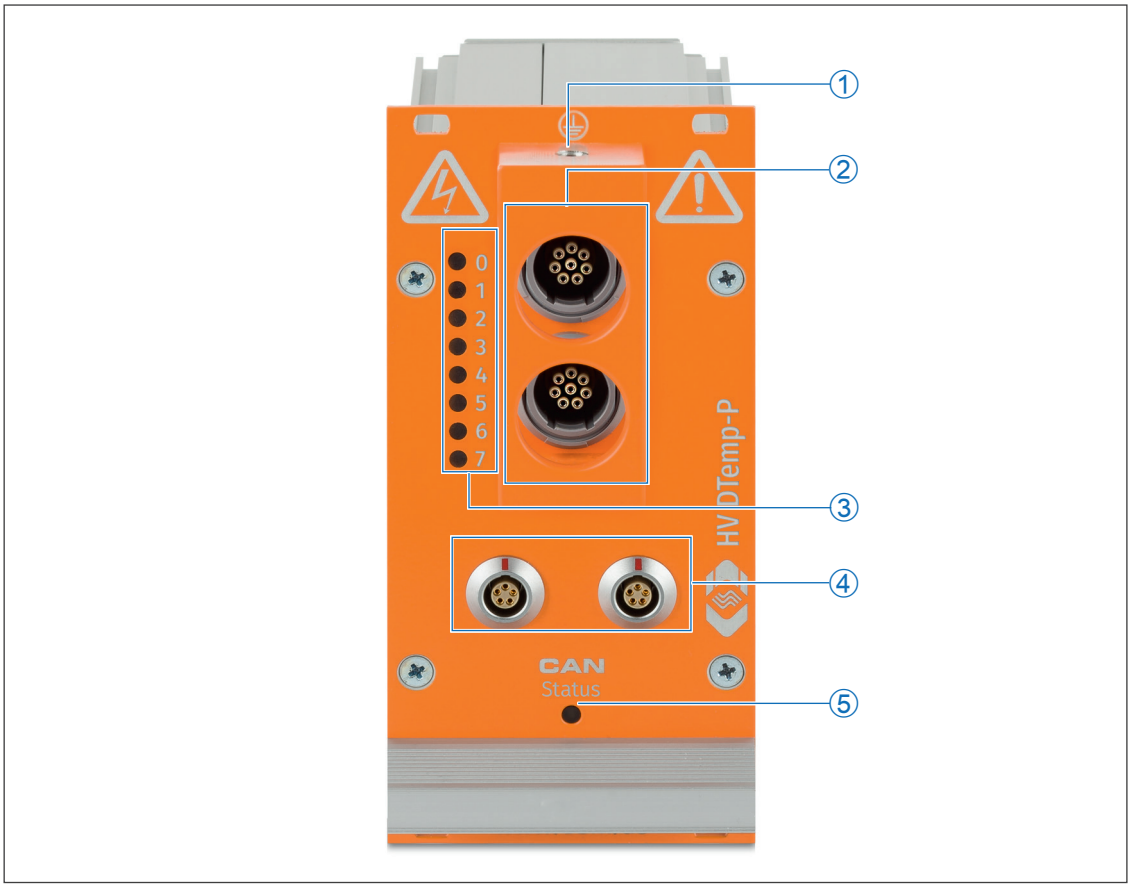


Fig. 3-2: HV DTemp-P central unit, front view

1. M6 threaded hole for ground cable connection (→ *chapter 4.3.2.3 "Ground connection"*)
2. Measurement inputs (→ *chapter 4.3.2.2 "8-pin LEMO Redel multi connector"*)
3. LED Indicators for measurement inputs 0 - 7 (→ *chapter 3.2.2 "Measurement input LED indicators"*)
4. CAN/power supply connectors (→ *chapter 4.3.2.1 "CAN sockets"*)
5. CAN bus indicator LED (→ *chapter 3.2.1 "CAN bus LED indicator"*)

3.1.2 HV DTemp-M controller

HV DTemp-M controllers handle the addressing and power supply of the sensors. They record the digital signals of the temperature sensors and transmit the temperature values to the central unit (Fig. 3-2). One controller provides 16 digital inputs ① for up to 16 (HV DTemp-M16) or 64 measuring points (HV DTemp-M64). The 4-pin sockets ② are used to

- connect the controller to the central unit HV DTemp-P using a high-voltage-safe cable or
- daisy-chain the controller to a further controller using a connection cable.

It is possible to connect up to eight[2] HV DTemp-Mx controllers to one HV DTemp-P central unit, depending on the license and thus the maximum number of measuring points.

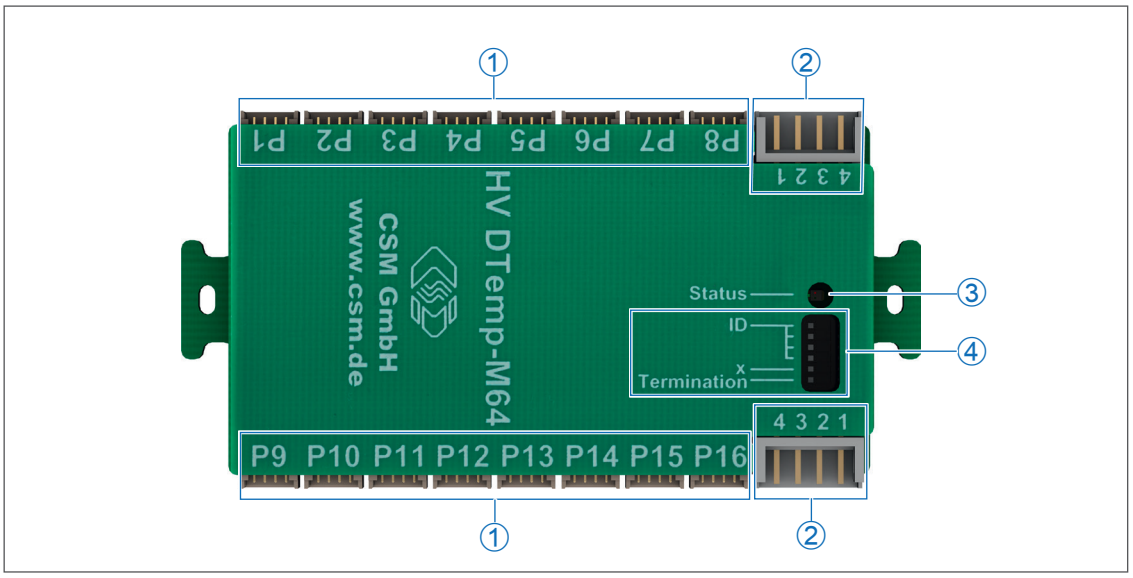


Fig. 3-3: HV DTemp-M controller: top view

1. Sockets for sensors/sensor assemblies
2. Sockets for controllers/central unit
3. Status LED indicator (→ *chapter 3.2.3 "Status LED indicator (controller)"*)
4. Encoding switches (→ *chapter 4.3.3.5 "Encoding switches"*)

3.1.3 Sensors and sensor assemblies

Sensors are available for HV DTemp measurement systems as single sensors or as sensor assemblies.

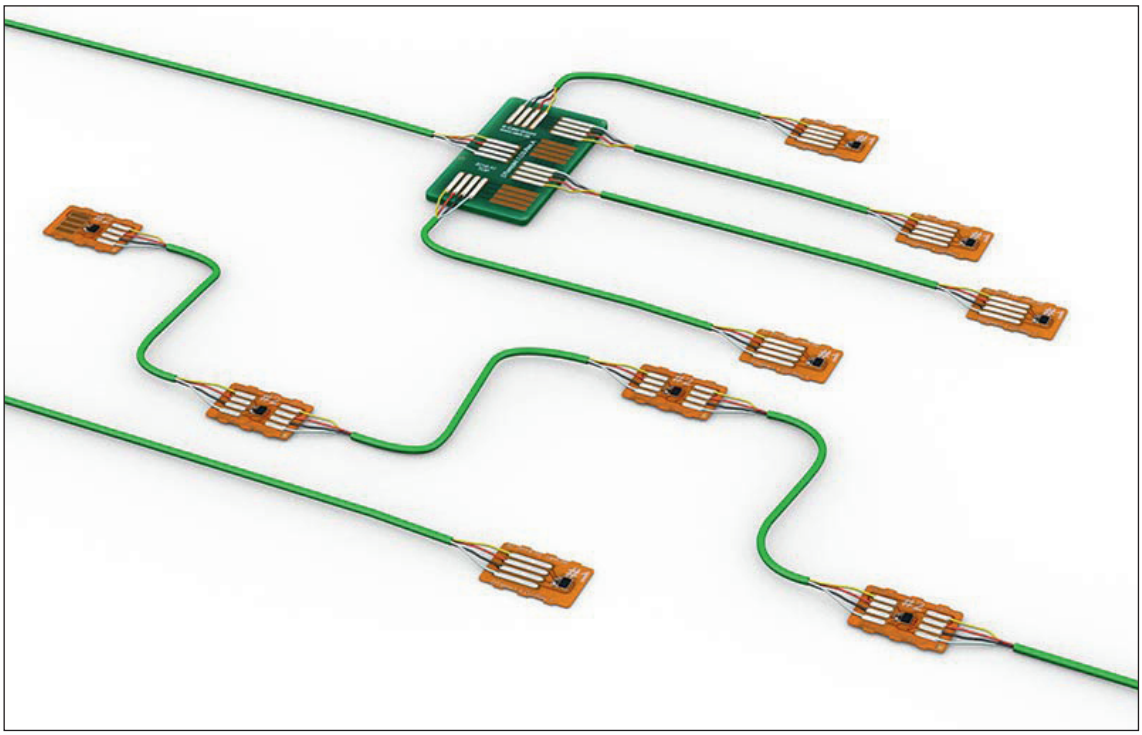


Fig. 3-4: Single sensors/sensor assemblies for HV DTemp-M controllers

i	Please contact our sales department for further details about sensors.

3.2 Functional description of LED indicators

3.2.1 CAN bus LED indicator

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

LED		Meaning
Color	Status	
–	off	
green	continuously lit	Normal operation
green	flashing	Module selected via configuration software.
red	continuously lit	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	flashing	Module has been selected via the configuration software and is in idle mode.
green/red	flashing	A firmware download is in progress

Tab. 3-1: CAN bus LED indicator

3.2.2 Measurement input LED indicators

The LEDs provide information on the status of the corresponding measurement input.

LED	Status	Meaning
-	off	No controller with this ID detected and no channels configured for this ID.
50 % green	flashing	Measurement channel in configuration software selected.
100 % red	continuously lit	There is an ID conflict. Check the encoding switch settings and restart the system.
50 % red 50 % green	flashing	ID detected, measurement channel not configured
50 % red	flashing	ID not detected, measurement channel configured
100 % green	continuously lit	ID detected and measurement channel configured; ready for measurement operation

Tab. 3-2: Measurement input LED indicators

3.2.3 Status LED indicator (controller)

This status LED indicator provides information on the operating status of the controller.

LED	Status	Meaning
100 % green	continuously lit	Controller works properly, data is being transmitted
100 % red	continuously lit	Incorrect ID setting, HV DTemp-P central unit has detected an error

Tab. 3-3: Status LED indicator (controller)

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

HV DTemp-P central units are equipped with a GORE™ membrane. This membrane is needed to regulate pressure and humidity. To ensure reliability and performance of the device, it is absolutely essential that the small ventilation inlet in the rear side of the housing is not blocked or restricted in any way. If this happens, condensate will 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 or use.

	NOTE!
	Trouble-free operation and electrical safety can only be ensured if the module is correctly installed. ☞ Ensure correct installation. ☞ Operate the module only within the specified operating environment. → *See "HV DTemp" datasheet for further information.*

4.2 Mounting an HV DTemp measurement system

	NOTE!
	Strong magnetic fields, such as those induced by permanent magnets, may impair the trouble-free operation of the module. ☞ Never attach the module 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 make any mechanical modifications to the housing. ☞ Observe mounting instructions.

Requirements

- The ventilation opening of the GORE™ membrane must not be blocked or clogged by mounting at the intended position.
- The mounting position must offer sufficient space to connect and disconnect the cables without kinking or clamping them.
- Avoid a mounting position in which the modules are subjected to continuous strong vibrations and/or shocks.

Required parts/materials

- Four screws and a suitable screwdriver or wrench

Mounting the module

☞ Fasten the module to the mounting position.

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

4.3 Installing a HV DTemp measurement system

4.3.1 Before installation

WARNING!	
	HV DTemp measurement systems are used in high-voltage applications. **Working under voltage (e.g. when handling HV batteries) carries the risk of life-threatening electrical shocks.** ☞ Make sure that this work is only carried out by qualified and trained electricians (DIN VDE 1000-10). ☞ Observe safety instructions.

WARNING!	
	The HV DTemp-P central unit is applied 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!	
	Opening of the housing impairs the operational safety of the HV DTemp-P central unit and bears the risk of life-threatening electrical shocks. **Opening the housing can be life-threatening due to high voltage.** ☞ Never open the housing. ☞ Do not carry out any mechanical or electrical modifications on HV measurement systems.

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 this 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 DTemp-P central units feature reinforced insulation against each other as well as against CAN interfaces, power supply and housing.

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

	CSM offers maintenance and repair packages for HV DTemp-P central units. → *Chapter 6 "Maintenance and Cleaning"*

4.3.2 HV DTemp-P central unit connectors

The CAN sockets located in the lower half of the front panel (Fig. 3-2, ④) are used both for transmitting CAN signals and for power supply. The interface cable connects the module with the data acquisition system (computer) and the power supply.

NOTE!	
	Take special care when connecting third-party devices to a measurement bus with HV DTemp measurement systems. ☞ Ensure that the configuration settings are compatible with 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.

The controllers and the sensors connected to them are connected to the HV DTemp-P central unit using the 8-pin multi-connector sockets (Fig. 3-2, ②).

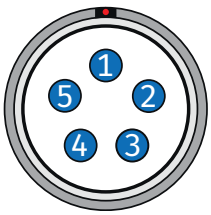
If required, the HV DTemp-P central unit can be connected to ground using the M6 threaded hole in the top side of the front bracket (Fig. 3-2, ①) .

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 modules. At the end of the measurement chain, a CAN termination resistor is plugged into the open CAN socket.

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

- **FGG.0B.305.CLA xxxxx** [3]

	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

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

	The LEMO 0B socket is CSM's standard version. If the module is to be equipped with non-standard sockets, please contact our sales department.

4.3.2.2 8-pin LEMO Redel multi connector

The HV DTemp-P central unit is equipped with two 8-pin multi-connector sockets. Depending on the license, a maximum of eight controllers can be connected to the two measuring inputs. The controllers can be distributed to both measuring inputs or connected to only to one of them.

4.3.2.3 Ground connection

The housing of an HV DTemp-P central unit 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 hole in the top side of front bracket. This threaded 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.

Required parts/materials

- 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 mm². DIN 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

Two measurement cables can be connected to an HV DTemp-P central unit. The following measurement cables are currently available:

Module	Measurement cable	Ground cable cross section	Required cross section for ground cable
HV DTemp-P	HV DTemp-P Cable (2.5 m/5 m)	0.65 mm²	isolated: 2.5 mm² non-isolated: 4.0 mm²

Tab. 4-2: Measurement cables - Ground cable cross sections

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

Connecting the cables

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

4.3.2.4 Connecting the cables

Cables of various lengths are available for connection to the data acquisition system and the power supply, as well as for daisy-chaining the measurement modules:

- Cables for connecting CAN measurement modules: K70-xxxx
- Cable for connecting the HV DTemp Measurement System-P central unit with both the computer and the power supply: K73-xxxx/ K176-xxxx

	NOTE!
	Depending on the number of modules and the cable lengths it may be necessary to apply an intermediate power supply. → *See paragraph "Cable lengths" for further information.*

4.3.2.5 Connecting the power supply

Connecting an HV DTemp-P central unit and any further measurement modules linked to it to the power supply is made via the interface cable, which also connects the measurement module to the PC/data acquisition system. These cables are available in different lengths.

The modules are designed for low power consumption. In combination with CSM connection cables and due to their compact design, these modules can in most cases be easily installed. To ensure error-free functioning, the following aspects should be taken into account when choosing the appropriate power supply.

Minimum supply voltage

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

When operating these 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 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 it. The voltage at the last module in a supply chain must not drop below 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 modules are wired in series (given the same cable length and supply voltage) than stated in, an additional power supply is needed. An intermediate power supply is also required if, due to correspondingly higher power consumption, of series modules 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.

→ *Further information on the cables available can be found in the "CAN Accessories" datasheet.*

4.3.3 Controller connectors

4.3.3.1 Installation of controllers and sensors – operational safety

WARNING!	
	HV DTemp measurement systems are used in high-voltage applications. **Working under live conditions (e.g. when handling HV batteries) carries the risk of life-threatening electrical shocks.** ☞ Make sure that work is only carried out by qualified and trained electricians (DIN VDE 1000-10). ☞ Observe safety instructions.

The only component of the HV DTemp measurement system located outside the HV environment is the HV-safe central unit HV DTemp-P. **Like the sensors, the controllers are located in the HV battery and thus within the high-voltage range.**

Since the HV battery cannot be switched voltage-free, the safety instructions for the installation of controllers and sensors must be strictly observed when handling HV DTemp measurement systems.

→ *See CSM document "Safety Instructions HV DTemp".*

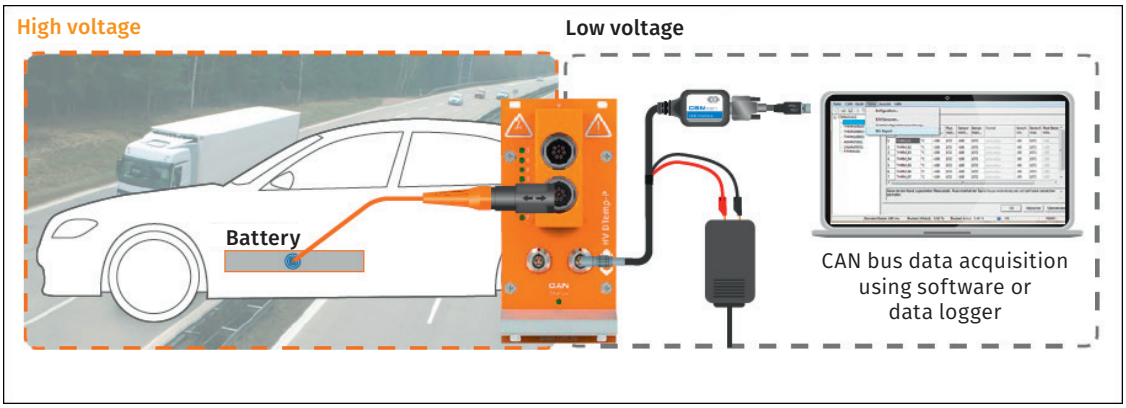


Fig. 4-1: HV DTemp measurement system: high-voltage and low-voltage range

4.3.3.2 General instructions for mounting sensors and controllers

	NOTE!
	Electrical safety and fault-free operation can only be ensured if the original cables designed for the installation are used. ☞ When daisy-chaining controllers and connecting sensors, only use CSM special cables designed for this purpose. ☞ Never use do-it-yourself solutions or cables from third-party manufacturers.

	NOTE!
	Controller and sensors should be installed in such a way that the connecting cables can be kept as short as possible and that mechanical stress to the cables is avoided. ☞ Make sure that the cable lengths are as short as possible. ☞ Make sure that no chafing occurs during installation. ☞ If necessary, preventive measures must be taken to protect the cables from chafing or sharp edges.

4.3.3.3 Plugging and unplugging connectors

The following instructions apply to all plug connections of an HV DTemp controller.[4]

☞ Take hold of the notch between plug and socket and pull the plug (Fig. 4-2).

☞ Never pull the cable directly!

☞ Make sure that the ambient temperature does not exceed +85 °C during insertion and removal.

☞ Insert the plug slowly axially and straight into the socket (Fig. 4-2). The latches are located on the lower side of the plug (see marking Fig. 4-3).

☞ Never try to force the plug in and out. If a plug-in/out process does not work properly, check whether a) the pins are bent or b) the housing may have become deformed.

☞ When wiring, make sure that the plug connections are not exposed to unnecessary mechanical stress and that the cables are not subjected to mechanical strain.

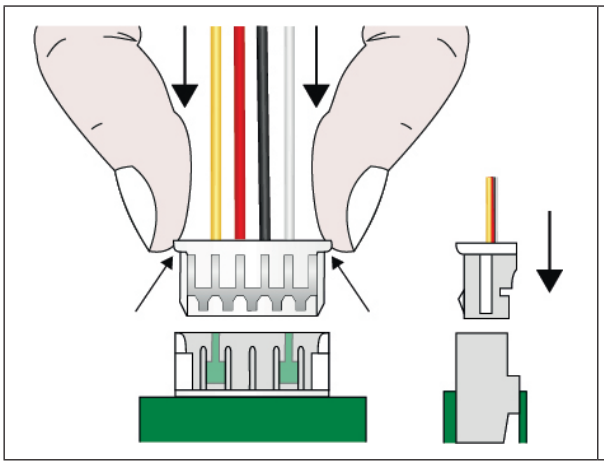


Fig. 4-2: Insert the plugs straight.

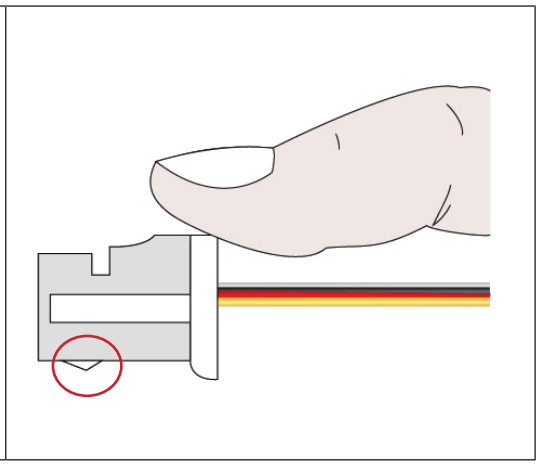


Fig. 4-3: Pull the plug to disconnect the cable.

4 Connectors WR-WTB125 (controller/central unit) and Molex PicoBlade & JST S4B-EH (sensors).

How to apply sensors

	NOTE!
	When mounting sensors at the measuring point, they must always be isolated, i.e. separated from any potential.

	NOTE!
	Since there is very little space available inside a battery, the sensors are equipped with very thin cables. Accordingly, these cables are sensitive and can only withstand limited mechanical stress. Therefore, sensor cables and flexible circuits should be handled very carefully. ☞ Do not kink sensor cables and flexible circuits. ☞ Make sure that cables and flexible circuits are not mechanically stressed. Provide strain relief if necessary. ☞ Do not bend the sensor cable by 90° directly at the end of a solder lug.

	NOTE!
	When choosing the measuring point, also make sure that a sensor will not be exposed to mechanical strain after mounting. ☞ Never expose sensors to mechanical strain.

Sensor designs

Currently, single sensors and flexible circuits are used. Both types are available with only individual sensors and as sensor assemblies. Fig. 4-4 and Fig. 4-5 show units with unsealed sensors. These units are also available with sealed sensors.

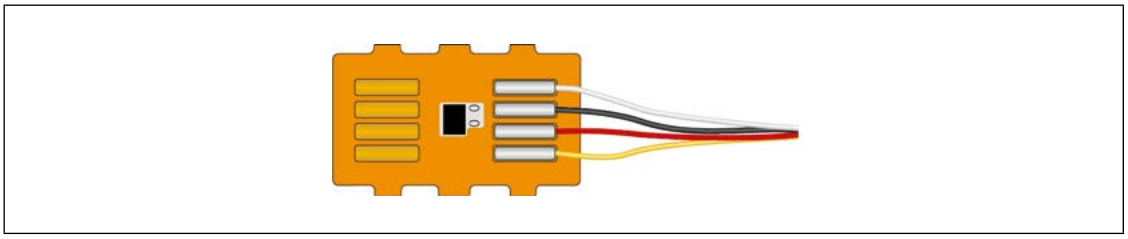


Fig. 4-4: Single sensor, top view

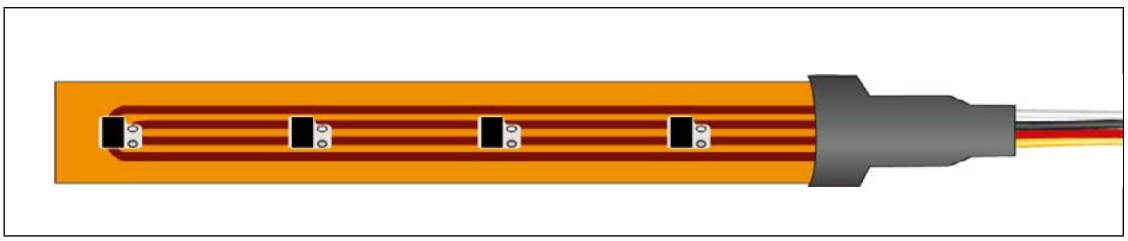


Fig. 4-5: Sensor assemblies (flexible circuit)

In both versions, the lower side of the sensor is electrically isolated (see Fig. 4-6). This means that no further isolation material is required when mounting the sensors with the lower side towards the measuring point, as recommended by CSM.

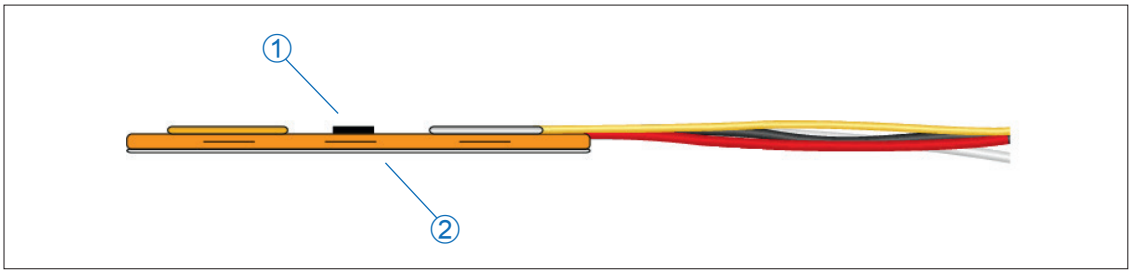


Fig. 4-6: Single sensor, lateral view

1. Top side with sensor and solder lugs
2. Lower side with isolation layer

Self-adhesive, electrically isolating Kapton® foil is recommended for fixing individual sensors and flexible circuits. Included in the scope of delivery are circular Kapton® foil segments for mounting and fixing the sensors to the measuring points in a single step.[5]

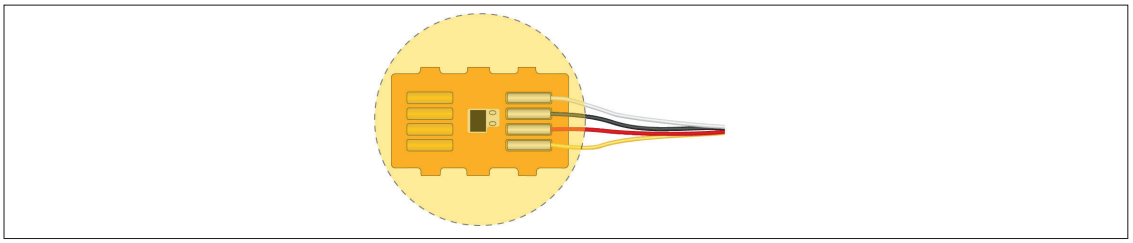


Fig. 4-7: Single sensor fixed with Kapton® foil

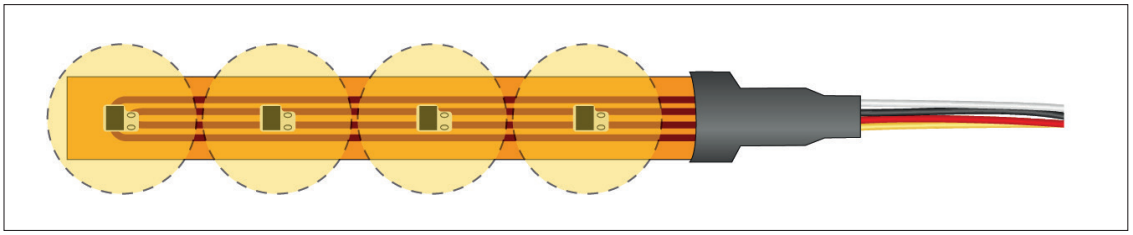


Fig. 4-8: Sensors of a sensor assembly (flexible circuit) fixed with Kapton® foils

	NOTE!
	☞ When applying a sensor to the measuring point, make sure that ... it is always isolated from the measuring point. ... the lower side of the sensor is resting flat on the measuring point. ... the bending radius does not drop below 7.5 × D [6] when installing the connection cables (Fig. 4-9). ... the connection cables are not bent sharply or placed over sharp edges (see Fig. 4-9).

	NOTE!
	☞ When placing the flexible circuits, make sure that ... the circuit is not bent sharply but carefully over the edge. ... no sensor is located within the bending radius.[7]

5 A sensor or sensor assembly can be disassembled and removed from the measuring point by removing the foil(s).
6 "D" indicates the outer diameter of a cable or the thickness of a flat cable in mm.
7 If a sensor is located within the bending radius, there is a risk that the solder lugs will break away from the foil surface and contact with the sensor will be interrupted.

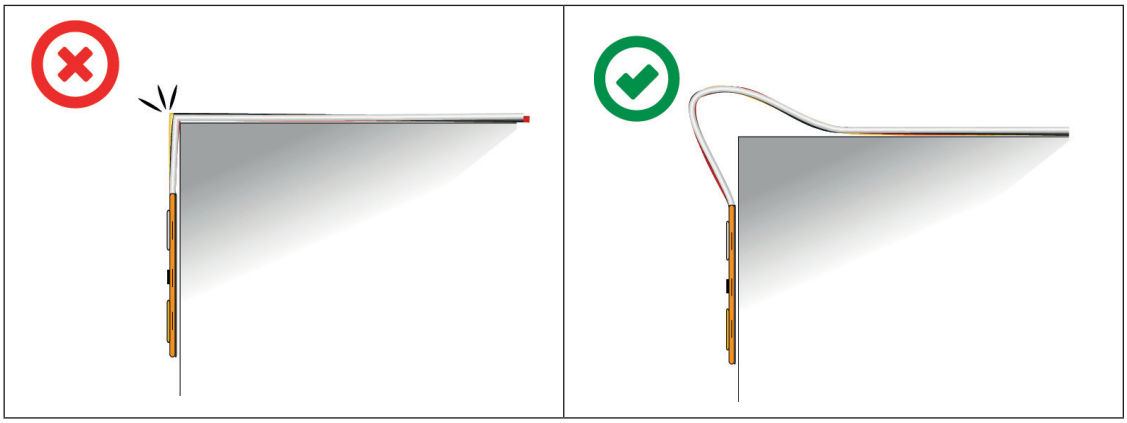


Fig. 4-9: Do not kink the sensor cable (left), but carefully bend it over the edge (right)

Proceed as follows to fix the sensor(s) on the measuring point:

☞ Position the sensor directly on the measuring point.

☞ Remove the protective foil from the Kapton® foil and use the Kapton® foil to mount/fix the sensor at the measuring point.

4.3.3.4 Mounting the controllers

For safety reasons the controllers must also be fixed in order to minimize mechanical strain. For this purpose, the controllers are equipped with mounting lugs ① which are used to attach the controller to the intended mounting location using suitable fastening material (e.g. cable ties).

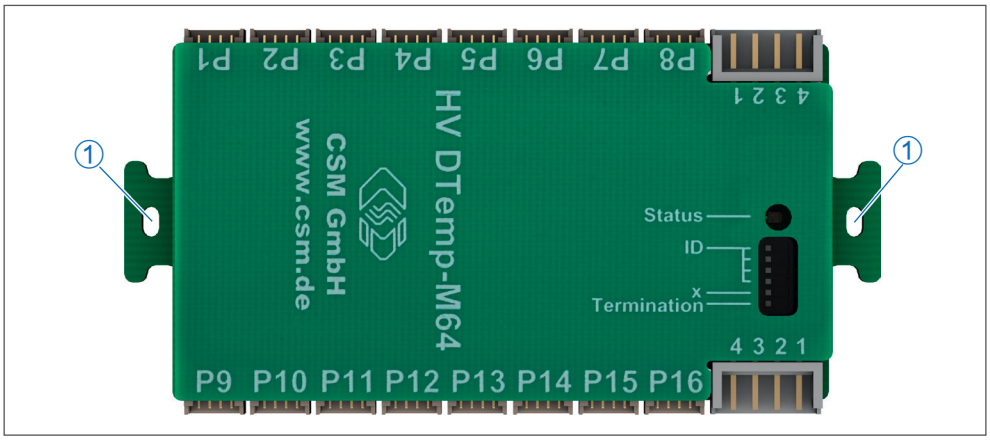


Fig. 4-10: Controller, mounting lugs

4.3.3.5 Encoding switches

Whether only one or more controllers are connected to a measurement input, you have to make sure that

- ... the required ID is set on each controller.[8]
- ... the last controller of a chain is terminated.

The setting of the controller ID and the termination of a controller is done by using the encoding switches (see Fig. 4-11).

8 Make sure that an ID is only used once per measurement chain.

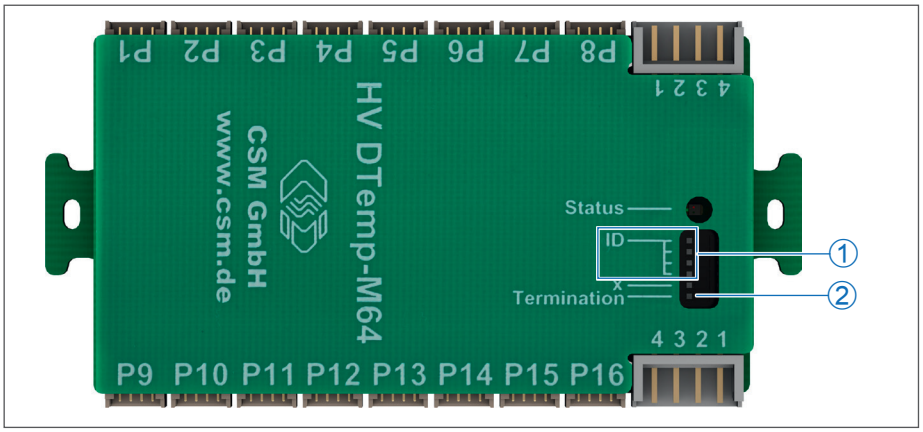


Fig. 4-11: Encoding switches, top side of controller

3. Encoding switches 1-4 for specifying the controller ID
4. Encoding switch "Termination" for terminating a controller

Switch position	Function
Left	Off
Right	On

Tab. 4-3: Encoding switch position

4.3.3.6 Setting the controller ID

Switch				ID
1	2	3	4 [9]	
On	On	On	On	0
Off	On	On	On	1
On	Off	On	On	2
Off	Off	On	On	3
On	On	Off	On	4
Off	On	Off	On	5
On	Off	Off	On	6
Off	Off	Off	On	7

Tab. 4-4: Encoding switches, controller ID

4.3.3.7 Terminating a controller

The "Termination" switch (see Fig. 4-11) is used to terminate a controller. Switch position "On" indicates that termination is enabled.

9 Only the switches "1" to "3" are required to set the controller ID. The ID switches "4" and "x" are without function.

5 Using a HV DTemp Measurement System

5.1 Typical example of a measurement application

Fig. 5-1 shows a measurement application consisting of an HV DTemp measurement system, a HV battery as well as a power supply, a CAN interface and a PC with the necessary software for CAN data acquisition and configuration and the required connection cables.

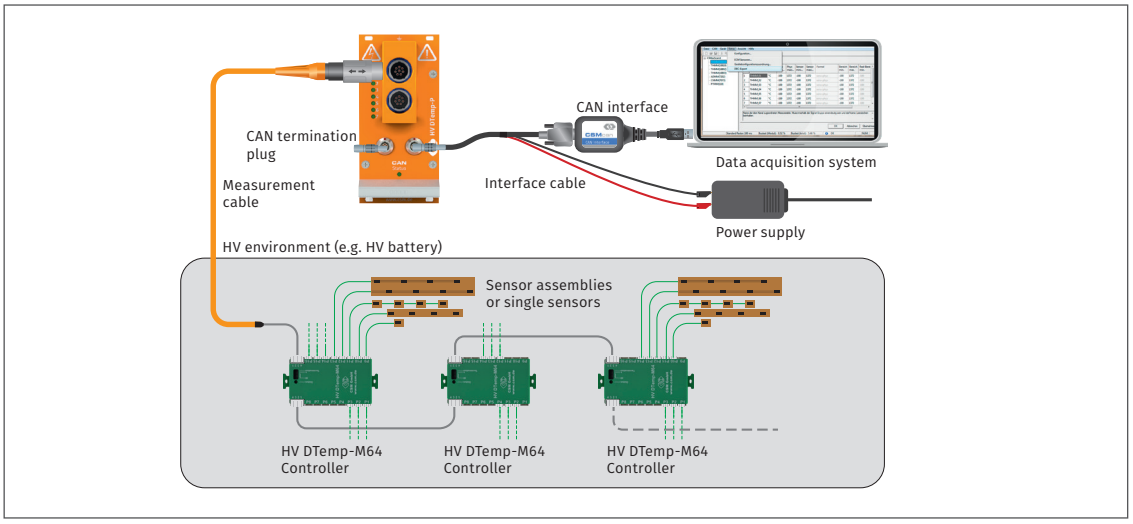


Fig. 5-1: Measurement application with HV DTemp measurement system

The installation consists of the following components:

- 1 HV DTemp-P central unit
- 1 High-voltage battery equipped with 3 HV DTemp-M64 controllers and various sensors
- 1 data acquisition system (PC) with DTEMPconfig configuration software
- 1 interface cable with power supply connectors
- 1 measurement cable (central unit - controller)
- 2 controller connection cables
- 1 CAN termination plug
- 1 CAN interface
- 1 power supply

Connecting the components

☞ Mount sensors and controllers in the HV battery.
☞ Connect the sensors to the controllers and daisy-chain the controllers.
☞ Plug in the measurement cable(s) on the controller side.
☞ Connect the interface cable to one of the CAN sockets of the HV DTemp-P central unit.
☞ Plug the CAN termination plug into the free CAN socket of the control unit.
☞ Connect the other end of the interface cable with the PC via the CAN interface.
☞ Connect the banana plugs of the interface cable to the power supply.
☞ Connect the measurement cable to the 8 pin multi-connector socket.

5.2 Configuration software DTEMPconfig

	NOTE!
	A configuration document (DBC file) is included in the scope of delivery of a HV DTemp measuring system. If the configuration document has to be changed, the configuration software DTEMPconfig is required. This software is available at CSM for a license fee. For further details please contact the sales department..

5.2.1 DTEMPconfig user interface

The DTEMPconfig software is used for the configuration of HV DTemp measurement systems. The DTEMPconfig user interface consists of the following sections:

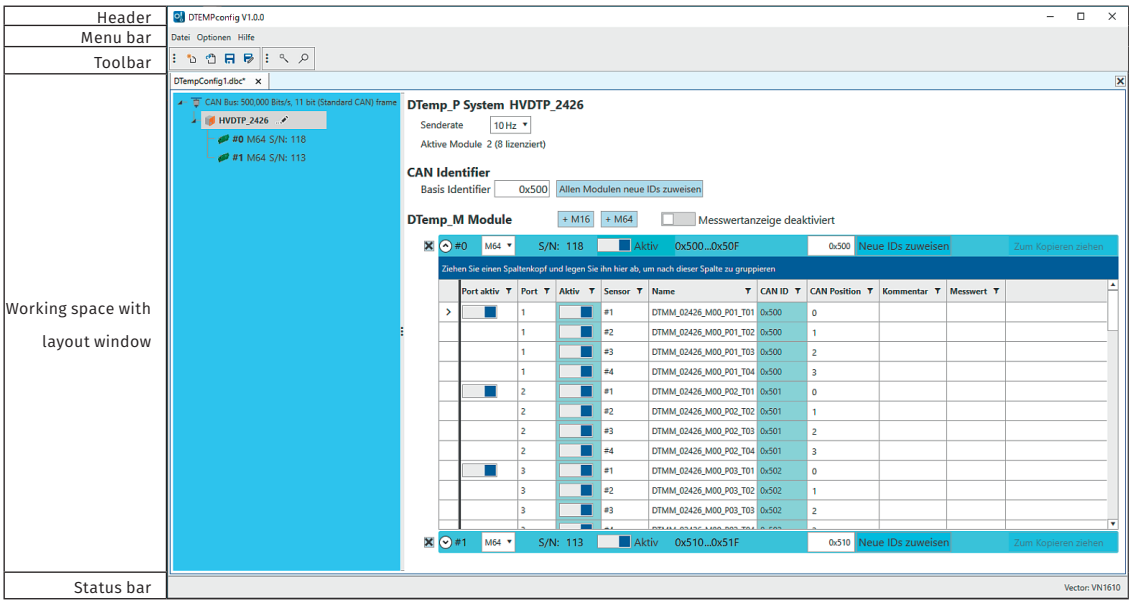


Fig. 5-2: DTEMPconfig user interface

Header

Clicking the program icon on the left opens the program menu. The program menu provides the usual functions for modifying the position and resizing of the program window.

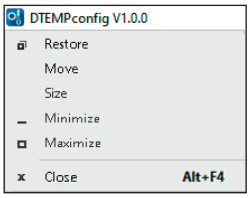


Fig. 5-3: Program menu

Menu bar

The commands are arranged in the following menus:

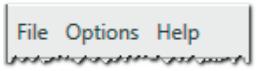


Fig. 5-4: Menu bar

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

Toolbar

The toolbar contains the most frequently used menu commands.

Icon	Command	Function
	New	...opens a new configuration document.
	Open	... opens a dialog to load an existing configuration document.
	Save	... saves the active configuration document.
	Save As	... opens the dialog **Save as**. The configuration document can be given a different name and saved in a different folder.
	Auto Configuration	... starts the Auto-Configuration.
	Scan Bus	... scans the bus for connected hardware.

Tab. 5-1: Toolbar commands

Working space

The configuration data is summarized in a configuration document and stored as a DBC file (CAN). In DTEMPconfig, the data of a configuration is processed in the working space of the program in a two-pane configuration window.

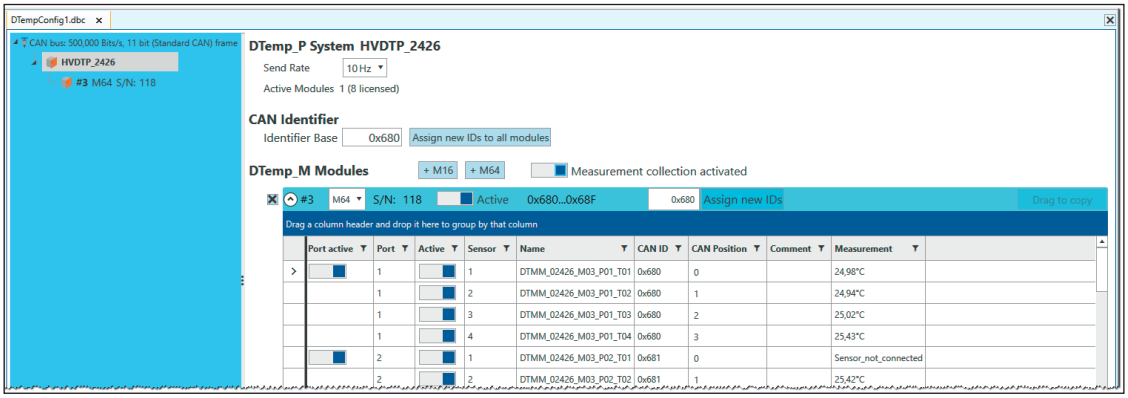


Fig. 5-5: DTEMPconfig configuration window

→ *See chapter 5.3.2.2 "Creating a configuration", section "Setting options in the left section of the configuration window (highlighted in blue)" and "Configuration window, right".*

→ *See DTEMPconfig online help, section "DTEMPconfig user interface, 4. Working space" for further information.*

Status Bar

The status bar provides the following information:

- the interface currently connected to the PC or
- the message "No interface"

5.3 Setting the central unit and the controller

	NOTE!
	It is recommended always to use the latest version of DTEMPconfig as older versions may not support all functions.

The following sections contain information on the following topics:

- Setting options for the HV DTemp-P central unit and the HV DTemp-M controller

Similar to CSMconfig, configurations in DTEMPconfig can be created both *online* and *offline*.

Online configuration

- The measurement system is linked to the configuration software.
- Upon completion in DTEMPconfig, a configuration can be directly transferred to the HV DTemp Measurement System.

Offline configuration

- There is no connection between configuration software and the central unit(s). The configuration document is created "offline", which means without connection to the measurement chain.
- The configuration is transferred to the measurement chain via DTEMPconfig at a later time, after an online connection to the measurement chain has been established.

5.3.1 Creating an 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 module or a measurement chain at a later time or made available for further use in other tools such as vMeasure exp, CANape® or INCA.

☞ Start DTEMPconfig.

⇨ The DTEMPconfig program window opens.

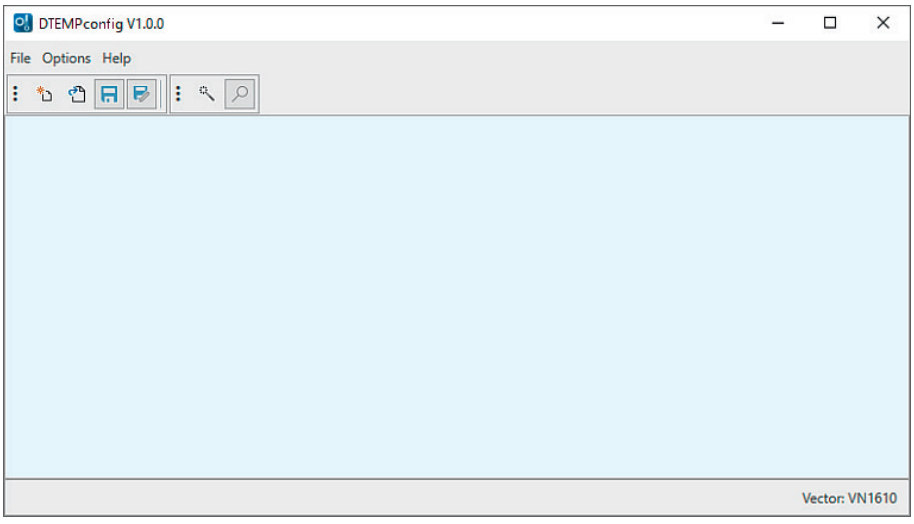


Fig. 5-6: The DTEMPconfig program window

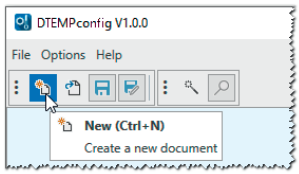


Fig. 5-7: **File | New**

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

⇨ An empty configuration window opens.

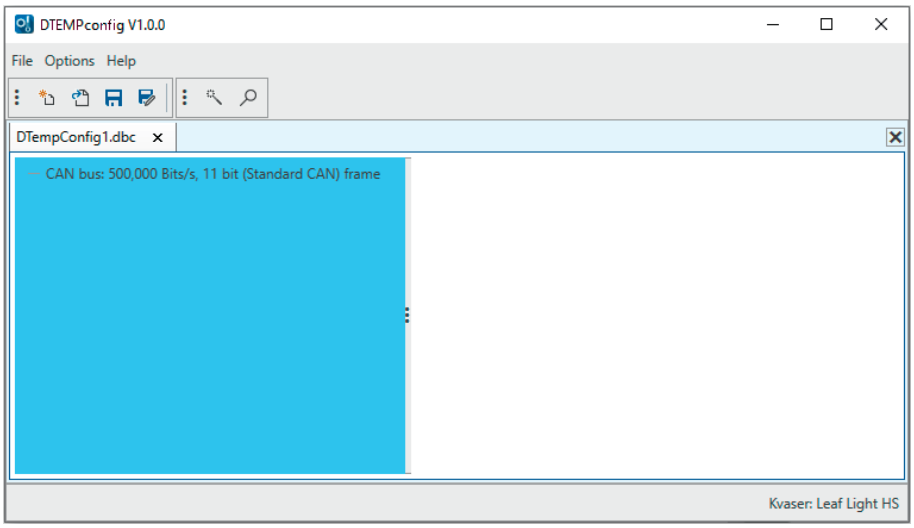


Fig. 5-8: DTEMPconfig: New configuration document

Insert central unit

☞ Move the mouse pointer to the CAN bus entry and right-click.

⇨ The context menu opens.

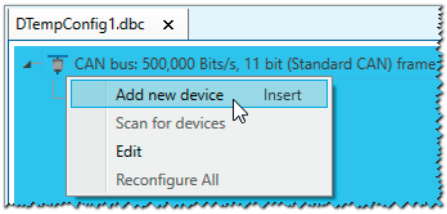


Fig. 5-9: Context menu, **Add new device**

☞ Select **Add new device** from the context menu.

⇨ The **Device Properties** dialog opens.

Fig. 5-10: **Device Properties** dialog

☞ Enter the serial number (**S/N**) of the HV DTemp-P central unit if available.

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

⇨ The structural elements **DTemp_P System**, **CAN Identifer** and **DTemp_M Modules** are displayed in the right window section.

⇨ A yellow warning symbol indicates that there is no online connection to the central unit.

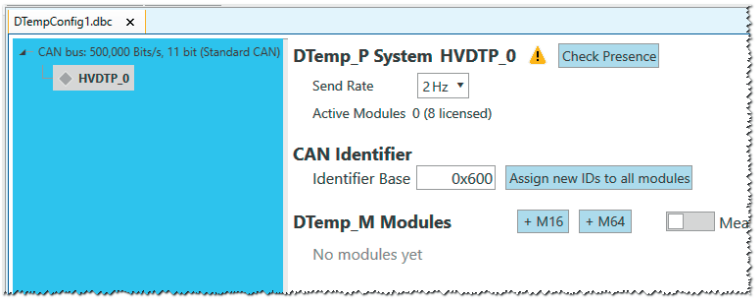


Fig. 5-11: DTEMPconfig: Central unit inserted into the configuration

Inserting a controller

The controller(s) required for the configuration are inserted in the **DTemp_M Modules** section ('No modules yet' is displayed there so far).

Fig. 5-12: Inserting a controller

☞ Select **+M64** (or **+M16**) in the **DTemp_M Modules** section.

⇨ A table for a corresponding HV DTemp-M controller is inserted.

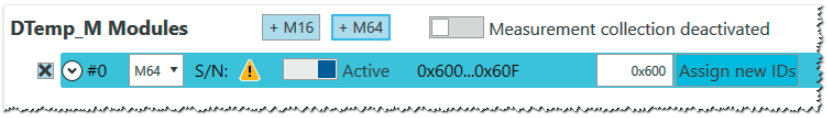


Fig. 5-13: Controller inserted into the configuration

The fields for the ID (**#**) and the serial number (**S/N**) display '0' or, as with the central unit, a yellow warning symbol. This symbol indicates that there is no online connection.

☞ Click on the blue bar or the ⌄ button, to expand the table. This table provides the means to configure the sensors individually.

⇨ The table is faded in.

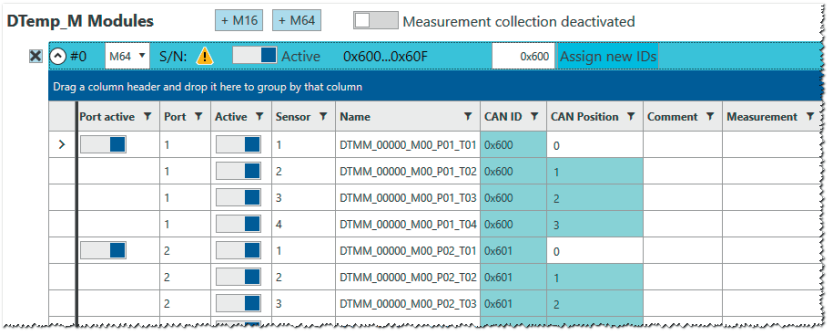


Fig. 5-14: Expanded controller table

☞ Make the required settings.

⇨ Select **Save As** to save the configuration document.

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

Notes on the setting options for controller and central unit are given in chapter 5.3.2 "Creating an online configuration".

→ *See "DTemp_M Modules section" and chapter 5.3.2.4 "Module settings".*

If a configuration has been newly created or modified, it has finally to be transferred to the central unit.

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

5.3.2 Creating an online configuration

Preparing the configuration

☞ Before starting an online configuration, make sure that:

- ... measurement system and computer are properly connected via a suitable CAN interface.
- ... the latest version of DTEMPconfig is installed on the computer.

5.3.2.1 Starting the program

☞ Start DTEMPconfig.

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

If DTEMPconfig is connected to a measurement application via an interface and if this interface was already used in a previous session, then it is usually displayed in the lower right-hand corner of the status bar after program start-up.

Selecting an interface

If a different interface is used than in the past session, the **Interface** dialog opens with the currently available interface preselected.

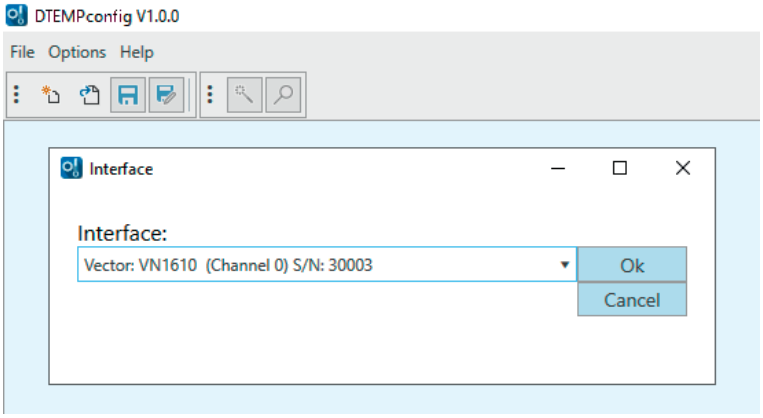


Fig. 5-15: **Interface** dialog: Selecting an interface

If the program cannot detect an interface, "No interface" will be displayed in the status bar and the **Interface** dialog opens.

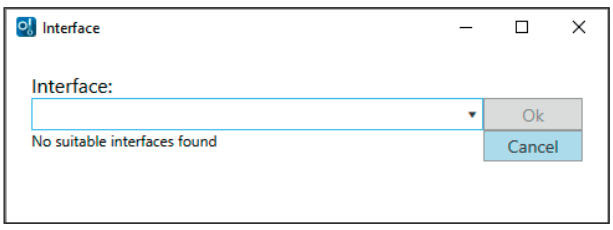


Fig. 5-16: **Interface** dialog: No suitable interfaces found

Check the interface connection or connect a suitable interface.

☞ Close DTEMPconfig and restart the program.

⇨ The interface should now be available in the selection menu of the **Interface** dialog.

→ *Further information on this topic can be found in the DTEMPconfig online help on page "Interface (Dialog)".*

5.3.2.2 Creating a configuration

Scan Bus and Auto-Configuration

Both functions can be used to identify modules connected to the bus and to read out stored configurations. In addition to the module detection, **Auto-Configuration** features an option to solve possibly existing ID conflicts. However, an automatic channel configuration in its actual sense (e.g. setting the measurement range) is not performed.

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

Reading in a configuration

The configuration is read in using the **Scan Bus** command.

☞ Start DTEMPconfig.

⇨ The DTEMPconfig program window opens.

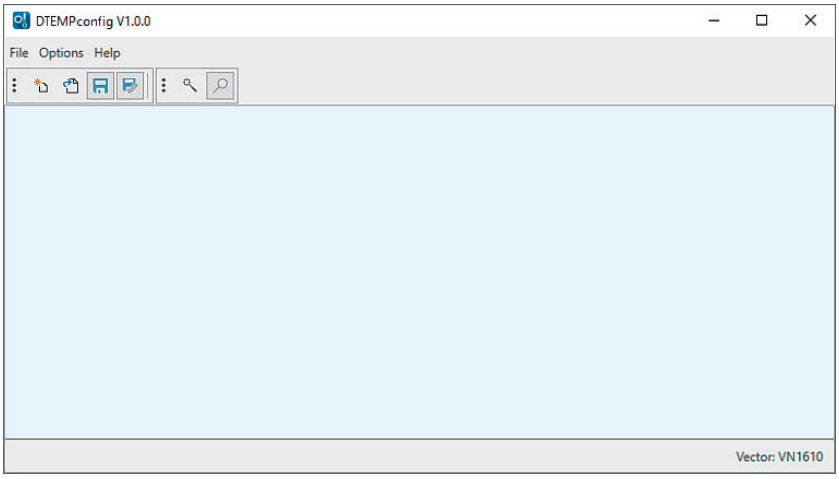


Fig. 5-17: DTEMPconfig user interface, no configuration window opened

If DTEMPconfig cannot detect an interface, the **Interface** dialog opens and indicates a missing interface connection.

→ *See chapter 5.3.2.1 "Starting the program", section "Selecting an interface".*

Running Scan Bus

Scan bus checks the CAN bus for connected devices (central unit(s) and controllers). The configuration data is compiled to be finally saved in a DBC file.

	NOTE!
	A new configuration document must be opened in order to perform **Scan Bus**. In an **Auto-Configuration**, the configuration document is generated automatically. It does not need to be created manually beforehand.

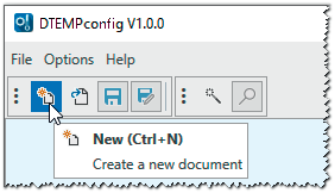


Fig. 5-18: Creating a new configuration document

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

⇨ An empty configuration document opens in the working space.

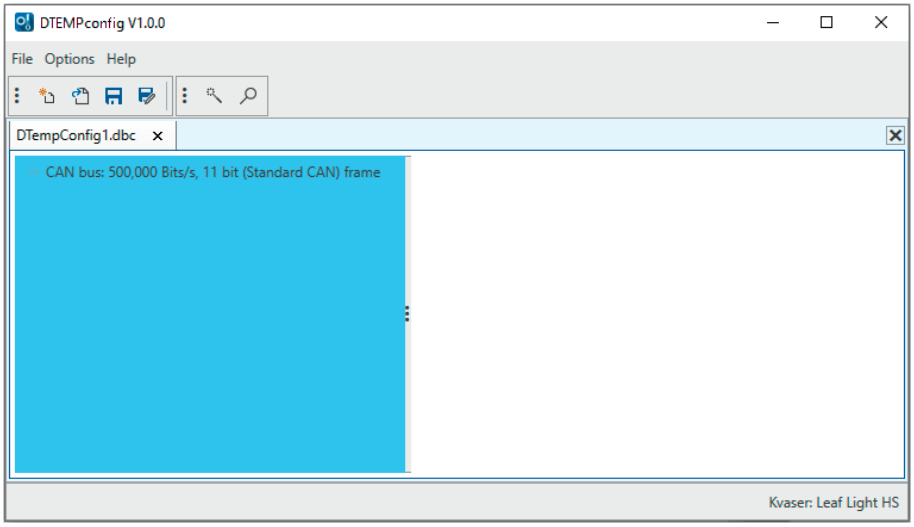


Fig. 5-19: Empty configuration window

☞ Execute **Scan Bus** (→ **Ctrl + B**).

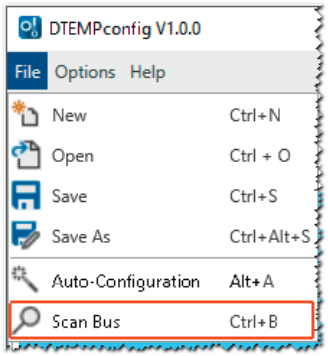


Fig. 5-20: **File | Scan Bus**

⇨ The bus is checked for connected hardware.

⇨ The detected components are displayed in the left section (highlighted in blue) of the configuration window.

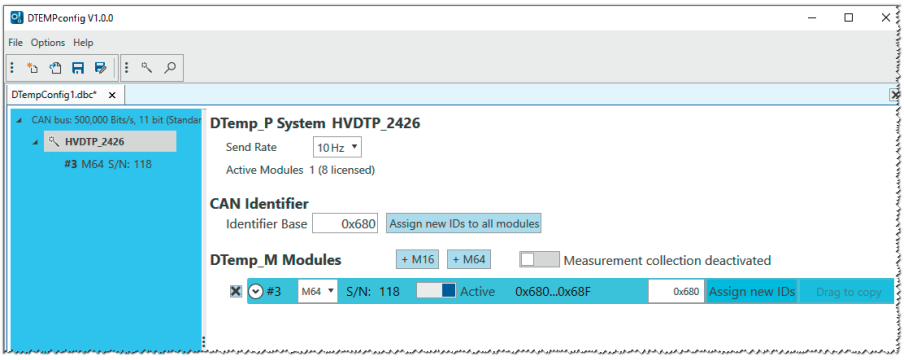


Fig. 5-21: Read-in configuration file

Running Auto-Configuration

Also in this case, the bus is checked for connected hardware. **Auto Configuration** is also used to detect and resolve CAN ID conflicts. When running **Auto Configuration** a configuration document is automatically generated. Upon process completion, the new configuration file needs to be named accordingly and stored in the required folder.

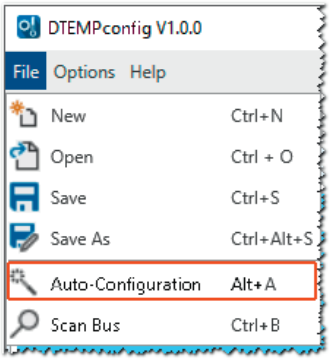


Fig. 5-22: **File | Auto-Configuration**

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

⇨ The bus will be scanned for devices and possibly existing conflicts.

⇨ Detected components are listed on the left below the CAN bus level (Fig. 5-21).

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

Setting options in the left section of the configuration window (highlighted in blue)

- CAN bus level – Right-clicking opens the context menu. The **Edit** command opens the **CAN Bus** dialog.

  → *See chapter 5.3.2.3 "Setting CAN parameters".*

- Module level – The **Edit** command opens the **Device Properties** dialog.

  → *See chapter 5.3.2.4 "Module settings".*

- Controller level – Here the controllers connected to the central unit are displayed. The example in Fig. 5-21 shows an HV DTemp-M64 controller with the ID '3' and the serial number '118'. The setting options for a controller are grouped in a table in the right window pane in the **DTemp_M Modules** section. Each controller is provided with a separate table.

Setting options in the right section of the configuration window

***DTemp_P System** section*

The **Send rate** selection menu provides the means to set a different send rate if required.

The **Active Modules** entry shows the number of connected controllers. The number in brackets ('x' licensed) indicates the number of controllers activated by the license.

***CAN identifier** section*

The input field **Identifier base** displays the currently specified identifier base.

→ *See DTEMPconfig online help, page "DTEMPconfig user interface", section "CAN Identifier" for further Information.*

***DTemp_M Modules** section*

The **DTemp_M Modules** section contains information and setting options for the controllers that are included in the configuration.

- The buttons **+M16** and **+M64** are used to insert controller table templates.
- Use the switch to the right of these buttons to fade the measured temperature values in or out [10] (equivalent to **Toggle On/Offline** in CSMconfig).
  - **Measurement collection deactivated**: measurement values are not displayed
  - **Measurement collection activated**: measurement values are displayed

By default, no measurement values are displayed, i.e. the switch is in position **Measurement collection deactivated**.

☞ Set the switch to **Measurement collection activated**.

⇨ The message "configuration_changed" is displayed in the cells of the **Measurement** column.

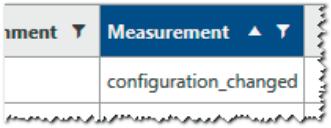


Fig. 5-23: **Measurement** table column: "configuration_changed"

To make the measured values available for the HVDTemp-P central unit, the changed configuration has to be written to that device.

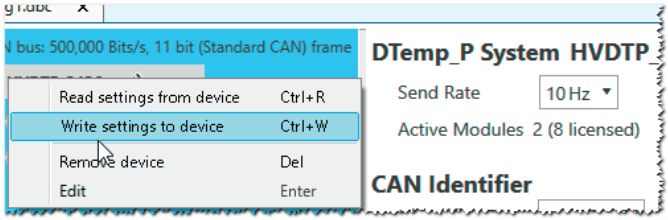


Fig. 5-24: Context menu, module level

☞ Select **Write settings to device** from the context menu of the module.

⇨ The configuration is written to the central unit.

⇨ The measured values are displayed in the **Measurement** column.

10 The switch is only used to switch the display of the measured values on or off. The measured values are transmitted by the HV DTemp-P central processing unit regardless of this setting.

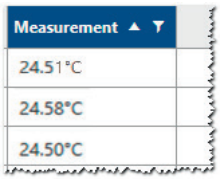


Fig. 5-25: **Measurement** table column: measurement values visible

→ *Further information on the setting options of the configuration tables can be found in the DTEMPconfig online help on page "DTEMPconfig user interface", section "DTemp_M Modules".*

☞ Use **Save** or **Save as** to finally save the configuration document.

5.3.2.3 Setting CAN parameters

i	If a new configuration was created via **Auto-Configuration** or **Scan bus**, then the CAN settings usually do not have to be changed manually.

Changing the CAN parameters may be necessary, for example, if

- … additional modules with higher measurement data rates are used in a measurement application.
- … a data acquisition software is used that requires different CAN parameters.

Opening the "CAN Bus" dialog

☞ Move the mouse pointer over the CAN bus entry and right-click.

⇨ The context menu opens.

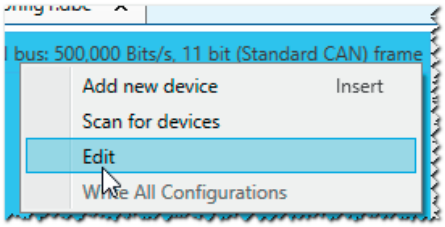


Fig. 5-26: Context menu: **Edit** command

☞ Click on **Edit**.

⇨ The **CAN Bus** dialog opens.

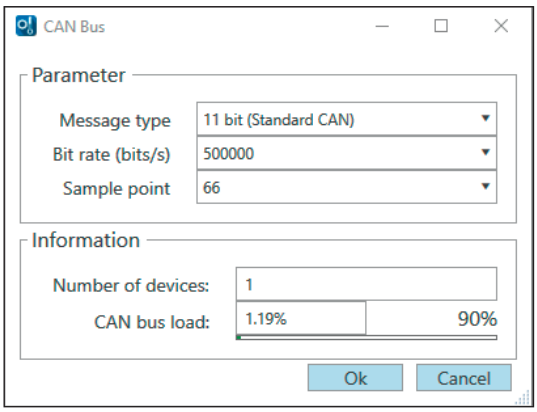


Fig. 5-27: **CAN Bus** dialog

Parameters	
Message type	The message type defines the number of bits used for the CAN identifiers of the messages (11 bit or 29 bit).
Bit rate (bits/s)	The bitrate defines how many bits per second (bits/s) are transmitted on the CAN bus.
Sample Point	This pull-down menu provides options to specify the time when a bit is read (sampled) to determine its logical level.
Information	
Number of devices	This field displays the number of devices connected to the bus.
CAN bus load	This field displays the expected bus load of the current configuration. The percentage on the right shows the maximum bus load, specified in the **Settings** dialog (**CAN defaults** → **Busload limit**). The CAN bus load depends on the following parameters: ▸ Number of active controllers ▸ Message type (29-bit messages require more bits per message than 11-bit messages, which results in a higher bus load) ▸ Bitrate (lower bitrate = higher bus load)

Tab. 5-2: **CAN Bus** dialog: setting options

☞ Make the required settings.

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

⇨ If the process was successful, the following message appears:

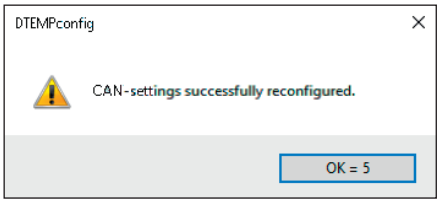


Fig. 5-28: Message "CAN-settings successfully reconfigured"

☞ Click **OK** to close the window.

→ *Further information can be found in the DTEMPconfig online help on page "CAN Bus (Dialog)".*

5.3.2.4 Module settings

☞ Right-click on the device entry.

⇨ The context menu opens.

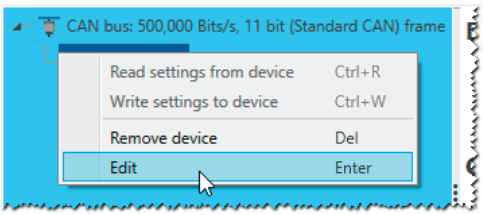


Fig. 5-29: Context menu, module level

☞ Select **Edit** from the context menu.

⇨ The **Device Properties** dialog opens.

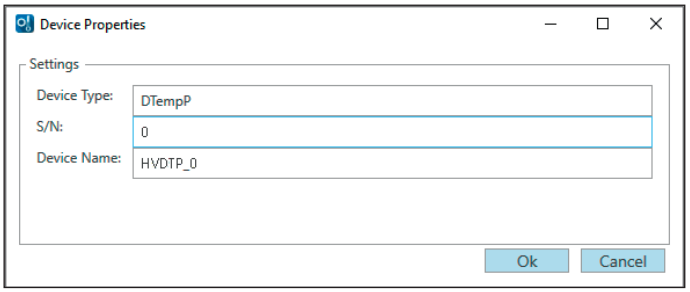


Fig. 5-30: **Device Properties** dialog

Field name	Function
Device type	The device type **DTempP** is pre-set by default and cannot be changed. This field is thus greyed out.
S/N	The configuration protocol uses that number to address a specific module. Enter the serial number of the central unit into this field.
Device Name	A default name is displayed here at first, consisting of the name of the device type and the serial number. Alternatively, an individual, user-defined name can be entered. ▸ The name must contain at least 1 character and a maximum of 24 characters. ▸ Allowed characters are letters (A...Z, a...z), digits (0...9) and underscore (_). ▸ The name has to begin with a letter or digit (not an underscore).

Tab. 5-3: **Device Properties** dialog: setting options

If **Scan Bus** or **Auto-Configuration** are performed in an online configuration, the detected serial number is displayed in the **S/N** field.

In an offline configuration, the serial number of an HV DTemp-P central unit has to be entered manually into the **S/N** field.

☞ Make the required settings.

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

5.3.2.5 Sending and saving configuration data

At module level, the context menu contains, among others, the following commands:

- **Read settings from device** reads the configuration from a central unit. The firmware version and the hardware revision number are also read out.
- **Write settings to device** writes the configuration that is currently active in DTEMPconfig to a central unit.

Transferring the configuration data to the module

When the configuration of the central unit and the controller(s) has been completed, the data must finally be transferred to the central unit.

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

☞ Right-click on the device entry.
⇨ The context menu opens.

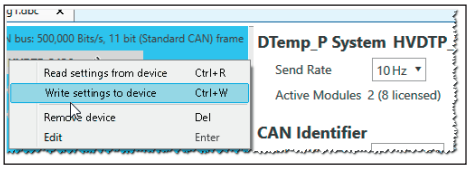


Fig. 5-31: Context menu, module level: **Write settings to device**

☞ Select **Write settings to device**
⇨ The following message is displayed:

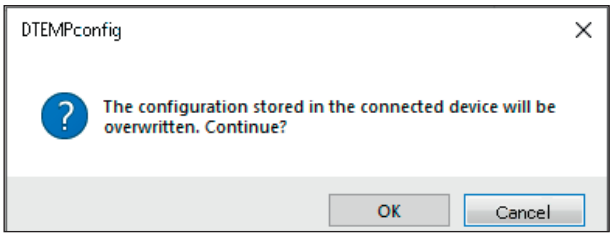


Fig. 5-32: Safety prompt before overwriting the old configuration

☞ Click **OK** to write the configuration to the device.
⇨ A message indicates the successful reconfiguration of the central unit.

or

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

Reading configuration data from the central unit

☞ Select **Read settings from device** in order to load a configuration that is stored in a central unit into the configuration document.

Saving the configuration

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

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

⇨ The **Save As** dialog opens.

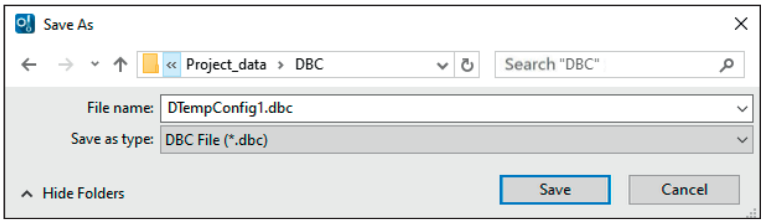


Fig. 5-33: **Save As** dialog

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 tab (here: `DTempConfig1.dbc`).

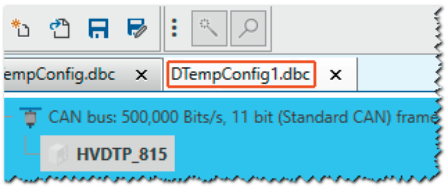


Fig. 5-34: New file name: `DTempConfig1.dbc`

5.3.3 Integrating a DTEMPconfig DBC file into a measurement application

The DBC file of a HV DTemp measurement configuration can be integrated into a CAN measurement application in CSMconfig by using the **Import foreign CAN-DB** command.

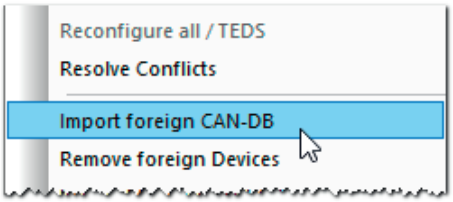


Fig. 5-35: CSMconfig: **File | Import foreign CAN-DB**

☞ Select **File** | **Import foreign CAN-DB**.

⇨ The **Open** dialog opens.

☞ Pick the DBC file and confirm the selection by clicking **Open**.

⇨ The DBC file containing the HV DTemp configuration is imported and displayed in the configuration document (here in the **Tree View** window).

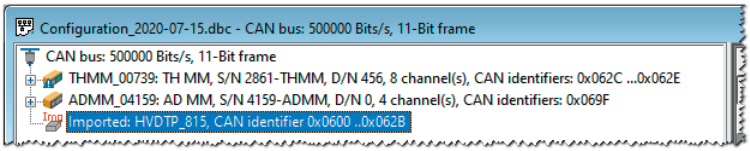


Fig. 5-36: Imported DBC file in CSMconfig

5.3.4 Changing the default settings

The **Settings** dialog contains some basic settings which can be modified if required.

☞ Select **Options | Settings.**

⇨ The **Settings** dialog opens.

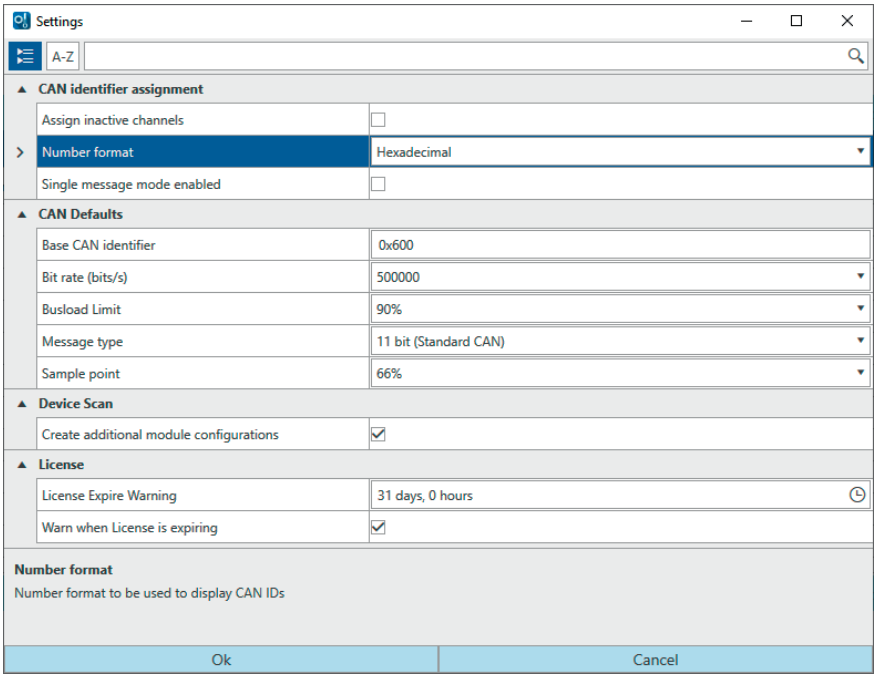


Fig. 5-37: **Settings** dialog

CAN Defaults [11]	
Base CAN Identifier	The identifier base that is assigned to a newly generated module. This entry can be modified if required.
Bit rate (bits/s)	Selection menu for specifying the bit rate. The bitrate defines how many bits per second (bits/s) are transmitted on the CAN bus.
Message type	The message type defines the number of bits used for the CAN identifiers of the messages (11 bit or 29 bit).
Busload Limit	Selection menu for setting the maximum bus load.
Sample Point	The time when a bit is read (sampled) is specified here in order to determine its logical level.
CAN identifier assignment	
Format for CAN-Identifiers	Selection menu containing the following options: ▸ Decimal ▸ Hexadecimal
Single message mode enabled	If this option is enabled, an individual CAN ID is assigned to every temperature measurement value.
Assign inactive channels	If this option is enabled, CAN IDs will also be assigned to inactive channels.
Device Scan	
Create additional module configurations	If this option is enabled, then additional module configurations, which were detected at the bus but which are not included in the read-out device configuration, will be inserted.
License	
License Expire Warning	If the option **Warn when License is expiring** is enabled, the license expiration date stored in the license file will be verified. A click on the 🕒 symbol opens a menu in which the time from which on a warning is issued can be specified.
Warn when License is expiring	If this option is set, the license expiration date stored in the license file is verified. A warning of the impending expiration is issued from the time specified via **License Expire Warning**.

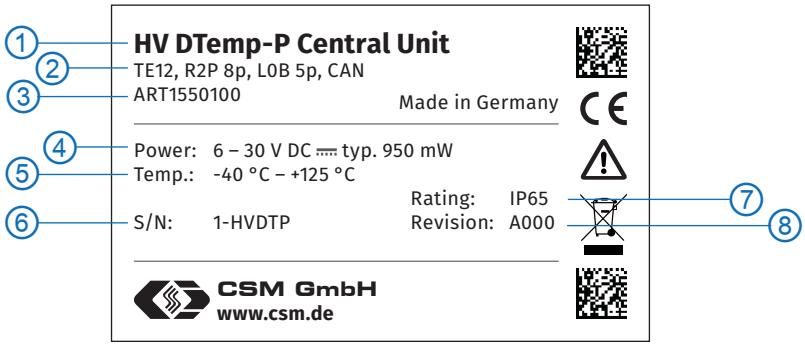
Tab. 5-4: **Settings** dialog: setting options

11 Most of the settings in this section can also be specified in the **Parameter** section of the **CAN Bus** dialog.

6 Maintenance and Cleaning

6.1 Type label

The type label contains the technical data of the HV DTemp-P central unit.



①	HV DTemp-P Central Unit	Device type
②	TE 12, R2P 8p, L0B 5p, CAN	Device details: ▸ TE 12 – Housing type: 19 inch module, width: 12 Division Units (DU) ▸ R2P 8p – Measurement channel sockets: LEMO Redel 2P, 8-pin ▸ L0B 5p – CAN/power supply sockets: LEMO 0B, 5-pin ▸ CAN – Bus system
③	ART1550100	Part number of the measurement module
④	Power: 6 – 30 V DC, typ. 950 mW	Power supply range, typical power consumption
⑤	Temp.: -40 °C – +125 °C	Operating temperature range
⑥	S/N: 1-HVDTP	Measurement module serial number
⑦	Rating: IP65	Protection class
⑧	Revision: A000	Hardware revision number

Tab. 6-1: Type label

6.2 Maintenance services

Before delivery, each HV DTemp-P central unit is subjected to a functional test. In addition, a test certificate (HV insulation test) is issued for each central unit. This is documented by the stickers "Function tested" and "HV insulation test" which are attached to the rear side of the module housing.

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.

- Functional test
- High-voltage insulation test (functional testing included)
- Repair service

	NOTE!
	An insulation test every 12 months is required in order to ensure the measurement module's operational safety. ☞ Make sure that a high-voltage insulation test according to EN 61010-1:2010 is carried out at least every 12 months.

6.3 Cleaning instructions

	WARNING!
	An HV DTemp-P central unit is applied 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 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 module. ☞ Use only a slightly moist cloth.

Requirements

- All cable connections have been removed.

Required parts/materials

- Soft cloth
- Mild detergent, if necessary.

Cleaning the module

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

7 Appendix

7.1 List of figures

7.2 List of tables

CSM GmbH
Computer-Systeme-Messtechnik

Raiffeisenstr. 36, 70794 Filderstadt, Germany
+49 711 - 77 96 40 info@csm.de
www.csm.de

Our company is certified.

ISO 9001, ISO 14001
Certified Integrated Quality and Environmental Management System
www.tuv-sud.com/ms-cert