An Axiometrix Solutions Brand

Dx - Telemetry System

Manual

Edition 6 - 2023-10-23

imc Test & Measurement GmbH • Voltastr. 5 • 13355 Berlin • Germany

Disclaimer of liability

The contents of this documentation have been carefully checked for consistency with the hardware and software systems described. Nevertheless, it is impossible to completely rule out inconsistencies, so that we decline to offer any guarantee of total conformity.

We reserve the right to make technical modifications of the systems.

Copyright

Open Source Software Licenses

Some components of imc products use software which is licensed under the GNU General Public License (GPL). Details are available in the About dialog.

A list of the open source software licenses for the imc measurement devices is located on the imc STUDIO/imc WAVE/imc STUDIO Monitor installation medium in the folder "*Products**imc DEVICES**OSS*" or "*Products**imc DEVICEcore**OSS*" or "*Products**imc STUDIO**OSS*". If you wish to receive a copy of the GPL sources used, please contact our Hotline.

Notes regarding this document

This document provides important notes on using the device / the module. Safe working is conditional on compliance with all safety measures and instructions provided. The manual is to be used as a kind of reference book. You can skip the description of the modules you do not have.

Additionally, all accident prevention and general safety regulations pertinent to the location at which the device is used must be adhered to.

If you have any questions as to whether you can set up the device / module in the intended environment, please contact the imc hotline. The measurement system has been designed, manufactured and unit-tested with all due care and in accordance with the safety regulations before delivery and has left the factory in perfect condition. In order to maintain this condition and to ensure safe operation, the user must observe the notes and warnings contained in this chapter and in the specific sections applicable to the concrete device. Never use the device outside the specification.

This will protect you and prevent damage to the device.

Special notes

Warning

Warnings contain information that must be observed to protect the user from harm or to prevent damage to property.

Note

Notes denote useful additional information on a particular topic.

Reference

A reference in this document is a reference in the text to another text passage.

Table of contents

1 General introduction

1.1 Customer support / Hotline

If you have problems or questions, please contact our Customer Support / Hotline.

imc Test & Measurement GmbH

Hotline: **+49 30 467090-26**

E-Mail: hotline@imc-tm.de

Internet: www.imc-tm.de

International partners

You can find the international sales partners on the Internet at

https://www.imc-tm.com/imc-worldwide/

You will help us with inquiries if you can name the serial number of your devices as well as the version designation of the software. You should also have this documentation at hand. Thank you very much!

1.2 Legal notice

Quality management

imc Test & Measurement GmbH holds the ISO 9001 certification. You can download the certification and information about our quality system on our website:

https://www.imc-tm.com/about-imc/quality-assurance

Warranty

Subject to the general terms and conditions of imc Test & Measurement GmbH.

Liability restrictions

All information and notes in this manual have been compiled taking into account the applicable standards and regulations, the state of the art and our many years of knowledge and experience.

The manufacturer accepts no liability for damage due to:

- Non-observance of the manual
- Non-intended use

Guarantee

Each device undergoes several quality tests before leaving production. In the process, almost every early failure is detected. Nevertheless, it is possible that a component fails only after a longer period of operation. For this reason, all imc products come with a two-year functional warranty. The prerequisite is that no changes have been made in the device.

Unauthorized intervention in the device voids any warranty claim.

ElektroG, RoHS, WEEE, CE

The imc Test & Measurement GmbH is registered with the authority as follows:
WEEE Reg. no. DE 43368136
valid from 24.11.2005

Reference

https://www.imc-tm.com/elekrog-rohs-weee/ and https://www.imc-tm.com/ce-conformity/

1.3 Calibration of the measurement inputs

imc Test & Measurement GmbH recommends an annual calibration of the D^x-SCT measurement inputs and the analog outputs of the D^x-RCI. For further information please contact us at:

E-Mail: hotline@imc-tm.de

Note

The maximum errors specified apply for 1 year after delivery of the device under normal operating conditions (observe operating temperatures), unless otherwise stated.

1.4 Customized cable manufacturing

To comply with the limits for Class B equipment under Part 15 of the FCC Rules, all signal lines connected to the meter must be shielded and the shield must be connected.

Unless otherwise indicated, all connecting cables must not be long cables as defined by IEC 61326-1 (< 30 m). LAN cables (RJ 45) and CAN bus cables (DSUB-9) are excluded from this. Only cables with suitable properties for the task (e.g. isolation to protect against electric shock) may be used. Independently performed modifications to cables will void the manufacturer's functional warranty.

1.5 Explanation of symbols

Reference

... indicates where to find further or related information.

Note

... highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

Warning

... indicates a hazardous situation or even a potentially hazardous situation that may result in property hazardous situation that may result in property damage if not avoided.

Attention

... indicates a possible risk of injury.

Help us to improve the documentation and the products:

- Working with the device could be improved by changing the mechanics?
- There are terms or descriptions in the manual or technical data that are incomprehensible?
- What additions and extensions do you suggest?

2 Safety

This section provides an overview of all important aspects of protection of the users for reliable and trouble-free operation. Failure to comply with the instructions and protection notes provided here can result in serious danger.

Responsibility of the operator

The D^x telemetry system is for use in commercial applications. The user is therefore obligated to comply with legal regulations for work safety.

Along with the work safety procedures described in this document, the user must also conform to regulations for safety, accident prevention and environmental protection which apply to the work site. If the product is not used in a manner specified by the manufacturer, the protection supported by the product may be impaired.

The user must also ensure that any personnel assisting in the use of the D^x telemetry system have also read and understood the content of this document.

Operating personnel

This document identifies the following qualifications for various fields of activity:

- *Users of measurement engineering*: Fundamentals of measurement engineering. Basic knowledge of electrical engineering is recommended. Familiarity with computers and the Microsoft Windows operating system. Users must not open or structurally modify the measurement device.
- *Qualified personnel* are able, due to training in the field and to possession of skills, experience and familiarity with the relevant regulations, to perform work assigned while independently recognizing any hazards.

Warning

- **Danger of injury due to inadequate qualifications!**
- Improper handling may lead to serious damage to personnel and property. When in doubt, consult qualified personnel.
- Work which may only be performed by trained imc personnel may not be performed by the user. Any exceptions are subject to prior consultation with the manufacturer and are conditional on having obtained corresponding training.

Special hazards

This segment states what residual dangers have been identified by the hazard analysis. Observe the safety notes listed here and the warnings appearing in subsequent chapters of this manual in order to reduce health risks and to avoid dangerous situations. Existing ventilation slits on the sides of the device must be kept free to prevent heat accumulation inside the device. Please operate the device only in the intended position of use if so specified.

Danger

Lethal danger from electric current!

- Contact with conducting parts is associated with immediate lethal danger.
- Damage to the insulation or to individual components can be lethally dangerous.

Therefore:

- In case of damage to the insulation, immediately cut off the power supply and have repair performed.
- Work on the electrical equipment must be performed exclusively by expert electricians.
- During all work performed on the electrical equipment, it must be deactivated and tested for static potential.

Injuries from hot surfaces!

- Devices from imc are designed so that their surface temperatures do not exceed limits stipulated in EN 61010-1 under normal conditions.

Therefore:

- Surfaces whose temperature can exceed the limits under circumstances are denoted by the symbol shown at left.

Industrial safety

We certify that the D^x telemetry system in all product configuration options corresponding to this documentation conforms to the directives in the accident prevention regulations in "Electric Installations and Industrial Equipment" (DGUV Regulation 3)*. This confirmation applies exclusively to the D^x telemetry system, but not to all other components included in the scope of delivery.

This certification has the sole purpose of releasing imc from the obligation to have the electrical equipment tested prior to first use (§ 5 Sec. 1, 4 of DGUV Regulation 3). This does not affect guarantee and liability regulations of the civil code.

* previously BGV A3.

Observe notes and warnings

Devices from imc have been carefully designed, assembled and routinely tested in accordance with the safety regulations specified in the included certificate of conformity and has left imc in perfect operating condition. To maintain this condition and to ensure continued danger-free operation, the user should pay particular attention to the remarks and warnings made in this chapter. In this way, you protect yourself and prevent the device from being damaged.

Read this document before turning on the device for the first time carefully.

Warning

Before touching the device sockets and the lines connected to them, make sure static electricity is diverted to ground. Damage arising from electrostatic discharge is not covered by the warranty.

3 Delivery and operation

3.1 After unpacking

The delivery must be checked for completeness and transport damage immediately upon receipt. In case of externally visible transport damage, proceed as follows:

- Do not accept the delivery or accept it only with reservations,
- Note the extent of the damage on the transport documents/delivery bill of the carrier,
- Initiate a complaint.

After unpacking, check the unit for mechanical damage and loose parts inside. If there is transport damage, imc customer service must be informed immediately. The unit must then not be put into operation.

Check the supplied accessories for completeness according to the scope of delivery, see chapter "Packaging" 16.

Note

Complain about any defect as soon as it is detected. Claims for damages can only be asserted within the applicable complaint periods.

3.2 Before commissioning

If the device is brought into the operating room from a cold environment, condensation may occur. Wait until the device has adjusted to the ambient temperature and is absolutely dry before putting it into operation. If condensation has formed during transport or storage, the instrument must be acclimatized for approx. 2 h before it is put into operation.

For your measurements, we recommend that you allow the instrument to warm up for at least 30 minutes.

The instruments are intended for use in clean, dry rooms, unless they are specially designed and approved for this purpose. They must not be operated in the presence of explosion hazards or aggressive chemical agents.

Ambient temperature

The limits of the ambient temperature cannot be given as a general rule, since they depend on many factors of the concrete application and environment, such as airflow/convection, heat radiation balance in the environment, contamination of the housing/contact with media, mounting structure, system composition, connected cables, operating mode, etc. This is taken into account by providing information on the operating temperature instead. Furthermore, no sharp limits can be predicted for electronic components either. As a general rule, reliability decreases when operating under extreme conditions (forced aging). The specifications for the operating temperature represent the extreme limits at which the function of all components can still be guaranteed.

3.3 Notes on connecting

3.3.1 Precautions for operation

Certain ground rules for operating the system, aside from reasonable safety measures, must be observed to prevent danger to the user, third parties, the device itself and the measurement object. These are the use of the system in conformity to its design, and the refraining from altering the system, since possible later users may not be properly informed and may ill-advisedly rely on the precision and safety promised by the manufacturer.

Note

If you determine that the device cannot be operated in a non-dangerous manner, then the device is to be immediately taken out of operation and protected from unintentional use. Taking this action is justified under any of the following conditions:

I. the device is visibly damaged,
II. loosed parts can be heard within the device,
III. the device does not work,
IV. the device has been stored for a long period of time under unfavorable conditions (e. g. outdoors or in high-humidity environments).

1. Observe the specs in the chapter "Technical Specs " and the application hints about the individual system in order to prevent damage to the unit through inappropriate signal connection.
2. Note when designing your experiments that all input and output leads must be provided with shielding which is connected to the ground ("CHASSIS") at one end in order to ensure high resistance to interference and noisy transmission.
3. Unused, open channels (having no defined signal) should not be configured with sensitive input ranges since otherwise the measurement data could be affected. Configure unused channels with a broad input range or short them out. The same applies to channels not configured as active.
4. If you use a removable storage medium for internal data backup, observe the notes in the imc software manual. The manufacturer's restriction regarding the maximum ambient temperature must be observed.
5. Avoid prolonged direct exposure to sunlight.

3.3.2 Soldering

Soldering work may only be carried out by skilled personnel. The following standards must be observed:

- IPC-J-STD-001H (implementation)
- IPC-A-610H (controls)

4 Maintenance and service

4.1 Maintenance

No special maintenance is required. Corrective work may only be carried out by imc Test & Measurement GmbH. If you have any complaints, please enclose a note with the device containing a brief description of the fault. If the name and telephone number of the sender are also written on the note, this will help us to process the complaint quickly.

In case of telephone inquiries, you will help us if you have the serial number of your device and, in the case of the D^x-RCI receiver unit, the configuration file "....dxp" and this manual ready. You can find the serial number of the device on the type plate. Thank you very much!

4.2 Cleaning

The D^x telemetry system is constructively protected against contamination of the electronic components. If the housings are soiled, only external cleaning may be carried out in the switched-off state with non-aggressive agents such as isopropyl alcohol. Due to the design of the D^x-RCI receiver unit and the D^x-SCT transmitter unit, maintenance is not necessary: You only have to make sure that the cables are protected against mechanical stress.

4.3 Storage

The D^x telemetry system can be stored after use for later use. However, it must be protected from:

- electrostatic charge (leads to destruction of electronic components)
- humidity (leads to corrosion)

Permissible storage temperature: 10 °C to 40 °C

The supplied cables must be stowed without kinks. The individual modules must be packed in such a way that they are not mechanically damaged. Batteries must be stored separately from the modules so that the modules are not damaged in the event of acid leaking from the battery.

4.4 Transport

Only transport the device in the original packaging or in suitable packaging that provides protection against impact and shock. In case of damage, please inform the customer service 6 immediately. Transport damage is excluded from the warranty claim. Damage due to condensation can be limited by wrapping the device in plastic foil.
You can also print out the handling label for lithium-ion batteries and affix it to the package yourself. Please note that the form and format is exactly specified by IATA: the printout must be in color in the format: 120 x 110 mm.

Fig. 1: Li-Ion Handling Label

5 Introduction

Congratulations on the purchase of your new D^x digital multichannel telemetry system.

We recommend that you first familiarize yourself with the basics of the system before installing or commissioning it.

5.1 Abbreviation

RCI	=	Receiver Control Interface
SCT	=	Signal Conditioning Transmitter
RSU	=	Receiver Satellite Unit
SD-Card	=	memory card

5.2 System overview

The D^x telemetry system consists of a receiver unit (D^x-RCI) and up to four multi-channel telemetry transmitters (D^x-SCTs). Up to 6 data channels can be measured per transmitter unit. The measurement data is digitized on the transmitting unit and transmitted serially to the receiving unit by radio signal. A sync signal from the D^x-RCI (every 5 ms) ensures that all transmitters are synchronized.

The receiving unit operates with low interference in diversity mode with 2 antennas and outputs the measurement data on the display, as an analog signal or as CAN messages.

The power supply of the transmitter units is very flexible: The D^x-SCTs can be operated either inductively (with ring stator or inductive head), with powerful rechargeable batteries or with standard 9 V batteries.

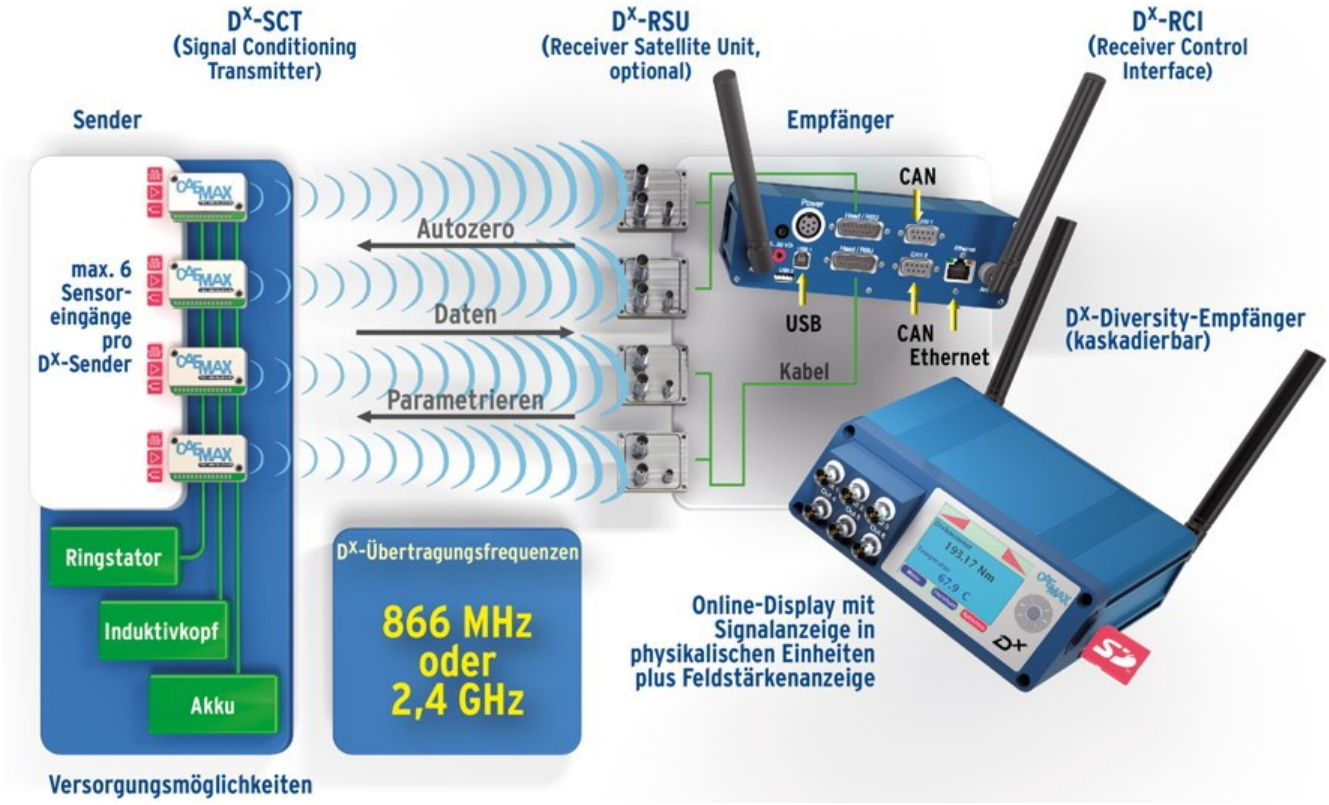


Fig. 2: System overview

5.3 Use

The D^x telemetry system is only to be used for recording, forwarding and processing electrically measured quantities. In case of deviating use, the manufacturer does not assume any liability.

The system is designed for signal processing of resistive bridges such as strain gauges, thermocouples (-200 ° C to +1000 °C) and higher level voltages (0 V to ±22 V), e.g. usable for pressure, displacement and acceleration sensors.

5.4 Packaging

The complete system can be delivered in a sturdy transport case. If only individual components are ordered, they will be sent without a case.

Package content:

1. Receiver Control Interface (D^x-RCI)
2. Signal Conditioning Transmitter (D^x-SCT)
3. Ethernet cable
4. Rod antennas
5. Power adaptor
6. Users manual
7. Optional: flat antenna
8. Optional: Ring stator
9. Optional: mounting accessories for wave application

Fig. 3: Case with Dx telemetry system

(example picture; the content depends on the order)

6 Technical components

6.1 Signal Conditioning Transmitter (Dx-SCT)

Fig. 4: Transmit unit D^X-SCT

	D^X-SCT 868 MHz	**D^X-SCT-HT 2.4 GHz**
High-frequency transmitter	channel freely programmable in 868 MHz ISM band	channel freely programmable in 2.4 GHz ISM band
Transmitting power	max. +10 dBm, regulated according to demand and national restrictions (incl. LBT-procedure)	+7 dBm
Data transport	packet transmission with error detection	
Voltage supply	inductive supply with inductive head and stator loop or DC supply 7.5 V to 39 V	
Temperature range	-40 °C to +85 °C	-40 °C to +125 °C
Dimensions	approx. 45 mm x 25 mm x 10 mm	
Weight	< 14 g	

6.1.1 Voltage inputs for low signal levels

Small signal levels, such as strain gauge bridges, active thermocouples, etc.

The D^X-SCT transmitter unit has four inputs. In half-bridge or single-ended mode applications, all four inputs are available for measurements; in differential mode, two inputs are always occupied by one channel. The two modes can be combined: If, for example, a full bridge is placed on input 1, 2 (differential mode), two single-ended signals can also be connected to input 3, 4.

Input range	±0.244 mV/V to ±1000 mV/V adjustable via D^X-RCI (freely) (no external resistors or jumpers)
Resolution	16 bit
Accuracy	0.01 to 0.025 %
Sampling rate	max. 4.6 kHz/5 kHz total sampling rate (D^X-RCI 868 MHz/Dx-RCI-HT 2,4 GHz; exclusive auxiliary channels)
Antialiasing filter	6-pin Butterworth, cut-off frequency 1/5 of the sampling rate
Bridge supply voltage	4.096 V (max. 40 mA short circuit protection)
Bridge adjustment	> dual measuring range, can be triggered remotely
Test shunt	a 330 kΩ resistor, remotely triggerable (test signal for bridge resistance verification or broken thermocouple detection)

6.1.2 Inputs for high-level signals (voltage measurement)

One differential input and one single-ended input

Input range	±0.2 V to ±22.5 V freely adjustable by remote control
Resolution	16 bit
Accuracy	±0.025 %
Sampling rate	max. 4.6 kHz/5 kHz total sampling rate (D^X-RCI 868 MHz/D^X-RCI-HT 2.4 GHz; exclusive auxiliary channels)
Antialiasing filter	6-pin Butterworth, cut-off frequency 1/5 of the sampling rate

6.1.3 Additional channel for measurement of temperature of the transmitter electronics

The additional channel of the D^X-SCT for temperature is also used as a reference point for thermocouples.

Measurement range	-30 °C to +100 °C
Resolution	12 bit
Refresh (update) rate	25 Hz

6.1.4 Additional channels for measurement of temperature of the transmitter electronics

The additional channel for measuring the supply voltage can be used to monitor the battery voltage or the quality of the inductive supply.

Measurement range	-41.5 V to +41.5 V
Resolution	12 bit
Refresh (update) rate	25 Hz

6.2 Connection variants of the DX-SCT

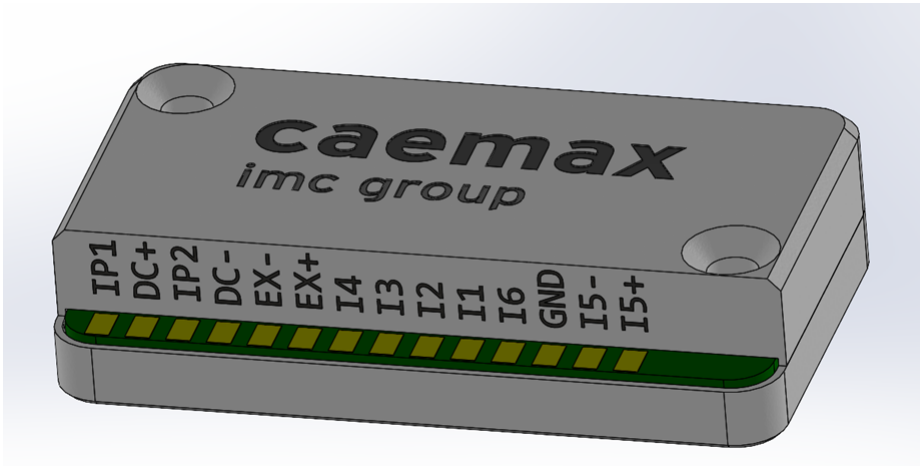


Fig. 5: D^X-SCT

Fig. 6: D^X-SCT with screw terminal connections

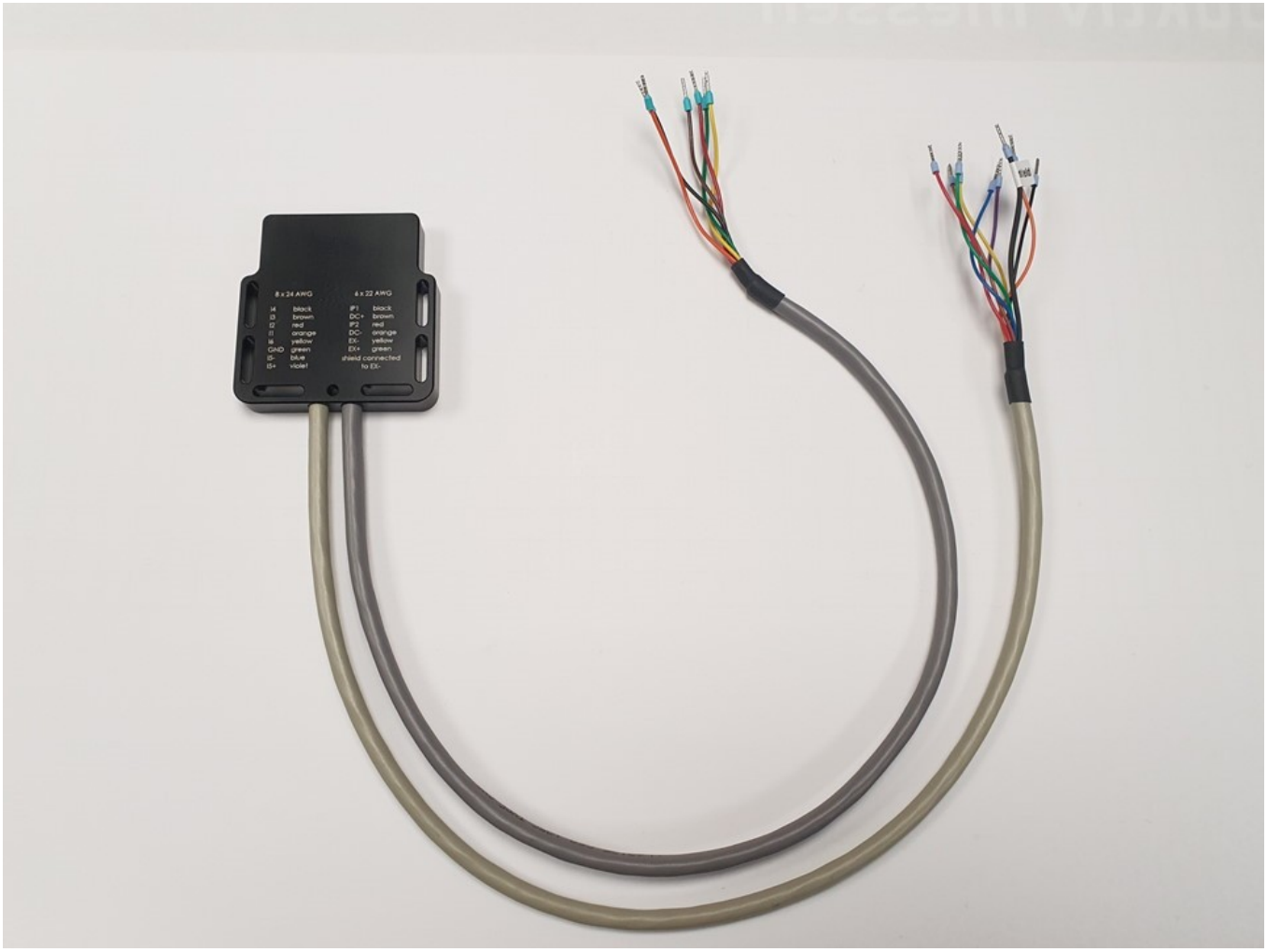


Fig. 7: D^X-SCT with connection cable integrated in a special housing

Fig. 8: D^X-SCT with connection cable integrated in a special housing (more detailed view)

Fig. 9: D^X-SCT with connection cable integrated in a special housing: color scheme

6.3 Pin configuration Dx-SCT

Pin	Label	SCT standard	SCT 3x strain gauge
1	IP1	Induktive Power 1	
2	DC+	DC Power Plus, positive power supply input connection	
3	IP2	Induktive Power 2	
4	DC-	DC-Power Ground, negative power supply input connection	
5	EX-	Excitation -, sensor supply negative	
6	EX-	Excitation -, sensor supply negative	
7	EX+	Excitation -, sensor supply positive	
8	EX+	Excitation -, sensor supply positive	
9	I4	negative input at differential with I3 (bridge input or temperature) 1/2 bridge; temperature Single-ended	negative input at input of full bridge with I3; 1/2 bridge
10	I3	positive input at differential with I4 (bridge input or temperature) 1/2 bridge; temperature Single-ended	positive input at input of full bridge with I4; 1/2 bridge
11	I2	negative input at differential with I1 (bridge input or temperature) 1/2 bridge; temperature Single-ended	negative input at input of full bridge with I1; 1/2 bridge
12	I1	positive input at differential with I2 (bridge input or temperature) 1/2 bridge; temperature Single-ended	positive input at input of full bridge with I2; 1/2 bridge
13	I6	voltage input up to ±22.5 V, Single-ended to GND	not available
14	GND	Analog-Ground, Ground for Single-ended-wiring	not available
15	I5-	negative input voltage up to ±22.5 V (differential input with I5+)	negative input at input of full bridge with I5+; 1/2 bridge
16	I5+	positive input voltage up to ±22.5 V (differential input with I5-)	positive input at input of full bridge with I5-; 1/2 bridge

Warning Attention

EX- and GND must not must not be connected (short circuit).

Only a trained specialist may solder. Use a temperaturee-controlled soldering station with a fine tip and heat the solder pads to a maximum of 360 °C.
See also chapter "Soldering" 13 for soldering standards.

Pin	Label	SCT standard	SCT 3x temp	SCT 3x strain gauge
1	IP1	Induktive Power 1		
2	DC+	DC Power Plus, positive power supply input connection		
3	IP2	Induktive Power 2		
4	DC-	DC-Power Ground, negative power supply input connection		
5	EX-	Excitation -, sensor supply negative		
6	EX+	Excitation -, sensor supply positive		
7	I4	negative input at differential with I3 (bridge input or temperature) 1/2 bridge; temperature Single-ended	negative input at temperature differential with I3; temperature Single-ended	negative input at input of full bridge with I3; 1/2 bridge
8	I3	positive input at differential with I4 (bridge input or temperature) 1/2 bridge; temperature Single-ended	positive input at temperature differential with I4; temperature Single-ended	positive input at input of full bridge with I4; 1/2 bridge
9	I2	negative input at differential with I1 (bridge input or temperature) 1/2 bridge; temperature Single-ended	negative input at temperature differential with I1; temperature Single-ended	negative input at input of full bridge with I1; 1/2 bridge
10	I1	positive input at differential with I2 (bridge input or temperature) 1/2 bridge; temperature Single-ended	positive input at temperature differential with I2; temperature Single-ended	positive input at input of full bridge with I2; 1/2 bridge
11	I6	voltage input up to ±22.5 V, Single-ended to GND	not available	not available
12	GND	Analog-Ground, Ground for Single-ended-wiring	not available	not available
13	I5-	negative input voltage up to ±22.5 V (differential input with I5+)	negative input at temperature differential with I5+; temperature Single-ended	negative input at input of full bridge with I5+; 1/2 bridge
14	I5+	positive input voltage up to ±22.5 V (differential input with I5-)	positive input at temperature differential with I5+; temperature Single-ended	positive input at input of full bridge with I5-; 1/2 bridge

Warning Attention

EX- and GND must not must not be connected (short circuit).

Only a trained specialist may solder. Use a temperaturee-controlled soldering station with a fine tip and heat the solder pads to a maximum of 360 °C.
See also chapter "Soldering" 13 for soldering standards.

6.3.1 Connection to a DC voltage source

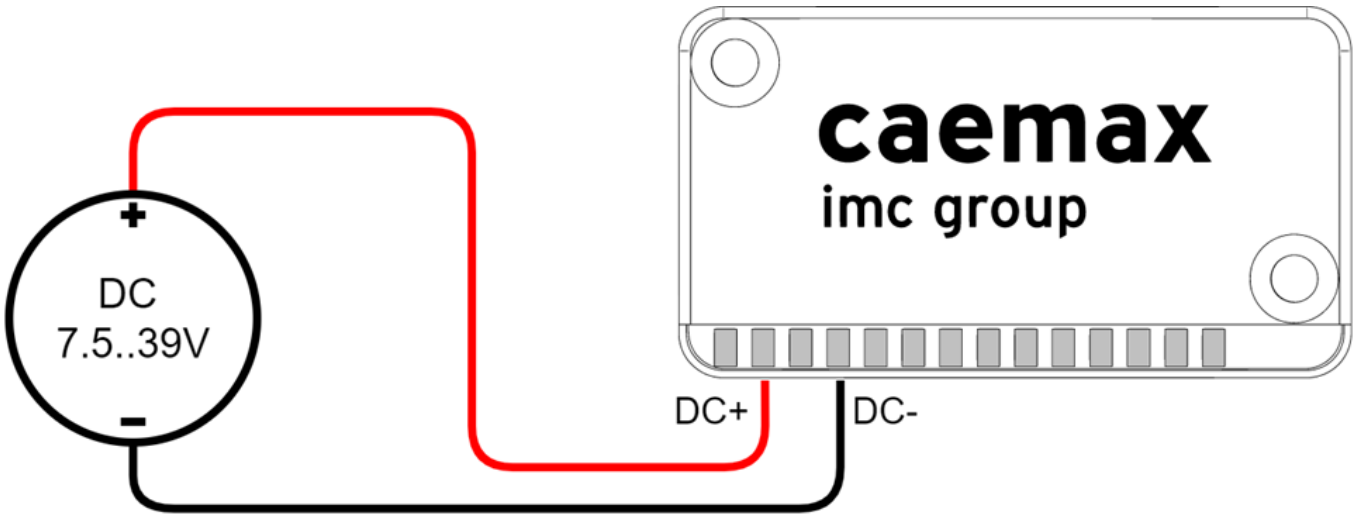


Fig. 10: Connection of D^X-SCT to a DC voltage source

6.3.2 Connection to an inductive voltage source

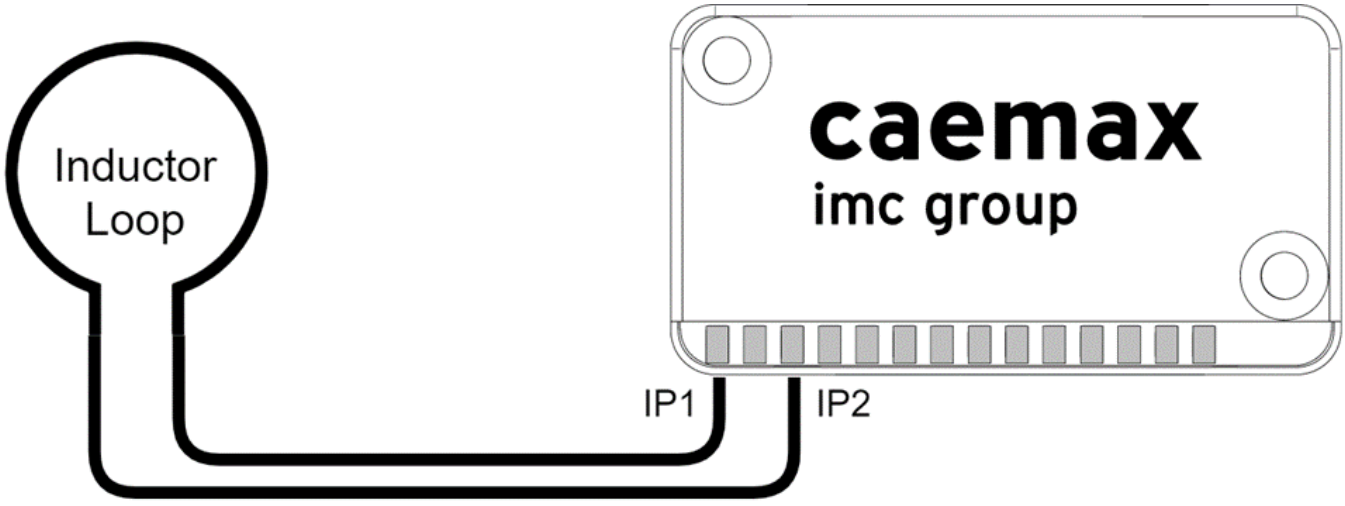


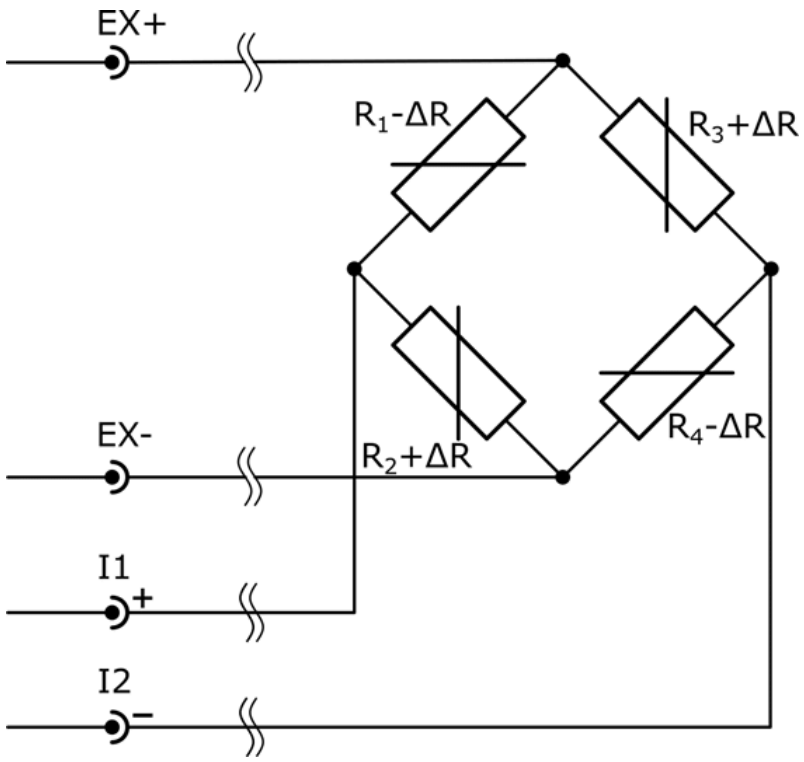
Fig. 11: Connection of D^X-SCT to an inductive voltage source

Reference

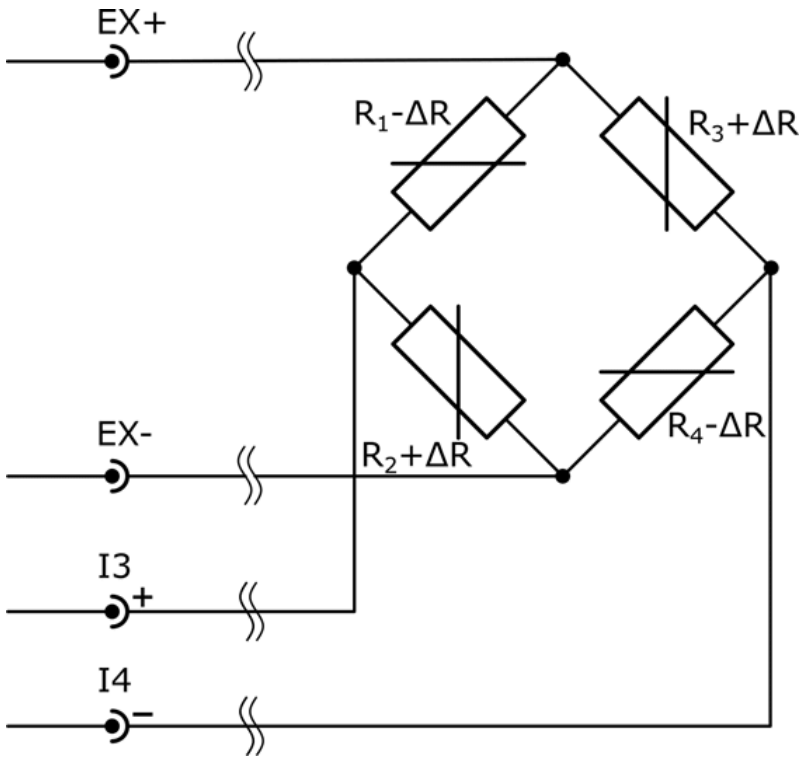
See chapter "D^X-OVP module" 44 for the use of the D^X-OVP modules for an overvoltage protection.

6.3.3 Resistive full bridge, e.g. strain gauge

Channel 1

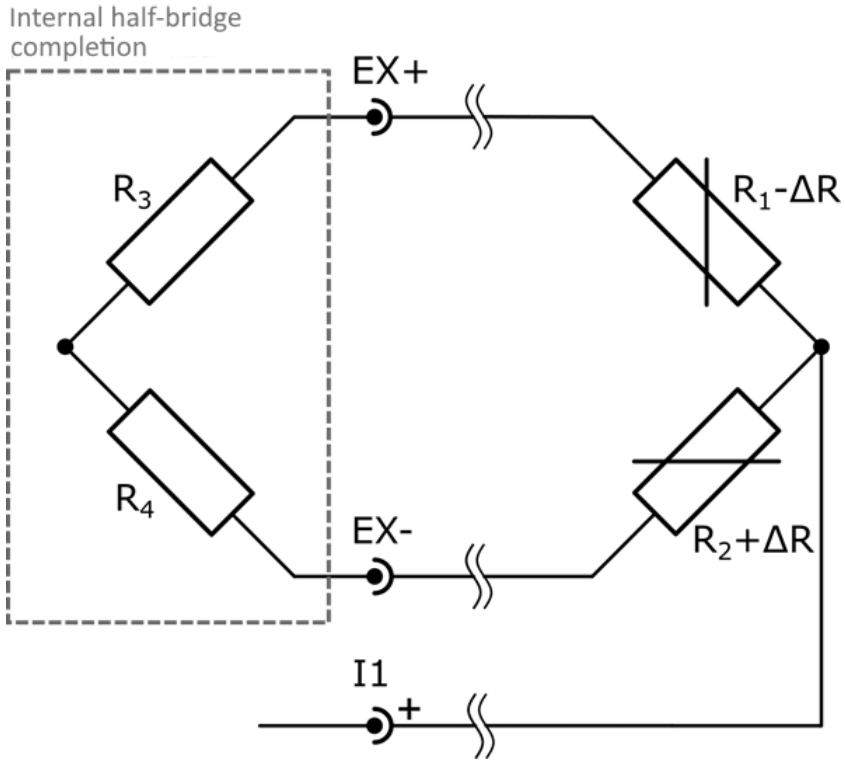


Channel 3

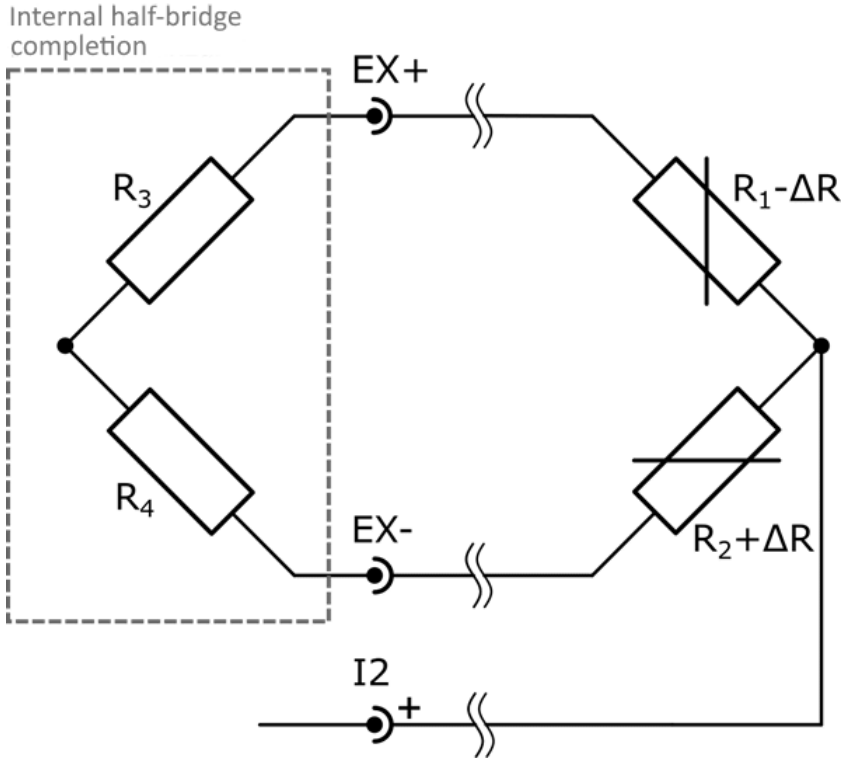


6.3.4 Resistive half bridge, e.g. strain gauge

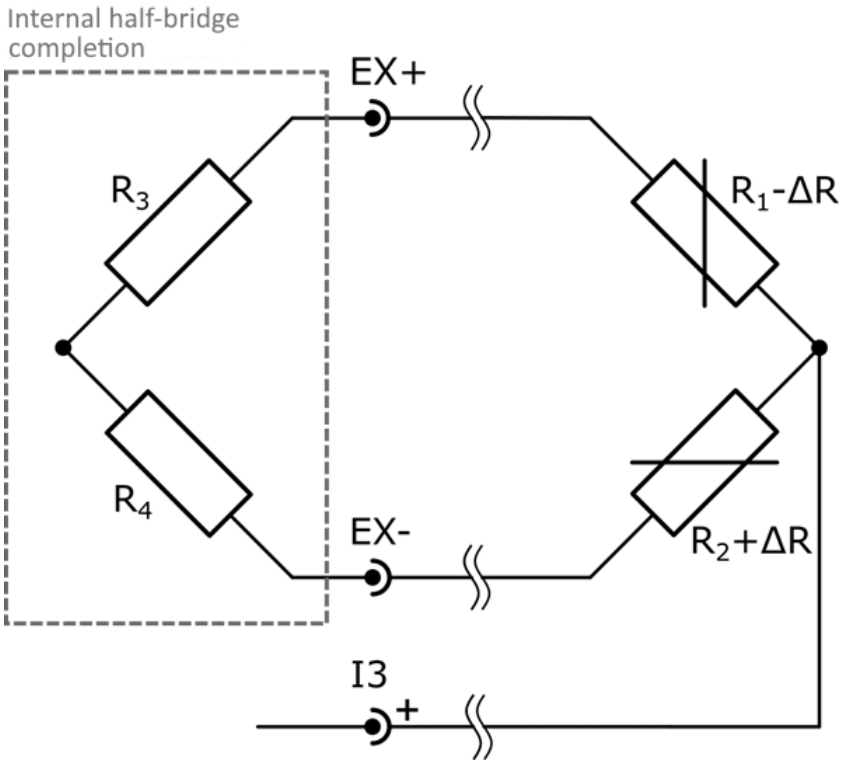
Channel 1



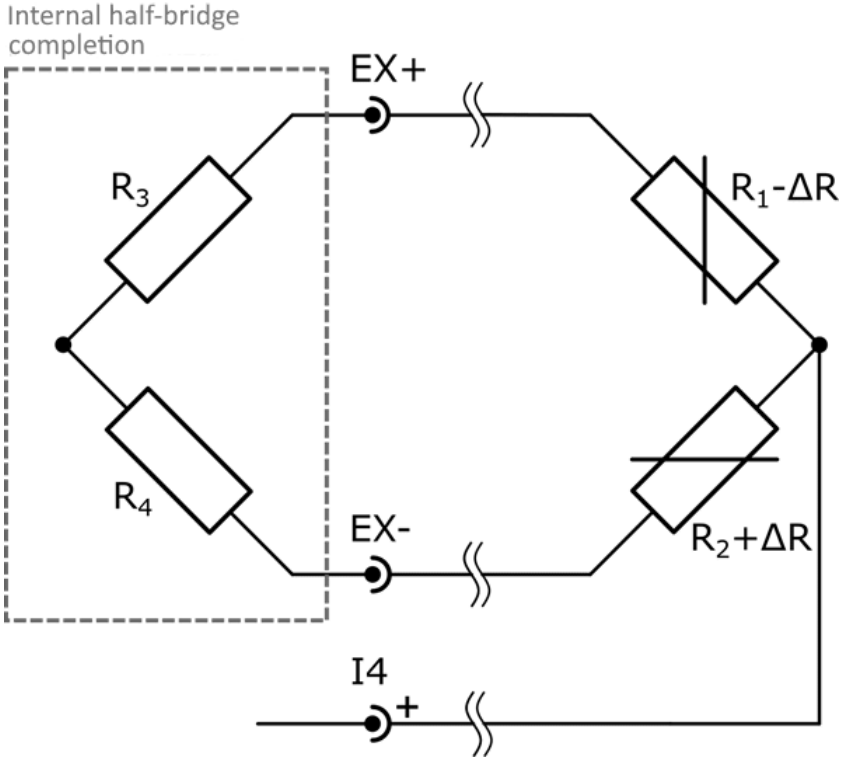
Channel 2



Channel 3



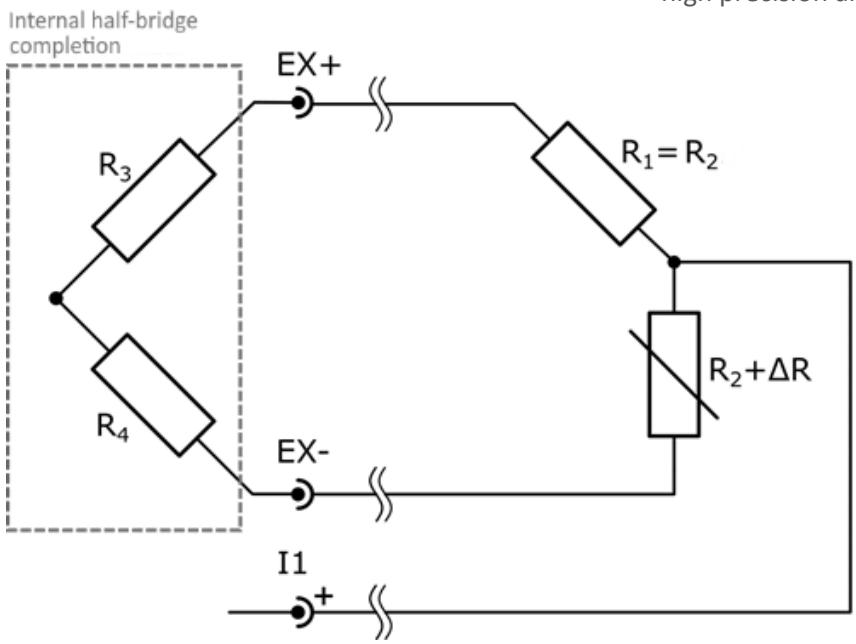
Channel 4



6.3.5 Resistive quarter bridge (with completion to half bridge)

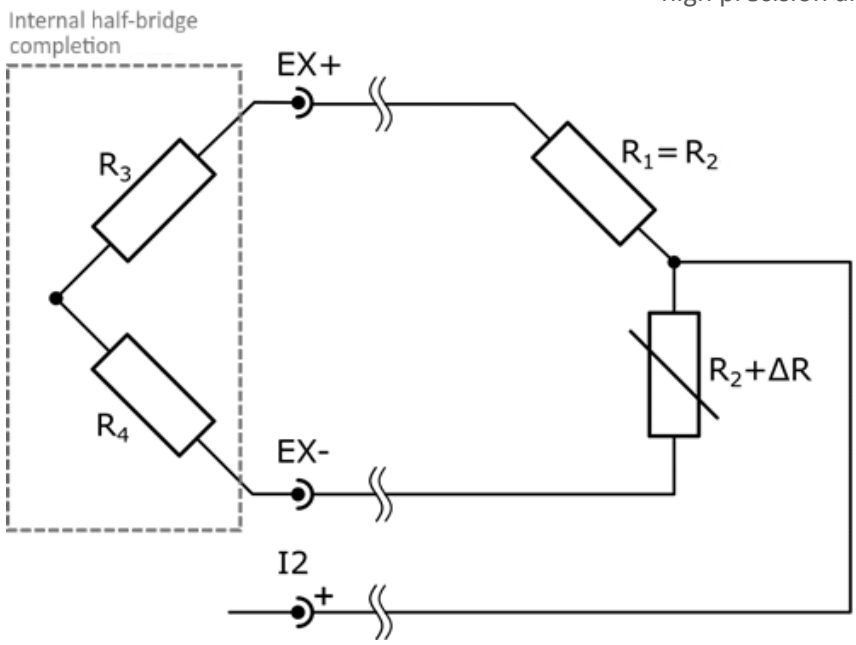
R_1: Complementary resistor with high precision and stability

Channel 1



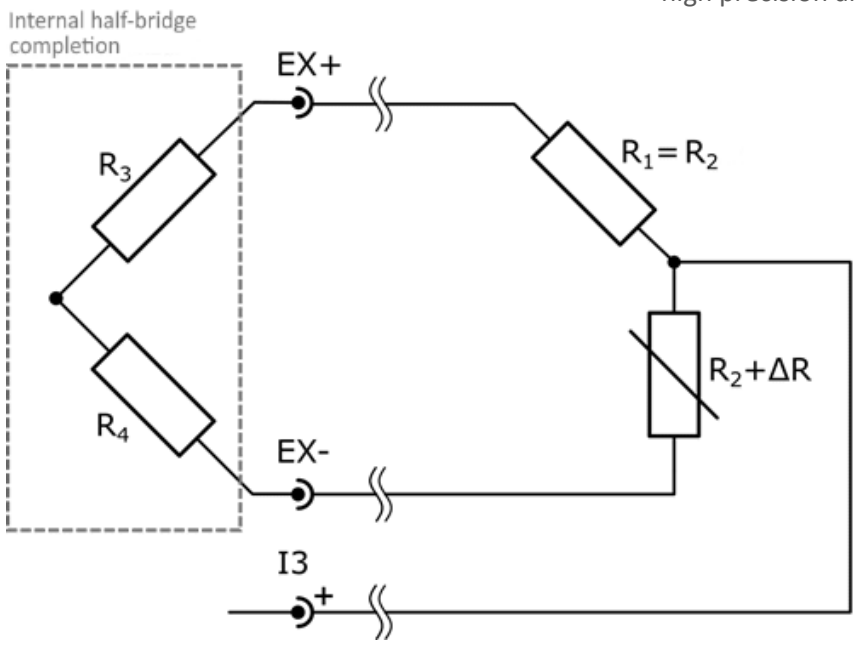
R_1: Complementary resistor with high precision and stability

Channel 2



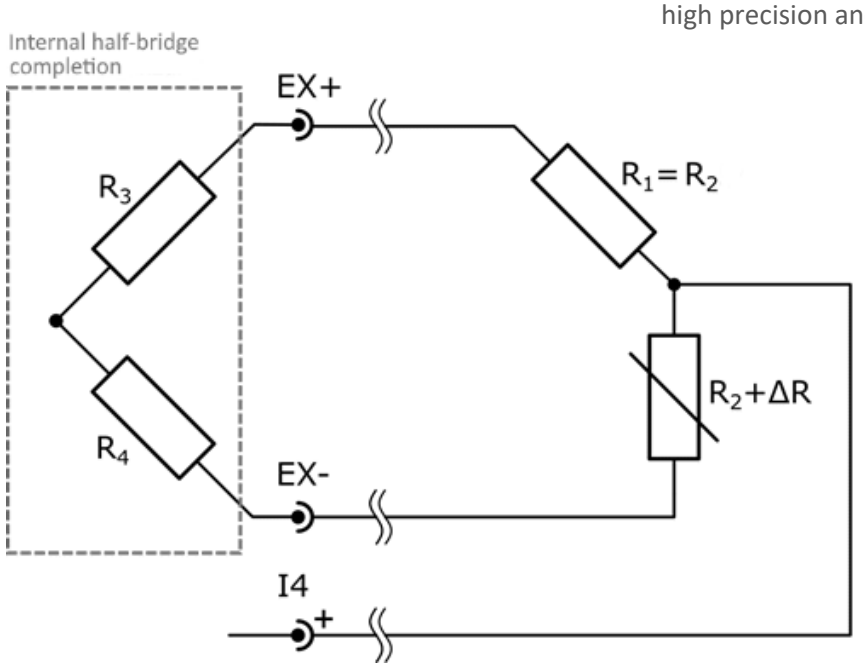
R_1: Complementary resistor with high precision and stability

Channel 3



R_1: Complementary resistor with high precision and stability

Channel 4



6.3.6 Thermocouples - differential

Warning Attention

Thermocouples cannot be used with screw terminal or with cable housing

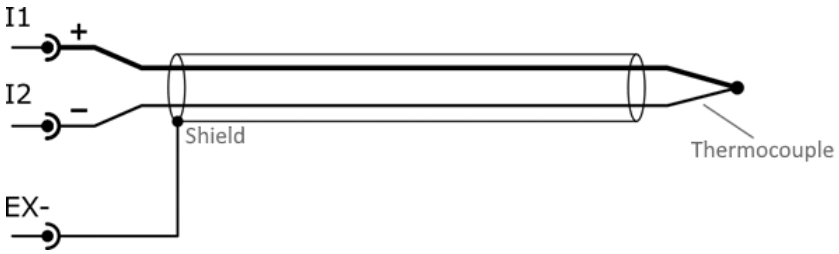
Warning Attention

For thermocouple measurements, the quality of the solder joint at the cold junction is critical. Thermocouple wires are difficult to solder. This is impossible with commercially available solder. imc uses a special solder for this purpose, which can be obtained from us.

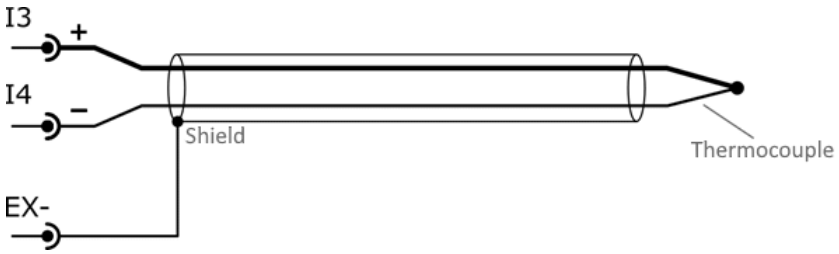
We recommend that the wires are well pre-tinned before they are soldered onto the pads of the D^x-SCT.

Contamination after soldering affects the accuracy of the temperature measurement. The soldering points must therefore be cleaned carefully.

Channel 1



Channel 2



6.3.7 Thermocouples - Single-ended

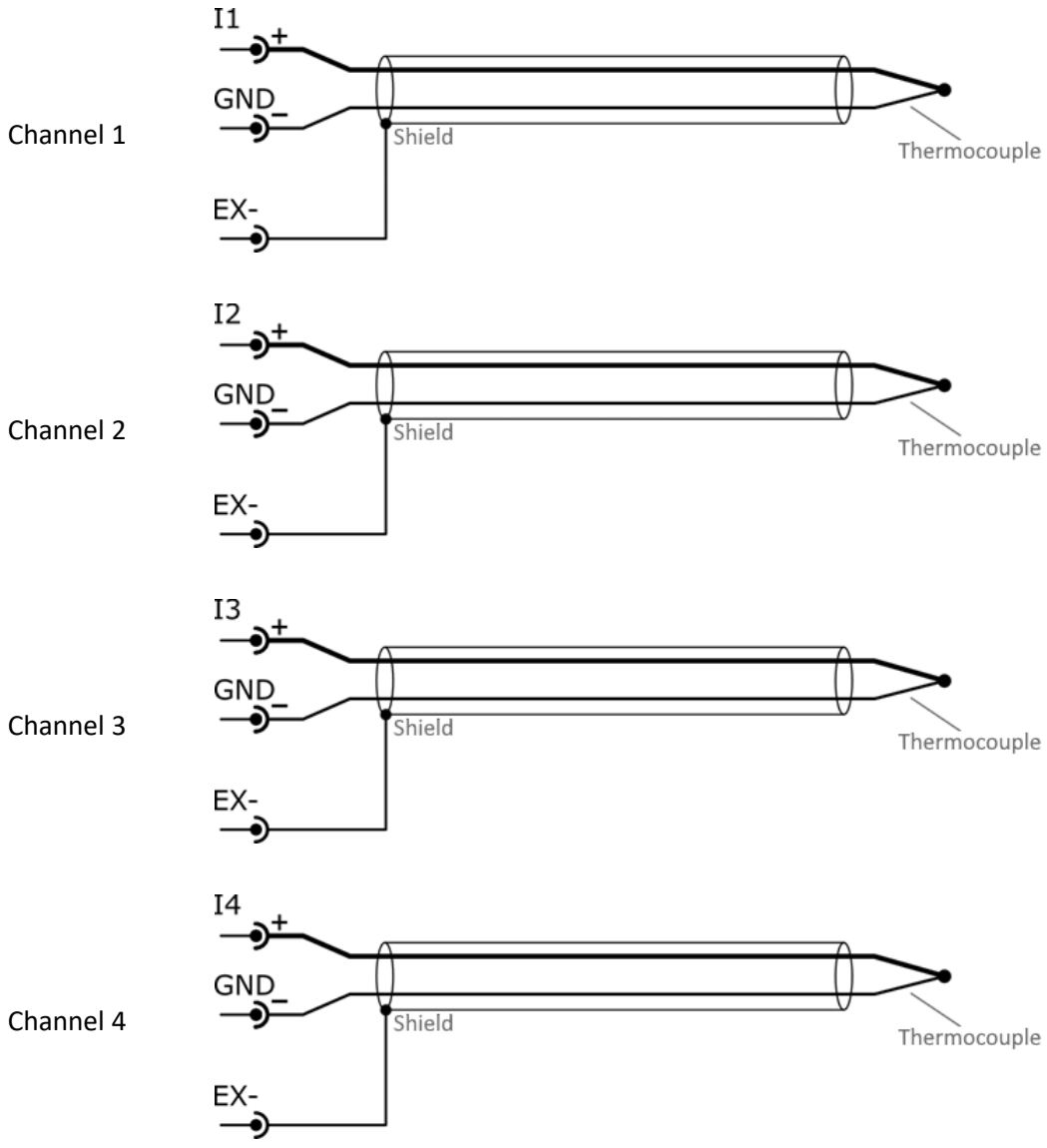
Warning Attention

This connection variant can only be used with galvanically isolated thermocouples. The differential connection is to be preferred.

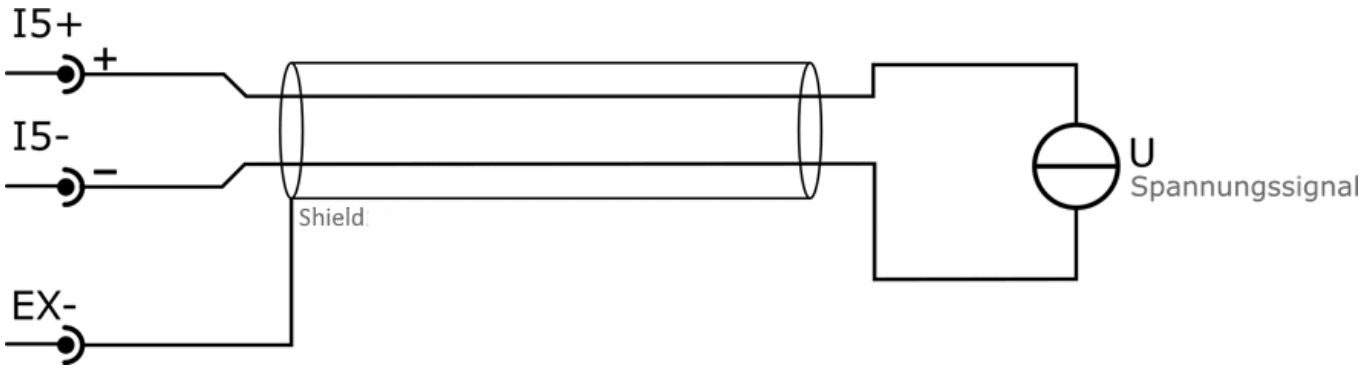
For thermocouple measurements, the quality of the solder joint at the cold junction is critical. Thermocouple wires are difficult to solder. This is impossible with commercially available solder. imc uses a special solder for this purpose, which can be obtained from us.

We recommend that the wires are well pre-tinned before they are soldered onto the pads of the D^x-SCT.

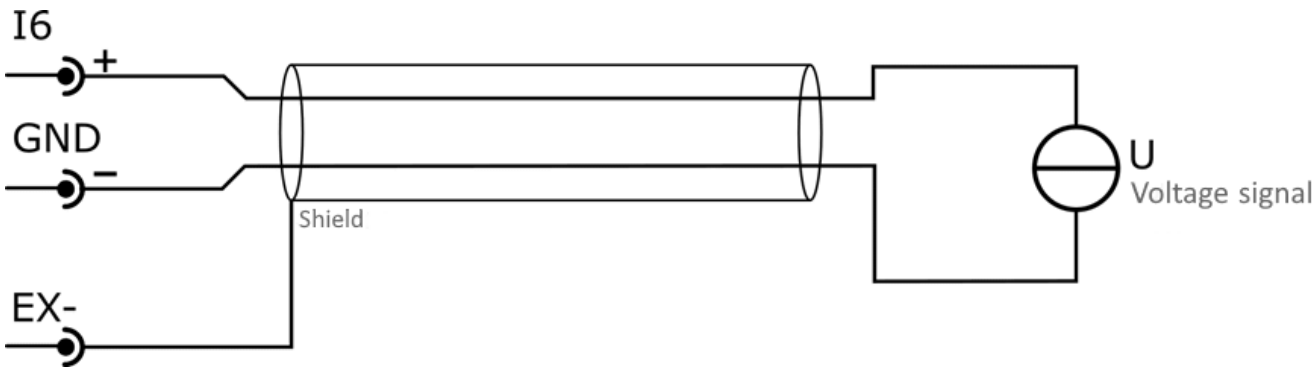
Contamination after soldering affects the accuracy of the temperature measurement. The soldering points must therefore be cleaned carefully.



6.3.8 High level voltage signal - differential



6.3.9 High level voltage signal - Single-ended



6.4 Receiver Control Interface (Dx-RCI)

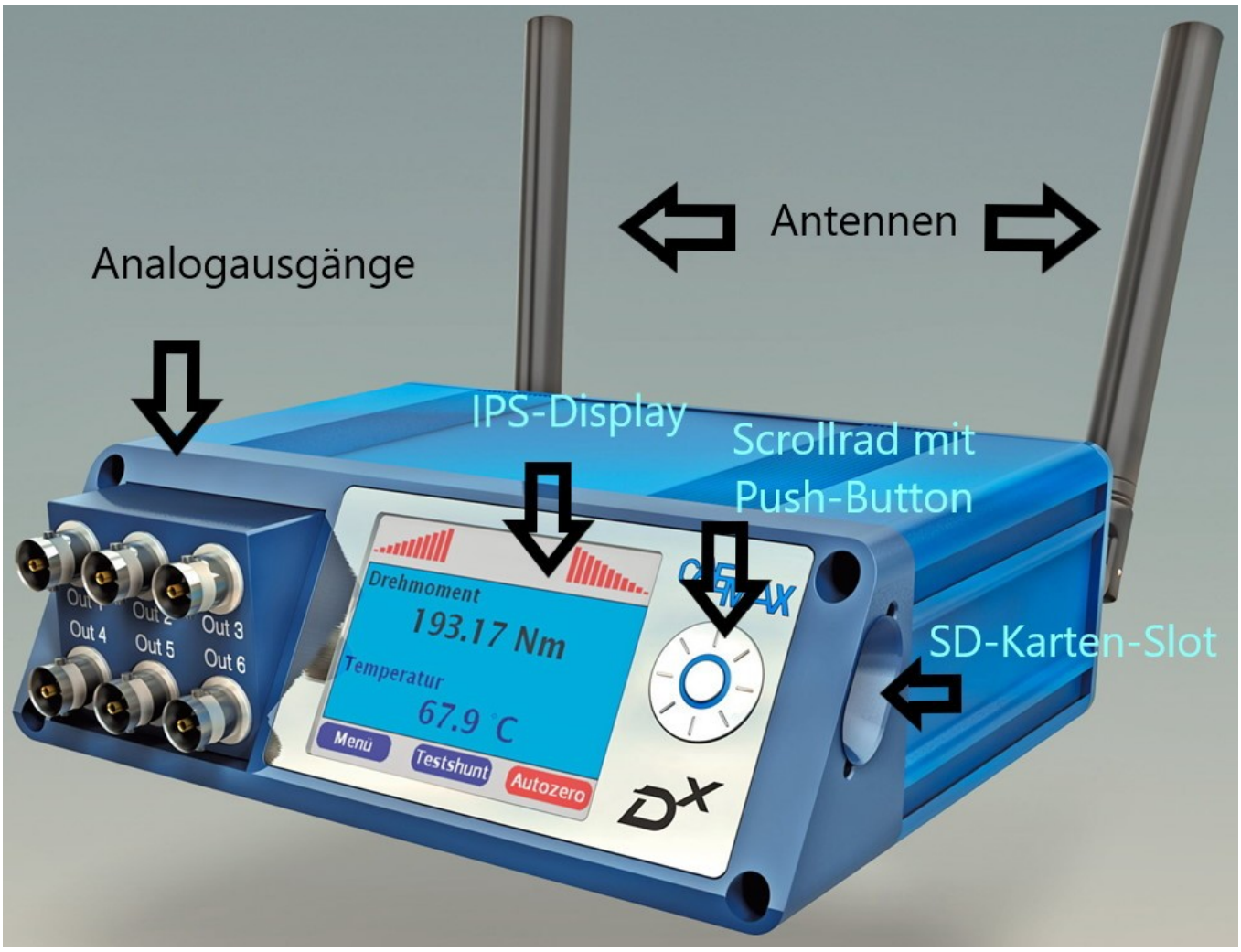


Fig. 12: D^X-RCI front view

6.4.1 Technical Specs

Display	2.83 Zoll IPS-Display (In-Plane Switching)
Resolution	320 x 240 px
Contrast	high contrast, Sunlight readable
Viewing angle	±85° no preferred direction
Input interface	multifunction wheel with rotary function and 5 keys
Analog output	6 BNC sockets, freely assignable
Output range	±10 V with fixed frequency low pass filter
Resolution	16 bit
Accuracy	±0.01 % full scale
High frequency transceiver	channel freely programmable in 868 MHz ISM band (optional also 2.4 GHz)
Structure	2 independent receiving systems operating in diversity mode
Synchronization	synchronized sampling and controlled transmit frequencies of up to four D^x-SCT units, resulting in a synchronous data stream
Power supply	9 to 36 V DC
Power consumption	< 5 W
Temperature range	-20 °C to +65 °C
Dimensions	approx. 170 x 130 x 53 mm
Weight	approx. 0.8 kg

6.4.2 Sockets

Fig. 13: D^X-RCI rear view

SMA-sockets	for connecting the antennas (only use the delivered rod (stick) or flat antennas)
Safety sockets (banana)	for the DC supply of the D^X-RCI (9 to 36 V) **Warning** Attention This connection is not suitable for supplying ring or fixed stators when an AC power supply unit is connected!
Power socket	Connection for external power adaptor (DC 9 to 36 V)
USB socket	USB 2.0 Full Speed/12 Mbit for configuration data exchange
Head/RSU	DSUB-15 socket for a connection of optional satellite receiver
CAN	DSUB-9 socket, CAN 2.0b, standard and extended identifier, freely programmable up to max. 1 MBaud connection according to ISO 11898, galvanically isolated
Ethernet	10/100 Mbit network connection with web server for parametrization, RJ 45 with possibility of interlocking
SD-Card (lateral)	standard SD slot for saving the parametrization. (currently up to 16 GB)
BNC sockets (front)	6 analog outputs, freely assignable

6.4.2.1 Power socket

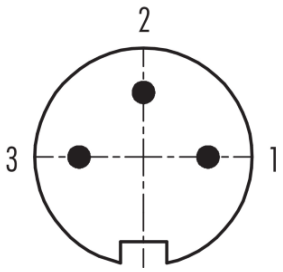


Fig. 14: Pin configuration power socket Binder M16 (3-pin)

Pin	Signal
1	
2	- (minus)
3	+ (plus)

6.4.2.2 CAN socket pin configuration (DSUB-9)

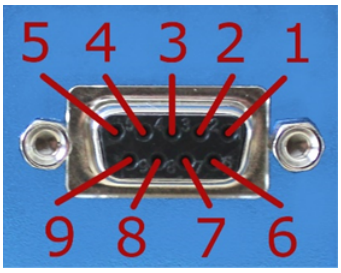


Fig. 15: Pin configuration DSUB-9 CAN socket

Pin	CiA name	function
1	--	n.c.
2	CAN_L	CAN_L
3	CAN_GND	CAN_GND
4	--	n.c.
5	--	n.c.
6	--	n.c.
7	CAN_H	CAN_H
8	--	n.c.
9	--	n.c.

6.4.3 Synchronization

To synchronize the sampling and the data stream of the D^x-SCT transmitters, the D^x-RCI receiver sends a signal every 5 ms. The maximum deviation is 60 ns.

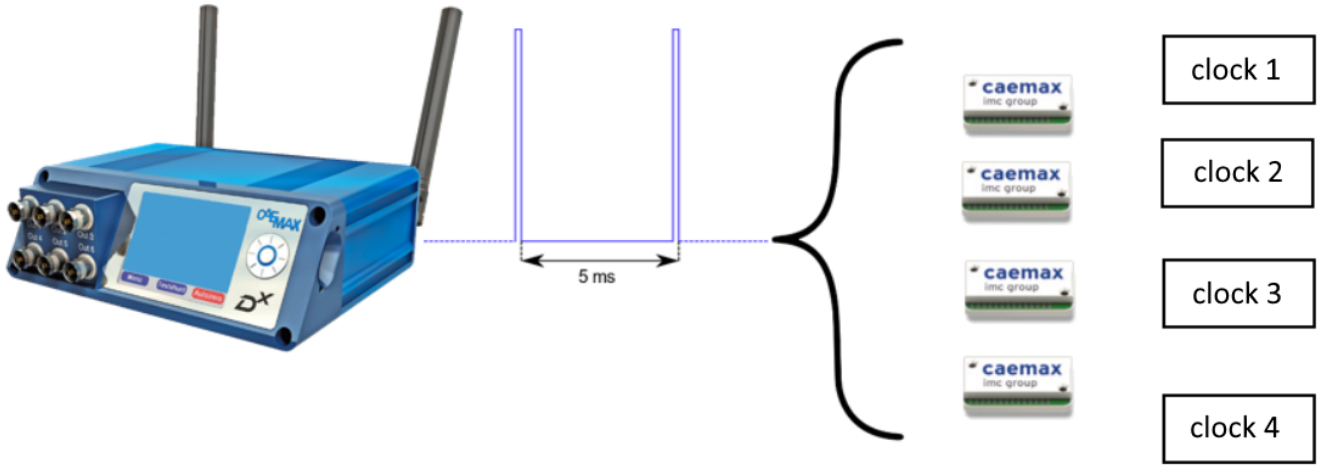


Fig. 16: Overview synchronization of multiple D^x-SCTs

The delay between a physical event and the output on the D^x-RCI can be calculated with the following formulas:

CAN output:

$$t_{delay} = 0.01s + \frac{3.1}{f_{sample}}$$

f_{sample} := sampling rate of the D^x

Analog output:

$$t_{delay} = 0.01017s + \frac{3.1}{f_{sample}}$$

f_{sample} := sampling rate of the D^x

7 Power supply of the transmitter unit Dx-SCT

Since the D^x-SCT transmitting unit is usually mounted on rotating components, the problem of power supply to the transmitting electronics arises. The D^x telemetry system offers different solutions:

- supply with battery/accumulator
- inductive supply with ring stator or fixed stator

However, never connect the D^x-RCI to the same power supply as the D^x-SCT.

Warning Attention

Never connect the D^x-RCI and the D^x-SCT to the same power supply.

Power consumption and voltage

The power consumption of the D^x-SCT transmitter unit depends, among other things, on the connected sensors (e.g. bridge resistors). A voltage of > 7.5 V is required to operate the D^x-SCT.

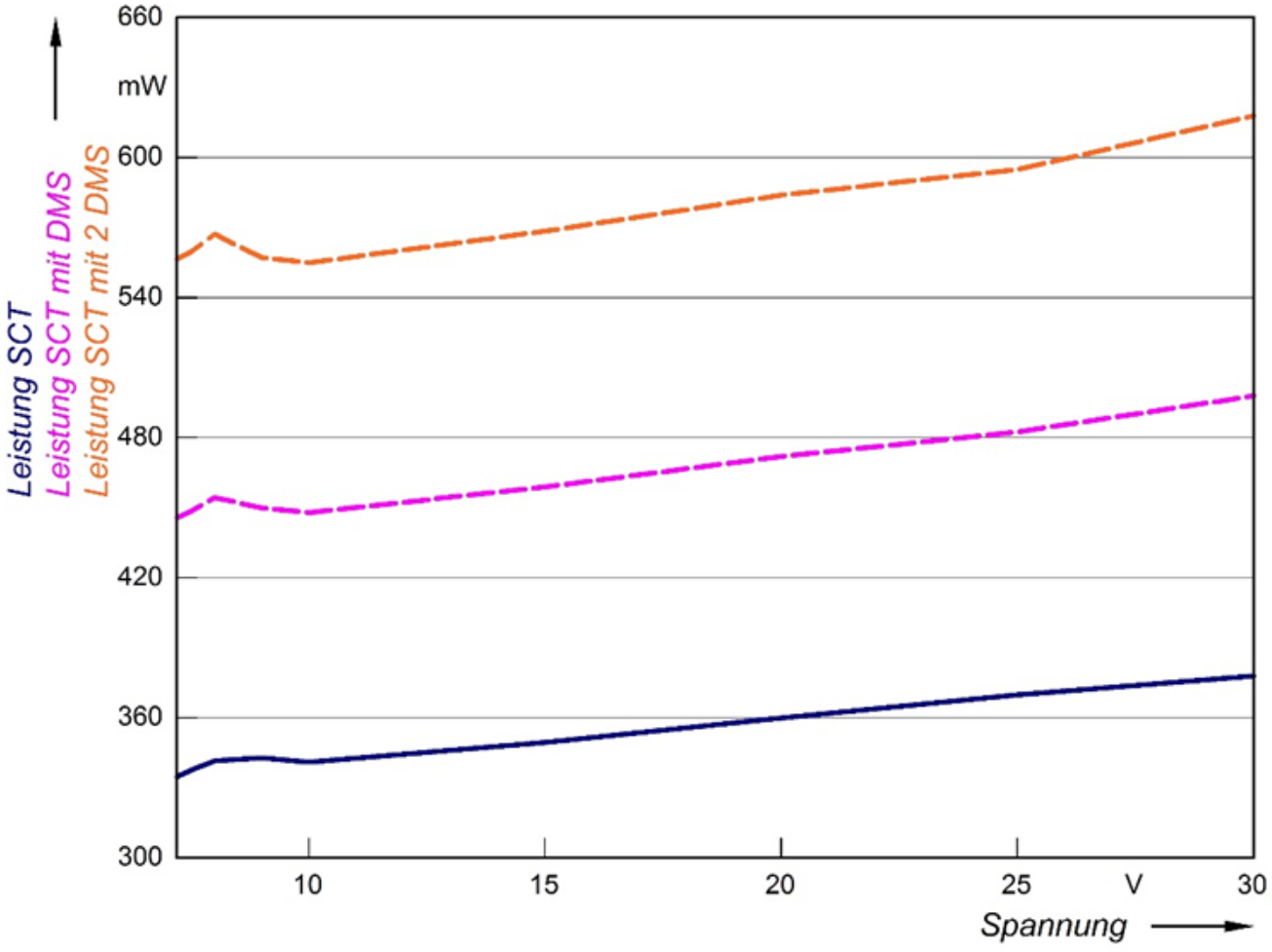


Fig. 17: Power consumption of the D^x-SCT power consumption SCT with 2 strain gauge out of the measurement setup SCT and power consumption SCT with DMS

7.1 Battery supply

The D^x-SCT can be operated with standard 9 V batteries or other battery types. The operating time - depending on the connected sensors and the battery used - is 3-6 h.

Connect the positive and negative terminals of the battery to the *DC Power Plus* and *DC Power Ground* terminals according to the connection diagram in chapter "pin configuration Dx-SCT" 22.

7.2 Integrated battery solutions

imc Test & Measurement GmbH provides solutions with integrated batteries for many standard applications. Here battery and transmitter unit D^x-SCT are integrated in one housing. Please contact us for further details.

7.3 Ring stator for inductive power supply

The Ring stator is used for contactless supply of the D^x-SCT transmitter units by inductive energy transfer: An alternating magnetic field generated by the stator ring induces a voltage in the secondary winding, which is used for the electrical supply of the D^x-SCT. There are step-by-step instructions 66 for installing the ring stator, just as there are for installing the secondary winding: chapter "Step-by-step instructions" 53.

Note

For diameters of 300 mm and more, we recommend the use of an OVP module for overvoltage protection (see chapter "Dx-OVP module" 44).

7.3.1 Overview

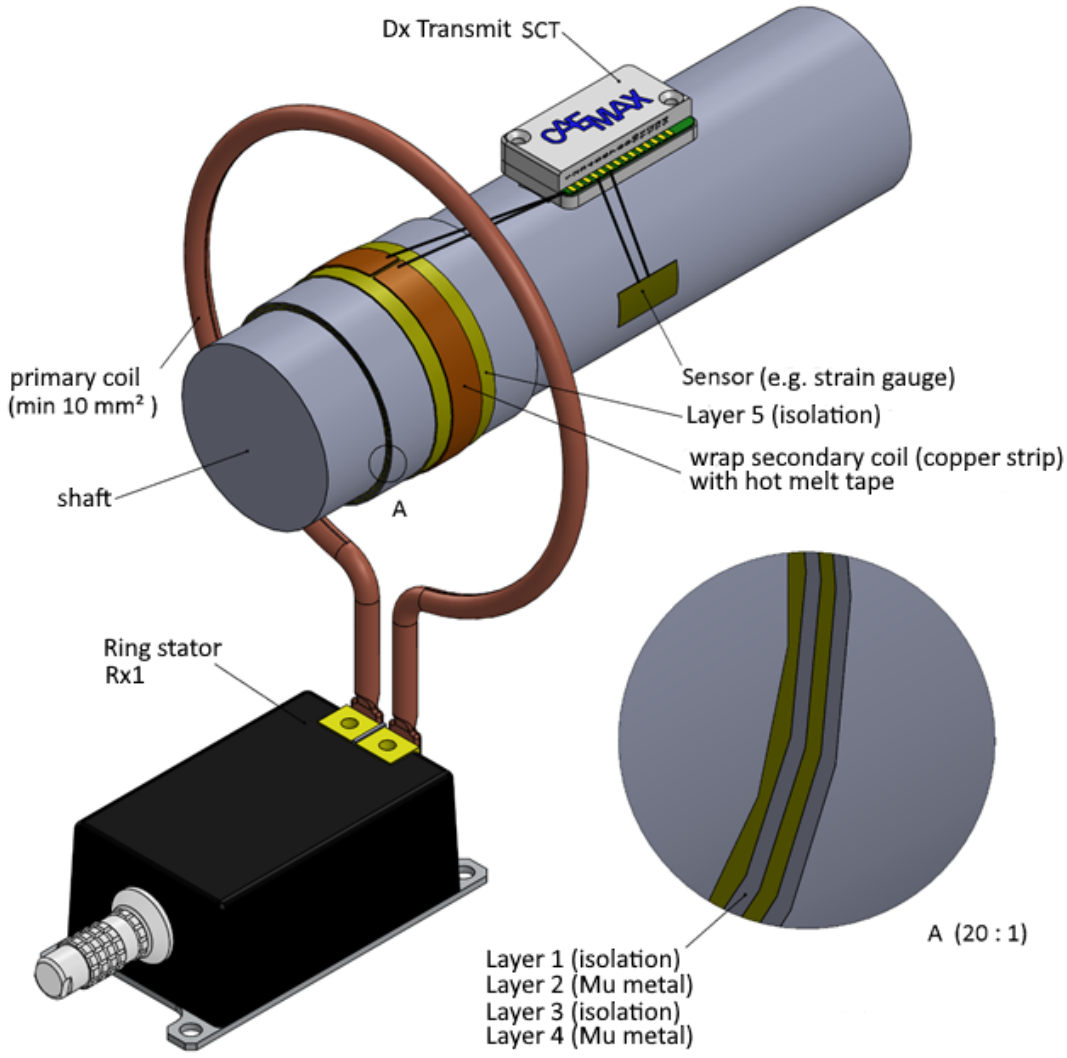


Fig. 18: Overview: installation of the Ring stator

7.3.2 Technical Specs of the Ring stators

Dimensions	approx. 84 x 54 x 37 mm without copper tube and lock
Tube	approx. 8 mm
Weight	approx. 324 g without copper tube
Temperature range	-10 °C to +85 °C
Transmission distance	approx. 0 mm to 70 mm
Ring diameter	30 mm to 300 mm (optional up to 1000 mm)
Ratio inner ring / outer ring	> 1:3 (the ratio of outer ring to inner ring must not exceed 3)
Power consumption	max. 25 W
Transmission frequency	30 to 60 kHz, automatically controlled
Supply voltage (DC)	9 V to 36 V
Protection class	IP 67
Connection cable	LEMO plug, banana plug, length 5 m
Terminal connection	LEMO socket

7.4 Fixed stator for voltage supply

The Fixed stator is used for contactless supply of the D^x transmitting units D^x-SCTs by inductive coupling: An alternating magnetic field generated at the stator head induces a voltage in the transmission winding, which is used for electrical supply of the D^x transmitting unit (D^x-SCT).

7.4.1 Overview

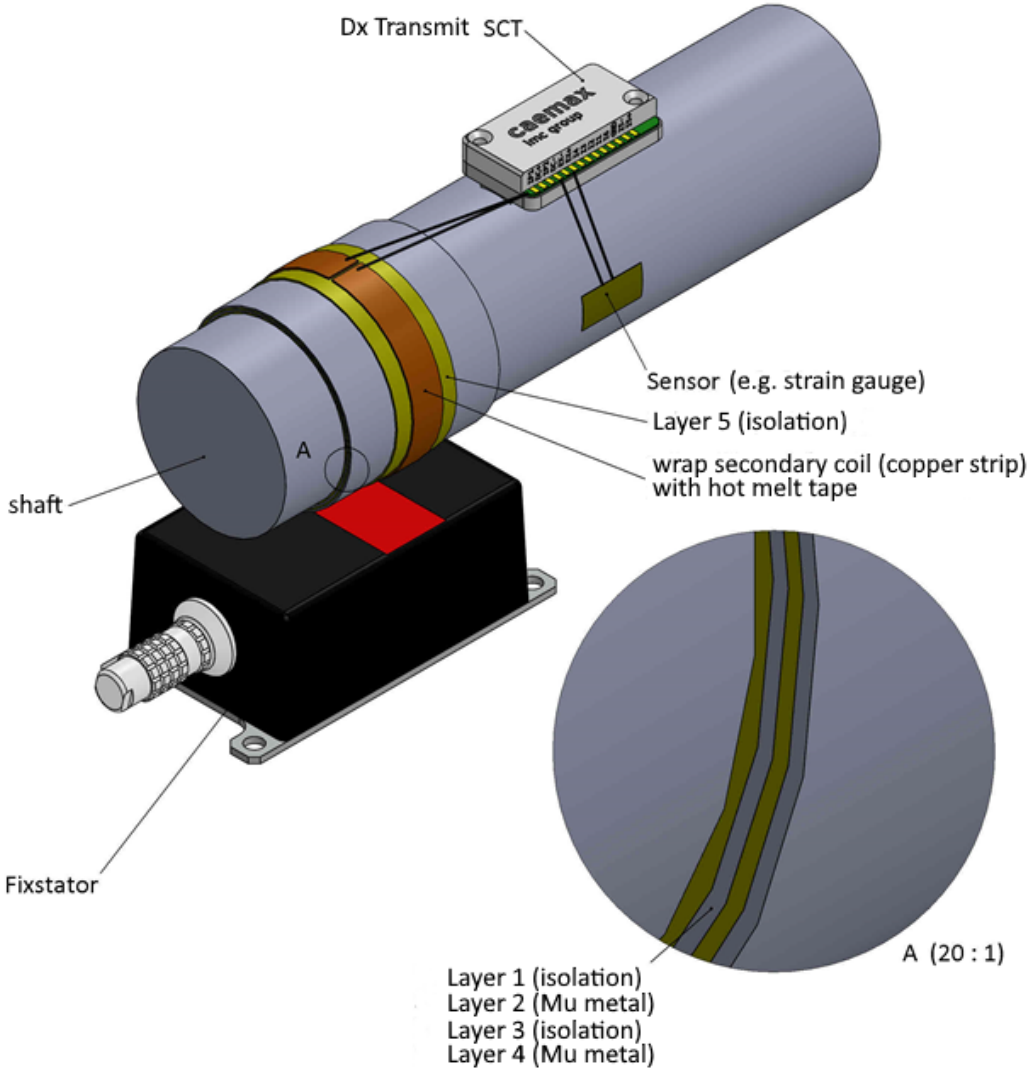


Fig. 19: Overview for an installation of the Fixed stator

7.4.2 Technical Specs of the fixed stator

Dimensions	approx. 84 x 54 x 37 mm
Weight	approx. 324 g
Temperature range	-10 °C to +85 °C
Transmission distance	5 to 35 mm
Power consumption	max. 25 W
Transmission frequency	30 to 60 kHz, automatically controlled
Supply voltage (DC)	9 to 36 V
Protection class	IP 67
Connection cable	LEMO plug, banana plug, length 5 m
Terminal connection	LEMO socket

7.5 Dx OVP module

7.5.1 Overview

The D^x-OVP module (Over Voltage Protection Module) is used to supply up to 4 connected D^x-SCT transmitting units with a constant voltage of 9 V and to protect the D^x-SCTs against overvoltage.

The D^x-OVP module is connected to the secondary winding of an inductive power supply for this purpose. The output of the D^x-OVP module is connected to the D^x-SCTs.

During normal operation, the two green LEDs of the protection module light up constantly.

If the green LEDs flicker, the set power of the inductive power supply is too low.

If the red LED lights up, the supplied voltage of the inductive power supply is too high and it must be regulated down.

7.5.2 Operating modes

D^x-OVP: operating modes

IN	OV	OUT	Operating state
			input voltage too low, output deactivated
			input voltage not stable (1te LED flicker), output active
			input voltage okay, output aktive
			input voltage high, output active --> input power reduced

7.5.3 Technical Specs Dx-OVP module

Temperature range	-40 °C to +85 °C
Input	12 V to 70 V AC (DC variant optional)
Output	9 V controlled
Number of supplied D^x-SCT	up to four D^x-SCT units supplied with one module
Cable length IP-In	30 cm
Cable length DC-Out	100 cm

7.5.4 Delivery state

The D^X-OVP module is supplied with two short (30 cm) black cables (IP IN) for connection to the secondary winding of an inductive power supply and with two longer (100 cm) cables, red and black (DC-OUT 9 V), to which up to 4 transmitting units D^X-SCTs can be connected.

Fig. 20: D^X-OVP module photo

7.5.5 Installation

Warning

Only skilled personnel may carry out the installation and connect the cables. In particular, the solder pads of the D^X-SCTs must not be heated above 360 °C and not for too long. See also chapter "Soldering work" 13 for soldering standards.

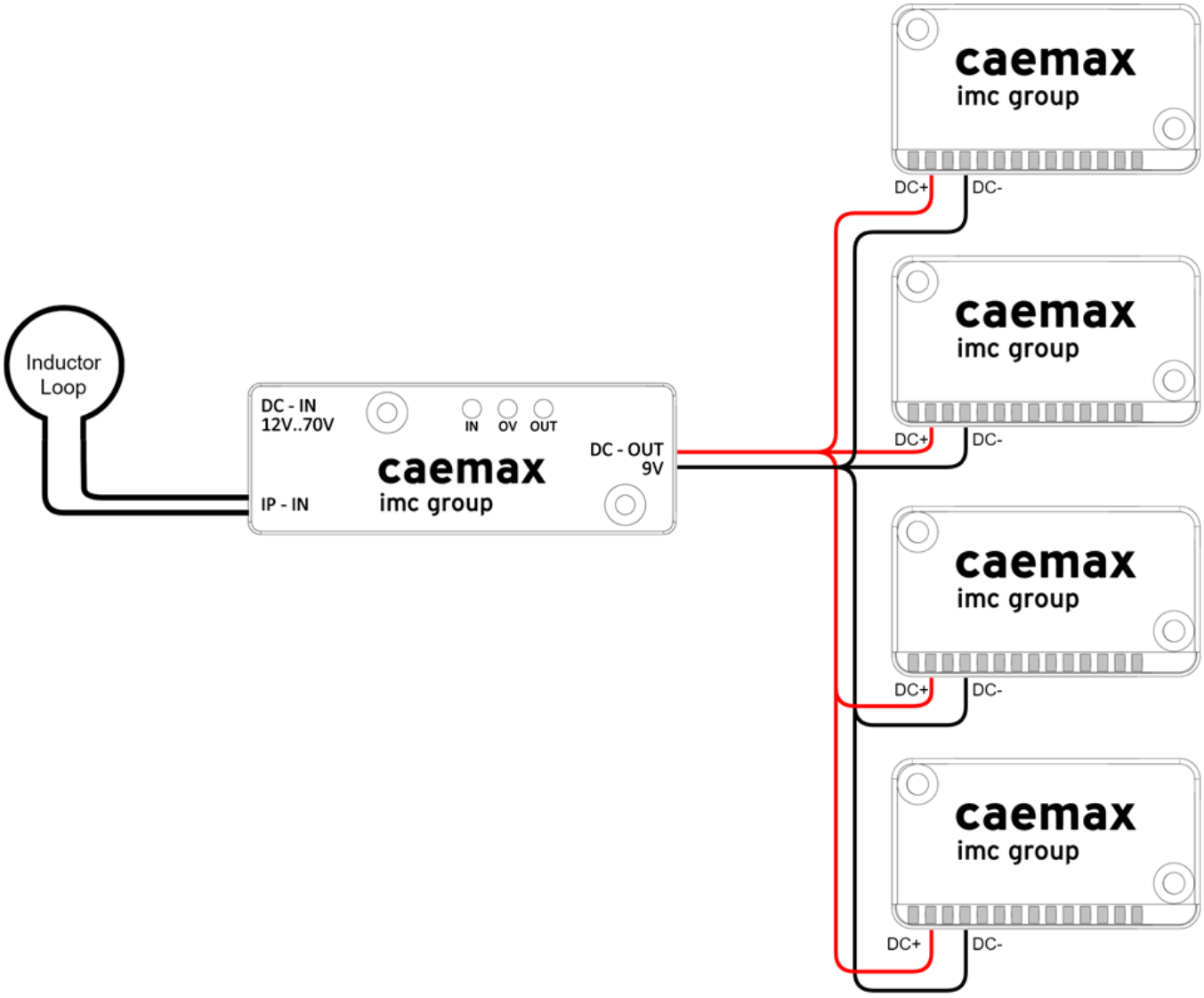


Fig. 21: Connection scheme of D^X-OVP modules for one inductive source and 4 D^X-SCT units

Connection to the secondary winding of the inductive power supply:

The two short black cables (IP-IN) are soldered to the secondary winding of the inductive power supply. The cable length must be as short as possible; shorten the cables if necessary. The cables should be routed as parallel as possible and must not form a loop or sling.

So instead of a D^X-SCT, connect the D^X-OVP module to the secondary winding of the inductive power supply.

For the installation of an inductive power supply, see the relevant chapters in this document and also on the **CAEMAX homepage**:

https://www.caemax.de/ringstator-montage/

Connection to the SCTs:

- Solder the long red cable (DC-OUT 9 V) to the DC+ input of the SCT.
- Solder the long black cable (DC-OUT 9 V) to the DC- input of the SCT.
- If several SCTs are to be connected to one D^X-OVP module, the SCTs must be connected in parallel. Up to 4 D^X-SCTs can be connected to one D^X-OVP module.

7.5.6 Commissioning

Fig. 22: Regulating the Stator power

- Before commissioning, set the ring stator or fixed stator to the lowest power. To do this, use a screwdriver to turn the set screw 13 turns to the left until a click is heard. Then the ring or fixed stator is set to minimum power (see figure 21: Regulating the Stator power). There is also an arrow with a "+" and "-" sign on the stator.
- Switch on (i.e. supply power to) the ring stator or fixed stator.
- Now increase the power of the ring or fixed stator until the two green LEDs of the D^x-OVP module light up constantly.

The power of the ring or fixed stator is increased by turning the set screw clockwise with the screwdriver.

- If the two green LEDs of the D^x-OVP module are stably green, there is a constant 9 V at the output of the D^x-OVP module.
- Use the D^x-RCI receiver unit to check whether the D^x-SCTs are being received. To do this, observe the reception bars of the D^x-RCI.

For information on how to change the transmit frequency of the D^x-RCI and the D^x-SCTs and further information on setting the D^x-RCI and the D^x-SCTs, please refer to the relevant chapters of this operating manual.

- If the power generated by the inductive power supply is too high, the red LED of the D^x-OVP module lights up. Nevertheless, there is a constant 9 V at the output of the D^x-OVP module.
- If the red LED on the D^x-OVP module lights up, adjust the ring stator or fixed stator down. To do this, use a screwdriver to turn the adjusting screw on the ring stator or fixed stator counterclockwise until the red LED on the D^x-OVP module turns off. If the red LED has switched off but the green LEDs are flickering, then carefully increase the power of the inductive power supply again until the green LEDs light up constantly.

8 Installation of the Dx-Telemetry System

8.1 General notes

- The cable connection between transmitter (sensor), transmitter unit and transducer winding should be as short as possible.
- In order to obtain precise measured values, the connecting wires between sensor and transmitting unit D^x-SCT should be twisted in pairs, In+ with In- and the supply cable DC+ with DC-. Care should be taken that the sensor wires are not parallel to the supply wires.
- The fixing holes of the D^x-SCT transmitter unit are only for fixing purposes. They may only be tightened with a maximum torque of 32 Nm. In case of accelerations or centrifugal forces, it is not sufficient to glue the D^x-SCT only with the bottom side, but it must be screwed.
- Knowledge of how to mount the transmitter (strain gauge, thermocouple) is assumed. Therefore, this procedure is not described in detail.

8.2 Safety notes

- Damaged or defective cables must not be used.
- Do not touch the running shaft, do not reach into gap between shaft and stator when running, avoid touching the D^x-SCT contacts during operation.
- Avoid direct contact of the stator with data carriers or other devices and systems that must be protected from magnetic fields.
- Operation by qualified personnel only; telemetry systems consist of electrostatic sensitive devices.
- This is a Class A device, i.e. suitable for industrial use. This equipment may cause radio interference in residential areas; in this case, the operator may be required to implement appropriate measures and to pay for them.
- Heating above the maximum operating temperature can lead to damage and failure of the stator (for details, see chapters "Commissioning with ring stator" 72 and "Commisioning with fix stator" 74). Dissipation of the heat energy generated during operation must therefore be ensured, e.g. by mounting on a metallic surface.

8.3 Installation of the receiver unit Dx-RCI

- Connect the D^x-RCI receiver unit to a voltage source. To do this, use the DC inputs (9 V to 36 V DC) or supply the system with the supplied power supply unit.
- If you want to configure the D^x telemetry system via your PC, connect the Ethernet interfaces of the PC and the D^x-RCI receiver unit using the Ethernet cable supplied.
- For forwarding the measurement data via the CAN bus, connect a CAN cable (CAN1: or CAN2:).

Note CAN 120-Ω-Terminator

The D^x-RCI receiver unit does not have a built-in CAN terminating resistor. If the D^x-RCI is located at the end of the CAN measuring chain, a 120 Ω terminating resistor must be plugged in between the connector and the CAN socket.

- For an analog tap of the measurement data, connect BNC cables to the analog outputs of the D^x-RCI receiver unit. These can be freely assigned to all measurement data channels (for configuration see chapter "Configuring analog outputs" 116).
- Connect the antennas. When doing so, only tighten hand-tight.

Note

Tighten the antennas, also the flat antennas if necessary, only hand-tight.

8.4 Installing the Dx-SCT transmitter unit on a shaft

After connecting the sensors to the D^x-SCT transmitter unit, it can be fixed on the shaft.

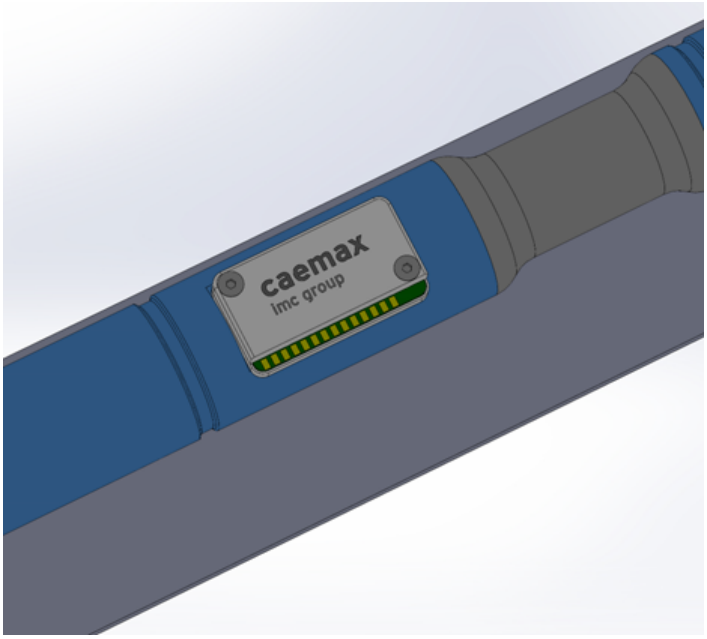


Fig. 23: Shaft with Dx-SCT

When mounting the D^x-SCT transmitter unit, please ensure that it lies flat on the shaft and is screwed in place. For this purpose, a suitable substructure may have to be constructed. We will be pleased to support you with this constructive solution.

The simplest solution is fastening with the aid of two belt straps that are adapted to the centrifugal forces that occur.

For mounting the D^x-SCT at high speeds and large shaft diameters, imc offers axial and radial D^x-SCT housings designed for higher centrifugal forces.

Make sure that the cables are routed free of tensile forces, as mechanical stresses at the solder joints can lead to failure and/or damage to the system.

Connect the Dx-SCT to a voltage source. The Dx-SCT is ready for operation as soon as it is supplied with power. To connect a voltage source, please observe the pining in chapter "pin configuration Dx-SCT" 22. If you use a ring stator or fixed stator for inductive power supply, please refer to chapter "Startup with ring stator" 72 and chapter "Startup with fixed stator" 74.

Note

To check whether the voltage you have applied is sufficient to operate the D^x-SCT transmitter unit, check the bridge supply voltage (see chapter "Dx-SCT pin assignment" 22). This is 4.096 ±0.1 V if the voltage supply is sufficient.

8.5 Attachment of a secondary winding for inductive energy transfer

A standard application of the D^x telemetry system is measurements on rotating shafts. The individual steps in mounting a secondary winding for inductive energy transfer on the shaft are shown below. The materials required for mounting can be ordered as a set from imc (Mounting Kit).

For **video instructions** on how to assemble the secondary winding and ring stator, see:

https://www.caemax.de/ringstator-montage/

8.5.1 General view

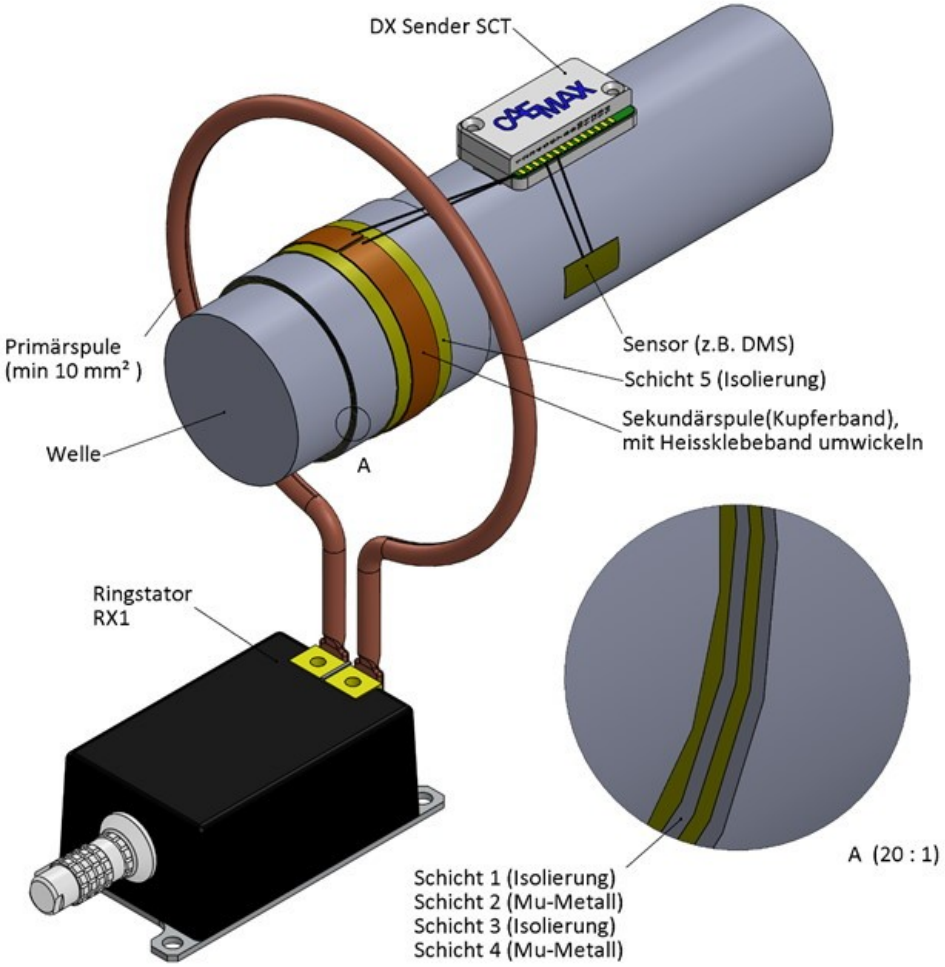


Fig. 24: Application ring stator

If you install the secondary winding correctly, the application should look like Figure 24.

8.5.2 Step by Step guidance

1. Wrap the shaft with fabric tape. The isolated surface must be wider on both sides than the mu metal to be subsequently applied to prevent short-circuiting of the Mu metal with the shaft.

Fig. 25: Isolating the shaft

2. Cut the first layer of Mu metal with protective film to the required length. The length is calculated with the formula π * diameter + 10 mm. For the diameter, include the previously applied isolating layer.

   Apply overlapping black isolating tape to one end of the mu-metal.

Fig. 26: Apply black isolating tape to one end of the Mu metal

3. Pull off the protective foil and stick the Mu metal onto the shaft. The ends must not touch, there must be no short-circuit winding with the Mu metal.

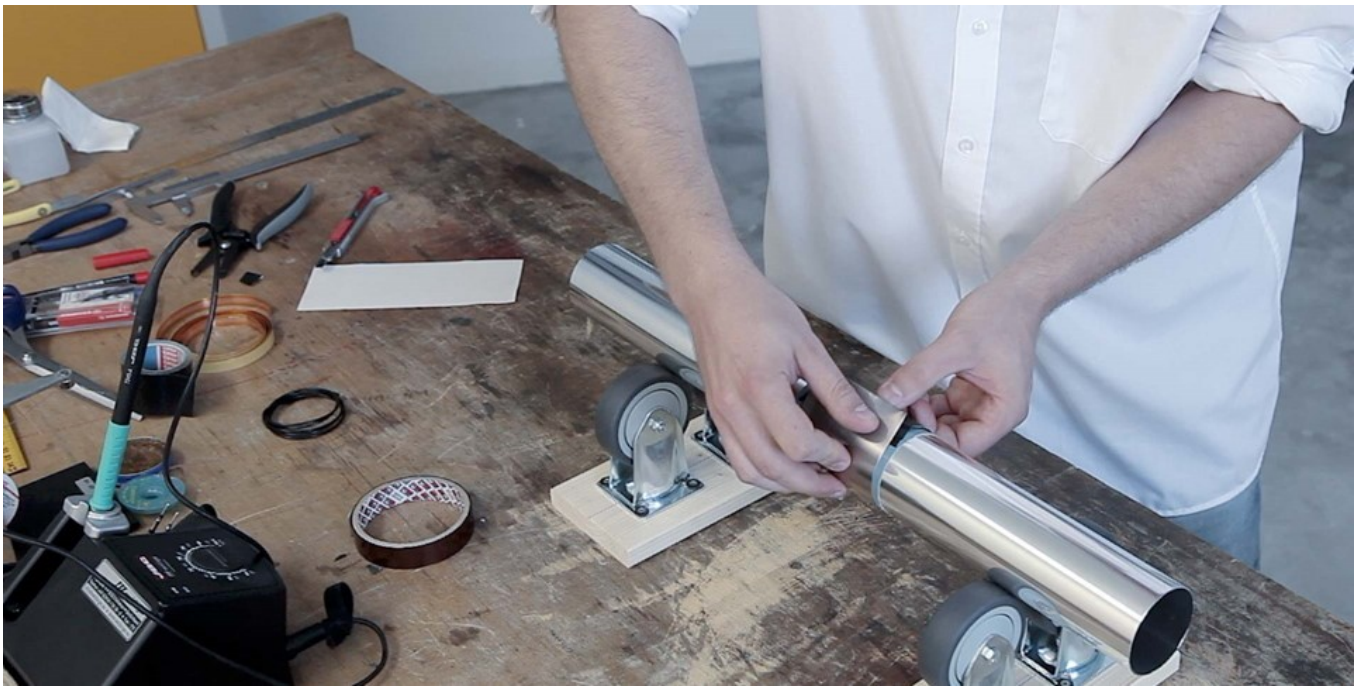


Fig. 27: Apply the first Mu metal layer to the shaft

Fig. 28: After applying the first mu-metal layer

4. Now isolate the Mu metal as described under 1. 53

Fig. 29: Attaching isolating tape

5. Now calculate the length of the second Mu metal layer with the formula π * diameter + 10 mm.

Fig. 30: Measuring the diameter

6. Cut the second Mu metal layer to this length and apply an overlapping black insulating tape to one end of the Mu metal. Peel off the protective foil.

7. Now the second Mu metal layer is applied. The overlap of this Mu metal layer must be offset by at least 90 ° to the overlap of the first Mu metal layer. So, for example, rotate the shaft by at least 90 ° before applying the second Mu metal layer.

Note

The overlap of the second Mu metal layer must be offset by at least 90 ° to the overlap of the first Mu metal layer.

Fig. 31: Apply second Mu metal layer

Fig. 32: After applying the second Mu metal layer

8. Apply the first layer of heat-resistant Kapton tape (polyimide tape) in the center.

Fig. 33: Apply Kapton tape

Fig. 34: After attaching the Kapton tape

9. Calculate the length of the copper tape for the secondary winding using the formula π * diameter - 5 mm. Cut the copper tape to size.

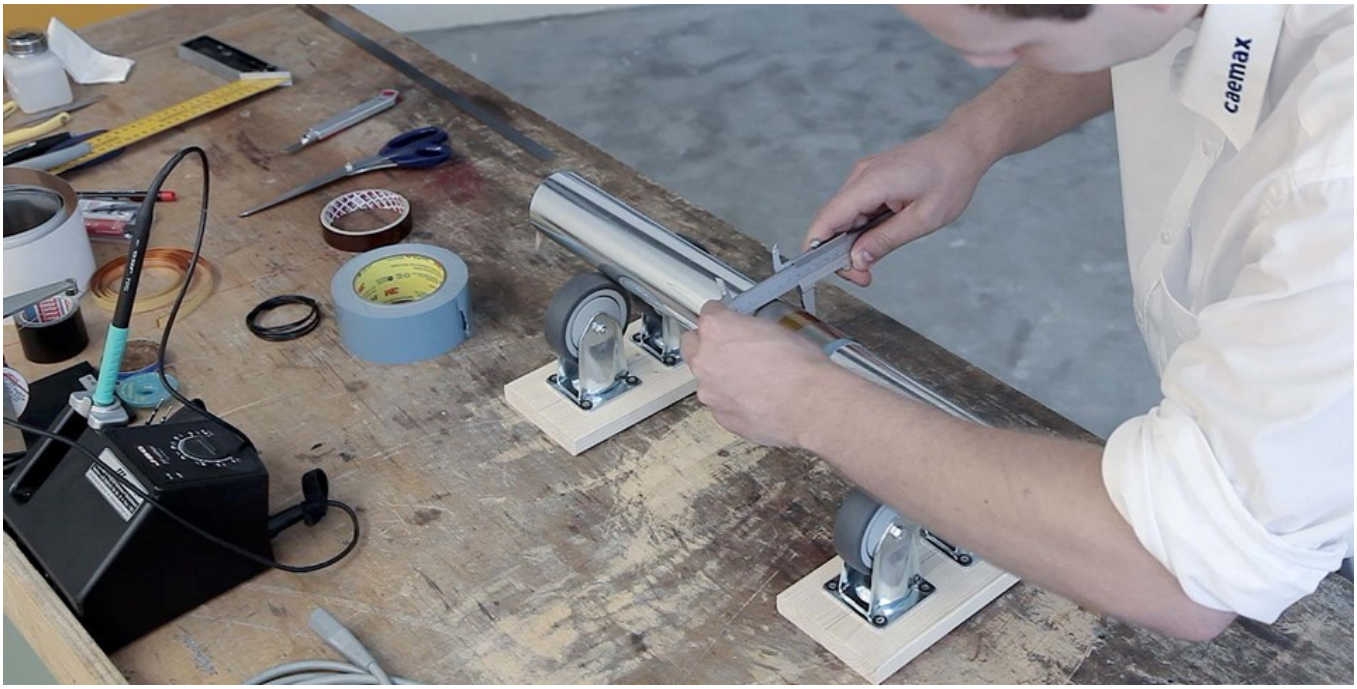


Fig. 35: Measuring the diameter

10. Tin both ends of the copper strip.

Fig. 36: Tin both ends of the copper strip

11. Now attach the D^x-SCT transmitter unit in a suitable manner.

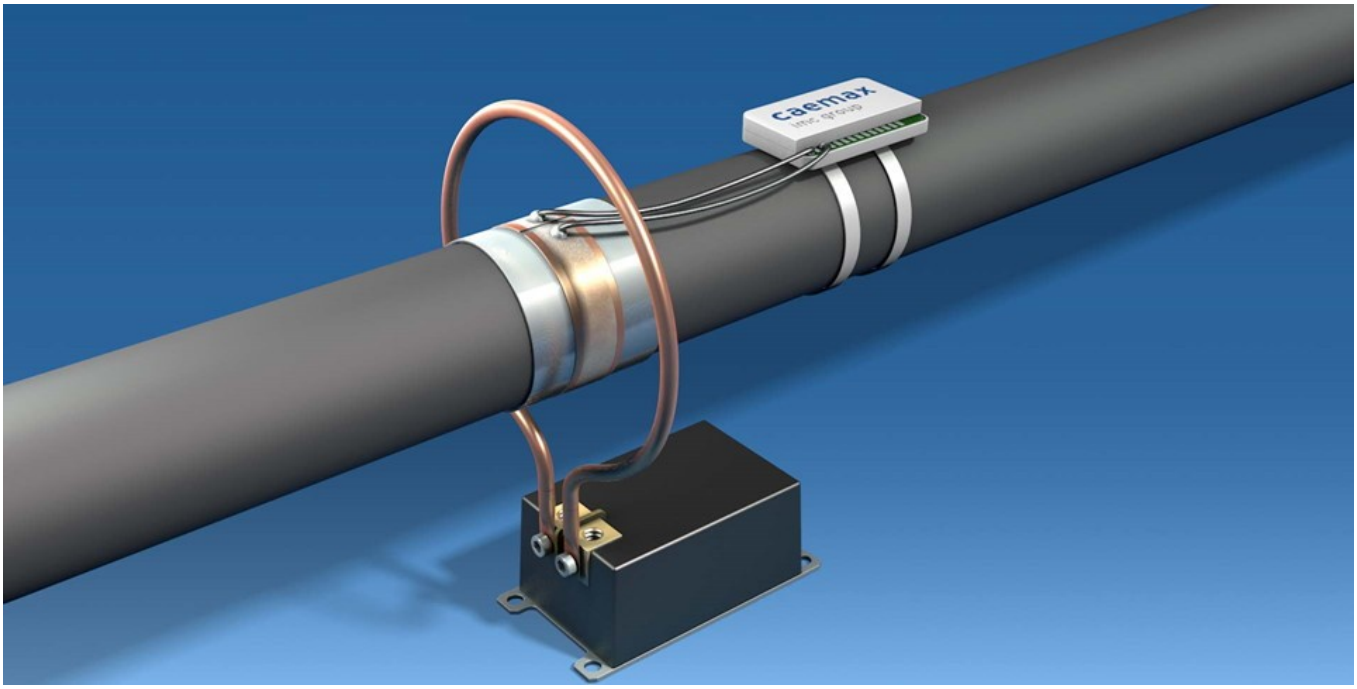


Fig. 37: Shaft with transmitter unit D^x-SCT, secondary winding and Ring stator

12. Measure and cut the stranded wire (at least AWG 20 or 0.62 mm^2) for the inductive power supply, strip the ends and tin them. Solder one stranded wire each with a maximum length of 100 mm onto the copper strip ends. The connecting leads should be soldered to the copper strip as flat as possible. As drawn in the 36 figure, the leads must be aligned at right angles to the copper strip.

Note

The connecting leads must be aligned at right angles to the copper strip or stator as shown in Fig. 36.

Fig. 38: Solder the wires for the inductive power supply to the copper strip.

13. Now place the copper strip as secondary winding centrally on the polyimide layer. The distance between the copper ends must be approx. 5 mm.

Note

If the ends of the secondary winding (copper strip) touch, the D^x-SCT transmitter unit is not supplied with power.

The soldering points with the stranded wire must not touch each other. The strands must be flat and close together. They must not touch the stator when the shaft is rotated.

The sensor leads should not cross with the connecting leads.

For measurements on shafts with high speed or high temperature imc offers special solutions (half shells, special housings etc.)

For more information please contact our support at
https://www.imc-tm.de/service-training/hotline-kundendienst/

Fig. 39: Assembly of the secondary winding

14. Solder the wire ends to the IP1 and IP2 terminals of the D^x-SCT transmitter unit.

Fig. 40: Soldering the wire ends to the D^x-SCT transmitter unit

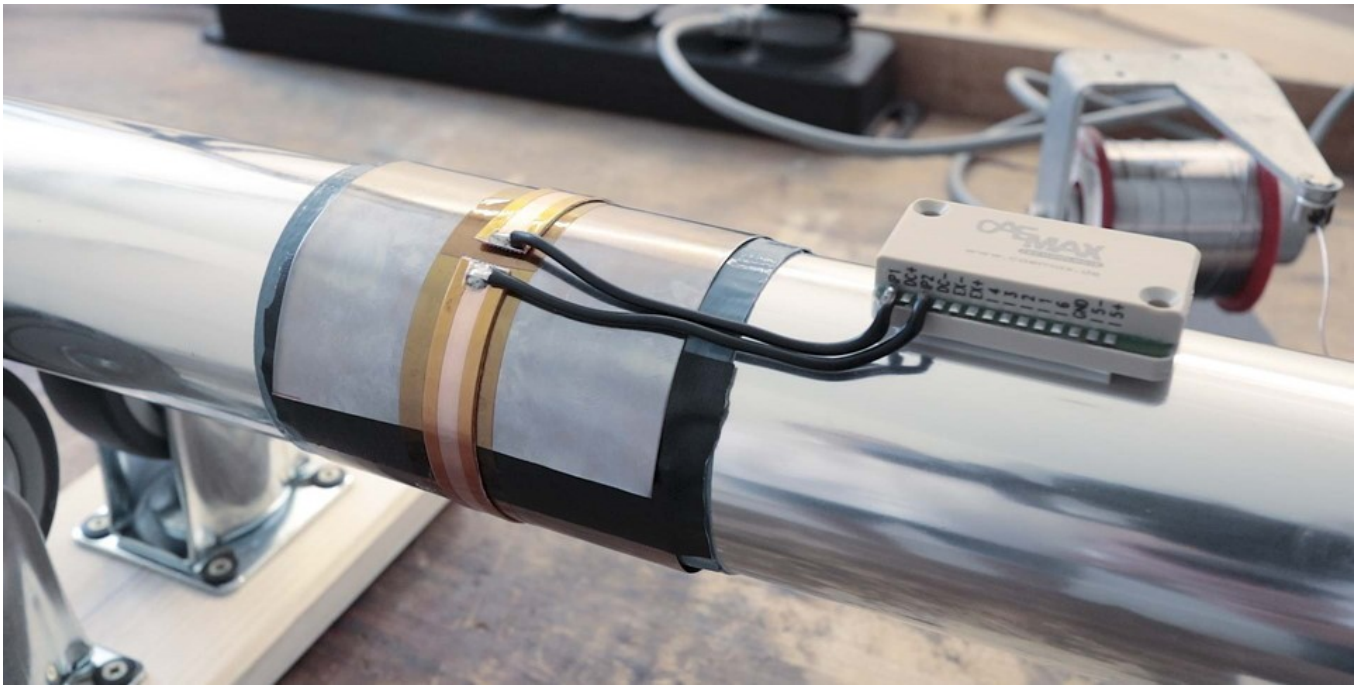


Fig. 41: Secondary winding connected to transmitter unit D^x-SCT

15. To secure against centrifugal forces and for protection, the transformer winding must be wrapped with the supplied fabric tape. Before commissioning the system, please observe chapter "Commissioning with ring stator" 72 or "Commissioning with fixed stator" 74.

Fig. 42: Apply gray tape for isolation and protection

Fig. 43: The finished secondary winding

8.6 Attachment of a ring stator winding for inductive energy transfer

A standard application of the D^x telemetry system is measurements on rotating shafts. The individual steps in mounting a secondary winding for inductive energy transfer on the shaft are shown below. The materials required for mounting can be ordered as a set from imc (Mounting Kit).

8.6.1 General view

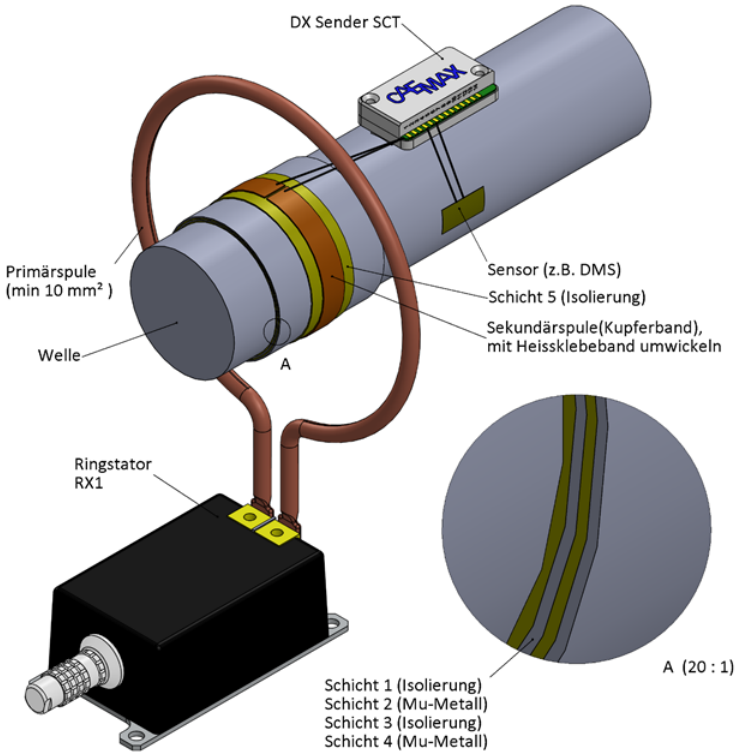


Fig. 44: Applikation Ringstator

If you install the secondary winding correctly, the application should look like Figure 44.

Warning Attention

Heating above 80 °C can lead to damage and failure of the stator. Dissipation of the heat energy generated during operation must therefore be ensured, e.g. by mounting on a metallic surface.

Note

The efficiency of the energy transfer is more favorable the smaller the distance between the primary and secondary windings. However, it is essential to take into account the mounting height of the secondary winding and the isolating layer as well as any inherent movements and imbalances of the shaft.

8.6.2 Step by Step guidance

1. Calculate the length of the copper ring: (40 mm + diameter) * π + 2 * L

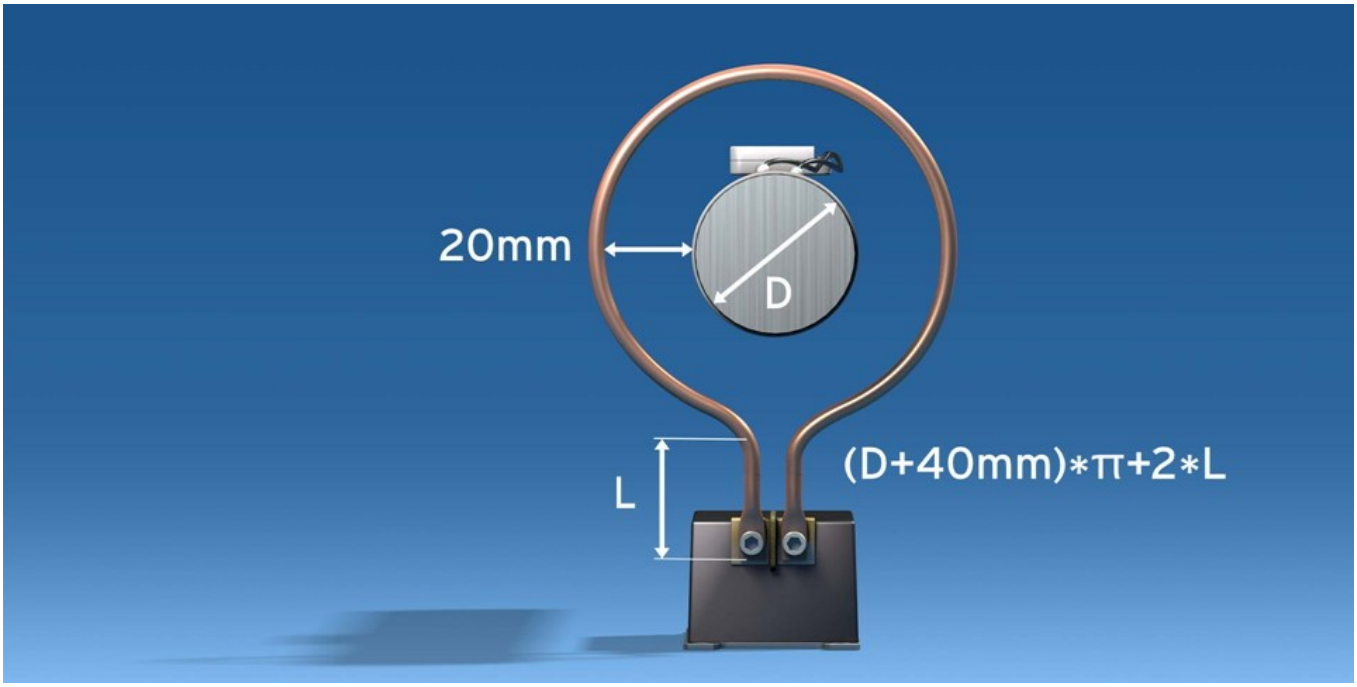


Fig. 45: Ring stator setup

2. Shape the copper wire: Bend the ends …

Fig. 46: Bend the ends of the copper wire

3. … and shape the arc.

Fig. 47: Form the arc of the ring stator

4. Press the copper tube together at both ends.

Fig. 48: Press the copper tube together at both ends

5. Drill a 5 mm diameter hole in each end of the copper tube.

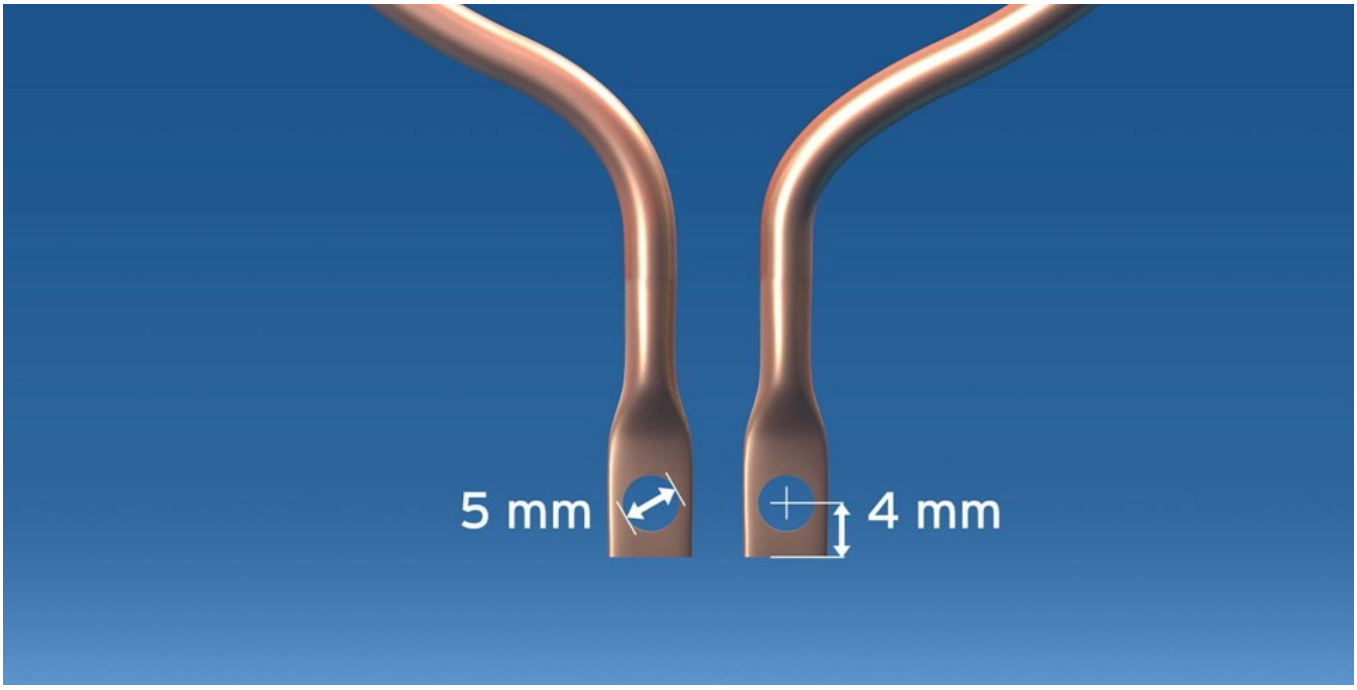


Fig. 49: Hole diameter and spacing

6. Trim the holes.

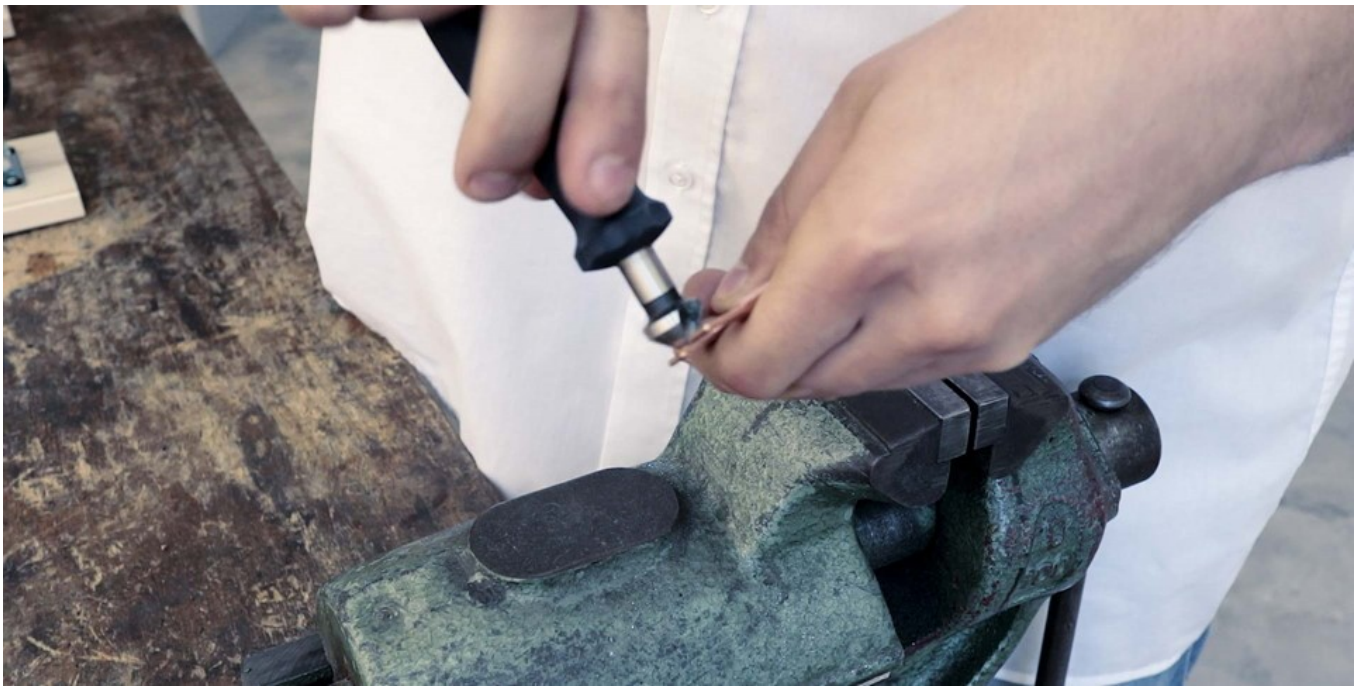


Fig. 50: Trim the holes

7. Sand the contact surfaces of the copper tube to reduce resistance.

Fig. 51: Sanding contact surfaces

8. Screw the primary winding to the ring stator.

Fig. 52: Screw primary winding to ring stator

9. Important: Set the output power regulator to the minimum position by turning it counterclockwise to avoid overvoltage.

Warning Attention

Set the stator power to the minimum value via the potentiometer screw on the stator housing. The direction of rotation for reducing the stator power is indicated on the housing. When the potentiometer screw has reached the minimum position, you will hear a clicking noise when turning it further.

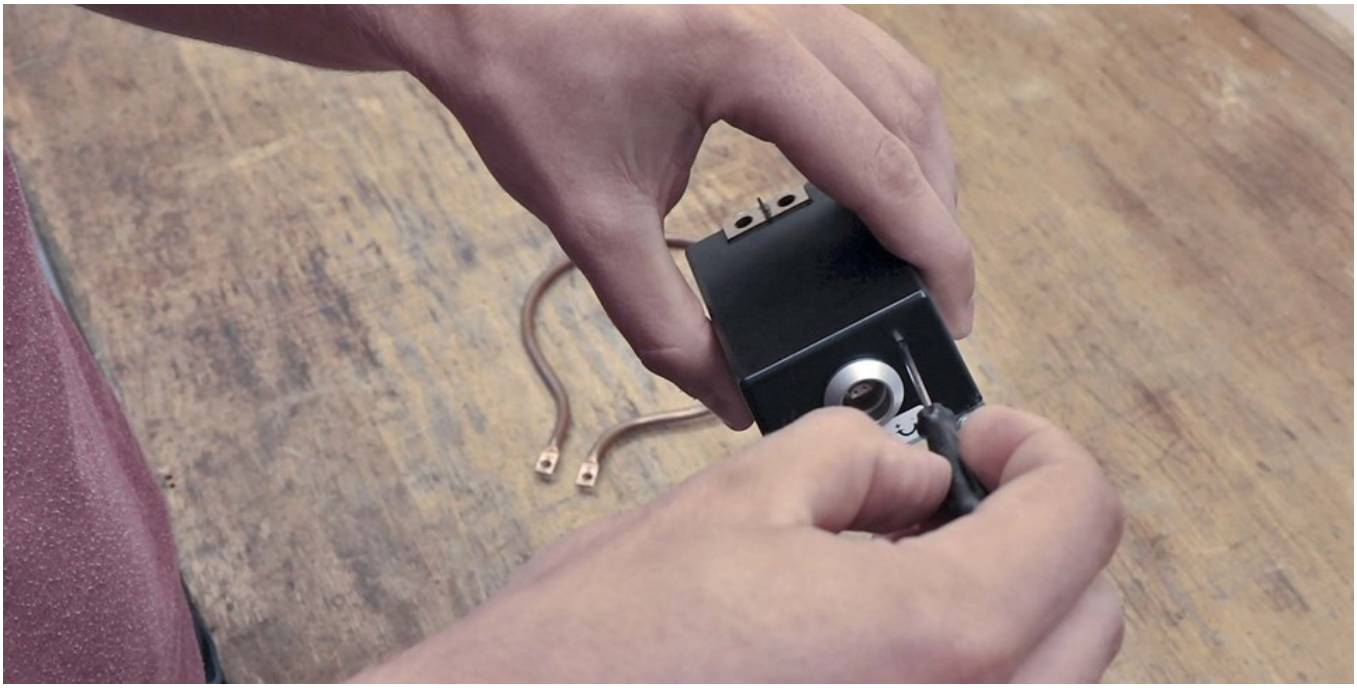


Fig. 53: Set the voltage regulator to the minimum position

10. Connect the supply cable to the ring stator.

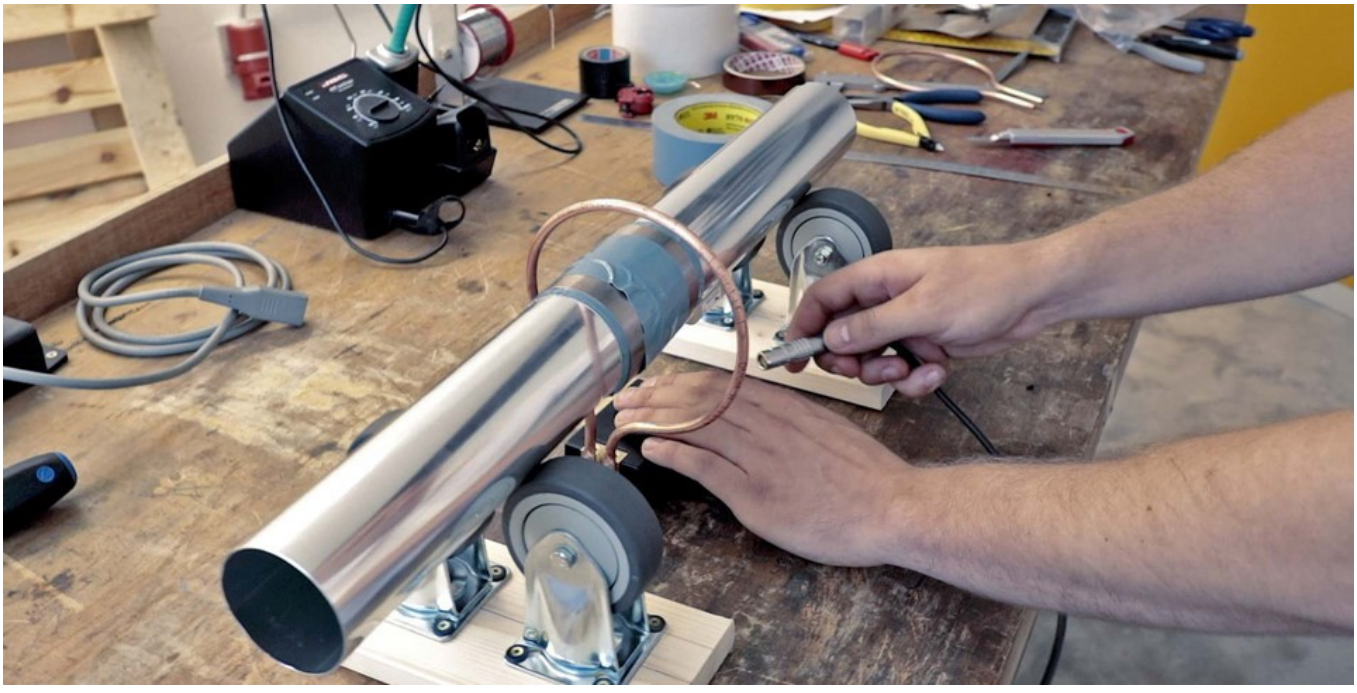


Fig. 54: Connect the power cable to the ring stator

11. Complete structure.

    Before commissioning the system, please refer to chapter "Commissioning with Ring stator" 72.

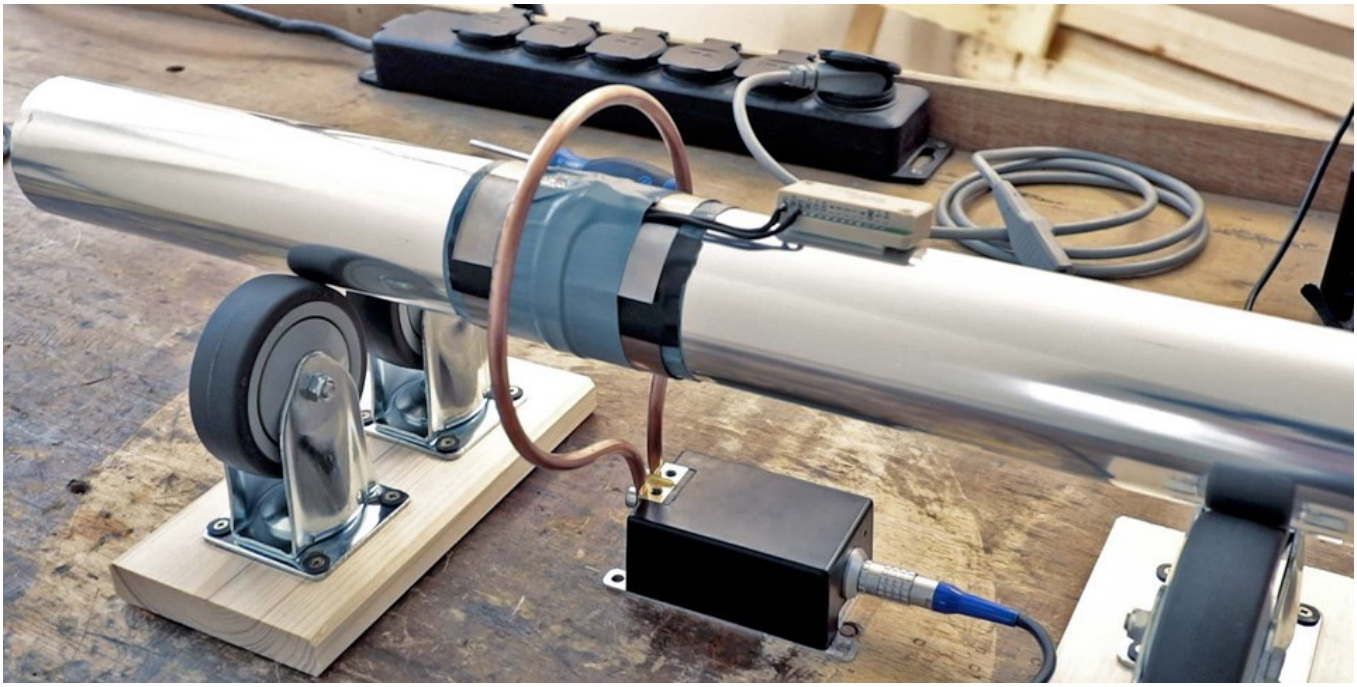


Fig. 55: Complete assembly: ring stator and secondary winding

8.7 Commissioning with Ring stator

Warning Attention

Set the stator power to the minimum value via the potentiometer screw on the stator housing. The direction of rotation for reducing the stator power is indicated on the housing. When the potentiometer screw has reached the minimum position, you will hear a clicking noise when turning it further.

- Plug in the supply cable of the ring stator and connect it to a voltage source in the range of 9 V to 36 V DC.

Warning Attention

The DC connection of the D^X-RCI receiver unit is not suitable for supplying ring or fixed stators when an AC power supply unit is connected!

- Wait approx. 30 seconds until the ring stator is in resonance with the copper ring and then check whether the D^X-SCT transmitter unit is sufficiently supplied with voltage. To do this, measure the voltage present between the EX- and EX+ terminals (i.e. the bridge supply voltage). If the D^X-SCT is sufficiently supplied, measure a voltage of 4.096 V.

Note

The operating point, i.e. the optimum frequency of the AC voltage applied to the stator ring, is automatically set and readjusted by the stator electronics. The operating point of the system depends, among other things, on the length of the primary winding. If you start up the stator for the first time, it will take approx. one minute to determine the optimum operating point.

- Measure a voltage lower than 4.096 V DC between EX- and EX+, also check the rms value VAC of the AC voltage applied between IP1 and IP2. If 0 V < VAC < 0.6 V, increase the power of the stator using the potentiometer on the stator housing (see figure 56). **Please proceed slowly** when doing this. The direction of rotation for increasing/decreasing the stator power is indicated on the housing.

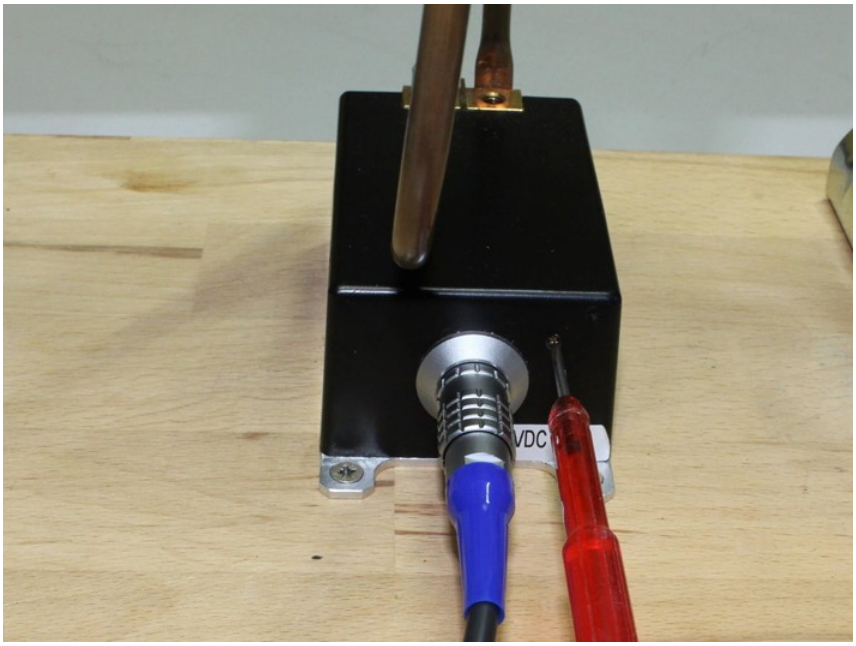


Fig. 56: Adjusting the stator power via potentiometer screw

Note

For diameters of 300 mm and more, we recommend using an OVP module for overvoltage protection (see chapter "Dx-OVP module" 72).

Reference

Further information on troubleshooting can be found in the "Questions & Answers" chapter 157.

8.8 Commissioining with Fix stator

- Attach the secondary winding of the inductive energy transfer to the shaft (for step-by-step instructions on how to attach the secondary winding, see the "Step-by-step instructions" chapter 53).
- Attach the Fix stator close to the shaft. The fixed stator should be fitted directly under the secondary winding. The arrow lasered on the stator housing must be congruent with the secondary winding.

Warning Attention

Heating above 80 °C can lead to damage and failure of the stator. Dissipation of the heat energy generated during operation must therefore be ensured, e.g. by mounting on a metallic surface.

- Now mount the D^X-SCT transmitter unit on the shaft and connect it. Connect the two stranded wires of the secondary winding to the IP1 and IP2 inputs (see chapter "Dx-SCT pin assignment" 22).
- Plug in the supply cable of the Fixstator and connect it to a voltage source in the range of 9 V to 36 V DC.

Warning Attention

The DC connection of the D^X-RCI receiver unit is not suitable for supplying ring or fixed stators when an AC power supply unit is connected! A commercially available plug-in power supply with at least 30 W power can be used for the power supply.

- Wait a few minutes and then check whether the D^X-SCT transmitter unit is sufficiently supplied with voltage. To do this, measure the voltage present between the EX- and EX+ inputs (i.e. the supply voltage of the strain gauge bridges). If the D^X-SCT is sufficiently supplied, measure a voltage of 4.096 V.

Note

The operating point, i.e. the optimum frequency of the alternating field applied to the stator, is automatically set and readjusted by the stator electronics. If you start up the stator for the first time, it may take several minutes to determine the optimum operating point.

- Measure a voltage lower than 4.096 V DC between EX- and EX+, also check the rms value VAC of the AC voltage applied between IP1 and IP2. If this voltage is < 0.6 V, increase the power of the stator via the potentiometer on the stator housing (see figure 56 72). To do this, turn the potentiometer screw clockwise. Turning it counterclockwise reduces the stator power.

For detailed troubleshooting instructions, refer to chapter "Questions & Answers" 157.

For instructions on installing the secondary winding, refer to the chapter "Attaching a secondary winding" 52.

9 From settings to measurement

For a measurement, perform the following steps:

- Connect the Dx-RCI receiver unit 75
- Connect the transmitting unit Dx-SCT 77
- If desired, connect a PC to the Dx-RCI
- Switch on the Dx-RCI 77
- Connect the Dx-SCT 80
- Configure the channels 85
- If desired, configure the analog outputs 116
- Configure the CAN-Output if required 116
- Configure an online display 120
- Save the settings 121
- Start the measurement 124

9.1 Connecting the Dx-RCI receiver unit

- Connect the D^x-RCI to a power source. To do this, use the DC inputs (9 V to 36 V DC) or operate it with the supplied power supply unit. The DC inputs are not designed to supply other loads. The supplied power supply unit must not be subjected to additional loads.

Warning Attention

Never connect loads to the DC sockets of the D^x-RCI.

- If you want to configure the D^x telemetry system using your PC, connect the Ethernet interfaces of the PC and the D^x-RCI using the Ethernet cable supplied. You can also connect the D^x-RCI to an existing network.
- For forwarding the measurement data via the CAN bus, connect a CAN cable (CAN1 or CAN2). If the D^x-RCI is at one end of the CAN bus line, a 120 Ω terminating resistor must be inserted between the plug and the CAN socket. Each CAN node at the ends of a CAN bus line must be terminated with 120 Ω.

Fig. 57: CAN terminating resistor

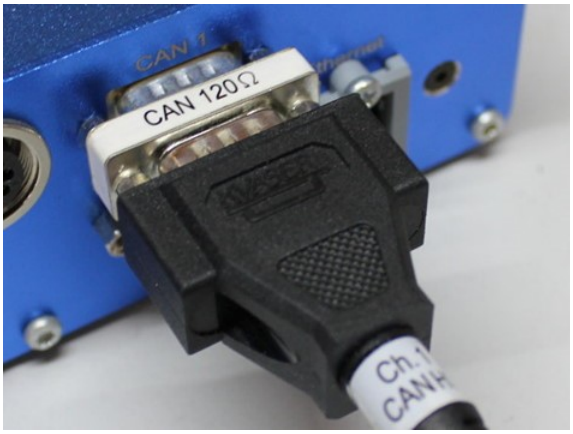


Fig. 58: Plugged CAN terminating rsistor (120 Ω)

Figure 58 shows an example of a CAN network consisting of 2 D^x-RCIs and a PC. The PC and the D^x-RCI 1 are each located at one end of the CAN bus. In the example, 120-Ω resistors must be inserted at D^x-RCI 1 and at the PC respectively. To the D^x-RCI 2, one cable is connected to the CAN1 socket, the other to the CAN2 socket, in each case without the 120-Ω resistor.

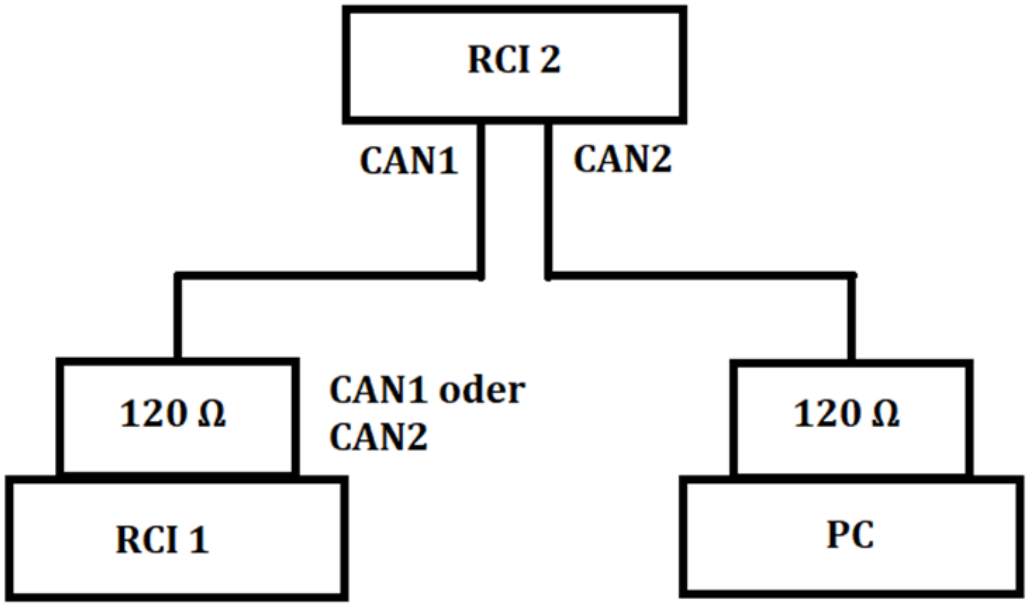


Fig. 59: Example for a CAN network, consisting of 2 D^x-RCIs and one PC.

Note

The D^x-RCI does not have a built-in CAN terminating resistor. If the D^x-RCI is at the end of the CAN bus line, a 120 Ω terminating resistor must be inserted between the plug and the CAN socket. Each CAN node at the ends of a CAN bus line must be terminated with 120 Ω.

- For an analog tap of the measurement data, connect BNC cables to the analog outputs of the D^x-RCI. These are freely programmable to all measurement data channels (for configuration see chapter "Configuring analog outputs" 116).

9.2 Connecting the Dx-SCT transmitter unit

The D^x-SCT can be supplied with power by battery or rechargeable battery or inductively with ring stator or fixed stator. For connecting the voltage source, please refer to chapter: Dx-SCT connection variants 19.

Note

To check whether the voltage you have applied is sufficient to operate the Dx-SCT transmitter unit, check the supply voltage of the strain gauge between EX+ and EX-. This is 4.096 V ± 0.1 V if the voltage supply is sufficient.

9.3 Switching the Dx-RCI receiver unit on and off

To switch the D^x-RCI receiver unit on and off, press the button in the center of the scroll wheel for about 5 seconds (see Figure 13 33).

9.4 Operating the Dx-RCI

The D^x-RCI receiver unit has a multi-function scroll wheel for manual operation. To navigate through a menu, either turn the scroll wheel or press the scroll wheel up/down/left/right accordingly. To then activate the selected item, one presses the button in the center of the scroll wheel.

9.5 Parameterization at the PC

This function makes it possible to parametrize the D^x telemetry system conveniently using your PC instead of the scroll wheel.

To configure the D^x telemetry system via a web browser, the D^x-RCI must be integrated into a network.

You can also establish a local network connection between the D^x-RCI and the measuring computer. To do this, connect the Ethernet interface of the D^x-RCI receiver unit to your measuring computer using an Ethernet cable.

Please note that your computer must be assigned an IP address (protocol IPv4) from the same network segment. The IP address 192.168.000.212 is preset on the D^x-RCI.

For the measuring computer, you then use 192.168.000.100, for example. **For a direct connection, the dynamic address assignment (DHCP) of your measuring computer must be deactivated.**

Warning

In case of a corporate network, please contact your system administrator.

To open the configuration dialog for a direct connection, use one of the following:

- Open the Windows Settings and search for "*View network connections*"
- Select "View network connections"

- Open Windows' input box by using the keyboard combination `[Win+R]`
- Enter the following command in the edit box: `control netconnections`

The "*Network Connections*" window appears. Then right-click the mouse over the entry for your network connection and then select the item "**Properties**" in the context menu once again. Then the Connection Properties window appears.

Select Version 4 of the **Internet Protocol Version 4 (TCP/IP4)** (1) and click on **Properties** (2). Now the current settings are visible. Enter the desired IP address and confirm with OK.

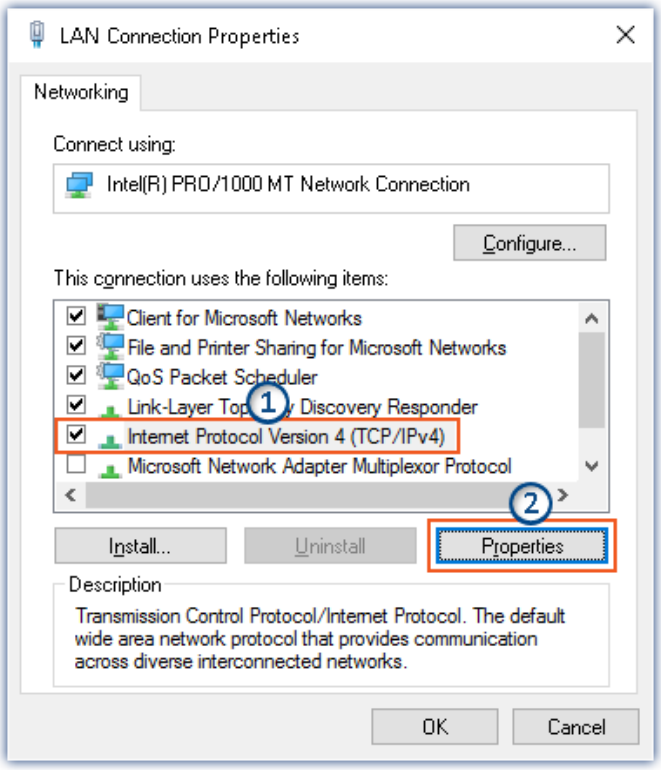


Fig. 60: LAN connection properties

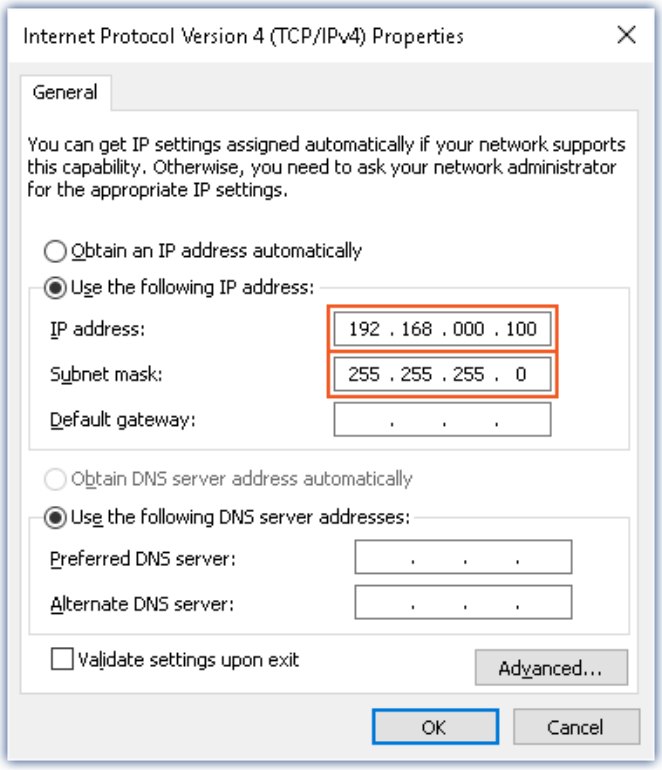


Fig. 61: Set network properties

In rare cases, a firewall on your measuring computer may block the network connection. In this case, contact your system administrator if necessary.

Open any web browser and call up the network address of the Dx-RCI receiver unit (default setting: 192.168.0.212).

Fig. 62: Dx-Start menu

Now you can perform the configuration via your web browser.

Note

The following steps (Integrate new Dx-SCT transmitter unit 80 to start measurement 124) can be performed both on the Dx-RCI receiver unit and via your web browser. Please note that when configuring via the web browser, you must confirm your entries with the Set button so that they are transferred to the Dx telemetry system.

9.6 Integrating new Dx-SCT transmitter unit

9.6.1 Add a new Device

A device is already present as the default setting. However, if this is deleted or if you require further devices for further D^x-SCTs, then switch on the/one new D^x-SCT transmitter unit to connect it to the D^x-RCI receiver unit. All other D^x-SCTs must be switched off. In the D^x menu, select *Devices* → *New Device*. This creates a new *Device X* object. If you want to integrate several D^x-SCTs, repeat the process for each D^x-SCT.

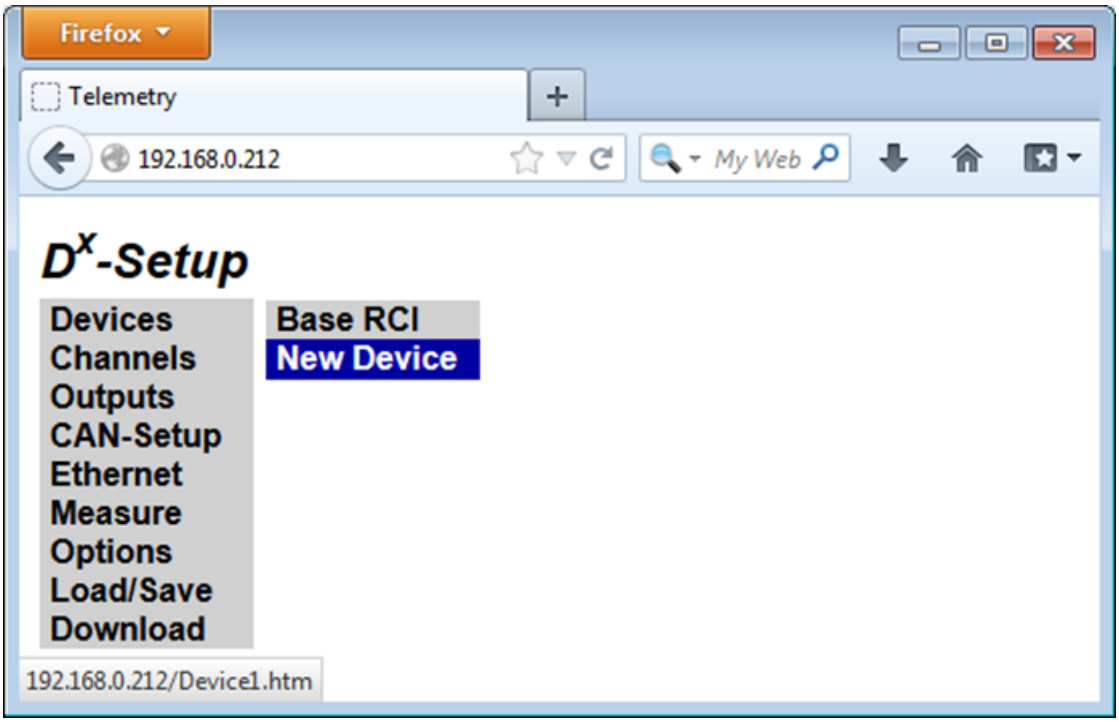


Fig. 63: Add new D^x-SCT

Note

If you want to integrate several transmitting units D^x-SCTs, create several new devices by selecting *Devices* → *New Device* several times. Only then are the D^x-SCTs programmed in sequence (see the following sections).

9.6.2 Search for Dx-SCT transmitter unit

Switch on the power supply of the D^x-SCT transmitter unit to be integrated. Make sure that all other D^x-SCTs in the environment are switched off, i.e. disconnected from the power supply. Select *Devices* → *Device X*.

Warning Attention

To search for and program a D^x-SCT transmitter unit, only this unit may be active. Therefore, disconnect all other D^x-SCTs in the vicinity from the power supply.

In the field *Serial number*: enter the last number of the serial number of your D^x-SCT. You will find this number on the D^x-SCT label. For example, if the serial number is *Dx-SCT-13-225*, enter 225.

The frequency of the D^x-RCI must match the frequency of the D^x-SCT. Keep the following in mind: Let's assume you have saved your settings in a DXP file. Now you change the frequency of the D^x-SCT and the D^x-RCI and reprogram them. But you forget to save the new settings in the DXP file. Now you switch off the D^x-RCI. However, the DXP file still contains the old values. If you now restart the D^x-RCI, the settings from the DXP file will be read, and these values will also be displayed - even though the D^x-RCI is now set to the previously programmed frequency! So the display matches the values from the DXP file and not necessarily the currently programmed frequency.

The D^x-RCI and the D^x-SCT must therefore be set to the same frequency. The search does not set the frequency automatically.

If you are configuring from a web browser, click *Set* to apply the value.

Click *Search*.

Note

If you do not have the serial number at hand, you can also use the search function to find the active D^x-SCT transmitter unit. To do this, enter a start value in the *Serial Number* field and click *Search*. From this start value, the 100 following serial numbers are now searched for. For example, if you enter 101 in the search mask, the D^x-RCI receiver unit searches for D^x-SCT transmitter units with the serial number 101 to 200.

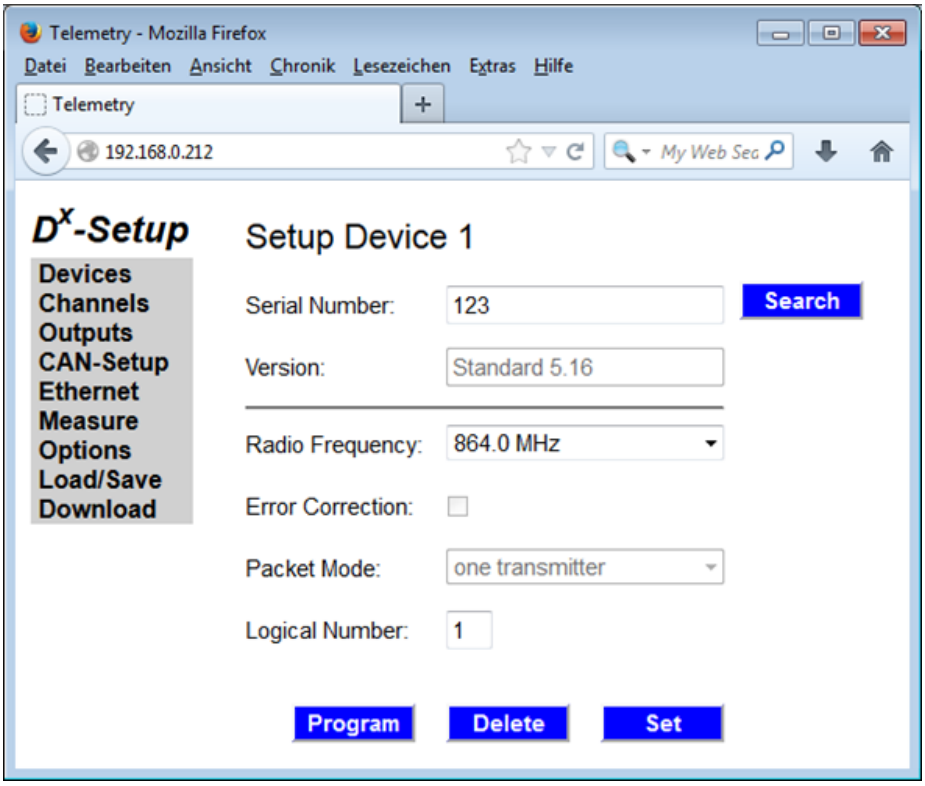


Fig. 64: Configure D^x-SCT

A search window appears. If the D^x-SCT is found, the version and the logical number are read out and a pop-up window appears. Confirm the *Device found*! message with *OK*.

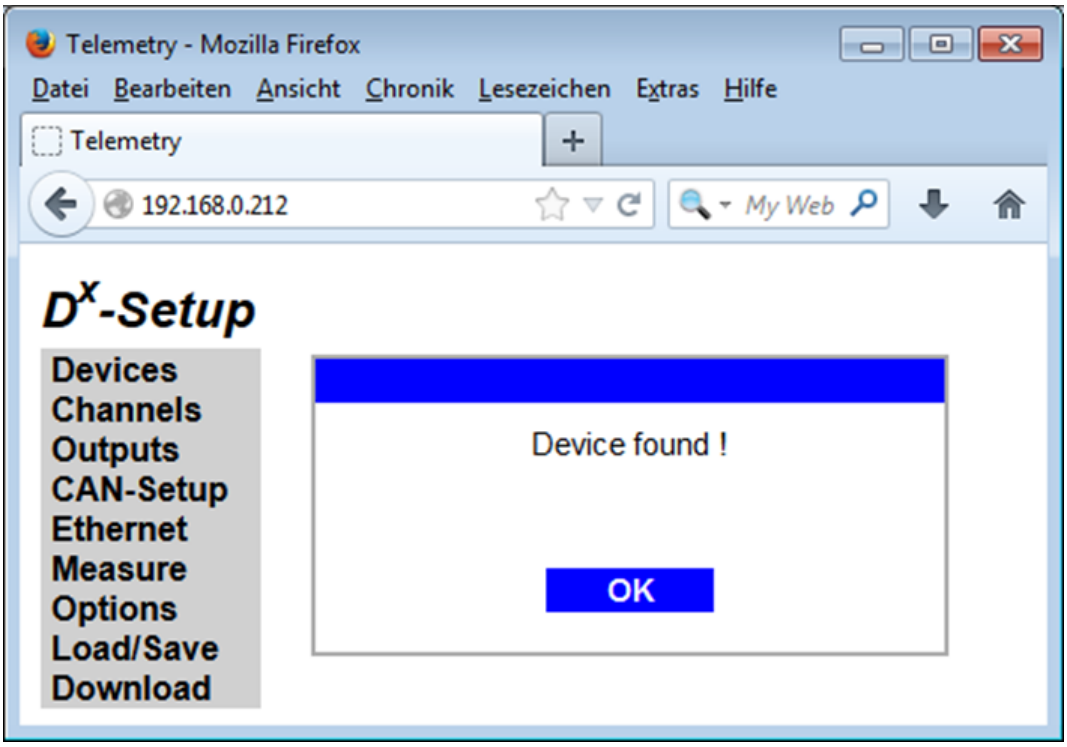


Fig. 65: Message "Device found!"

If the D^x-RCI does not find the D^x-SCT, the frequencies of the D^x-RCI and the D^x-SCT may not match. In this case, you can also use our D^x-Frequency-Lookup-Tool; it automatically searches for a switched-on D^x-SCT. You can obtain the program at Frequency Lookup Tool.

Now assign a *Logical Number* from 1-4. **Each transmitting unit Dx-SCT must be assigned a different number.**

Note

The D^x telemetry system transmits the measurement data serially. Each D^x-SCT transmitting unit is assigned a time section in the transmission window. The time range of this transmission window is divided into four sections. With the *Logical Number* you define at which section the respective D^x-SCT starts with the data transmission.

If you use only one transmitting unit D^x-SCT, enter a 1 as Logical Number. This allows you to use the complete transmission window (windows 1-4), which maximizes the usable sum sampling rate.

If you operate two transmitting units D^x-SCTs, use the Logical Number 1 for one D^x-SCT and the Logical Number 3 for the second. Thus, each D^x-SCT has 2/4 of the transmission time available.

For 3 and 4 D^x-SCT units, you can distribute the numbers as you wish.

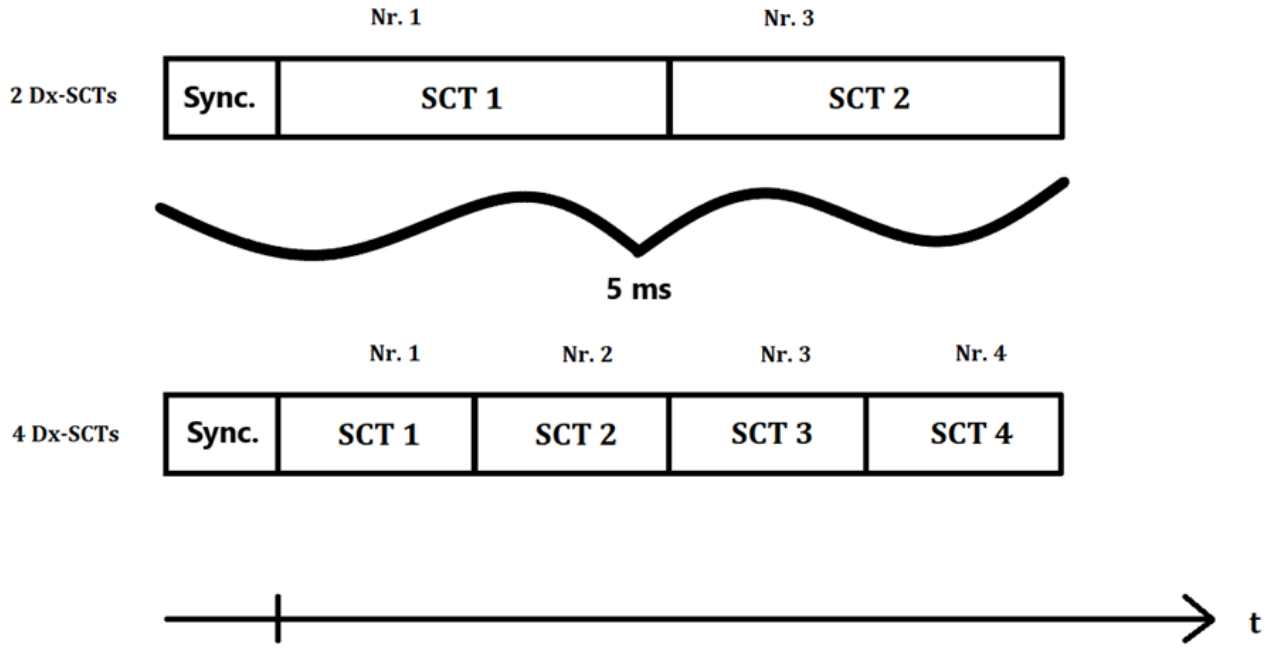


Fig. 66: Example for the assignment of the Logical Number

If you configure via the PC, confirm your entries with *Set*.

Click on the *Program* button

The following instruction appear *Program done*! *Repower transmitter*!

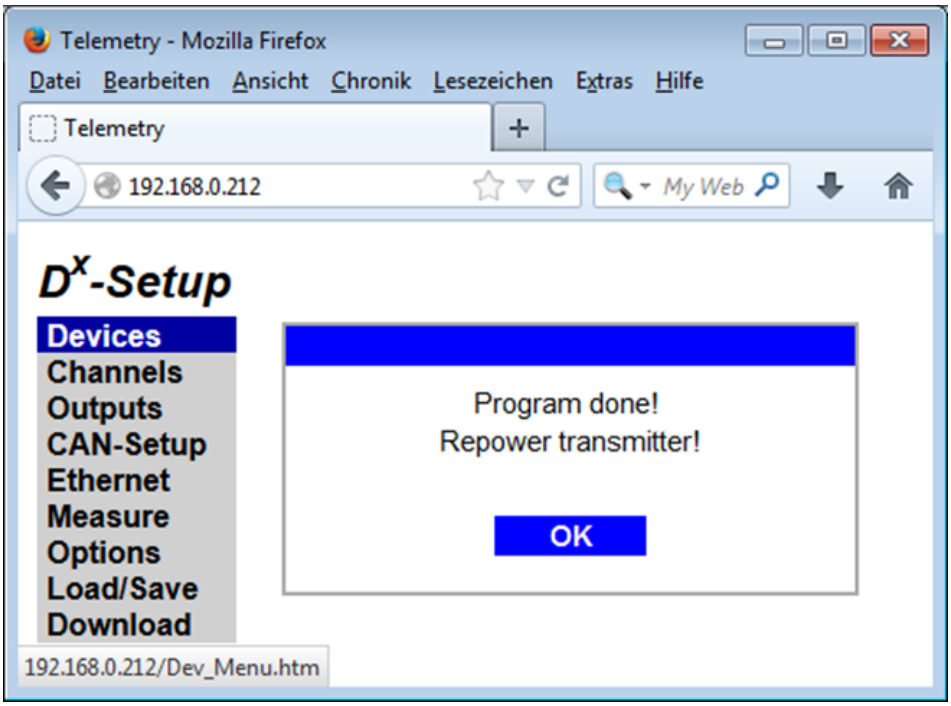


Fig. 67: Message "Program done!"

Confirm with *OK*.

Warning Attention

The message *Program done!* only indicates that the configuration data has been sent. For successful reprogramming of the D^X-SCT transmitter unit, it must be switched on and the radio signal from the D^X-RCI receiver unit must have been successfully received.
(ideal distance between D^X-RCI and D^X-SCT for programming: < 0.5 m).

Disconnect the D^X-SCT transmitter unit from the power supply for approx. 5 seconds and then restore the supply.

Call up the D^X-SCT transmitting unit you have just configured under *Devices* → *Device X*.
Click on *Search*.

If the D^X-SCT is found and the settings just made under *Logical Number* are read out, the configuration was successful.

Warning Attention

After each integration of a new D^X-SCT transmitter unit, the channel parameters of each D^X-SCT must be reprogrammed. This must be done by programming any channel of a D^X-SCT (under *Channels* → *Device X* → *Channel_X_Y*, see chapter "Programming channels" 87).

9.7 Channel configuration

If you have newly integrated one or more D^x-SCT transmitting units, all desired channels must be created and set in the next step. When this has been done, the settings must be saved in the DXP file (see chapter "Save configuration" 121). Subsequently, each D^x-SCT must be programmed separately.

Warning Attention

Once you have created and set all the desired channels, save the settings in the DXP file (see chapter "Save configuration" 121). Then reprogram the channel parameters of the D^x-SCT. This must be done by programming any channel of a D^x-SCT
(under *Channels* → *Device X* → *Channel_X_Y*, see chapter "Programming channels" 87).

Warning Attention

After each integration of a new D^x-SCT transmitter unit, the channel parameters of each D^x-SCT must be reprogrammed. This must be done by programming any channel of a D^x-SCT
(under *Channels* → *Device X* → *Channel_X_Y*, see chapter "Programming channels" 87).

9.7.1 Assign channel

Connect the sensors to the D^x-SCT according to the connection diagram
(see chapter "Dx-SCT connection variants" 19 and chapter "Dx-SCT connection variants" 22).

Open the menu item *Channels→Modes*. Select the signal mode for the respective channel. The following settings are available:

In standard version:

- Full bridge: full bridge strain gauge
- Half bridge: half bridge strain gauge with integrated supplement
- DC differential: differential voltage input
- DC Single-ended: grounded voltage input
- Thermo diff: thermocouple - differential input
- Thermo s. ended: thermocouple – with common ground (Single-ended)

In other versions, additional setting options are available:

In version "with RPM-Opt.":

- RPM signal (only on channel 5, and on this channel only this)

In version "3 ext. Thermo":

- Thermo signal (on Channel 4, 5 and 6, and on those channels only this)

In version "with PT-Opt.":

- PT signal (on Channel 1, 2, 3 and 4, and on those channels only this)

Channels 7 and 8 record the reference temperature and supply voltage of the D^x-SCT. These are sampled at 25 Hz and do not load the bandwidth.

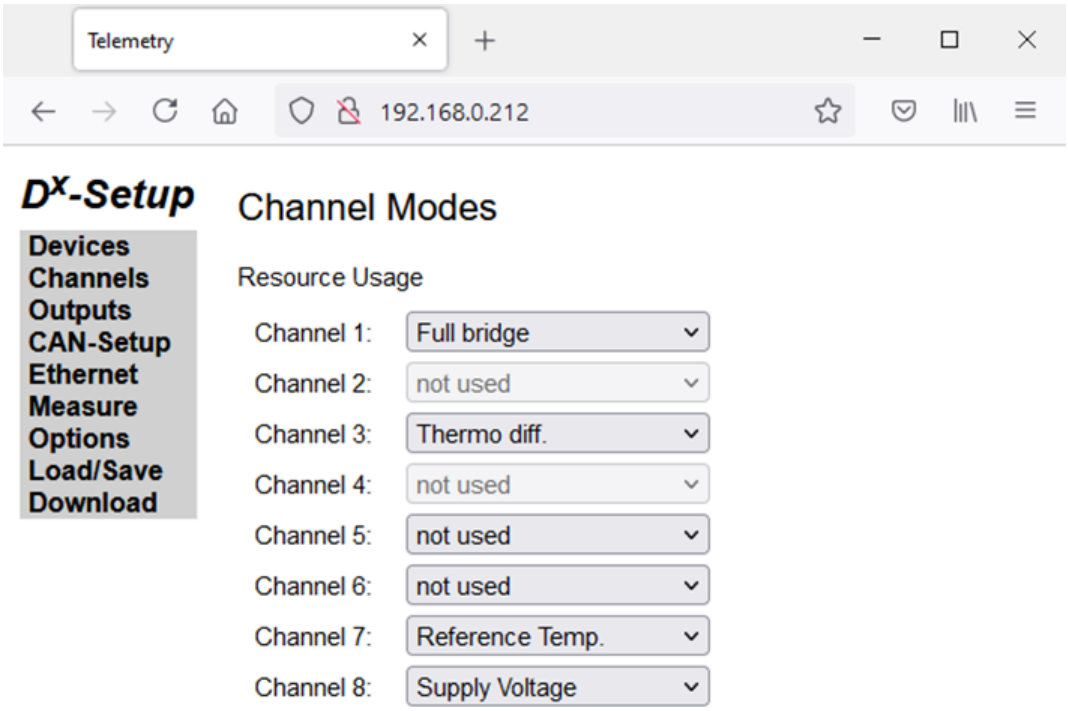


Fig. 68: Configuration menu channel mode

Note

Due to technical limitations, not all modes are available for every channel. Especially when assigning a channel as full bridge or in differential mode, the following channel is automatically shared and blocked as sensor input. Further information can be found in the chapter "Dx-SCT connection variants" 19.

9.7.2 Program channels

After each integration of a new D^x-SCT transmitter unit, an associated channel must be reprogrammed by each D^x-SCT. To create a new channel, please refer to chapter "Assigning channels" 85.

Open the menu item *Channels → Device X → Channel X_Y*. *Device X* here is the newly integrated D^x-SCT transmitter unit. *Channel X_Y* can be any channel of *Device X*.

Activate the *Program* button.

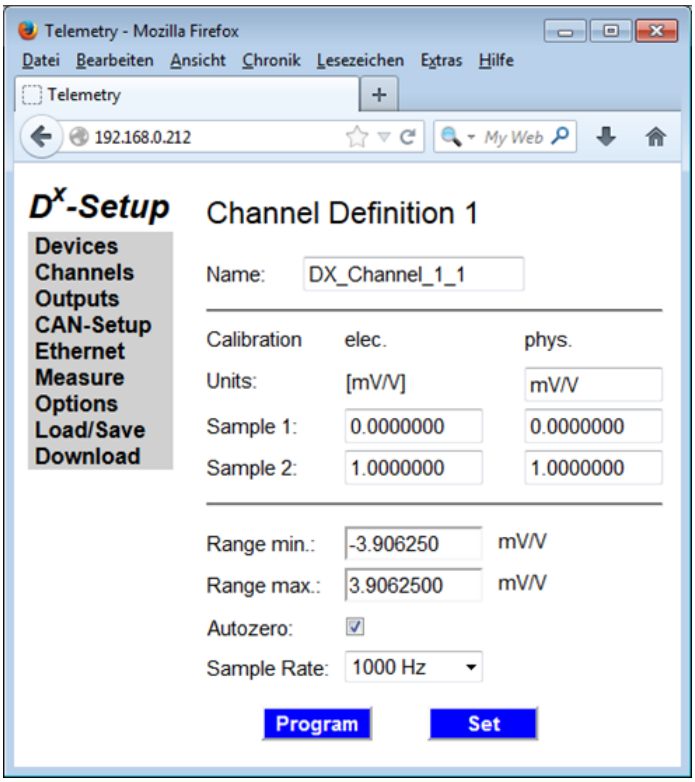


Fig. 69: Program channels

The message *Program done!* appear.

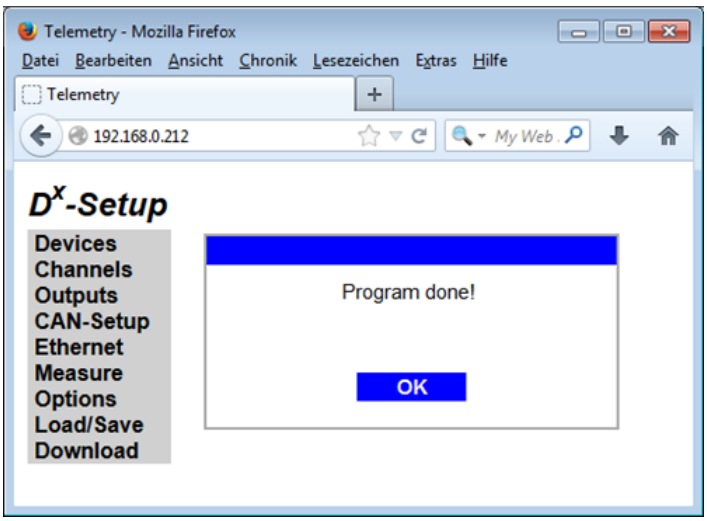


Fig. 70: Message "Program done!"

9.7.3 Configure full and half bridge

First make sure that the respective channel is defined as a bridge input (see chapter "Assigning channels" 85).
Open the desired channel with *Channels*→(*Device X*)→*Channel X*.

9.7.3.1 Calibration

Enter the coordinates of your calibration lines in the Calibration section under Sample 1: and Sample 2:. In the Units: field, specify the physical unit of the output quantity.

Example 1 Strain gauge full bridge

Let the following calibration line be given:

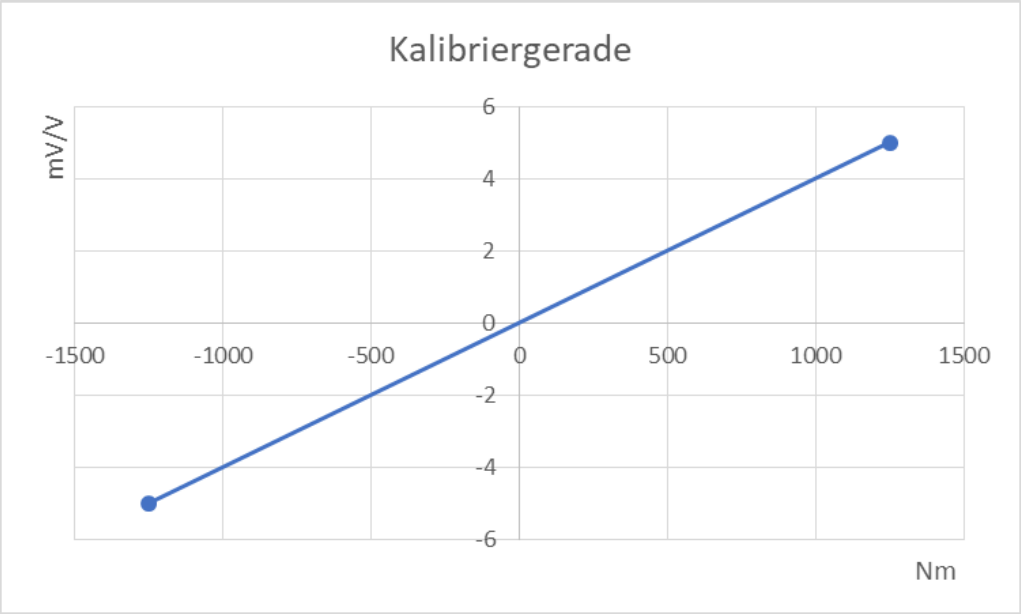


Fig. 71: Example of a calbration table

Enter the physical quantity in the field *Units*, in the example "Nm".

Now take two points from the calibration line, e.g.:
(-1000 Nm, -4 mV/V) and
(1000 Nm, 4 mV/V).

So if the strain gauge full bridge delivers a value of -4 mV/V, this value corresponds to a torque of -1000 Nm in the example. If the strain gauge full bridge supplies a value of 4 mV/V, then this corresponds to a torque of +1000 Nm in the example.

For *Sample 1*: enter -4 as the electrical value, and
to the right of it as physical value -1000.

For *Sample 2*: enter 4 as electrical value, and
to the right of it as physical value 1000.

When configuring via a web browser, click *Set* to apply the settings.

The data generated during the measurement is now converted using this two-point calibration and displayed accordingly.

Example 2 Strain gauge full bridge

Let the following sensitivity be given (taken from the calibration record):

Rechts- und Linksdrehmoment *

*Clockwise and Counterclockwise Torque **

S [mV/V] = 3.117524 * M [kNm]

M [kNm] = 0.3208 * S [mV/V]

Empfindlichkeit *sensitivity*	3.1175 mV/V / kNm

M - Moment */ moment*

S - Signal */ signal*

In the example, the sensitivity is 3.1175 mV/V /kNm.
0 [mv/V] should correspond to 0 [kNm], and
3.1175 [mV/V] then correspond to 1 [kNm] with the example values.

The values are then entered as follows:

- Please enter in the field *Units* under *phys.* kNm as unit value.
- For *Sample 1*, enter 0 under *elec.* and, to the right, 0 under *phys.*
- For *Sample 2*, enter 3.1175 under *elec.* and, to the right, 1.0 under *phys*.

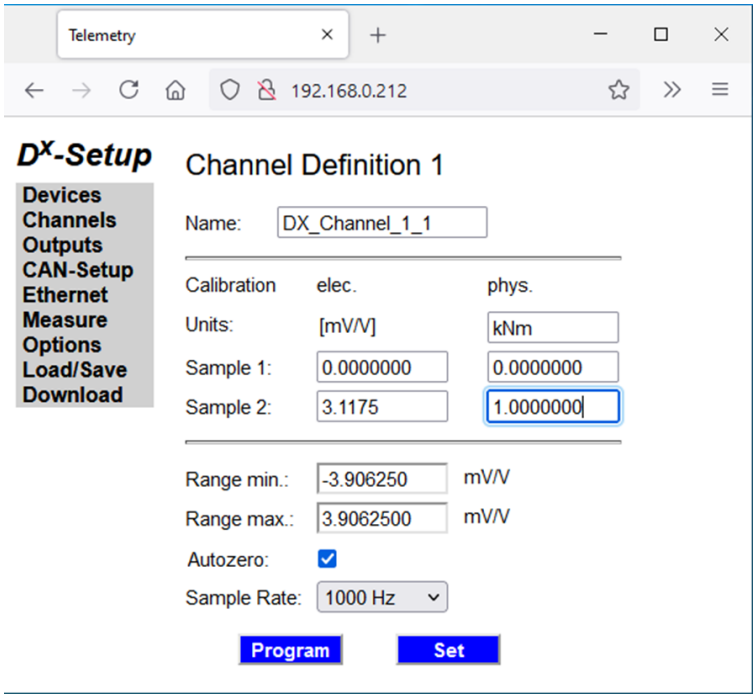


Fig. 72: Example of sensitivity (from the calibration record)

Example 2 Continued example 2: Strain gauge full bridge

For orientation, you can also use the measured values from the calibration certificate (here an example screenshot):

Messung	zwei Messzyklen in jeder Einbaustellung 0°, 90°			
Measurement	*two cycles at each mounting position 0°, 90°*			
M [Nm]	**S [mv/V], 0° /1**	**S [mv/V], 0° /2**	**S [mv/V], 90° /1**	**S [mv/V], 90° /2**
0	0.000000	0.000000	0.000000	0.000000
400	1.232139	1.240764	1.240463	1.232541
800	2.483714	2.479240	2.480602	2.483450
1200	3.722362	3.724755	3.726698	3.724256
1600	4.977418	4.973531	4.978543	4.980115
2000	6.226106	6.231846	6.235798	6.229642
2000	6.240281	6.238472	6.245174	6.243142
1600	5.001158	5.004380	5.005983	5.003260
1200	3.761529	3.757489	3.765391	3.763368
800	2.514008	2.509304	2.517822	2.514249
400	1.263756	1.258309	1.267932	1.264102
0	0.006960	0.005731	0.006143	0.005020

M - Moment */ moment*
S - Signal */ signal*

We have entered that 3.1175 mV/V corresponds to one kNm. For 2 kNm, we would expect a value of approx. 6.23 mV/V, which corresponds well with the corresponding values (6.226106, ...) from the calibration certificate.

When configuring via a web browser, click Set to apply the settings.

The data generated during the measurement is now converted using this calibration and displayed accordingly.

9.7.3.2 Measurement range

Enter the lower/upper limit of the measuring range in the specified unit under *Range min:* and *Range max:*. This is resolved with 16 bits. The next possible enclosing range is selected.

Note

The measuring range is adjustable in powers of two symmetrically around the zero point.

When configuring via a web browser, click Set to apply the settings.

It is essential that you press the *Program* button to send the settings to the D^x-SCT.

Warning Attention

When programming the D^x-SCT transmitter unit, make sure that it is switched on (i.e. supplied with power). Otherwise, programming cannot be performed, although a confirmation message appears afterwards.

In *Program done!* window, confirm with *OK*.

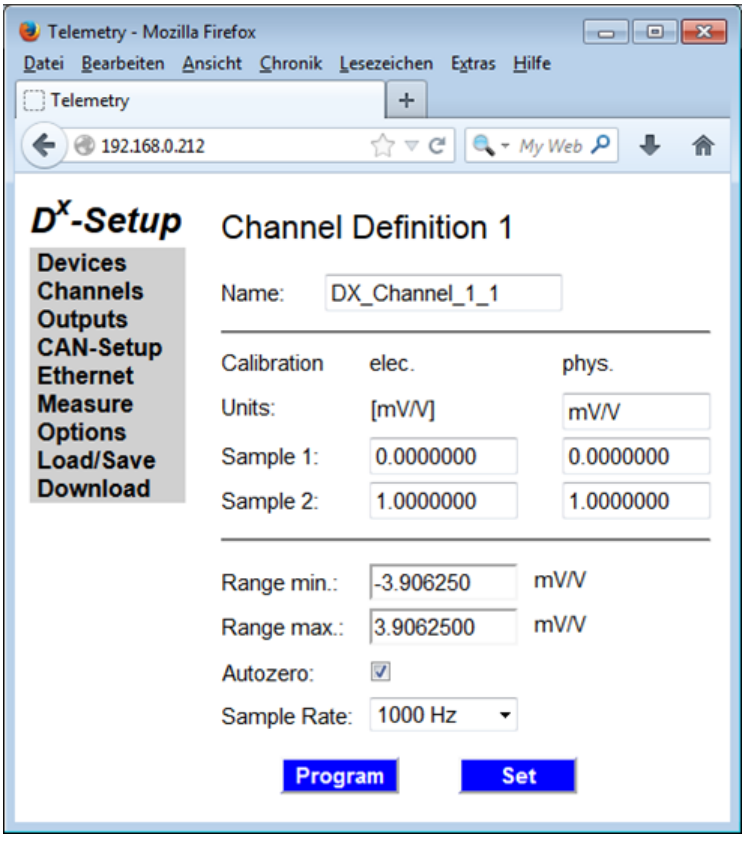


Fig. 73: Configuration menu full / half bridge

9.7.3.3 Autozero

To be able to perform a zero adjustment for this channel in the measurement mode, check Autozero (in an *Autozero*, the electrical quantity is set to zero, not the quantity converted with the straight line).

When configuring via a web browser, click *Set* to apply the settings.

If the adjustment made during the measurement is to remain stored in non-volatile memory in the D^x-SCT transmitter unit, the corresponding channel must be programmed after the zero adjustment (*Channels*→(*Device X*)→*Channel* X → *Program*).

Note

The zero balance value can be stored non-volatile by programming the channel.

To delete a saved alignment, uncheck *Autozero* and reprogram the corresponding channel (*Channels*→(*Device X*)→*Channel X* → *Program*).

9.7.4 Configure thermocouples (differential or single-ended)

Open the desired channel with *Channels*→(*Device X*)→*Channel X*.

9.7.4.1 Calibration

Enter the coordinates of your calibration lines in the *Calibration* section under *Sample 1*: and *Sample 2:*. In the *Units:* field, specify the physical unit of the output quantity.

9.7.4.2 Measurement range

Enter the lower/upper limit of the measuring range in the specified unit under *Range min:* and *Range max:*. This is resolved with 16 bits.

Note

The measurement range can be adjusted symmetrically around the zero point in powers of two.

9.7.4.3 Temperature mode

Under *Thermo Mode*, select the type of thermocouple (type J or type K).

When configuring via a web browser, click *Set* to apply the settings.

Select the *Program* button.

Warning Attention

When programming the D^x-SCT transmitter unit, make sure that it is switched on (i.e. supplied with power). Otherwise, programming cannot be performed, although a confirmation message appears afterwards.

In the *Program done!* window, confirm with *OK*.

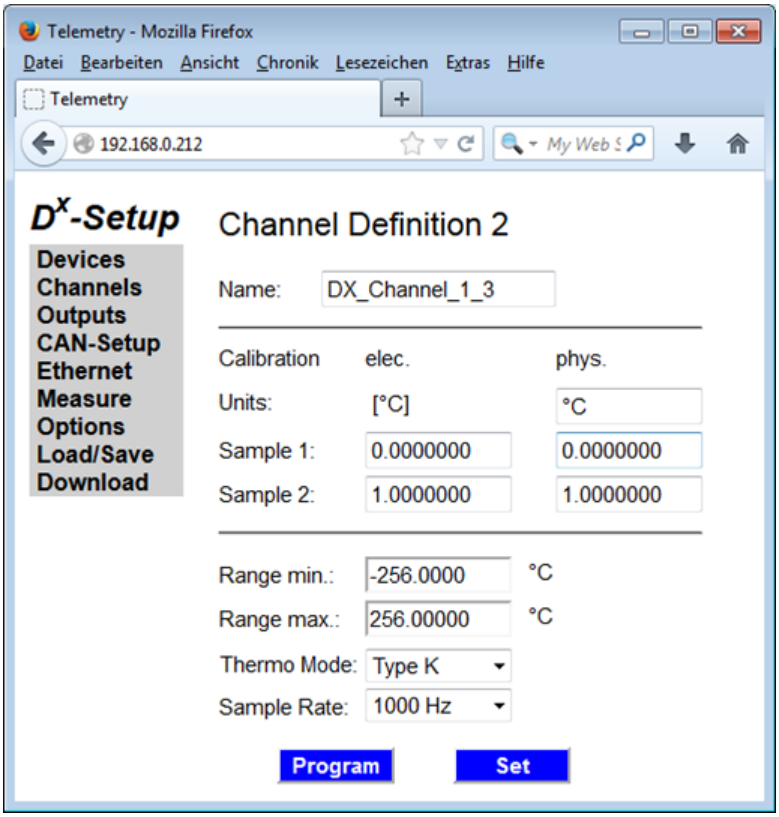


Fig. 74: Configuration menu thermocouple

9.7.5 Inputs for high-level voltage signal configuration

Open the desired channel with *Channels*→(*Device X*)→*Channel X*.

9.7.5.1 Calibration

Enter the coordinates of your calibration lines in the *Calibration* section under *Sample 1:* and *Sample 2:*. In the *Units:* field, specify the physical unit of the output quantity.

9.7.5.2 Autozero

To be able to perform a zero adjustment for this channel in measurement mode, set a check mark at *Autozero*. If the adjustment made during the measurement is to be permanently stored in the D^x-SCT transmitter unit, the corresponding channel must be programmed after the zero adjustment (*Channels*→(*Device X*)→*Channel X* → *Program*).

To clear a saved alignment, uncheck *Autozero* and reprogram the corresponding channel (*Channels*→(*Device X*) →*Channel X* → *Program*).

9.7.5.3 Measurement range

Enter the lower/upper limit of the measurement range in the specified unit under *Range min:* and *Range max:*. This is resolved with 16 bits.

Note

The measurement range is adjustable in powers of two symmetrically around the zero point.

When configuring via a web browser, click *Set* to apply the settings.

Select the *Program* button.

Warning Attention

When programming the D^x-SCT transmitter unit, make sure that it is switched on (i.e. supplied with power). Otherwise, programming cannot be performed, although a confirmation message appears afterwards.

In the *Program done!* window, confirm with *OK*.

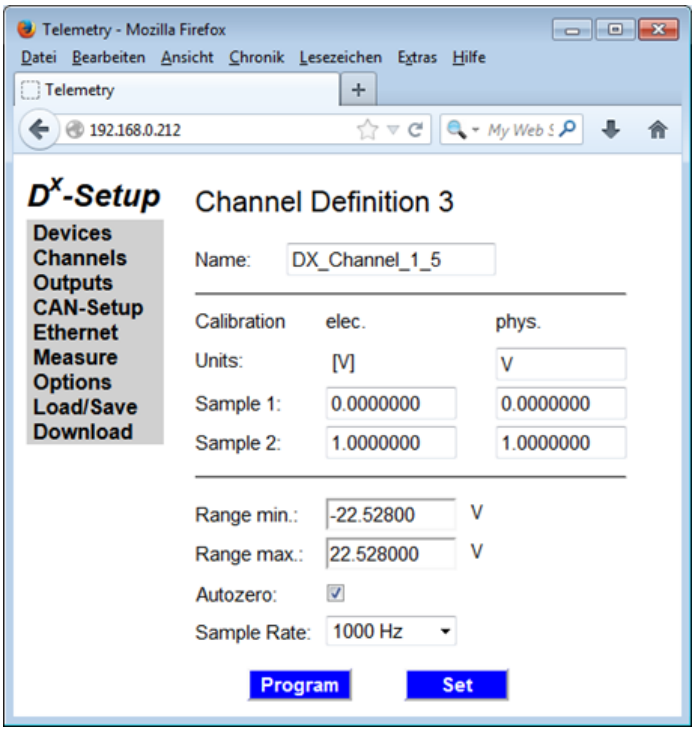


Fig. 75: Configuration menu voltage input

9.7.6 Version "3 Full-Br/Th": Configure third full bridge

The option to use a third full bridge is only available with a D^x-SCT of version "3 Full-Br/Th".

Search for the desired D^x-SCT transmitter unit as described in chapter "Creating a new transmitter unit" 80.

- If the D^x-SCT is found, "3 Full-Br/Th" appears automatically at *Version*.

Fig. 76: Version 3 Full-Br/Th of the D^x-SCT

- Under *Resource Usage* (*Channels*→(*Device X*)→*Modes*), set *Channel 5* to *Full bridge*.

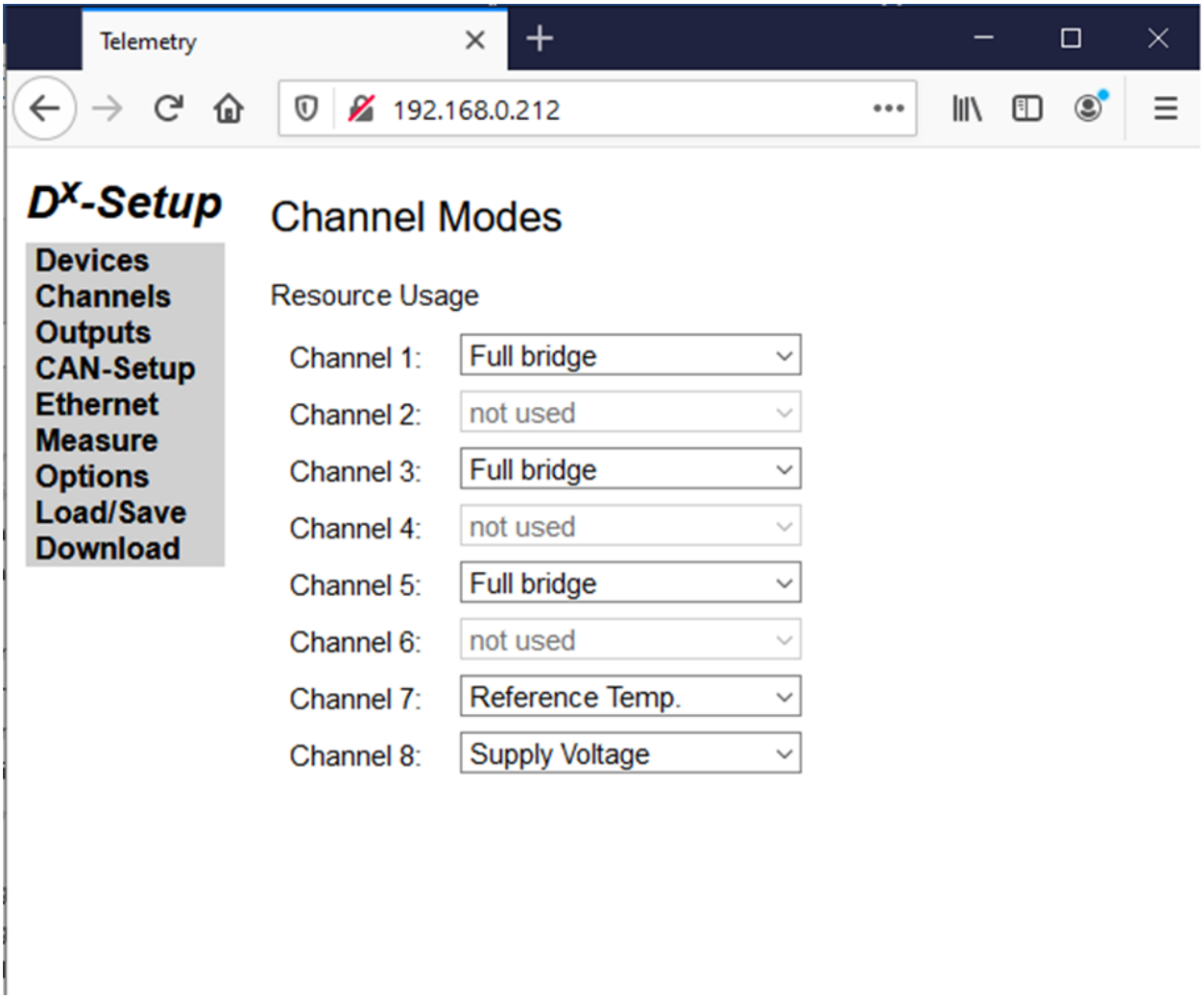


Fig. 77: Set channel 5 to Full bridge

- Select *Channels* ->(*Device X*)→ *Channel 5*.

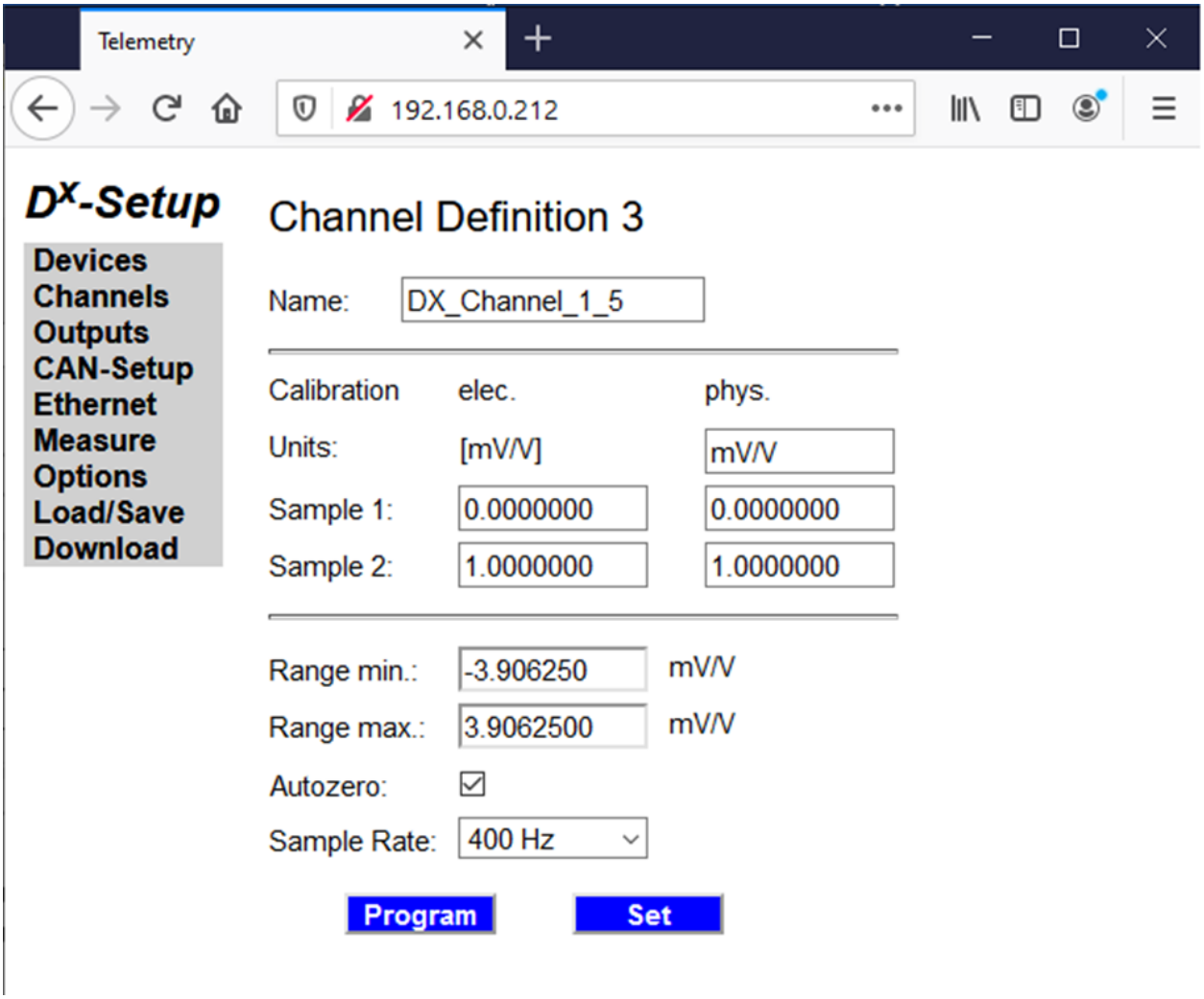


Fig. 78: Configuration menu for one full bridge

Enter the coordinates of your calibration lines in the Calibration section under Sample 1: and Sample 2:. In the Units: field, specify the physical unit of the output quantity.

Enter the lower/upper limit of the measurement range in the specified unit for each channel under Range min: and Range max:. This is resolved with 16 bits.

When configuring via a web browser, click Set to apply the settings.

Select the *Program* Button.

9.7.7 Version "with RPM-Opt.": Configure RPM signal

This option is only available with a D^x-SCT of the version "with RPM-Opt....".

Search for the desired D^x-SCT transmitter unit as described in chapter "Creating a new transmitter unit" 80.

- If the D^x-SCT is found, "with RPM-Opt. ..." appears automatically at Version.

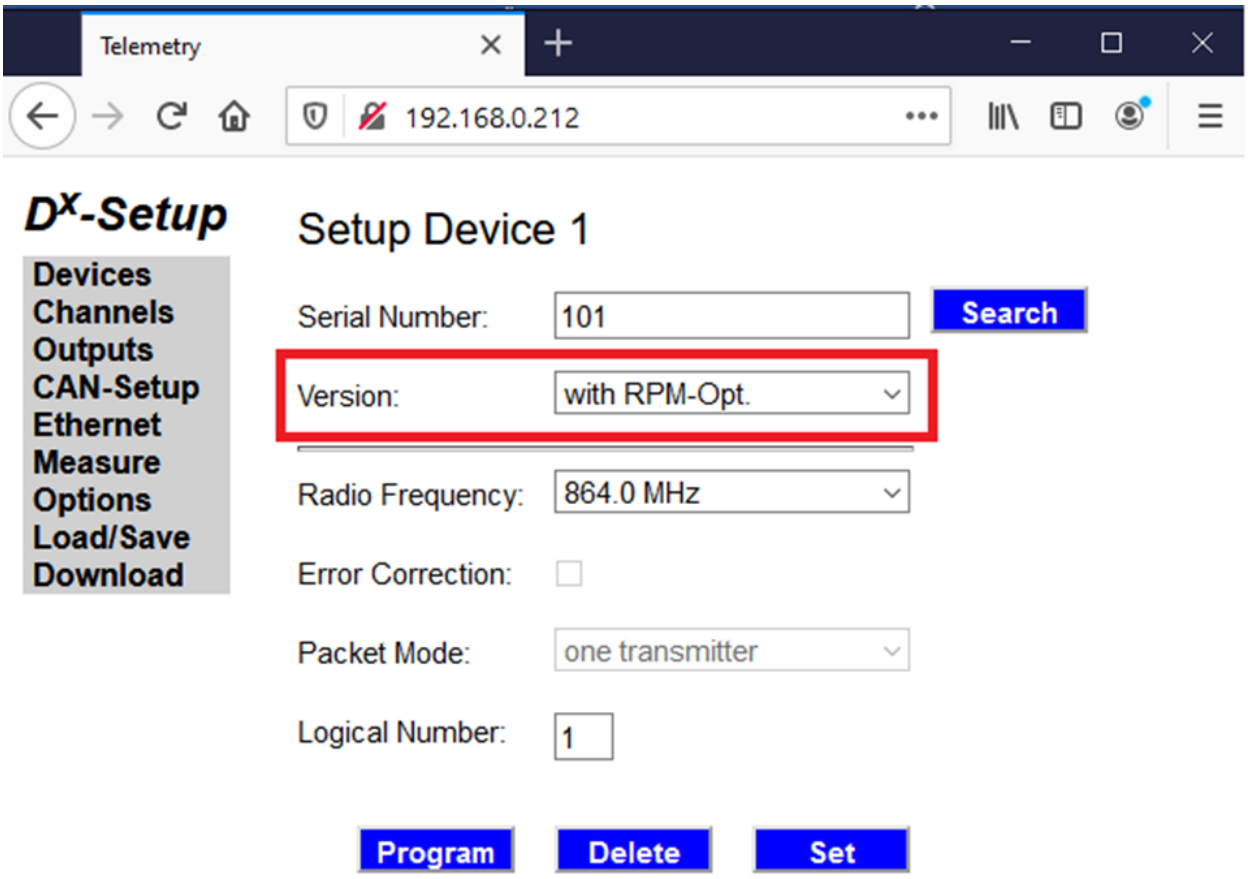


Fig. 79: Version with RPM-Opt. of the D^x-SCT

Set the *Channel 5* to *RPM signal* under *Resource Usage* (*Channels→(Device X)→Modes*).

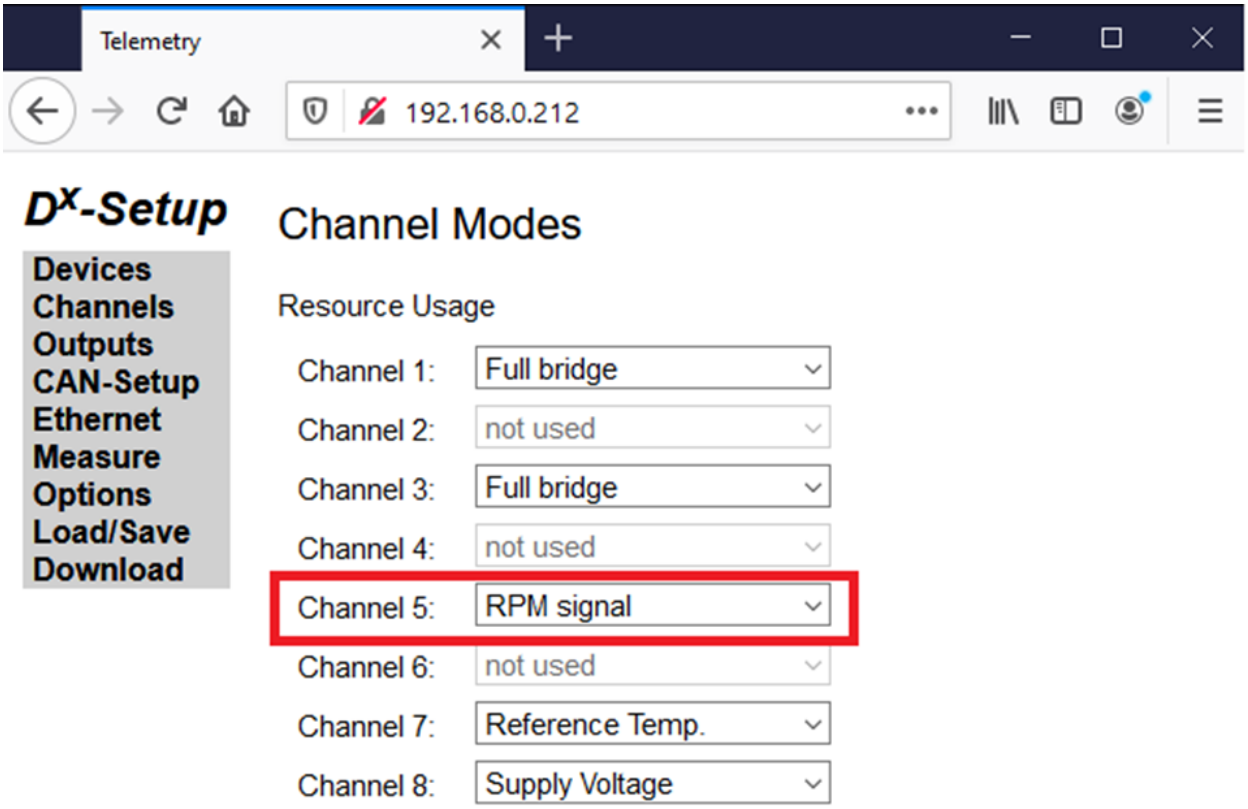


Fig. 80: Set channel 5 to RPM signal

Select *Channels* ->(*Device X*)→ *Channel 5*.

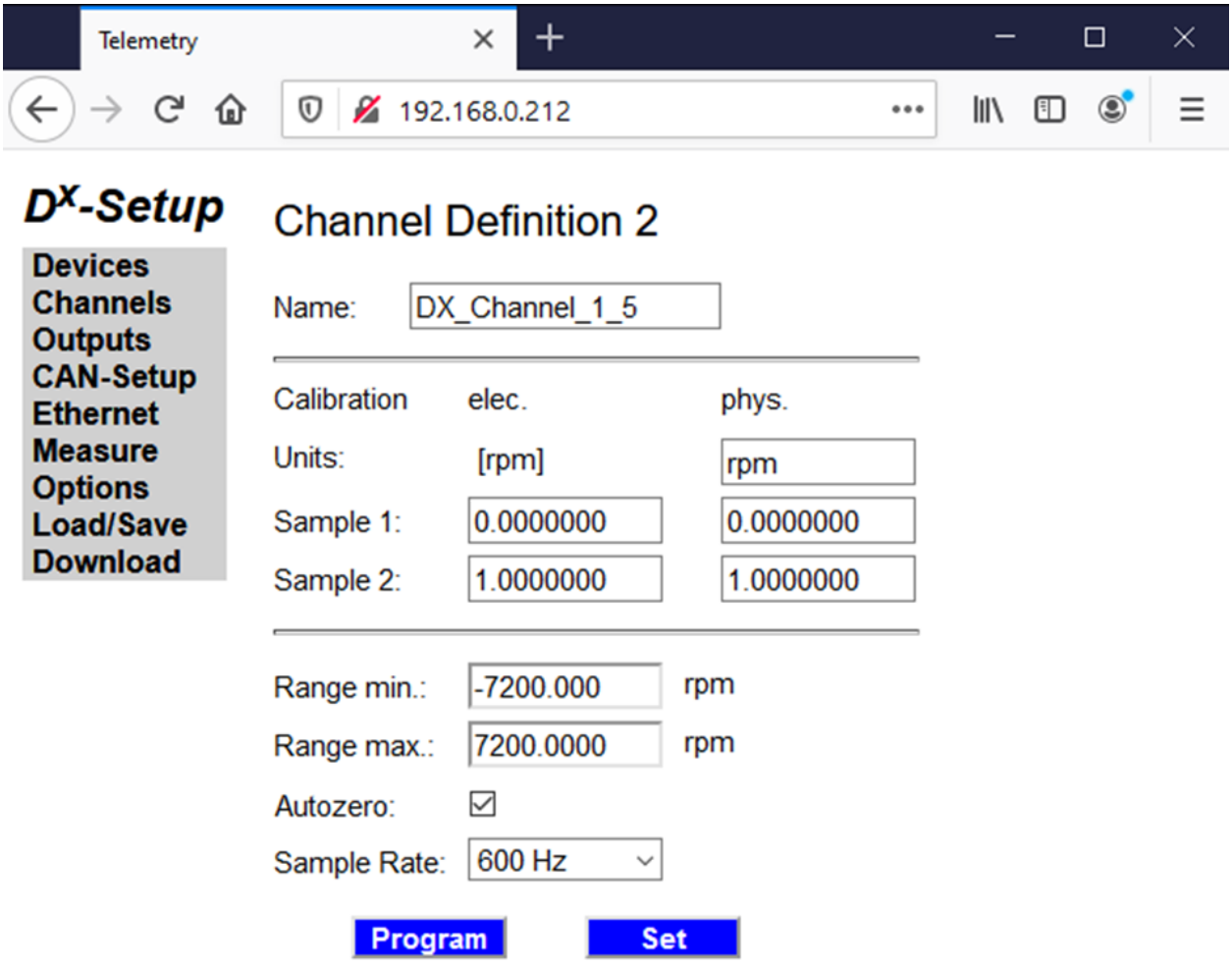


Fig. 81: Configuration menu for channel 5 with RPM signal

Enter the coordinates of your calibration lines in the *Calibration* section under *Sample 1*: and *Sample 2*:. In the *Units*: field, specify the physical unit of the output quantity.

Example Convert RPM to RPS

Let's assume you have connected the D^x-Speed rotation rate sensor. This supplies the rotation rate in revolutions per minute on channel 5. However, you want to display the rotation rate in revolutions per second.

In the *Units*: field, enter the physical quantity you want to obtain, in this case rps (revolutions per second).

Under *Sample 1*:, enter 0 as the rpm value, and to the right, under rps, also enter 0. This is clear, because zero revolutions per minute should also display zero revolutions per second.

Under *Sample 2*: enter 60 as the rpm value, and to the right, under rps, enter 1.
60 rpm corresponds to one revolution per second.

The data generated during the measurement is now converted using this two-point calibration and revolutions per second are displayed.

When configuring via a web browser, click Set to apply the settings.

Enter the lower/upper limit of the measurement range in the specified unit for each channel under *Range min*: and *Range max*:. This is resolved with 16 bits.

- When configuring via a web browser, click *Set* to apply the settings.
- Select the *Program* Button

9.7.8 Version "3 ext. Thermo": Configure thermo signal

This option is only available with a D^X-SCT of the "3 ext. Thermo" version. Selected external amplifiers can be connected to this version, with which a sensor break can be detected.

Search for the desired D^X-SCT transmitter unit as described in chapter "Creating a new transmitter unit" 80.

- If the D^X-SCT is found, "3 ext. thermo" appears automatically at *Version*.

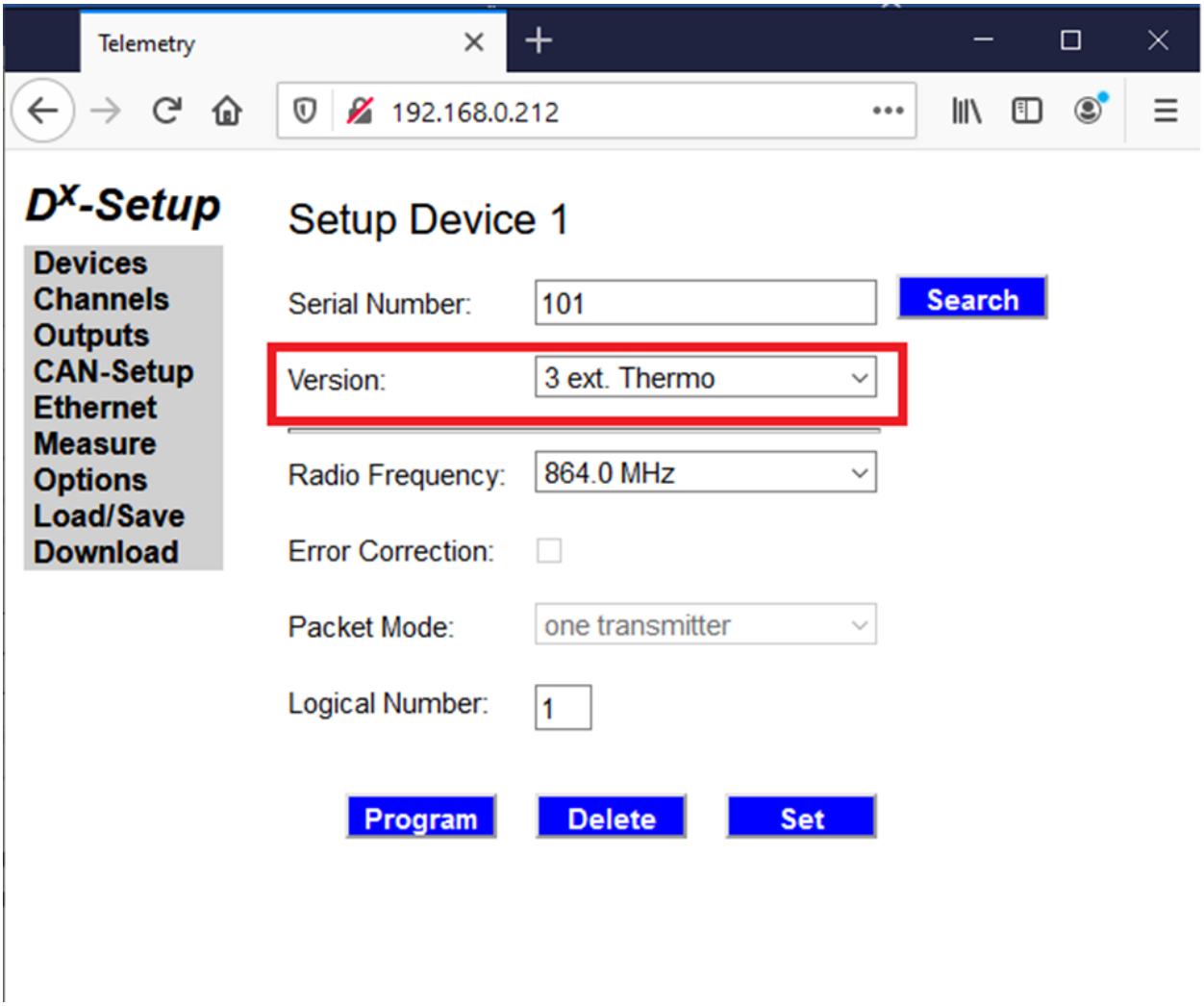


Fig. 82: Version 3 ext. Thermo der D^X-SCT

Under *Resource Usage* (*Channels*→(*Device X*)→*Modes*), set Channel 4 and/or 5 and/or 6 to *Thermo signal*.

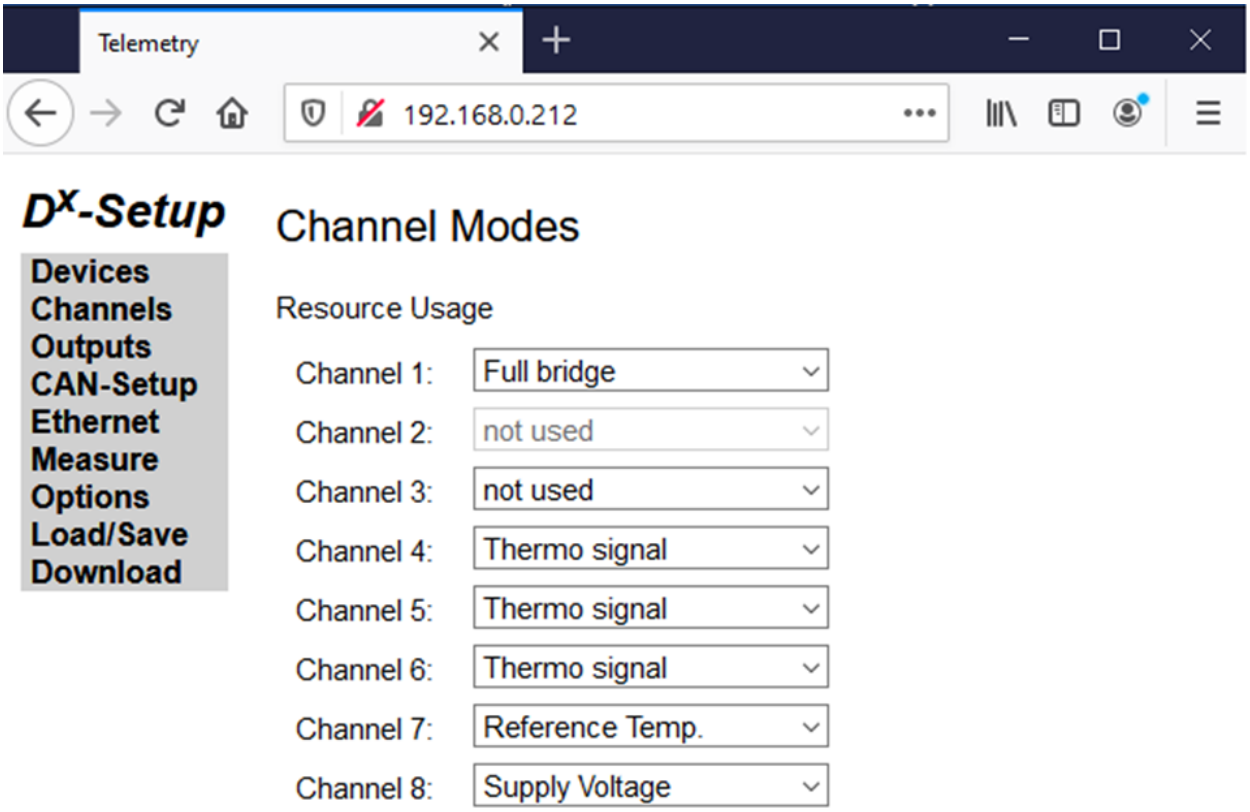


Fig. 83: Set channels to thermo signal

Select the channels you just set to *Thermo signal* (*Channels*→(*Device X*)→*Channel_X*) one by one.

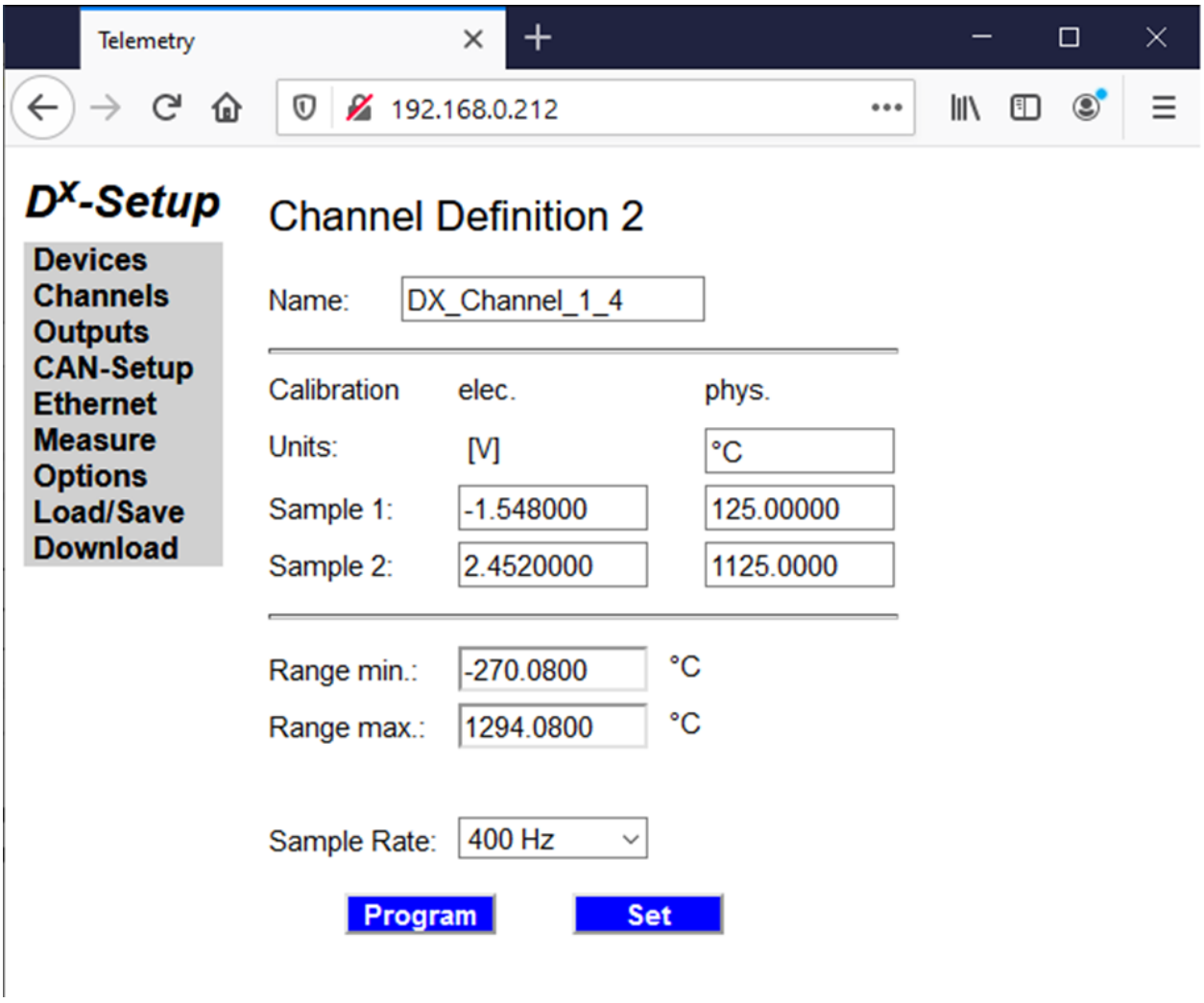


Fig. 84: Configuration menu for channels with Thermo signal

Enter the coordinates of your calibration line in the *Calibration* section under *Sample 1*: and *Sample 2*:. When entering under [V], you must subtract an offset of 2.048 V from the value from the calibration sheet and then enter the resulting value.

In the *Units*: field, specify the physical unit of the output size.

Enter the lower/upper limit of the measurement range in the specified unit for each channel under *Range min*: and *Range max*:. This is resolved with 16 bits.

When configuring via a web browser, click *Set* to apply the settings.

Select the *Program* Button.

9.7.9 Version "with PT-Opt.": PT-Signal konfigurieren

This option is only available with a D^x-SCT of the "with PT-Opt." version.

Search for the desired Dx-SCT transmitter unit as described in chapter "Creating a new transmitter unit" 80.

If the D^x-SCT is found, "with PT-Opt." appears automatically at *Version*.

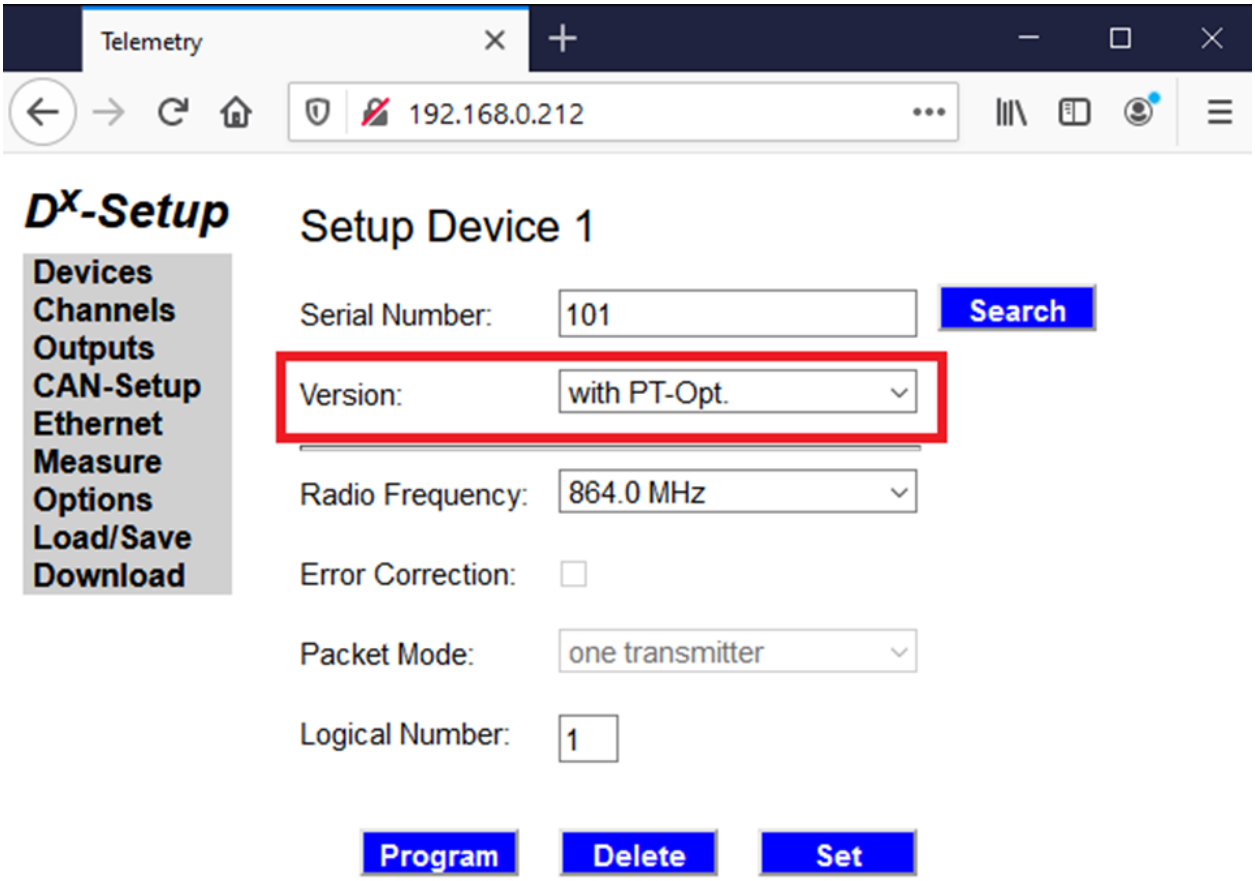


Fig. 85: Version with PT-Opt. of the D^x-SCT

Under *Resource Usage* (*Channels*→(*Device X*)→*Modes*), set Channel 1 and/or 2 and/or 3 and/or 4 to *PT signal*.

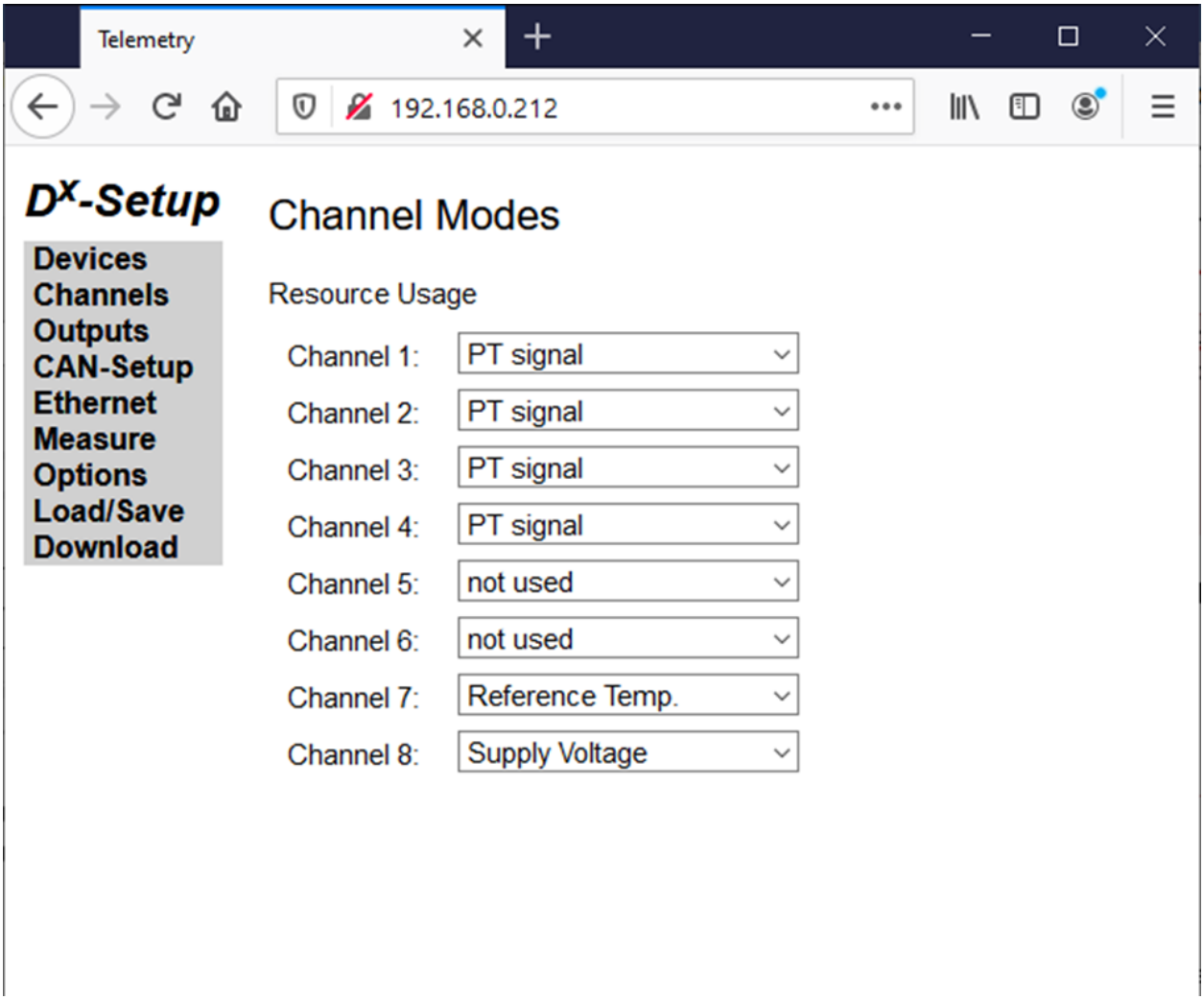


Fig. 86: Set channels to PT signal

Select the channels you just set to *PT signal* (*Channels*→(*Device X*)→*Channel_X*) one by one.

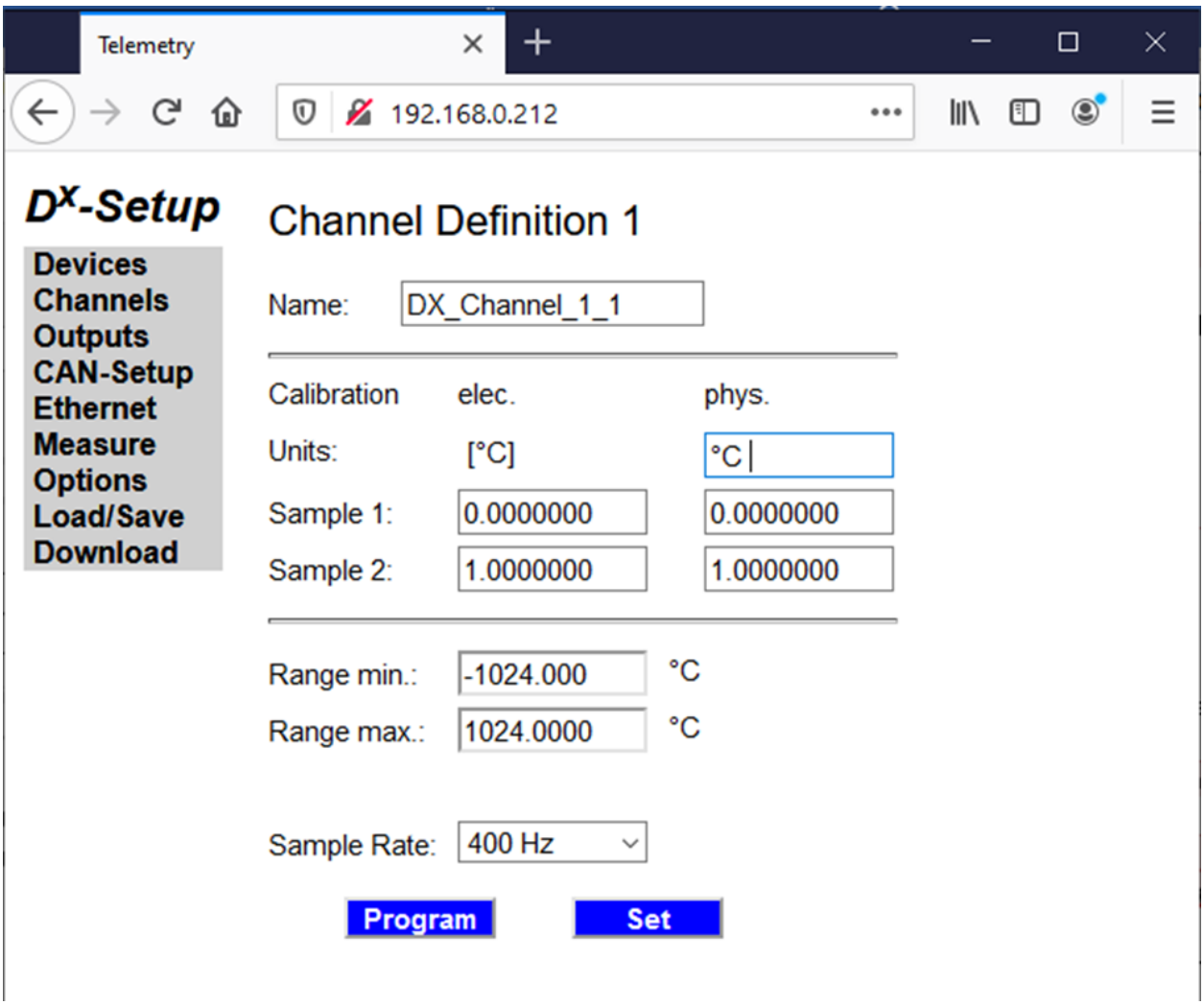


Fig. 87: Configuration menu for channels with Thermo signal

Enter the coordinates of your calibration lines in the *Calibration* section under *Sample 1*: and *Sample 2*:. In the *Units*: field, specify the physical unit of the output quantity.

Enter the lower/upper limit of the measurement range in the specified unit for each channel under *Range min*: and *Range max*:. This is resolved with 16 bits.

When configuring via a web browser, click *Set* to apply the settings.

Select the *Program* Button

9.7.10 Autozero

9.7.10.1 Set Autozero

Open the desired channel with *Channels→(Device X)→Channel X*.

To be able to perform a zero adjustment for this channel in the measuring mode, set a check mark at *Autozero*. This is the default setting.

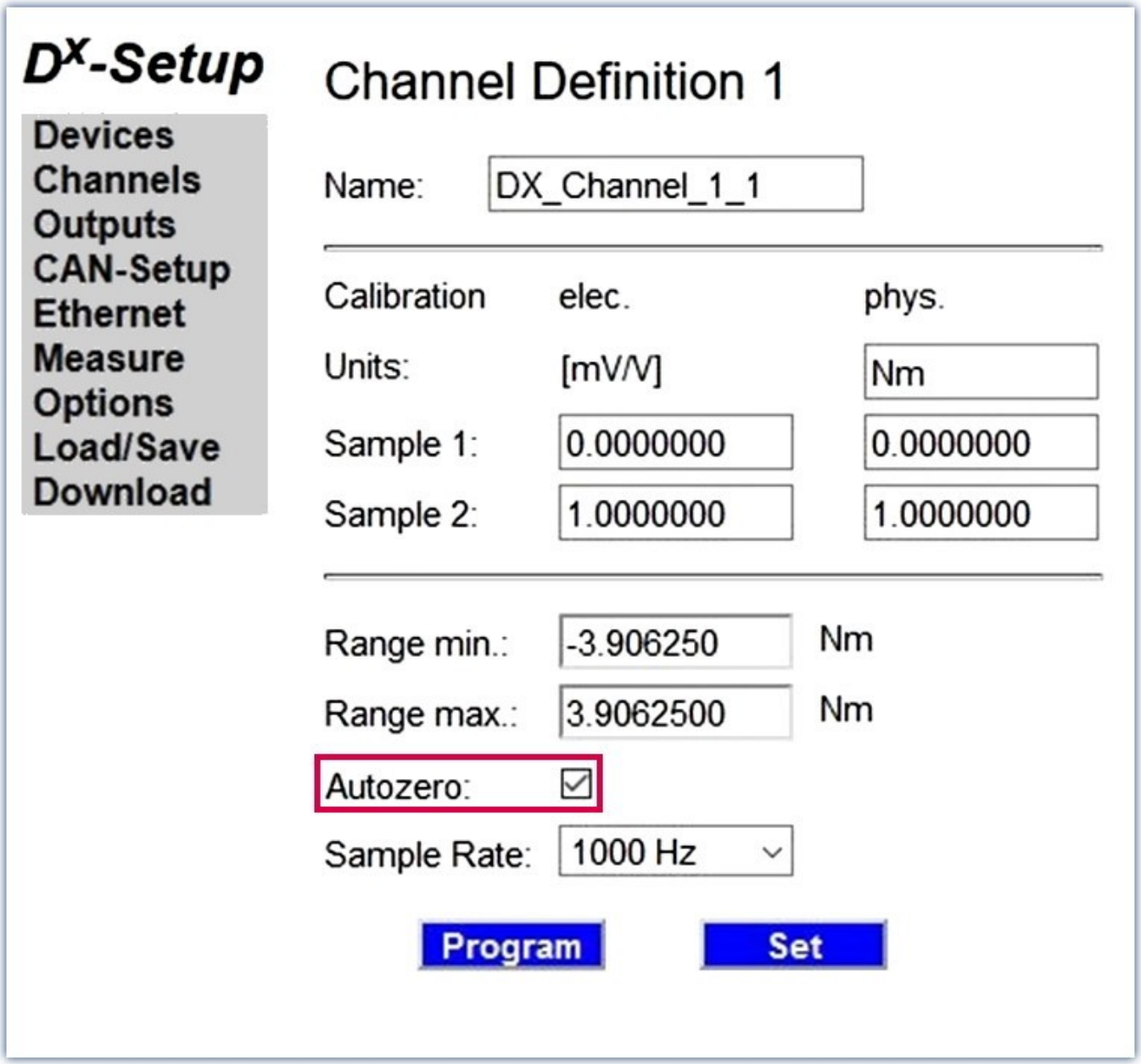


Fig. 88: Set checkmark at Autozero

When configuring via a web browser, click Set to apply the settings.

During the measurement (started via *Measure→Start*), an **Autozero** can now be triggered.

To do that press the *Autozero* button. Wait until the process is completed. The measured variable must be stable during the adjustment process.

The channels that do not have the *Autozero* checkmark remain unchanged.

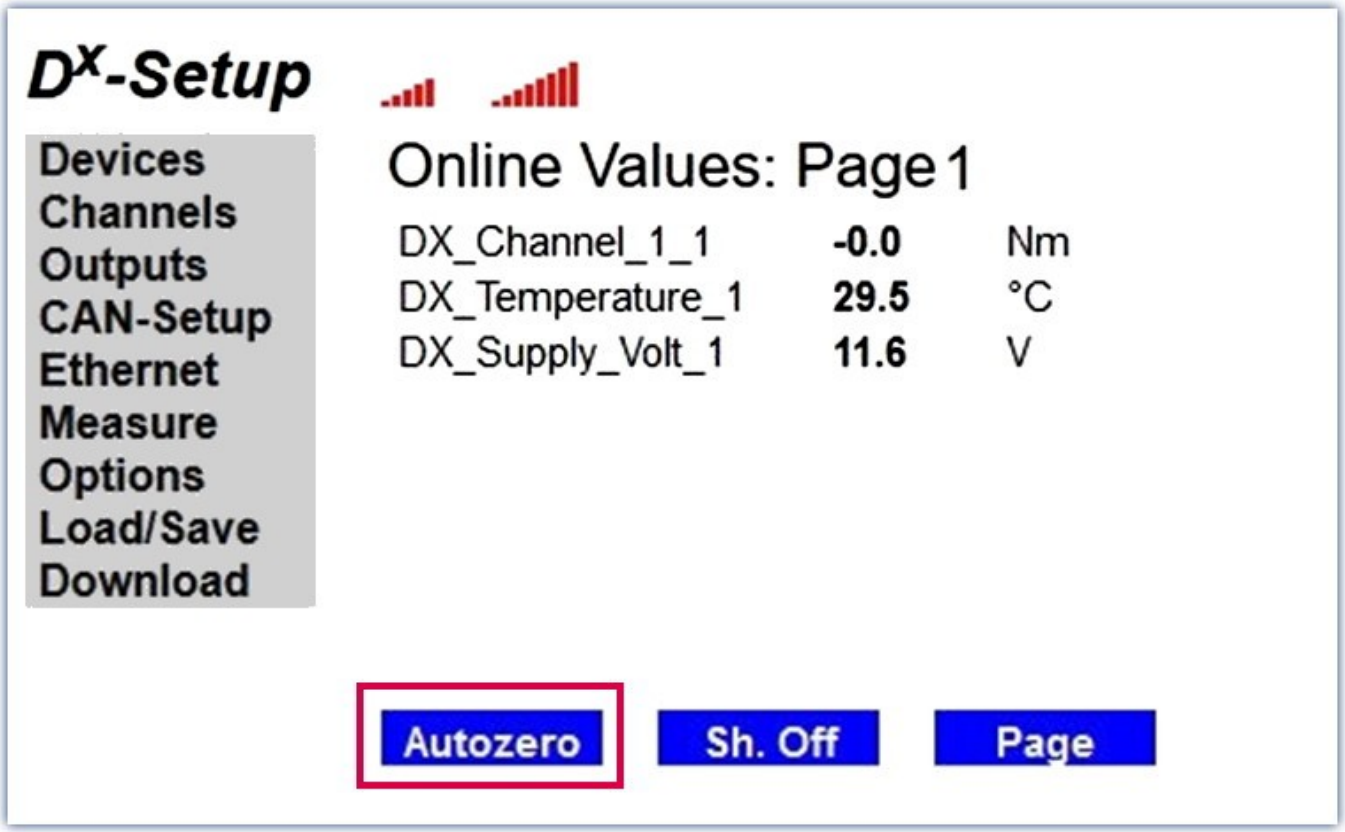


Fig. 89: Trigger Autozero during measurement

Note

The measured variable must be stable during the adjustment process.

If the adjustment is to remain permanently stored in the D^{x}-SCT transmitter unit, the corresponding channel must be programmed after the zero adjustment (*Channels*→(*Device X*)→*Channel X* → *Program*).

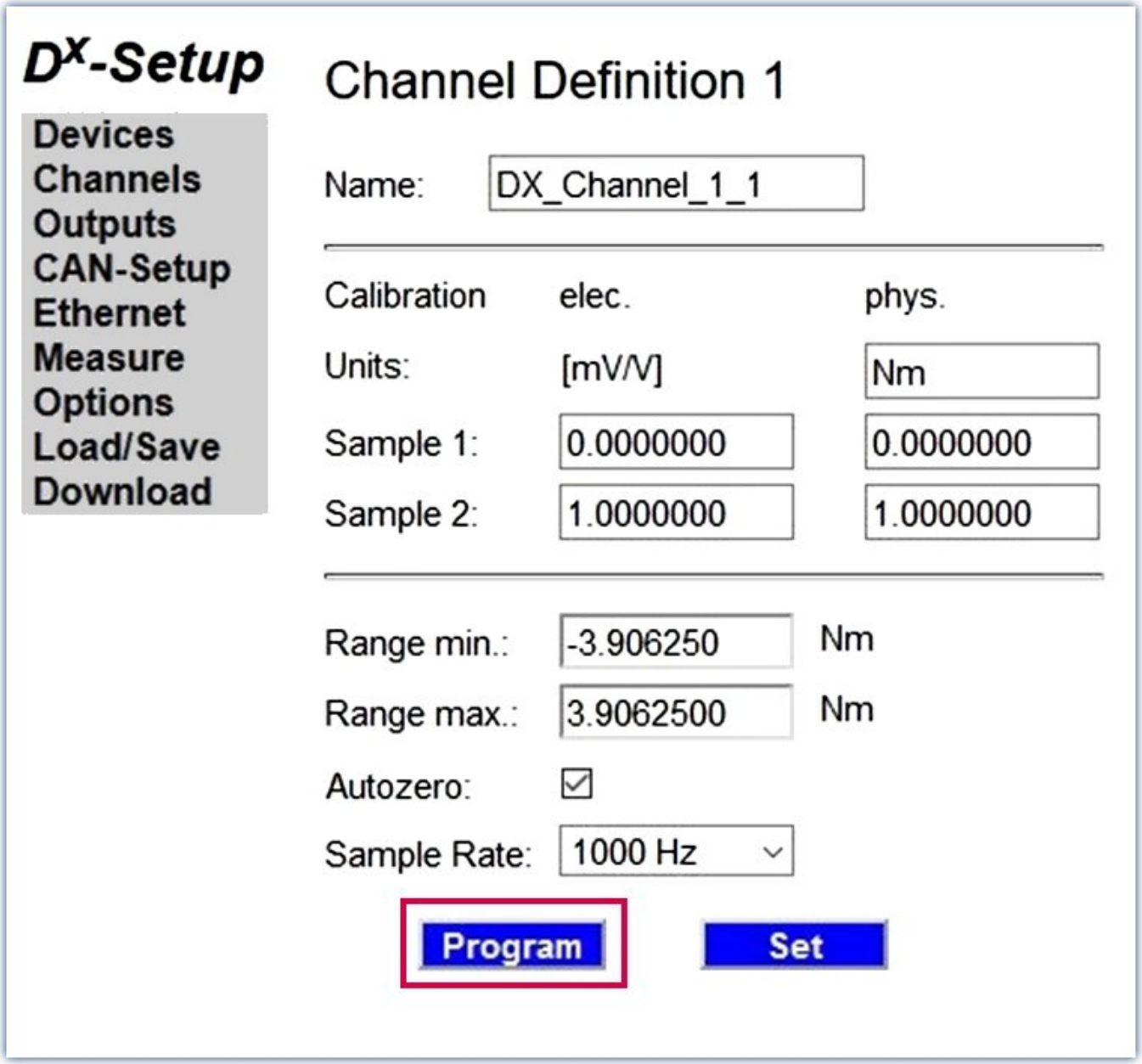


Fig. 90: Program channel

Note

The zero adjustment can be permanently stored in the D^{x}-SCT by programming any channel of the D^{x}-SCT.

9.7.10.2 Cancel Autozero

To delete a stored zero balance value again, open the desired channel with *Channels→(Device X)→Channel X*.

Remove the check mark from *Autozero*.

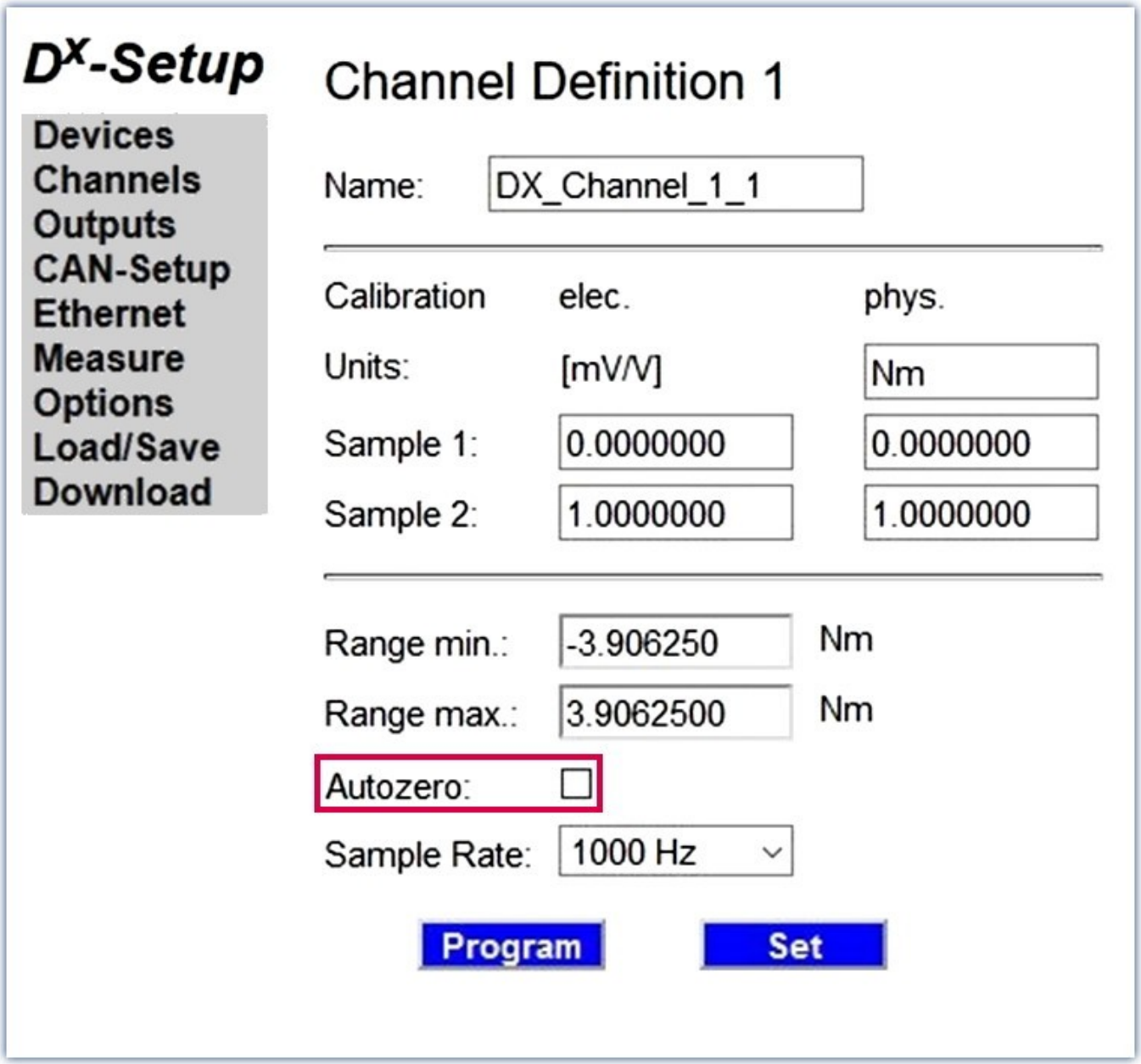


Fig. 91: Remove checkmark from Autozero

When configuring via a web browser, click *Set* to apply the settings.

Now reprogram the channel with *Channels→(Device X)→Channel X → Program*.

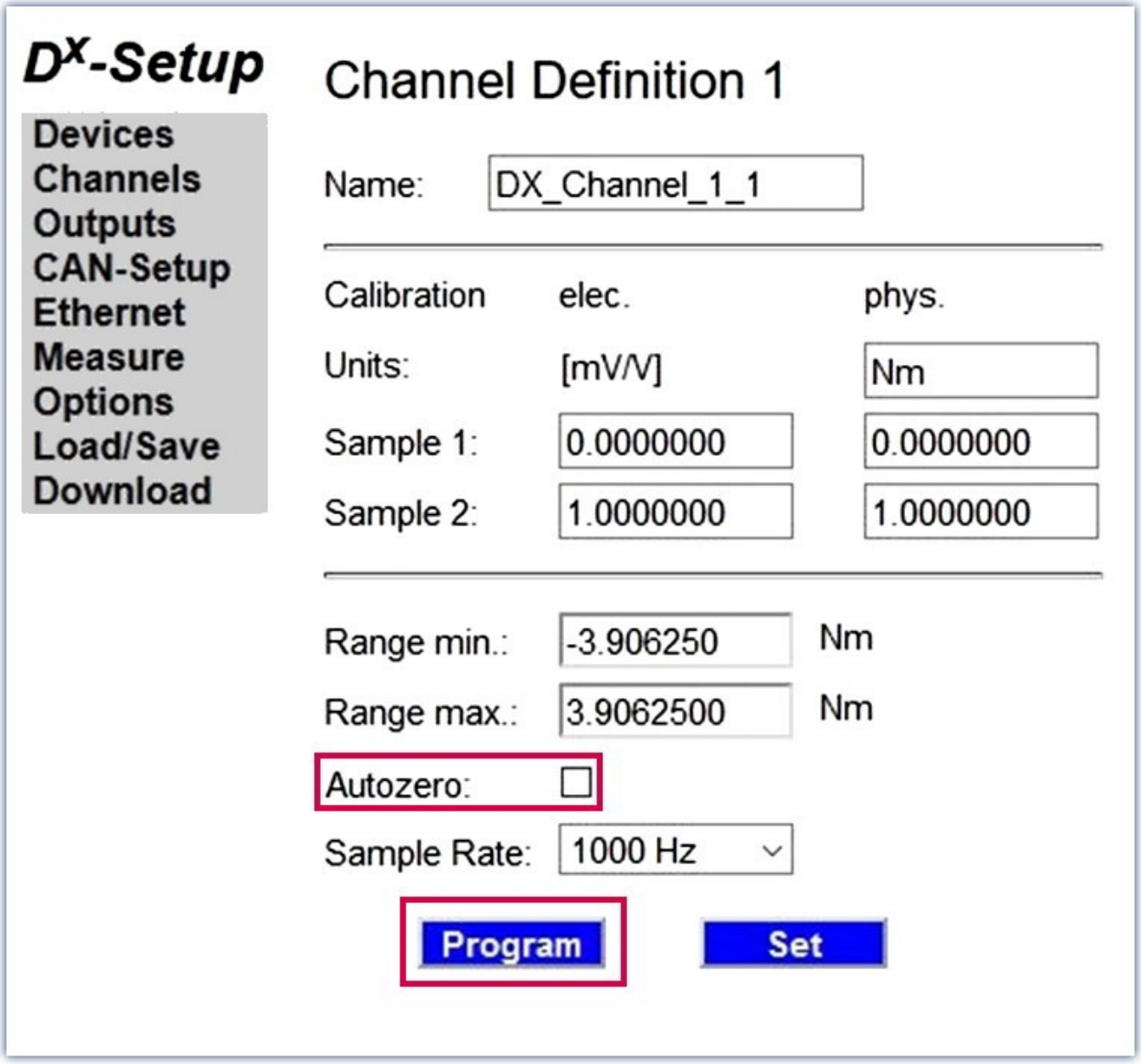


Fig. 92: Program channels

Now the previously saved adjustment is canceled again.

If you want to trigger an autozero again, open the desired channel with *Channels*→(*Device X*)→*Channel X*. Now check the Autozero box again.

Note

To delete a stored zero balance value again, remove the check mark from *Autozero* and reprogram the channel.

In order to be able to carry out a new *Autozero*, then set the checkmark at Autozero again and reprogram the channel.

9.7.11 Set sampling rate

Each channel of the D^x telemetry system is assigned the same sampling rate (except for the additional channels *Reference Temp.* and *Supply Voltage*).

If you want to change the sampling rate of the D^x telemetry system, each D^x-SCT transmitter unit must be reprogrammed individually. To do this, carry out the steps described here for any channel on each D^x-SCT. In doing so, make sure that all D^x-SCT units are ready to receive.

Open the menu item *Channels→Device 1 →Channel 1_Y*. *Channel 1_Y* can be any channel of *Device 1* (except for the additional channels *Reference Temp.* and *Supply Voltage*).

Select the desired sample rate under *Sample Rate*:. If you change the sample rate of a channel, this is automatically applied to all other channels of this D^x-SCT.

Note

The transmission window of the radio link is divided among the available channels. Therefore, the maximum sampling rate of the system depends on the number of channels and transmitting units D^x-SCT. The cut-off frequency of the 6-pole antialiasing filter with Butterworth characteristic is automatically set to 1/5 of the sampling rate (-3 dB). Channels 7 and 8 record reference temperature and supply voltage. These are sampled at 25 Hz and do not load the bandwidth.

The maximum sampling rates for the D^x-SCT (868 MHz/2.4 GHz) are listed in the following table:

Number of D^x-SCTs	Channels per D^x-SCT	D^x-SCT 868 MHz max. sampling rate per channel [Hz]	D^x-SCT-HT 2.4 GHz max. sampling rate per channel [Hz]
1 (log. no. 1)	1	4600	5000
	2	2200	2400
	3	1400	1600
	4	1000	1200
	5	800	800
	6	600	800
2 (log. no. 1 and 3)	1	3600	4000
	2	1800	2000
	3	1200	1200
	4	800	1000
	5	600	800
	6	600	600
3 or 4 (log. no. 1, 2, 3, 4)	1	1000	1200
	2	400	600
	3	200	400
	4	200	200
	5	200	200
	6	-	200

For example: When configuring 2 D^{x}-SCT 868 MHz transmitting units, the first D^{x}-SCT is assigned 3 channels, the second only 1 channel. The higher number is decisive. This results in a maximum sampling rate of 1200 Hz.

When configuring via a web browser, click *Set* to apply the settings.

Select the *Program* Button.

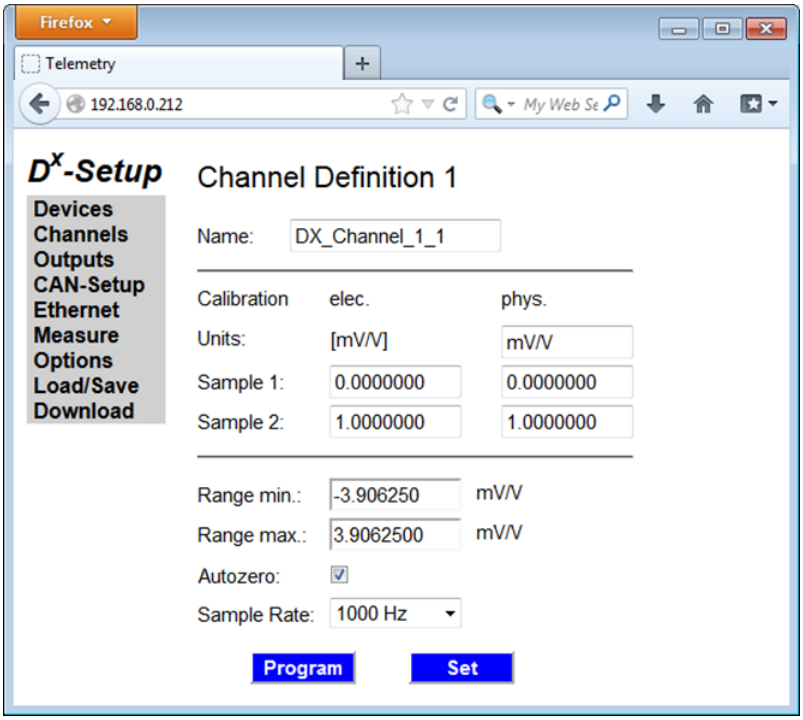


Fig. 93: Program sampling rate

Warning Attention

When programming the D^{x}-SCT transmitting units, make sure that they are switched on (i.e. supplied with power) and that the radio signals of the D^{x}-RCI receiving unit can be received. Otherwise, programming cannot be carried out, although a confirmation message appears afterwards.

In the *Program done!* window, confirm with OK.

Now one channel must be reprogrammed for each of the other D^{x}-SCT transmitting units in the system (see chapter "Programming channels" 87). The sampling rate selected for Device 1 is already stored.

9.7.12 Save settings in DXP file and program Dx-SCT

When you have made all the settings, save them in the DXP file under Load/Save (cf. chapter "Save configuration" 121). You must then program any channel of the D^{x}-SCT to send the settings to the D^{x}-SCT. The settings are then saved by the D^{x}-SCT. If you have made a change that affects the frequency, the sampling rate or the number of channels, or if you have newly added or removed a D^{x}-SCT, ALL D^{x}-SCTs must be reprogrammed.

Warning Attention

If you have made a change that affects the frequency, the sampling rate or the number of channels, or if you have newly added or removed a D^{x}-SCT, ALL D^{x}-SCTs must be reprogrammed.

Open the menu item *Channels→Device X →Channel X_Y*. *Device X* here is the integrated D^{x}-SCT transmitting unit. *Channel X_Y* can be any channel of *Device X*.

Activate the *Program* button.

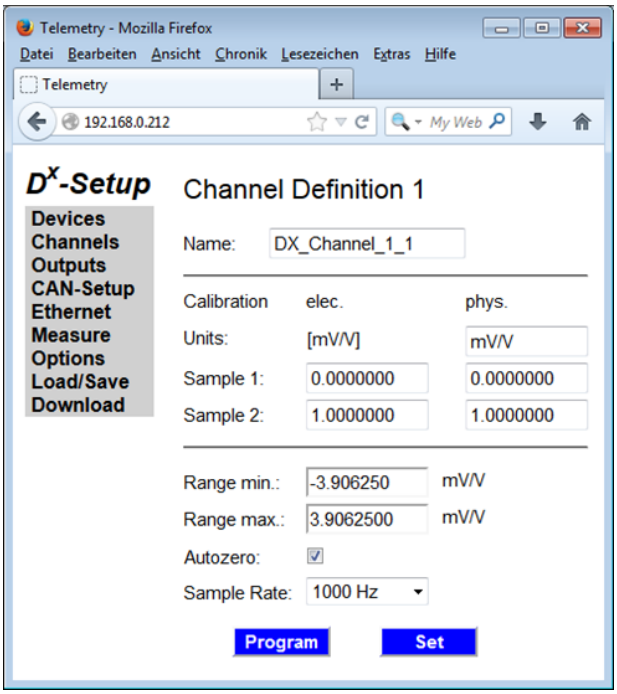


Fig. 94: Channel programming

The message *Program done!*

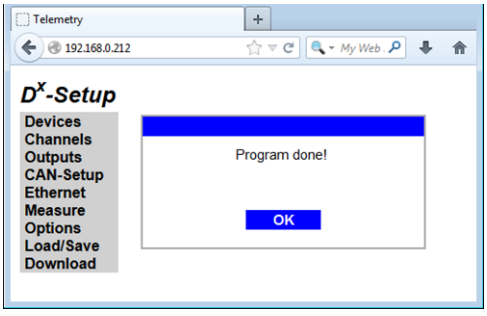


Fig. 95: Message "Program done!"

9.8 Configure analog outputs

The 6 analog outputs of the D^x telemetry system are freely assignable to all measuring channels.

In the menu, choose *Outputs* → *Output X*.

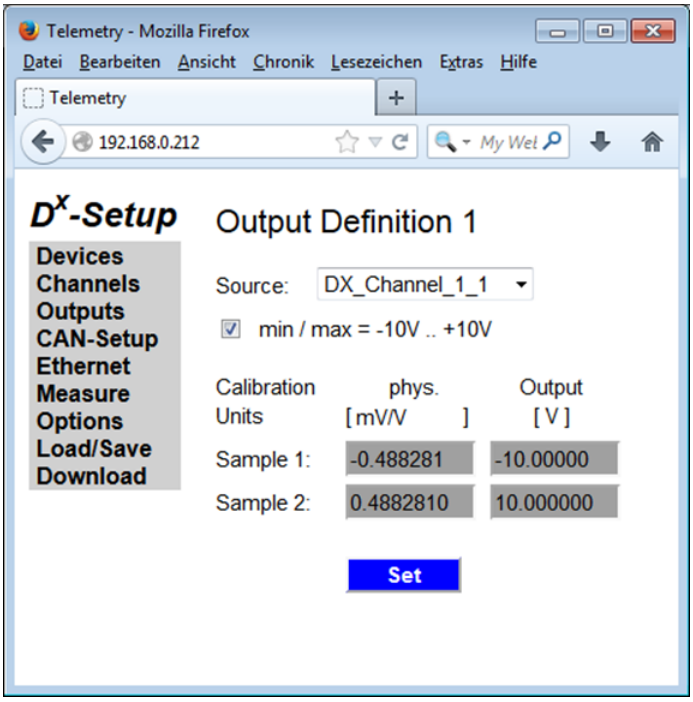


Fig. 96: Configuration menu analog output

Under *Source*:, select the data channel that you want to output.

If you check *min /max = -10 V to +10 V*, the lower/upper limit of the measurement range (see chapter "Measurement range" 91) is set to -10 V/+10 V. If you remove the check mark, you can define the output range yourself via a two-point calibration.

Note

The maximum/minimum output voltage is ±10 V, independent of the two-point calibration.

When configuring via a web browser, click *Set* to apply the settings.

9.9 Configure CAN output

The D^x-RCI receiver unit can send one or more CAN messages with measurement data via the CAN bus at every measurement time or at every xth measurement time. Each CAN message contains up to four 16-bit measured values.

9.9.1 Create/remove CAN message

In the menu, select *CAN Setup → New Msg.*

Enter the desired CAN-Id of the message in decimal or hexadecimal at *Id:*. With a check mark at hex you switch the CAN-Id from decimal to hexadecimal.

Set a check mark in the field *active*, so that this message is sent in measurement mode.

Select the length of the message under Message *Length*. A message has a maximum of 8 bytes, but it can be reduced if, for example, only two channels are to be transmitted. The setting is then 4 bytes.

In the *Data* field, select the channels that you want to transmit (max. 4 for an 8-byte message). Define for each channel under *Mot* the desired data format (deactivated = INTEL / active = MOTOROLA) as well as under *Sign* the sign transmission mode (deactivated = unsigned / active = signed). In most cases you do not have to change these settings.

The *Bit offset* between the channels must be at least 16 bits.

To accept the configuration, select *Set* respectively *OK*.

To delete the CAN message, select *Delete*.

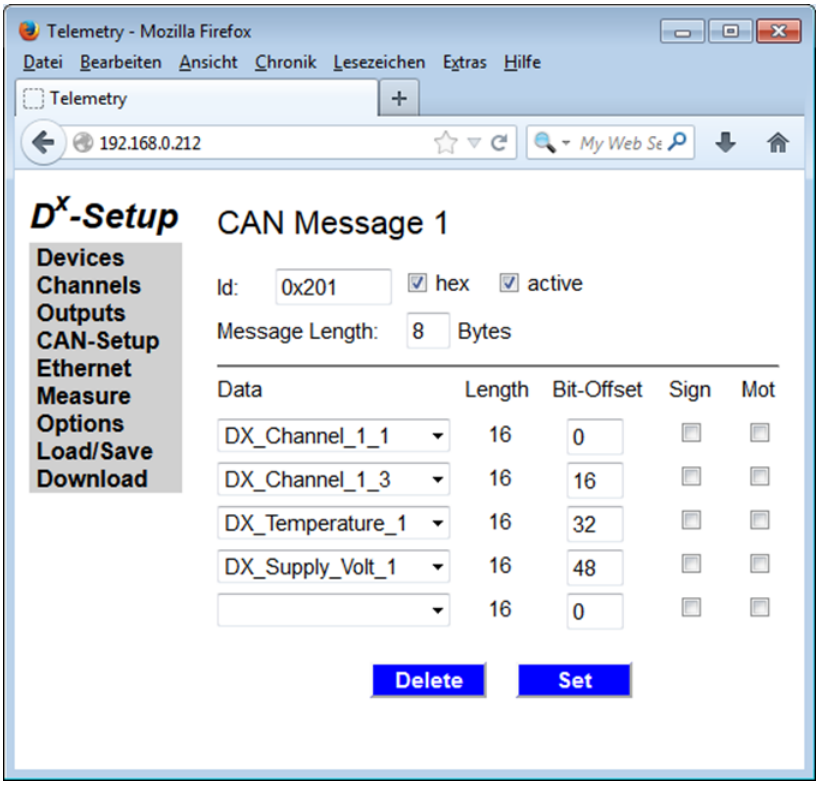


Fig. 97: Configuration menu CAN messages

9.9.2 Change/save CAN settings

9.9.2.1 CAN bus settings

In the menu, select *CAN Setup → General*.

Under Bitrate: select the bitrate of the CAN bus (default setting 500 kBaud). With a check mark at Extended Identifier you use a 29-bit identifier, without a check mark the default identifier with 11 bit is used.

Check *Ignore Acknowledge* to disable the acknowledge function when sending each CAN message. This is also the default setting. If the check mark at *Ignore Acknowledge* is removed, another bus station must acknowledge the messages. In the field *Send Rate: Sample Rate/* you can set that only every nth measured value is transmitted.

When configuring via a web browser, click on *Set* to apply the settings.

9.9.2.2 Create DBC file

With a DBC file you can conveniently read the data configuration of your CAN messages into your data acquisition software.

Enter the file name under *File Name* and click the *Write* button. This way you create a DBC file (CAN database) with the current configuration. Confirm the message *DBC file written!* with *OK*. The file is saved on the SD card.

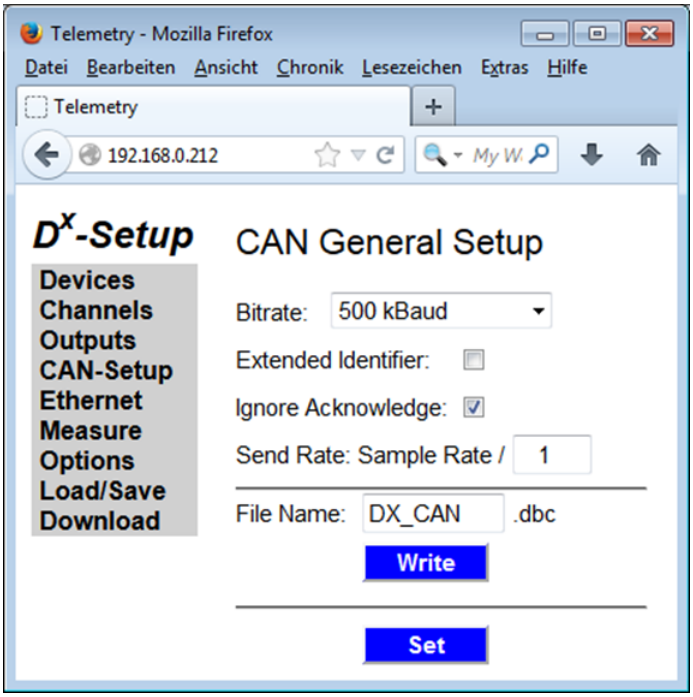


Fig. 98: CAN Setup

9.9.2.3 Download DBC file

To download the DBC file from the DX-RCI receiver unit to the measuring computer via a network connection, select the *Download* menu item in the browser.

Note

This menu item is only displayed in your browser and not on the DX-RCI receiver unit.

In the file list, click the name of your DBC file (default: *DX_CAN.dbc*) and import it.

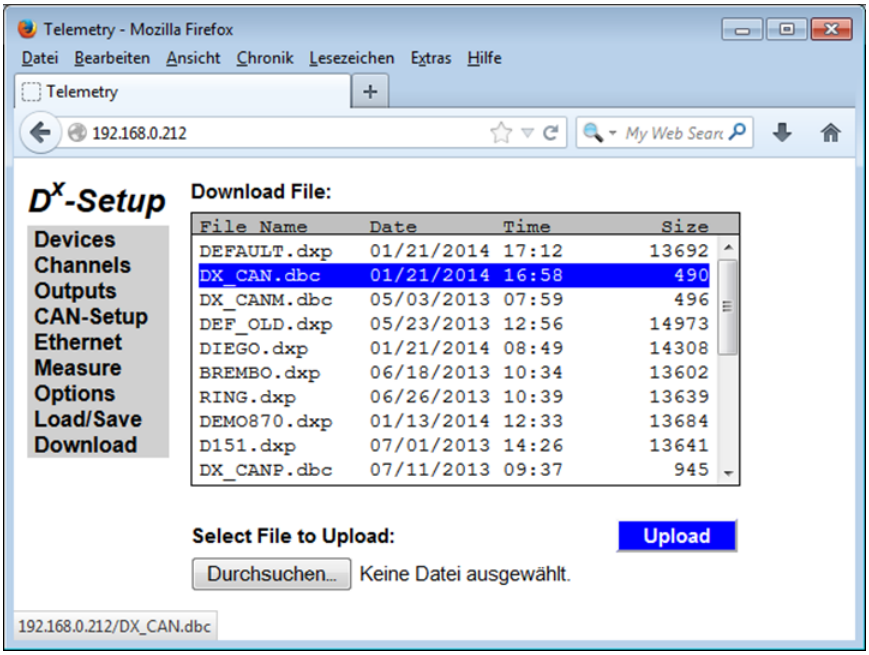


Fig. 99: Download DBC file

If there is no network connection to the measuring computer, you have the option of removing the SD card of the DX-RCI receiver unit and reading it into the card reader of your PC. The DBC file (default setting: *DX_CAN.dbc*) is stored in the root directory.

You can also connect the DX-RCI to a PC via the USB port. Then the DX-RCI appears there as a drive.

9.10 Configure Online display

In the measuring mode, you can have the current measured values output numerically on the display. You can configure up to 5 windows for this purpose.

In the *Measure* menu item, select the *Display X* subitem.

Select the channels you want to display from the drop-down menu. In the left field under *Decimal*, select the maximum number of characters (incl. sign, comma, digits before and after the decimal point) to be displayed. In the right field under *Places*, specify the decimal places.

When configuring via a web browser, click *Set* to apply the settings.

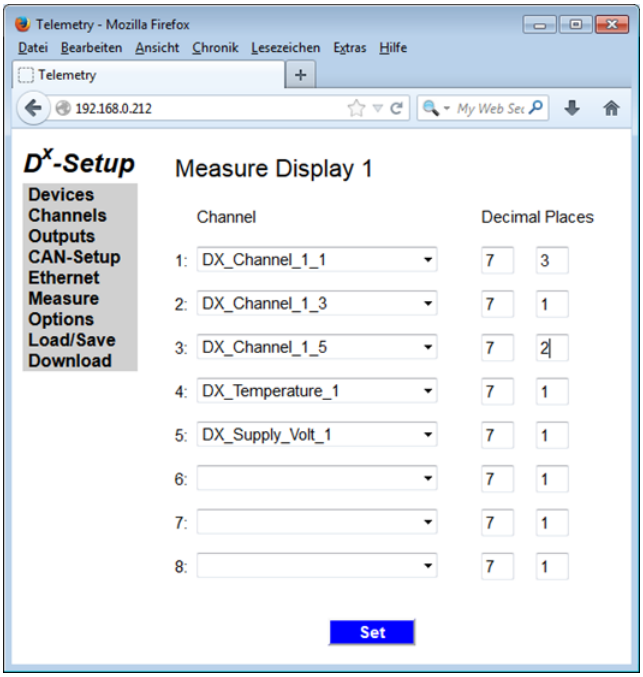


Fig. 100: Configure Online display

9.11 Save and load settings

You can store your configuration in a DXP file on the SD card. When the file is called up, the configuration data is read in and the system is parameterized accordingly.

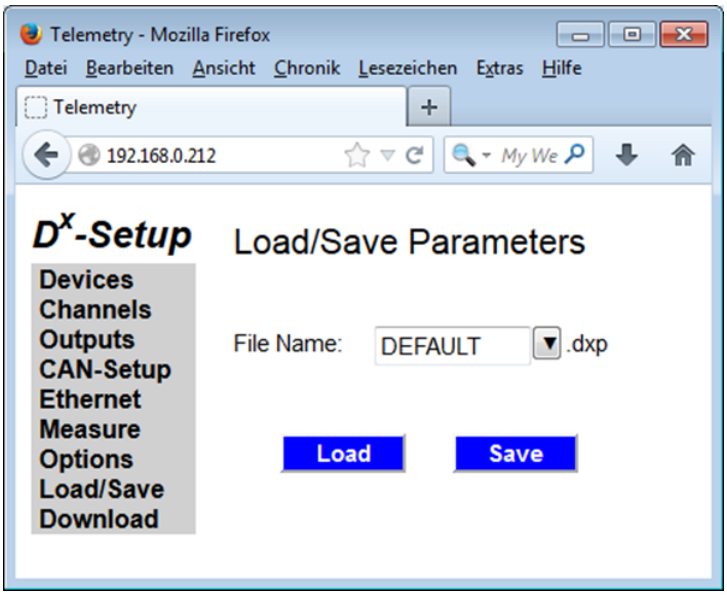
When the D^x-RCI receiver unit is restarted, the DEFAULT.dxp configuration file is always read in. If you save your configuration under this file name, it is available immediately after switching on.

Warning Attention

The frequency of a D^x-RCI receiver unit and a D^x-SCT transmitter unit changes only when you press the Program button. If you enter a new frequency in the *Radio Frequency* field and save the settings, they will be saved in the DXP file; however, the D^x-RCI and the D^x-SCT will NOT be automatically reprogrammed. Until you press the *Program* button, the D^x-RCI and the D^x-SCT will remain set to the frequency to which they were last programmed. Therefore, there may be a discrepancy between the displayed value and the value to which the D^x-RCI and the D^x-SCT are programmed. This must also be taken into account when restarting the D^x-RCI: During a restart, the DXP file is read out and the value stored there is displayed. This may differ from the value to which the D^x-RCI or the D^x-SCT were last programmed (see chapter "Menu: Device Base RCI" 128).

9.11.1 Save configuration

Select the *Load/Save* menu item.



Under *File Name*: enter the desired file name.

Fig. 101: Save configuration

Note

If you select the DEFAULT.dxp, this file is automatically read in when the D^x-RCI is restarted.

Select the *Save* button.

Confirm the *Parameters saved!* message with *OK*.

9.11.2 Load configuration

Select the *Load/Save* menu item. Under *File Name*, select or enter the file name of the configuration file from the drop-down list.

Select the *Load* button.

Confirm the *Parameters loaded!* message with OK.

Warning Attention

The frequency of a D^x-RCI receiver unit and a D^x-SCT transmitter unit changes only when you press the Program button. If you enter a new frequency in the "*Radio Frequency*" field and save the settings, they will be saved in the DXP file; however, the D^x-RCI and the D^x-SCT will NOT be automatically reprogrammed. Unless you press the Program button, the D^x-RCI and the D^x-SCT will remain set to the frequency to which they were last programmed. Therefore, there may be a discrepancy between the value displayed and the value to which the D^x-RCI and the D^x-SCT are programmed. This must also be taken into account when restarting the D^x-RCI: During a restart, the DXP file is read out and the value stored there is displayed. This may differ from the value to which the D^x-RCI or the D^x-SCT were last programmed (see chapter "Menu: Device Base RCI" 128).

9.11.3 Download configuration file

To download the DXP file via a network connection, select the *Download* menu item in the browser.

Note

This menu item is only displayed in your browser and not on the D^x-RCI receiver unit.

Click on the name of your DXP file in the file list (default: DEFAULT.dxp) and download it.

If there is no network connection to the measuring computer, you have the option of removing the SD card of the D^x-RCI and reading it into the card reader of your PC. The DXP files are stored in the root directory.

You can also connect the D^x-RCI to a PC via the USB port. Then the D^x-RCI appears there as a drive.

9.11.4 Call configuration file automatically at program start

When the D^x-RCI is restarted, the configuration file DEFAULT.dxp is always read in. If you save your configuration under this file name, it will be available immediately after switching on.

Select the *Load/Save* menu item. In the *File Name*: field, enter DEFAULT.

Select the *Save* Button

Confirm the *Parameters saved!* message with *OK*.

The configuration will be loaded automatically at the next program start.

Warning Attention

The frequency of a D^x-RCI receiver unit and a D^x-SCT transmitter unit changes only when you press the *Program* button. If you enter a new frequency in the *Radio Frequency* field and save the settings, they will be saved in the DXP file; however, the D^x-RCI and the D^x-SCT will NOT be automatically reprogrammed. Unless you press the *Program* button, the D^x-RCI and the D^x-SCT will remain set to the frequency to which they were last programmed. Therefore, there may be a discrepancy between the value displayed and the value to which the D^x-RCI and the D^x-SCT are programmed. This must also be taken into account when restarting the D^x-RCI: During a restart, the DXP file is read out and the value stored there is displayed. This may differ from the value to which the D^x-RCI or the D^x-SCT were last programmed (see chapter "Menu: Device Base RCI" 128).

9.12 Start measurement

9.12.1 Measurement and configurations mode

The switched-on D^x-RCI receiver unit is always in one of two modes:

- In measurement mode (*Measure → Start*), data is processed and transmitted to the CAN bus.
- In configuration mode, you can program the D^x-RCI receiver unit and the D^x-SCT transmitter unit. No measurement data is transmitted here.

To ensure consistent data, the measurement mode is exited as soon as you leave the *Measure → Start* page using the scroll wheel or via the network connection.

Warning Attention

A new call of the D^x configuration menu via your network connection automatically directs you to the D^x start page. The system interrupts the data transmission and switches to configuration mode. Therefore, make sure during the measurement that there is no new access to the D^x-RCI via the network. To do this, disconnect the Ethernet cable, for example.

9.12.2 Start / Stop measurement

In the *Measure* menu item, select the *Start* subitem. The system now switches to the measuring mode.

9.12.2.1 Change online display

In the web browser, you can switch (change) between the 5 online displays by clicking *Page*. On the D^x-RCI receiver unit, press the "up" and "down" keys of the scroll wheel to switch between the online views.

9.12.2.2 Trigger Autozero

Click the *Autozero* button to perform the zero point adjustment in all channels selected for this purpose (see the "Autozero" chapter 92).

9.12.2.3 Switch test shunt on and off

If you want to switch on the internal shunt resistor for test purposes, click on the *Sh. Off* button. The text in the button always shows the current actual state. *Sh. Off.* therefore means that the shunt is currently switched off. If you click on *Sh. Off.* the shunt is switched on; the text in the button changes to *Sh. On*. An internal shunt resistor of 330 kΩ is now connected between the positive input (I1 or I3) and the positive bridge supply terminal (EX+). This triggers a positive deflection of the signal. *Sh. On* now appears on the button. Click on *Shunt On* to switch the shunt off again.

With thermocouples, a sensor break can be detected in this way: If a sensor break occurs and the shunt is switched on, the negative full-scale deflection is displayed.

9.12.2.4 Stop measurement

To exit the measurement mode, press the *Cancel* button on the D^X-RCI receiver unit. You can cancel the measurement via the web browser by clicking on any menu item.

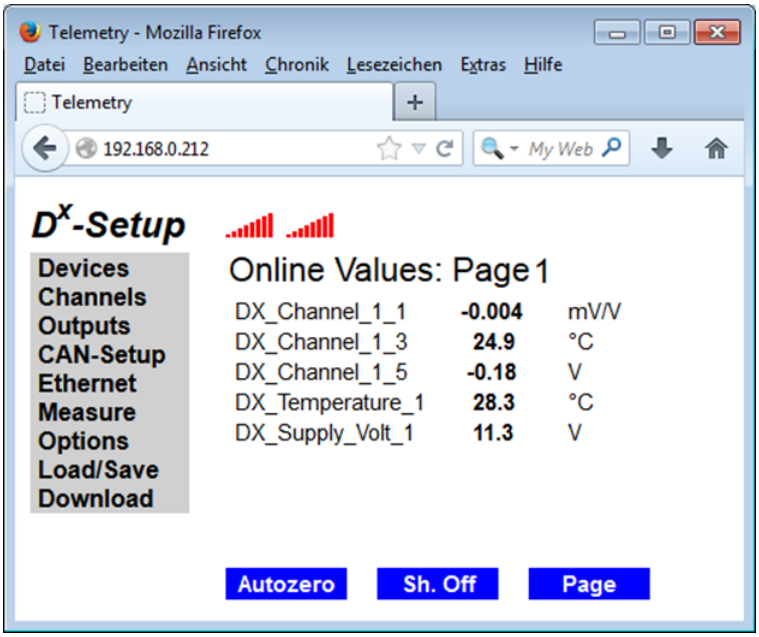


Fig. 102: Measurement mode

9.12.3 Start measurement automatically when switching on (Auto Measure Start)

With this function, the D^X-RCI receiver unit immediately goes into measurement mode after being switched on. The measurement does not have to be started manually separately.

This function only makes sense in connection with the Default.dxp file, since this file is automatically loaded when the D^X-RCI is started (if it exists).

Select the *Options* menu item.

Set a check mark in the *Auto Measure Start* field.

In case of configuration via a web browser, click on *Set* to apply the settings.

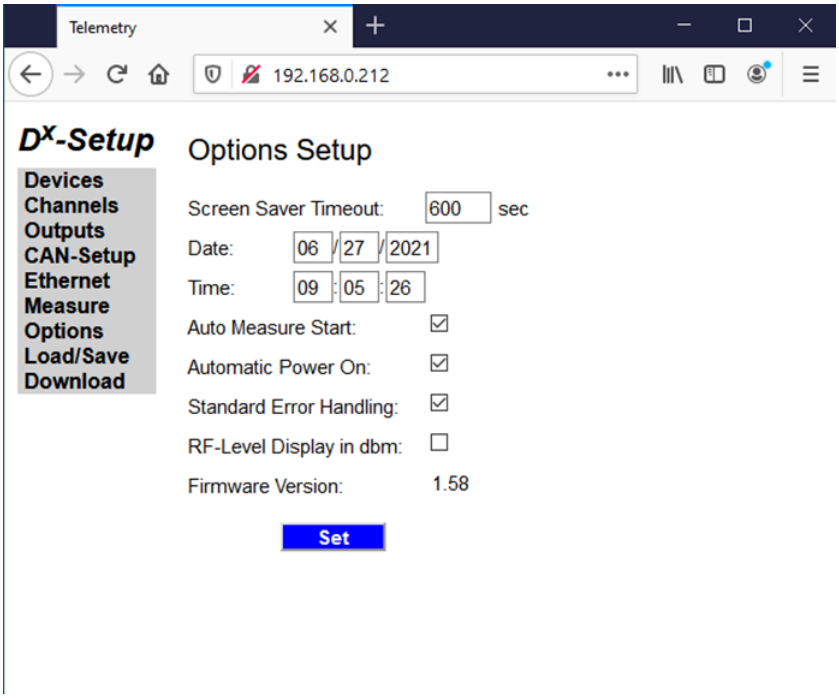
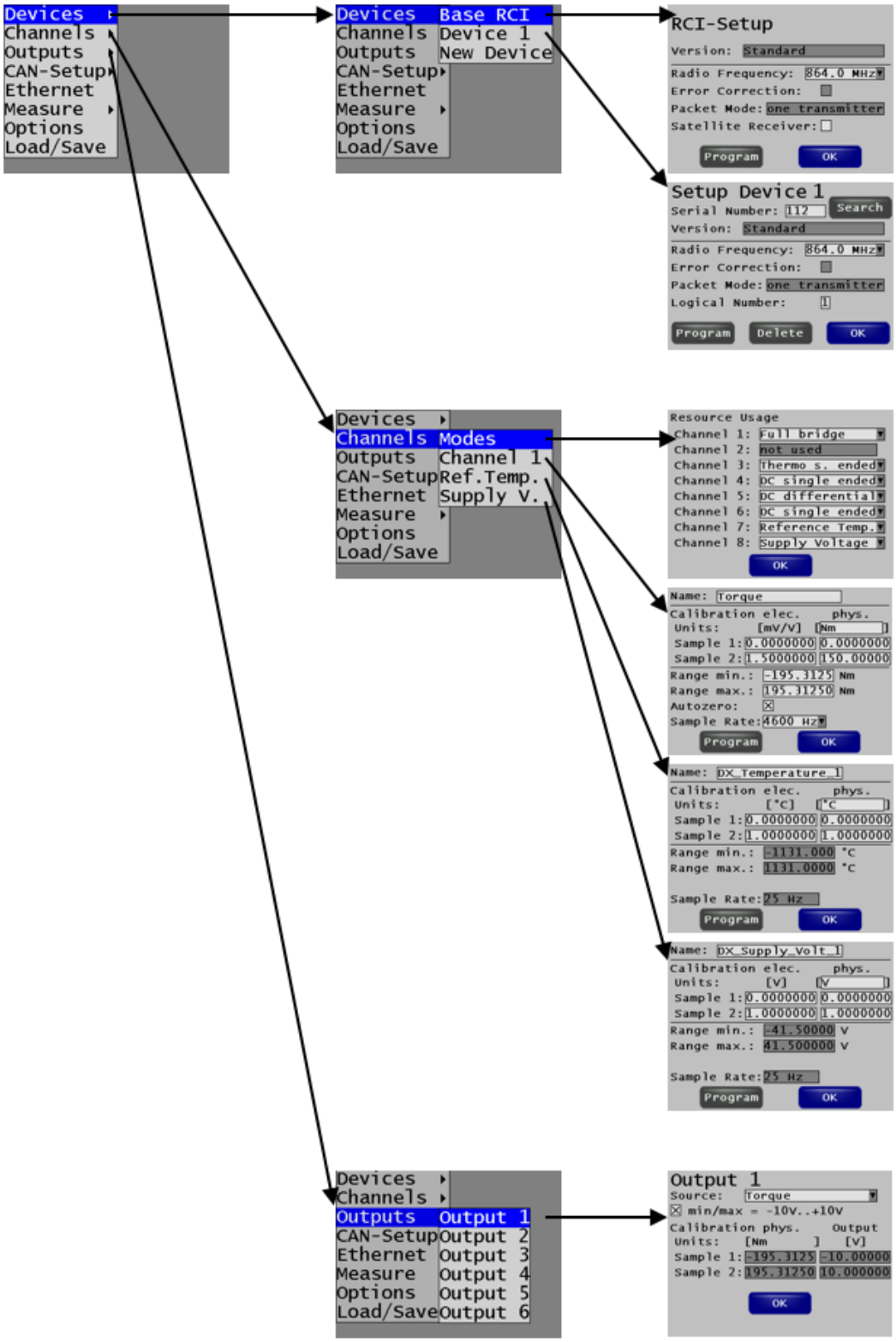


Fig. 103: Options menu / Start measurement automatically

10 Dx Configuration menu: Reference

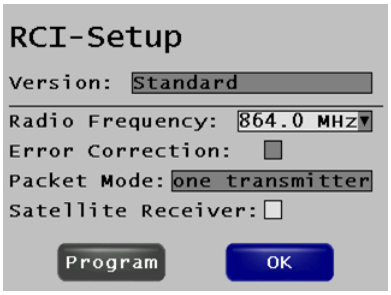
In this section all functions of the D^x configuration menu are shown in detail.

10.1 Menu tree



10.2 Settings

10.2.1 Menu: Device - Base RCI



Version: Information on the D^{x}-RCI version

Radio Frequency: Here you can set the desired radio frequency via a drop-down menu. To change the frequency, the *Program* button must be pressed after setting the frequency. If you use several D^{x}-RCI receiver units within radio range, they must be programmed with different frequencies.

If the checkbox under *Satellite* Receiver is checked, then pressing the *Program* button will program the frequency of the connected satellite receivers.

Warning

When a satellite receiver is connected to the system for the first time, the frequency must be programmed.

Always set the D^{x}-SCT transmitting units to the desired new frequency first, otherwise your D^{x}-RCI receiving unit will be running on a different frequency and will not be able to reach the D^{x}-SCT transmitting unit.

If two 868 D^{x}-RCIs are operated directly next to each other, a frequency spacing of 0.6 MHz should be maintained.

The frequency of a D^{x}-RCI receiver unit and a D^{x}-SCT transmitter unit changes only when you press the Program button. If you enter a new frequency in the Radio Frequency field and save the settings, they will be saved in the DXP file; however, the D^{x}-RCI and the D^{x}-SCT will NOT be automatically reprogrammed. Unless you press the *Program* button, the D^{x}-RCI and the D^{x}-SCT will remain set to the frequency to which they were last programmed. Therefore, there may be a discrepancy between the value displayed and the value to which the D^{x}-RCI and the D^{x}-SCT are programmed. This must also be taken into account when restarting the D^{x}-RCI: During a restart, the DXP file is read out and the value stored there is displayed. This may differ from the value to which the D^{x}-RCI or the D^{x}-SCT were last programmed.

Error Correction: An additional hardware error correction can be switched on here in the 2.4 GHz version.

Packet Mode: Reserved for future settings.

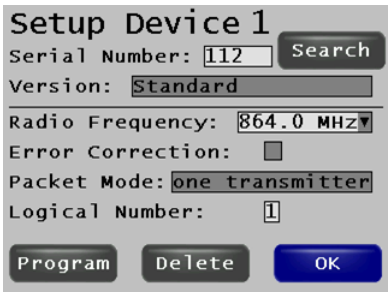
Satellite Receiver: This check box switches off the two internal transceivers in the D^{x}-RCI. This allows the external transceivers (RSU) to be connected and used.

Program:	Adopt the set parameters: Programs the frequency of the transceivers of the D^x-RCI or the connected satellites.
OK:	Exit menu item

Warning Attention

For a permanent change of the settings, the configuration must be saved via the *Load/Save* menu item (exception: the setting of the frequency. Please refer to the previous warning note for this).

10.2.2 Menu: Device - Device1



Serial Number: This number is used to address the D^{x}-SCT transmitter unit to be programmed. Only this D^{x}-SCT is addressed when programming the frequency and the logical number.

Search: This function searches for a D^{x}-SCT transmitting unit on the respective frequency and determines the *Serial Number* and *Logical Number* and enters them in the mask. The search starts with the entered *Serial Number*; then a maximum of the next 99 numbers are searched.

Warning

During the search, ensure that only one D^{x}-SCT transmitter unit is supplied with voltage to enable unique identification.

Version: Information about the type and version of the D^{x}-SCT

Note

The current firmware version is displayed after query by *Search*.

Radio Frequency: Here you can set the desired radio frequency via a drop-down menu. The D^{x}-SCT transmitting units can only communicate with D^{x}-RCI receiving units with the same frequency. Up to 4 D^{x}-SCTs with the same frequency can be operated with one D^{x}-RCI. The change is only active after programming and a restart of the D^{x}-SCT. The setting is non-volatile when programmed.

Warning

Always set the D^{x}-SCT transmitting units to the desired frequency first and then change the frequency of the D^{x}-RCI receiving unit, otherwise you will not be able to reach the D^{x}-SCTs.

Error Correction: An additional hardware error correction can be switched on here in the 2.4 GHz version.

Packet Mode: Reserved for future settings.

Logical Number: This number defines the starting point of the data transmission of the respective transmitting unit D^x-SCT in the transmission window. The time range is divided into 4 sections ("Logical Number" 1-4).

If you use only one D^x-SCT transmitting unit, use the "Logical Number" 1. This allows you to use the complete transmission window (window 1-4).

If you operate two D^x-SCTs, use the number 1 and 3, so each D^x-SCT has 2/4 of the time range available.

With 3 and 4 D^x-SCTs, you can distribute the numbers as you wish (see chapter "Searching for a transmitting unit" 80).

Warning

For a frequency, the "Logical Number" may only be assigned once.

Program: The settings ("Radio Frequency" and "Logical Number") are sent to the D^x-SCT transmitter unit with the serial number entered under "Serial Number" and programmed. Afterwards, a reset of the D^x-SCT is necessary. To do this, please disconnect the power supply to the D^x-SCT for at least 5 seconds.

Warning

Make sure that the D^x-SCT transmitter unit is reliably supplied during programming and that no other D^x-SCT transmitter unit is switched on at the same frequency.

Delete: This deletes this D^x-SCT from the configuration.

OK: Exit menu item

Warning

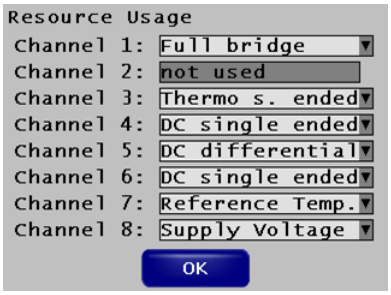
For a permanent change of the settings, the configuration must be saved on the SD in the D^x-RCI via the *Load/Save* menu item.

10.2.3 Menu: Device - New Device

If you want to use more (up to 4) transmitting units D^x-SCT, more can be added with this menu item.

10.2.4 Menu: Channels - Modes

10.2.4.1 Standard version



Channel 1: Select the measuring mode for the channel here. The following settings are available in the standard version:

- Full bridge: full bridge strain gauge
- Half bridge: half bridge strain gauge with integrated completion
- DC differential: differential voltage input
- DC Single-ended: grounded voltage input
- Thermo diff: thermocouple – differential input
- Thermo s. ended: thermocouple – with common ground

When assigning a channel as full bridge or in differential mode, the following channel is automatically shared and is thus no longer available to a sensor input!

Warning

Channels 1 to 6 share the maximum total sampling rate of 4.6 kS/s or 5.0 kS/s (HT).

Channel 2: Select the measuring mode for the channel here. The settings are only available if they are not locked by the selection "Channel 1". Otherwise the following settings are available:

- Half bridge: half bridge strain gauge with integrated completion
- DC Single-ended: grounded voltage input
- Thermo Single-ended: thermocouple – with common ground

Channel 3: see "Channel 1"

Channel 4: see "Channel 2"

Channel 5: Select whether the "Channel 5" "DC differential" should be activated

Channel 6: Select whether the "Channel 6" "DC Single-ended" should be activated

Channel 7: Select whether the "Channel 7" "Reference Temp." should be activated. This channel is sampled at 25 Hz and does not load the bandwidth.

Channel 8: Select whether the "Channel 8" "Supply Voltage" should be activated. This channel is sampled at 25 Hz and does not load the bandwidth.

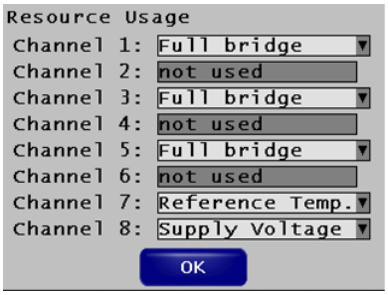
OK: Exit menu item

Warning Attention

For a permanent change of the settings, the configuration must be saved on the SD in the D^X-RCI via the Load/Save menu item.

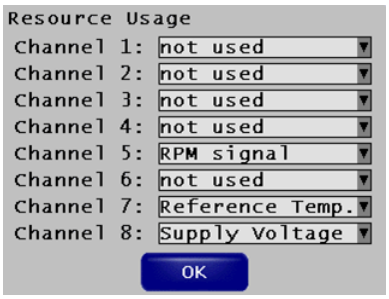
If a change is made, one channel of the D^X-SCT must be programmed.
If the sampling rate changes, all D^X-SCTs of the system must be reprogrammed.

10.2.4.2 Version "3 Full Br/Th"



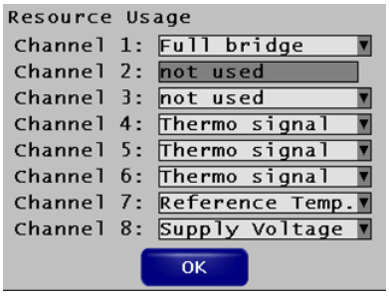
Channel 5: Another full bridge is available on channel 5.

10.2.4.3 Version "with RPM-Opt."



Channel 5: Select whether the "Channel 5" "RPM signa" should be activated

10.2.4.4 Version "3 ext. Thermo"

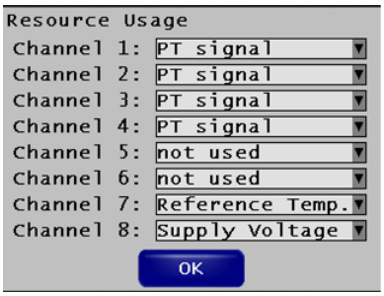


Channel 4: Select whether the "Channel 4" "Thermo signal" should be activated

Channel 5: Select whether the "Channel 5" "Thermo signal" should be activated

Channel 6: Select whether the "Channel 6" "Thermo signal" should be activated

10.2.4.5 Version "with PT-Opt."



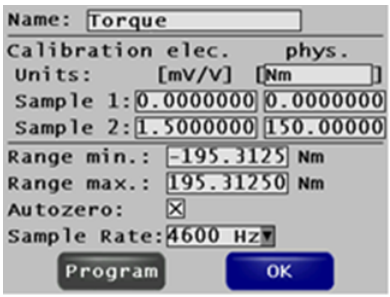
Channel 1: Select whether to enable the "Channel 1" "PT signal".

Channel 2: Select whether the "Channel 2" "PT signal" should be activated.

Channel 3: Select if the "Channel 3" "PT signal" should be activated

Channel 4: Select whether the "Channel 4" "PT signal" should be activated.

10.2.5 Menu: Channels - Channel x



Name:	Enter a channel name with a maximum of 16 letters here.
Units phys.:	Here you enter the desired physical unit.
Sample 1: Sample 2:	Sample 1 and Sample 2 define a calibration line which determines the conversion of the electrical signal (e.g. for bridges mV/V) into a physical quantity. The straight line equation is defined by two interpolation points (see chapter "Configuring full and half bridges" 88).
Range min., Range max.	The input value corresponds to the lower/upper limit of the measurement range in the specified unit. This is resolved with 16 bits. The next better enclosing range is selected automatically.
Autozero:	If this check mark is set, it is possible to perform a zero adjustment for this channel in the measuring mode. If the adjustment is to remain permanently stored in the D^x-SCT transmitter unit, any channel of the corresponding D^x-SCT must be programmed after the successful zero adjustment.
Sample Rate:	Here you set the desired sampling rate. This is the same for all adjustable channels operated on a D^x-RCI receiver unit, with the exception of Reference Temp. and Supply Voltage. The 6-pole Butterworth filter is set to 1/5 of the sampling rate (-3 dB).
Program:	With this button, the settings made above are sent to the corresponding D^x-SCT transmitting unit. If Autozero is checked, the current zero balance is also permanently stored in the D^x-SCT.

Warning

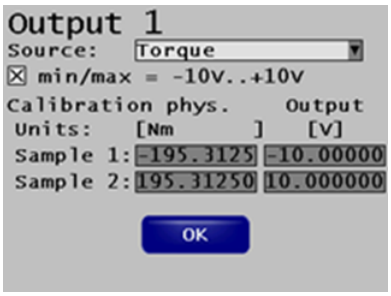
Make sure that the D^x-SCT transmitter unit is reliably supplied during programming.

OK:	Exit menu item

Warning **Attention**

For a permanent change of the settings, the configuration must be saved via the *Load/Save* menu item.

10.2.6 Menu: Outputs - Output x



Source: Selection of the channel that is to be output in analog form

min/max: If this check mark is set, the maximum measurement range of the channel is converted into an analog signal from -10 V to +10 V. If it is not set, the output range can be defined by a two-point calibration. (see Sample 1 + 2)

Note

The analog output signal is limited to -10 V to +10 V, independent of the two-point calibration.

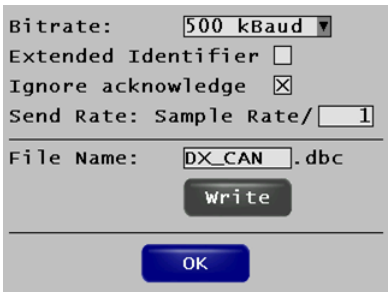
Sample 1:
Sample 2: Sample 1 and Sample 2 define a calibration line which determines the conversion of the physical signal (e.g. Nm) into an electrical voltage. The straight line equation is defined by two interpolation points.

OK: Exit menu item

Warning Attention

For a permanent change of the settings, the configuration must be saved via the *Load/Save* menu item.

10.2.7 Menu: CAN-Setup - General

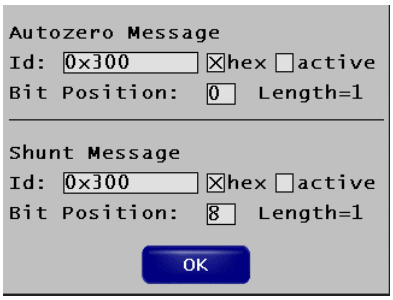


Bitrate:	Setting the transmission rate for the CAN bus
Extended Identifier:	If this option is enabled, a 29-bit extended identifier is used, otherwise the 11-bit.
Ignore Acknowledge:	The D^x-RCI receiver unit sends data without waiting for an acknowledgment of receipt from another bus station.
Send Rate:	Determines the output rate at which measurement data is to be sent on the CAN bus. Only every xth value is transmitted on the CAN bus. This corresponds to a reduction by the entered factor.
File Name:	File name for the DBC file
Write:	Writes the settings of the channels and the messages to the DBC file on the SD card
OK:	Exit menu item

Warning Attention

- For a permanent change of the settings, the configuration must be saved via the Load/Save menu item.
- Whenever changes are made to a CAN message, *CAN-Setup→General→write* must also be executed in order to rewrite the DBC file and to be able to pass the DBC file on to the further processing systems.

10.2.8 Menu: CAN-Setup - Rem. Ctrl



This function allows other devices to remotely activate the "Autozero" function or the "Test Shunt" on your D^x system.

Id: (Autozero Message)	Enter here the desired CAN-Id for the "Autozero Message" in decimal or hexadecimal.
Id: (Shunt Message)	Enter here the desired CAN-Id for the "Shunt Message" in decimal or hexadecimal.
hex:	Switching the CAN-Id from decimal to hexadecimal
active:	Activate the message. Only if this box is selected, the message is received via the CAN bus.
Bit Position:	Specifies the bit position for the remote messages (autozero and shunt). One bit is required in each case: Shunt: Change from 0 => 1 switches shunt on. Change from 1 => 0 switches shunt off. Autozero: Change from 0 => 1 triggers Autozero. To be able to trigger an Autozero again, the bit must first be set to 0 again.

Warning Attention

- For a permanent change of the settings, the configuration must be saved via the Load/Save menu item.
- Whenever changes are made to a CAN message, *CAN-Setup→General→write* must also be executed to rewrite the DBC file.

10.2.9 Menu: CAN-Setup - Message x

Id:	Enter here the desired CAN-Id of the message in decimal or hexadecimal.
hex:	Switching the CAN-Id from decimal to hexadecimal
active:	Activate the message. Only if this box is selected, the message is sent via the CAN bus. However, it is also written to the DBC file in the non-activated state.
Message Length:	A message has a maximum of 8 bytes = 64 bits, but it can be reduced if, for example, only two channels are to be transmitted. The setting is then 4 bytes.
Data:	**Note** The number of messages per time unit is decisive for the data load on the CAN bus. Therefore, it is favorable to utilize each message as much as possible to reduce the number of messages.
Bit-Offset:	Indicates at which position the 16 data bits of the respective channel start.
Sign:	Specifies whether the data is to be transmitted unsigned (offset binary) or signed (2's complement) (deactivated = without / active = with sign).
Mot:	Specifies the format of the data (disabled = INTEL / active = MOTOROLA).
Delete:	Delete the message
OK:	Exit menu item

Warning Attention

- For a permanent change of the settings, the configuration must be saved via the *Load/Save* menu item.
- Whenever changes are made to a CAN message, *CAN-Setup→General→write* must also be executed to rewrite the DBC file.

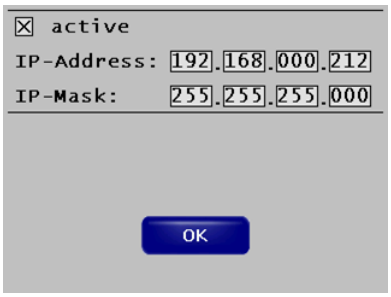
10.2.10 Menu: CAN-Setup - New Msg.

If you want to use more than one CAN message, each with max. 4 channels, additional messages can be parameterized. With the menu command "*CAN-Setup -> New Msg.*" you can easily add a new message.

Warning Attention

- For a permanent change of the settings, the configuration must be saved via the *Load/Save* menu item.
- Whenever changes are made to a CAN message, *CAN-Setup→General→write* must also be executed to rewrite the DBC file.

10.2.11 Menu: Ethernet



active: Activate the Ethernet connection.

Warning

If the Ethernet connection is activated on the D^x-RCI receiver unit, anyone in the network can parameterize the D^x-RCI.

IP-Address: Setting the IP address. The computer must be in the same segment. In this case (see the figure above): 192.168.000.xxx.

IP-Mask: Enter the network mask. The mask defines the network segment.

OK: Exit menu item

10.2.12 Menu: Measure - Display x

1-8: In lines 1 to 8, you select the channel to be shown on this display. Furthermore, the maximum number of characters (including sign, comma and decimal places) as well as the decimal places can be specified.

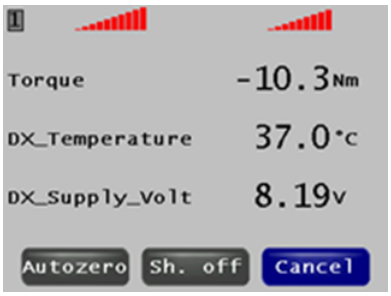
Up to 5 displays can be defined, which can be switched through in the measuring mode.

OK: Exit menu item

Warning Attention

For a permanent change of the settings, the configuration must be saved via the *Load/Save* menu item.

10.2.13 Menu: Measure - Start

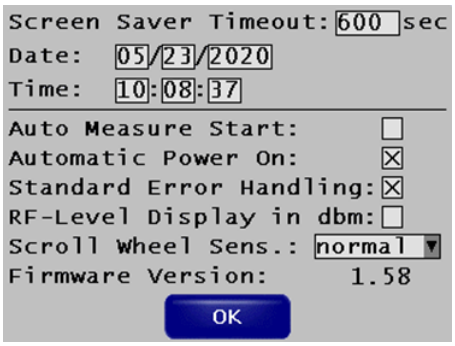


1:	Indication of which display you are in. The input wheel can be used to switch a display back and forth by pushing the push button up or down.
dbm display:	The display of the reception quality as a bar graph or as a decimal number. See "Options -> RF level display in dbm 143".
Autozero:	When this button is pressed, all channels for which "Autozero" has been selected are set to zero. If the adjustment is to remain permanently stored in the D^x-SCT transmitter unit, the corresponding channel must be programmed after the zero adjustment (*Channels→Channel X → Program*).
Sh. Off / Sh. On	This key displays or changes the state of the internal shunt resistor. The internal shunt resistor is connected between the positive input and the positive bridge supply terminal and results in a positive deflection of the signal. The shunt resistor is 330 kΩ.
Cancel:	Exit measurement mode.

Warning Attention

The CAN output is only active in the measuring mode.

10.2.14 Menu: Options



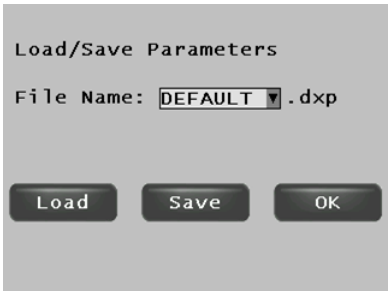
Screen Saver Timeout:	The time in seconds after which the screen saver is turned on.
Date:	Enter the date in the format: mm/dd/yyyy.
Time:	Enter the time in the format: hh:mm:ss
Auto Measure Start:	If this function is activated, the measuring mode with the CAN output is started automatically after the D^x-RCI receiver unit is switched on.
Automatic Power On:	When this function is activated, the D^x-RCI receiver unit starts automatically as soon as it is supplied with power.
Standard Error Handling:	In the event of a transmission error, the last displayed measured value is retained. Without this function, the negative full scale is output in the event of a transmission error.
RF-Level Display in dbm:	Switching the display of the received signal strength in the measuring mode. If this option is activated, the display is numerical, otherwise with the help of a bar graph.
Scroll Wheel Sens.:	The sensitivity of the rotary function of the control wheel is set here. The following can be selected: "lowest, low, normal, high".
Firmware Version:	Display of the installed version of the firmware
OK:	Exit menu item

Warning Attention

For a permanent change of the settings, the configuration must be saved via the *Load/Save* menu item.

10.2.15 Menu: Load/Save

This affects the files on the SD card.



File Name:	Selection of the file name of the DXP file to be loaded or saved. The parameter file "DEFAULT.dxp" is loaded automatically at startup. Existing file names can be selected or new names can be entered.
Load:	Loading the selected parameter file.
Save:	Save the current configuration to the selected file.
OK:	Exit menu item

Warning Attention

The frequency of a D^x-RCI receiver unit and a D^x-SCT transmitter unit changes only when you press the Program button. If you enter a new frequency in the Radio Frequency field and save the settings, they will be saved in the DXP file; however, the D^x-RCI and the D^x-SCT will NOT be automatically reprogrammed. Unless you press the Program button, the D^x-RCI and the D^x-SCT will remain set to the frequency to which they were last programmed. Therefore, there may be a discrepancy between the value displayed and the value to which the D^x-RCI and the D^x-SCT are programmed. This must also be taken into account when restarting the D^x-RCI: During a restart, the DXP file is read out and the value stored there is displayed. This may differ from the value to which the D^x-RCI or the D^x-SCT were last programmed (see chapter "Menu: Device Base RCI" 128).

10.2.16 Upload via Ethernet connection

If there is an Ethernet connection to your D^x telemetry system, you can conveniently upload files, for example for a firmware update, using the upload function of your browser. To do this, open a web browser and call up the IP address of the D^x-RCI (see also chapter "Parameterization on the PC" 77).

Select the *Download* menu item. This menu item is only available for parametrization via the browser.

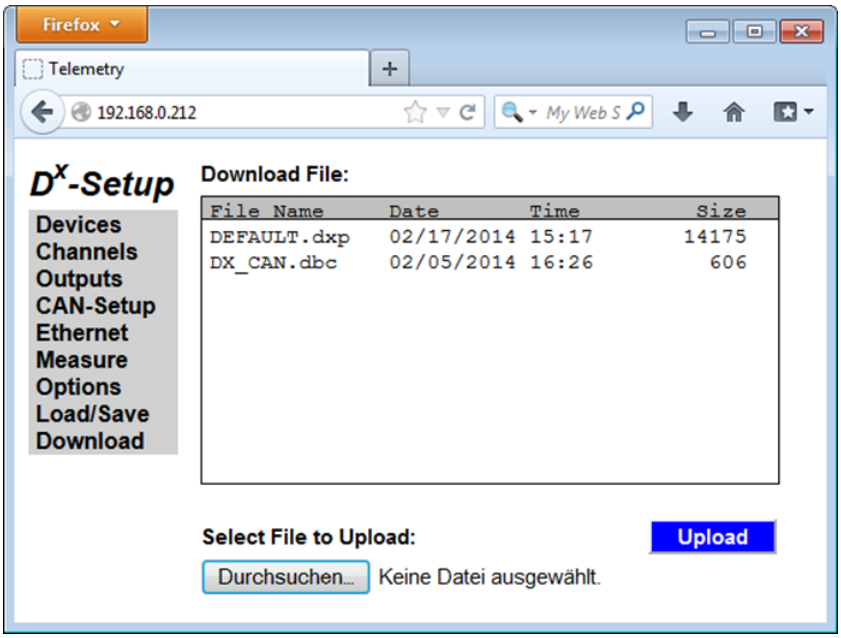


Fig. 104: Upload files

Select a file and press the *Upload* button.

11 Dx Special Systems

11.1 Dx-Speed: Rotational speed measurement

11.1.1 System overview

Your system consists of a D^x-Speed sensor, the D^x-SCT transmitter unit modified for this purpose and a D^x-RCI receiver unit. imc supplies the system in half-shell housings, round housings or manufactures individual solutions according to customer requirements.

The system measures the rotation rate without an external reference point. With one D^x-RCI you can synchronously measure the rotation rate of up to 4 wheels or axles.

11.1.2 Technical Specs

Maximum rotational speed	±7200 1/min
Accuracy	<0.5 % at 0 ° to 50 °
Signal frequency bandwidth	116 Hz (others upon request)
Temperature range	-10 °C to +65 °C (others upon request)

11.1.3 Settings

Search for the desired D^x-SCT transmitter unit as described in chapter "Integrating a new transmitter unit" 80.

- If the Dx-SCT is found, "with RPM-Opt. ..." appears automatically at Version.

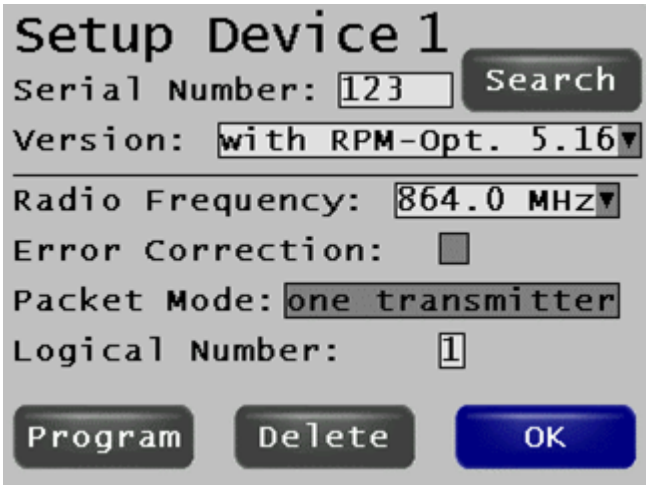


Fig. 105: Version with RPM option

- Set Channel 5 to RPM signal under Resource Usage (see chapter "Channel configuration" 85).

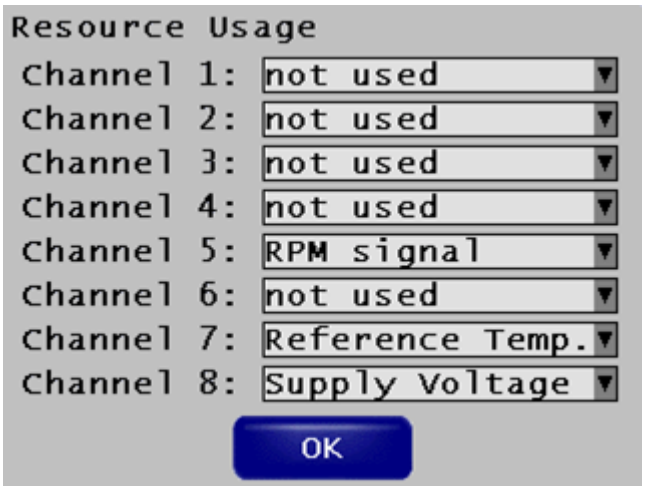


Fig. 106: Set channel 5 to RPM signal

- Select *Channels* -> *Channel 5* and program it (see chapter "Programming channels" 87).

- Set up a display window via *Measure* -> *Display_X* (see chapter "Autozero" 108).

- Start the measurement via *Measure* -> *Start* (see chapter "Save settings in DXP file and program Dx-SCT" 115).

- Select the desired display by pressing the top/bottom of the scroll wheel (the current display number is in the top left corner).

- The rotational speed is displayed.

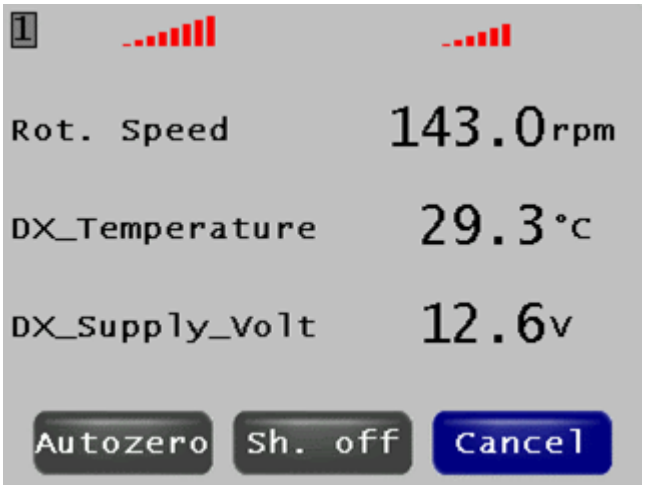


Fig. 107: The rotational speed is displayed (example image).

11.2 Dx-Power: Mechanical power measurements

11.2.1 System overview

Your system consists of a D^x-Speed sensor, a strain gauge for measuring torque, a modified D^x-SCT transmitter unit and a D^x-RCI receiver unit. From the values of the D^x-Speed sensor and the corresponding torque measuring point, the D^x-RCI calculates the mechanical power according to the formula 2π · rotational speed · torque. Due to the design of the D^x-Speed, you do not need another stator for mechanical power measurement. You can measure up to 4 combinations of D^x-Speed sensors and the respective strain gauges synchronously with one D^x-RCI.

The formula 2π · rotational speed · torque applies when the rotational speed per second is specified. However, the D^x-Speed or the D^x-Power specify the rotational speed per minute (rpm). Therefore, the following calculation path results internally:

$$\begin{aligned} P[W] &= 2\pi \ \text{Drehzahl}\ [\frac{1}{s}] * \text{Drehmoment}\ [Nm] \\ &= 2\pi * \frac{\text{rpm\_Wert}}{60}\,[\frac{1}{\text{min}}] * \text{Drehmoment}[Nm] \\ &= 0.1047 * \ \text{rpm\_Wert}\ [\frac{1}{min}] * \text{Drehmoment}\ [Nm] \end{aligned}$$

Example

The RCI indicates a rotational speed of 188.42 revolutions per minute. Multiplying by 0.1047 gives the angular velocity in [1/min], with the factor 2π already taken into account.

In addition, the RCI shows a torque of 89.56 Nm.

The mechanical power is then calculated with

$$0.1047 * 188.42\ [\frac{1}{m}] * 89.56\ [Nm] = 1767\ \text{Watt}$$

11.2.2 Technical Specs

Maximum rotational speed	±7200 1/min
Accuracy	<0.5 % at 0 ° to 50 °
Signal frequency bandwidth	16 Hz (others upon request)
Temperature range	-10 °C bis +65 °C (others upon request)
Torque measurement	based on strain gauge

11.2.3 Settings

Perform the settings for the D^x-Speed as described in chapter "Settings" 146.

- Under *Resource Usage*, set *Channel 1* to *Full bridge* and *Channel 5* to *RPM signal* (see chapter "Channel configuration" 85).

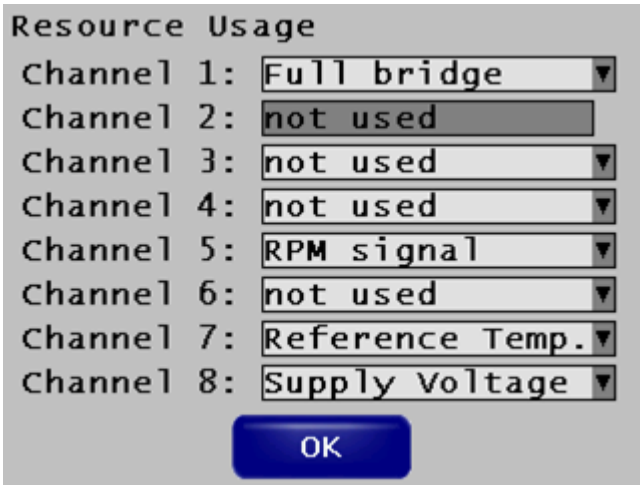


Fig. 108: Set Channel 1 to Full bridge, Channel 5 to RPM signal

- Select *Channels* -> *Channel 1* and program it (see chapter "Programming channels" 87).
- Go to menu *Local Channel Selection* under *Channels->Local/RCI*

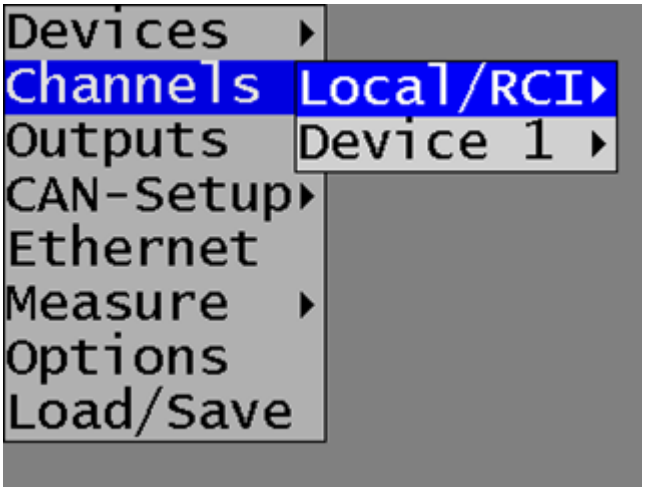


Fig. 109: On the way to Local Channel Selection

- Under *Local Channel Selection*, set *Power 1* to the channel that supplies the torque value (in the example "Torque")

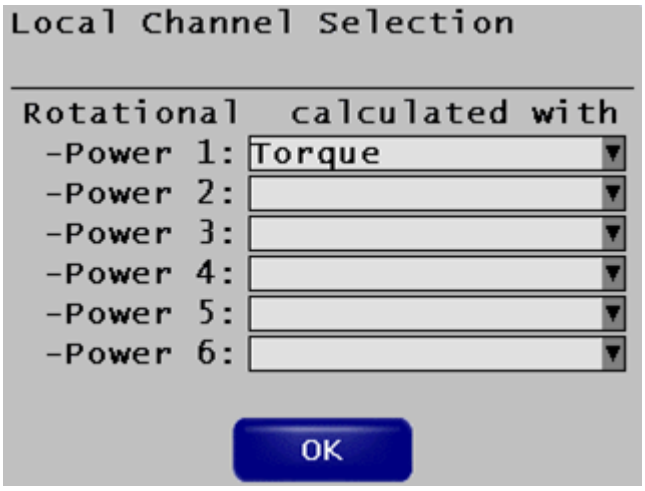


Fig. 110: Set Power 1 to the channel coupled with the torque

- Set up a display window via *Measure -> Display_X* (see chapter "Configuring the online display" 120).
- Start the measurement via *Measure -> Start* (see chapter "Start measurement" 124).
- Select the desired display by pressing the top/bottom of the scroll wheel (the current display number is in the top left corner).
- The torque, rotational speed and mechanical power are displayed.

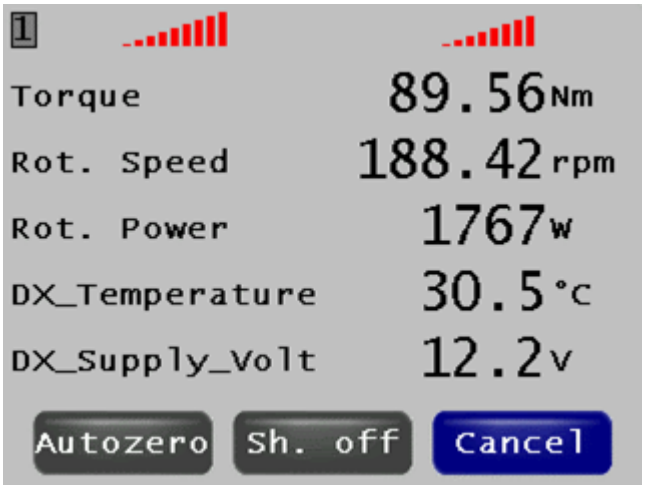


Fig. 111: Power measurement (example image)

11.3 Dx-BrakeTemp: Temperature measurement at the brake disc

11.3.1 System overview

Your system consists of one or two transmitter units D^x-SCT modified for this purpose as well as a receiver unit D^x-RCI and a round housing with 2, 3, 4 or 6 thermocouple sockets. On request imc also supplies the necessary impact sensors for temperature measurement. With one D^x-RCI you can synchronously acquire the measured values of up to 12 thermocouples (3 per transmitter unit D^x-SCT), e.g. at 4 brake discs with 3 thermocouples each.

11.3.2 Technical Specs

Accuracy	±1 K
Sampling rate	up to 200 Hz per channel with 3 channels per wheel at 868 MHz/ 400 Hz at 2.4 GHz
Temperature range	-10 °C to +60 °C
Sensor input	3 or 6 thermocouples type J or K per wheel
Measurement range	type K: up to 1300 °C type J: up to 1200 °C

11.3.3 Settings

Search for the desired D^x-SCT transmitter unit as described in chapter "Creating a new Dx-SCT transmitter unit" 80.

For 2 thermocouples, carry out the settings as described in chapter "From settings to measurement" 75 or chapter "Dx configuration menu: Reference" 127.

With 3 Thermocouples appears automatically at Version: "3 Full-Br/Th ..."

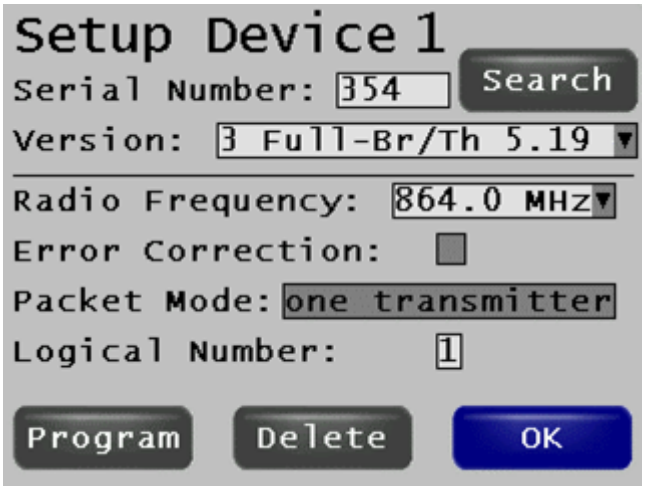


Fig. 112: Version with 3 thermocouples

Go to the menu *Resource Usage* under *Channels->*(*Device X*)*->Modes*

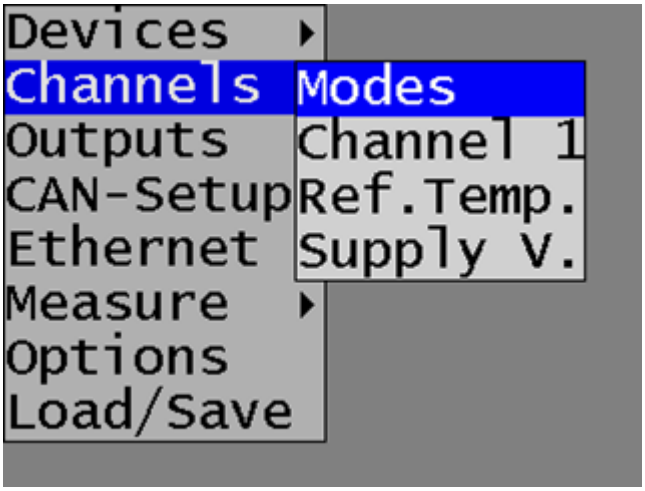


Fig. 113: On the Way to Resource Usage

Under *Resource Usage*, set *Channel 1, 3 and 5* to *Thermo diff*.

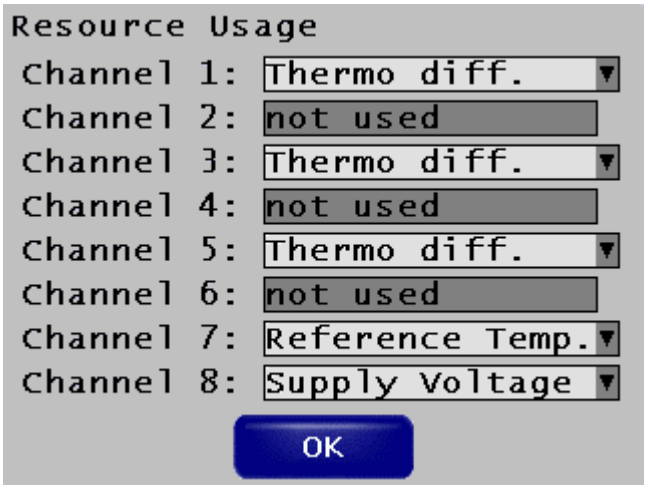


Fig. 114: Channel settings with 3 thermocouples

Select *Channels -> Channel 1 (, 3, 5)* and set the measurement range and two-point calibration if necessary. Also select the thermocouple type.

Select *Channels -> Channel 1* and program it (see chapter "Programming channels" 87).

Set up a display window via *Measure -> Display_X* (see chapter "Configuring the online display" 120).

Start the measurement via Measure -> Start (see chapter "Start measurement" 124).

Select the desired display by pressing the top/bottom of the scroll wheel (the current display number is in the top left corner).

The temperatures are displayed.

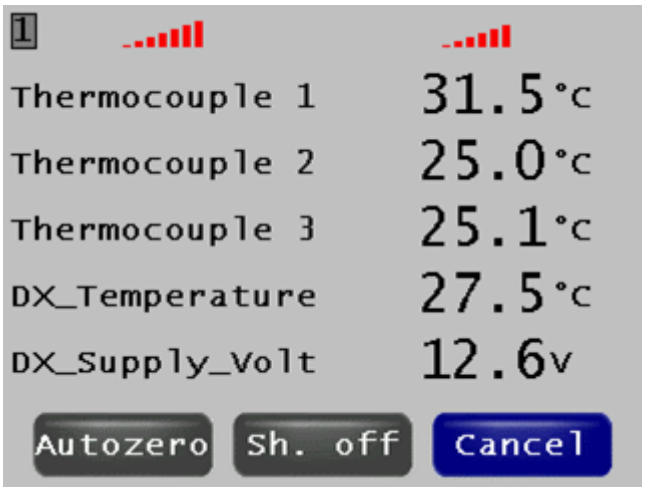


Fig. 115: Display of the temperatures (example picture)

12 Accessories

12.1 Dx antennas

A number of antenna types are available for interference-free signal transmission in a wide variety of applications.

12.1.1 Flat antenna

- Cable length approx. 5 m (optional 7..10 m), SMA plug
- Universal mounting options
- Dimensions: 72 mm x 55 mm x 10 mm
- Material POM (PEEK at HT)

Fig. 116: D^X-Flat antenna

12.1.2 Side mirror antenna

For driving tests in public road traffic, the measuring system should be set up as inconspicuously as possible. The antenna can be easily and quickly attached to the side exterior mirrors of the vehicle with the supplied rubber band mount.

Fig. 117: D^X side mirror antennas

12.2 Dx satellite receiver (Dx-RSU)

In case of unfavorable transmission and reception conditions due to shadowing, reflections, etc., up to four satellite receivers can be connected instead of the rod (stick) antennas, which transmit their data digitally and reliably to the D^X-RCI receiver unit. Synchronization is also maintained in this case. The satellite receivers can be up to 30 m away from the D^X-RCI receiver unit.

The D^X-RSU is an active receiver. If you use one or more D^X-RSU, the receiver in the D^X-RCI is switched off. So you can either use D^X-RSU receivers or use the antennas on the SMA socket of the D^X-RCI, but not both at the same time. To program the frequency of the D^X-RSUs, see chapter "Menu: Device - Base RCI" 128 (keyword "Satellite Receiver" and "Program"). The frequency must be programmed.

Using two D^X-RSU Y cables, you can connect up to four Dx-RSUs to one Dx-RCI.

Fig. 118: D^X satellite antenna

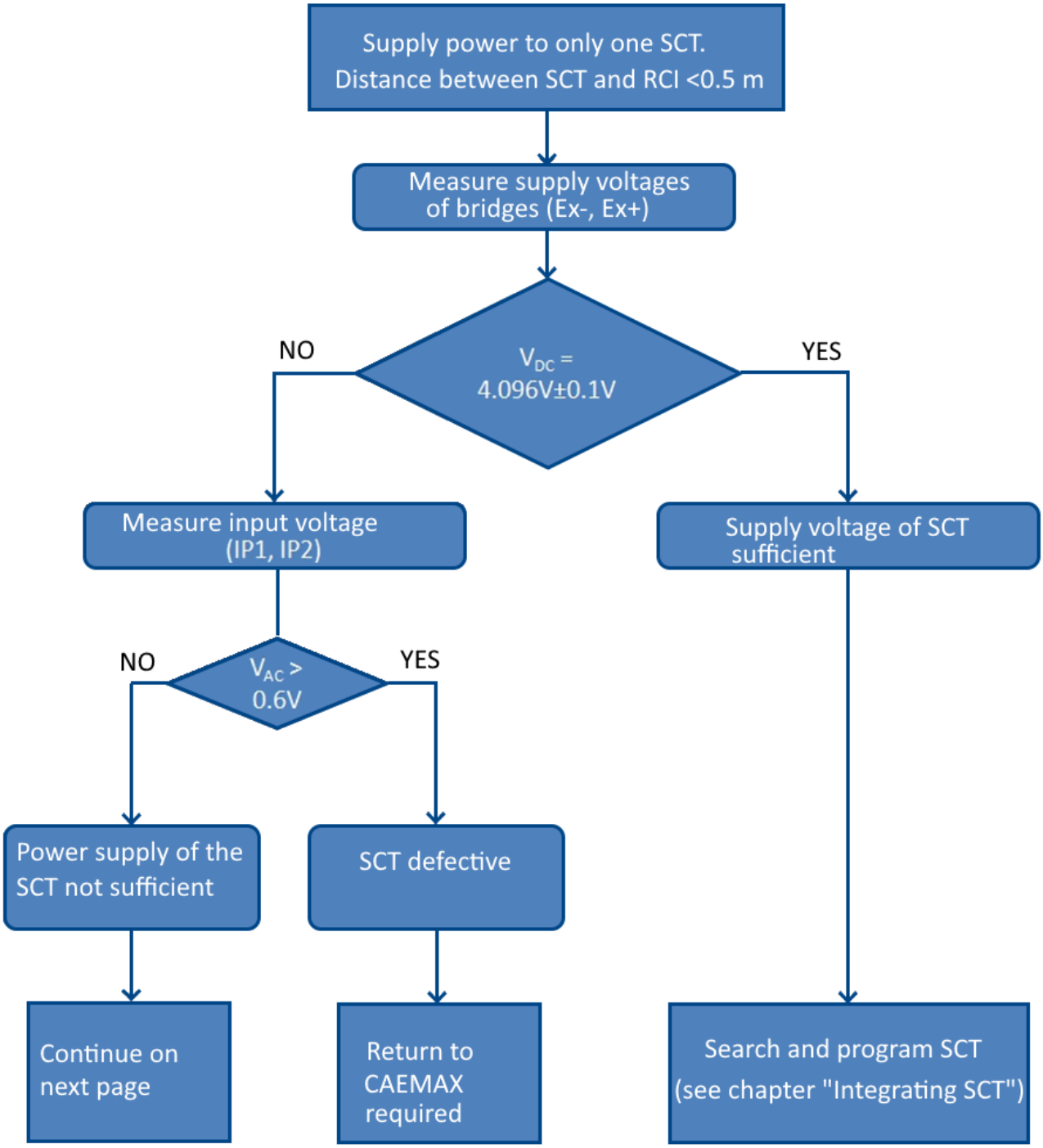
Fig. 119: D^X RSU Y-cable to connect multiple D^X satellite antennas

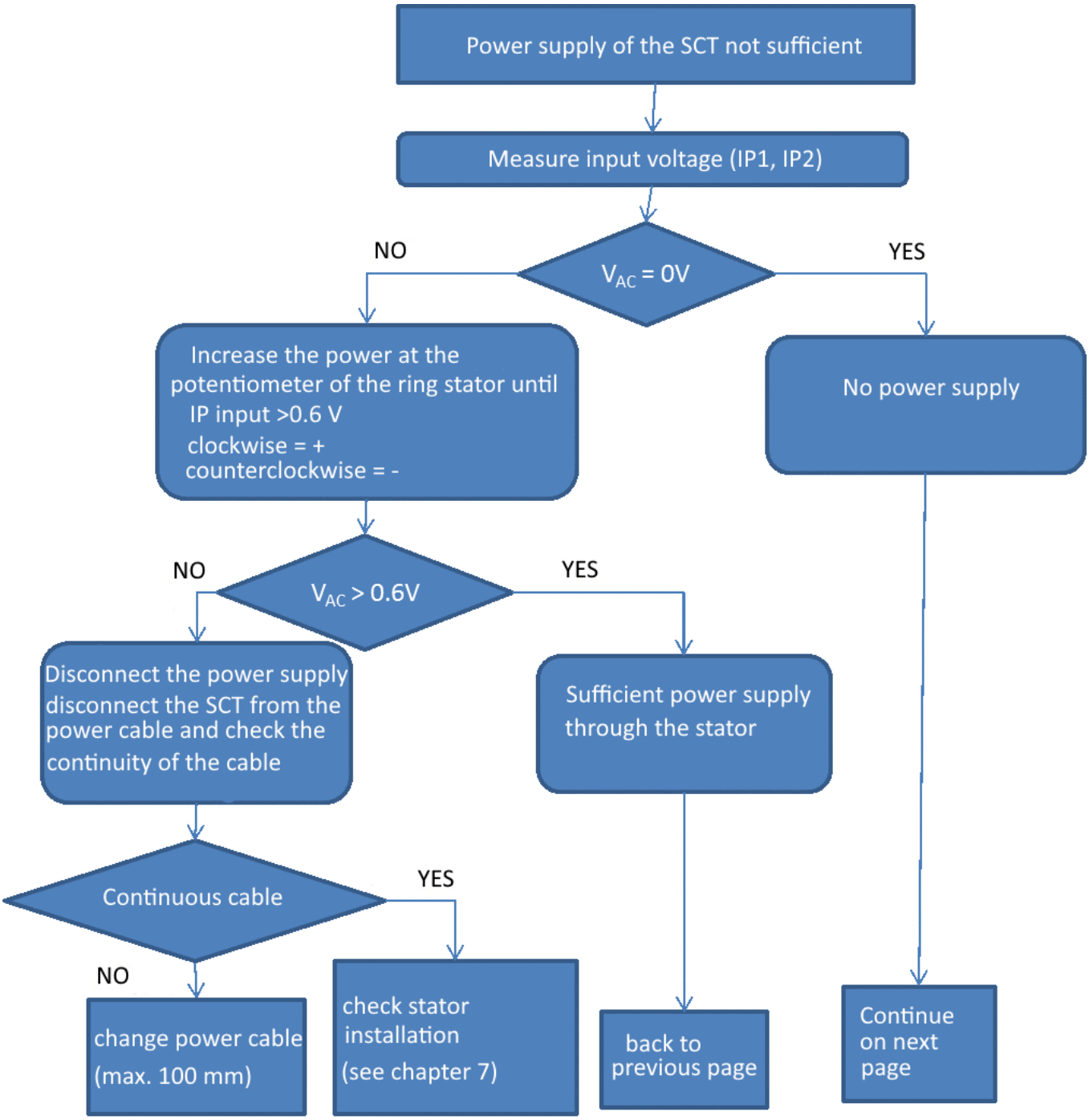
13 Questions & Answers

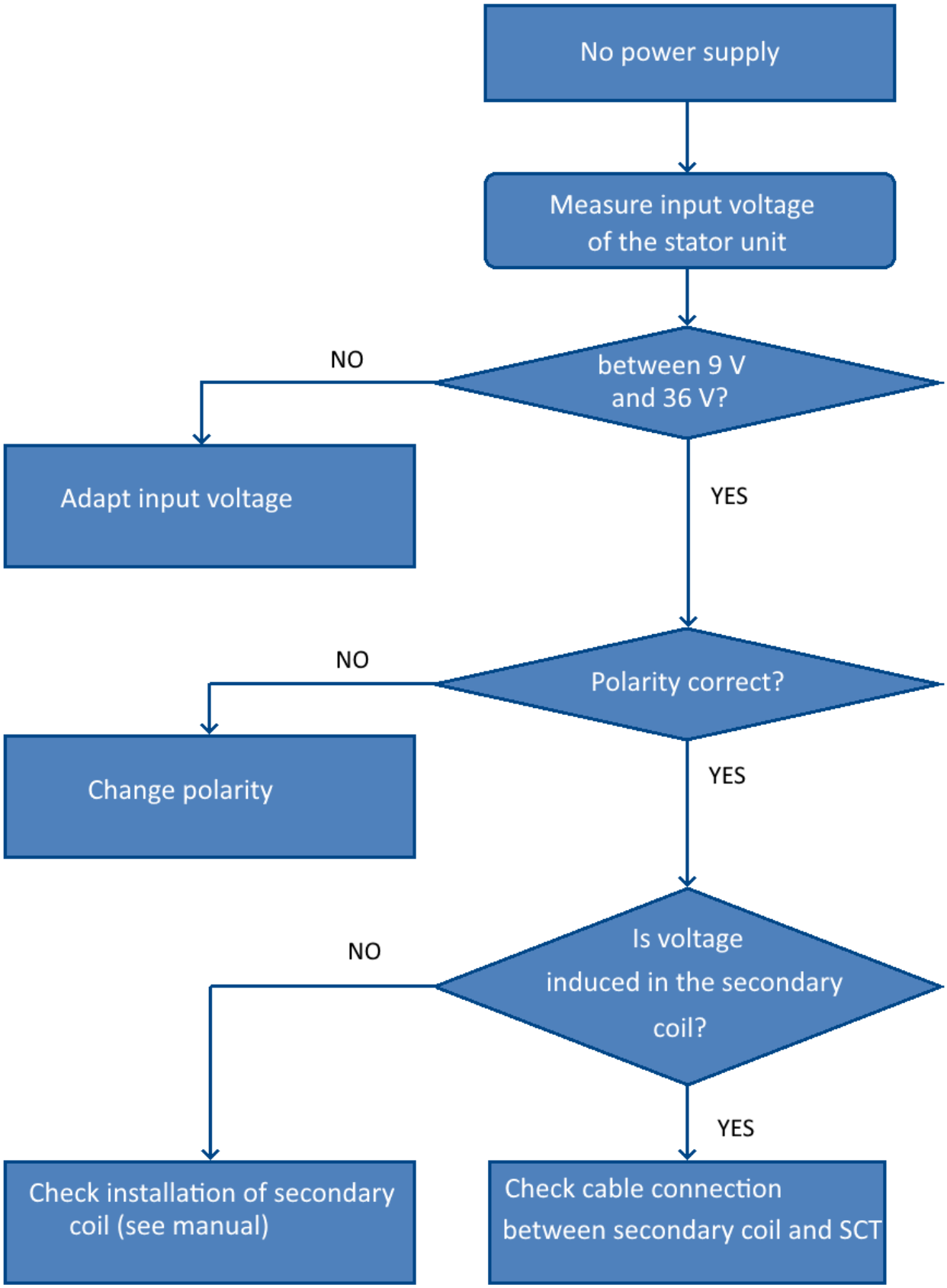
13.1 No signal from transmitting unit Dx-SCT: Automatic search

imc's D^x Frequency Lookup Tool allows you to automatically search for a D^x-SCT that is ready to transmit. You can download the program here

13.2 No signal from Dx-SCT transmitter unit: Troubleshooting




Power supply of the SCT not sufficient
Measure input voltage (IP1, IP2)
NO
V_{AC} = 0V
YES
Increase the power at the potentiometer of the ring stator until IP input >0.6 V
clockwise = +
counterclockwise = -
No power supply
NO
V_{AC} > 0.6V
YES
Disconnect the power supply disconnect the SCT from the power cable and check the continuity of the cable
Sufficient power supply through the stator
Continuous cable
YES
NO
change power cable (max. 100 mm)
check stator installation (see chapter 7)
back to previous page
Continue on next page


No power supply
Measure input voltage of the stator unit
between 9 V and 36 V?
NO
Adapt input voltage
YES
Polarity correct?
NO
Change polarity
YES
Is voltage induced in the secondary coil?
NO
Check installation of secondary coil (see manual)
YES
Check cable connection between secondary coil and SCT

13.3 General problems: Reconnecting the Dx-SCT transmitter unit

In the event of problems with the D^x telemetry system, it may be necessary to re-integrate your D^x-SCT transmitting units. Use the following step-by-step instructions as a guide:

1. Switch on the D^x-RCI receiver unit.
2. Remove all registered D^x-SCTs under Devices → Device X using the Delete button.
3. Disconnect all but one of the D^x-SCTs from the power supply.
4. Integrate a new D^x-SCT (see chapter "Integrating a new Dx-SCT transmitter unit" 80).
5. Repeat steps 3 and 4 until all D^x-SCTs are integrated.

13.4 Parallel operation of several Dx-RCIs: Changing the transmission frequency

If you operate two D^x receiver units (D^x-RCIs) in parallel, different transmit frequencies (referred to here as **freq1** and **freq2**) must be set for each D^x receiver unit and the associated D^x transmitter units (D^x-SCTs). The distance between the two frequencies should be at least 600 kHz for the D^x-RCI 868 MHz. With the D^x-RCI-HT, you can simply select the next entry from the corresponding menu.

The following example describes the configuration for a system with two D^x-RCIs, RCI 1 and RCI 2, and 4 D^x-SCTs. SCT 1 and SCT 2 are operated with RCI 1, SCT 3 and SCT 4 with RCI 2.

1. Switch receiver unit 1 (RCI 1) **on** and receiver unit 2 (RCI 2) **off**.
2. Switch off **all** transmitting units (D^x-SCTs) except for the D^x-SCT which you want to integrate (i.e. disconnect the power supply).
3. Set the RCI 1 to the same frequency as the D^x-SCT to which you want to establish a connection (in the menu under *Devices → Base RCI → Radio Frequency*, see chapter "Menu: Device Base RCI" 128).
4. Search for SCT 1 (*Devices → Device 1 → Search*, see chapter "Searching for a transmitting unit" 80). After the *Device found!* message, continue with the configuration.
5. Assign the logical number 1 (under *Devices → Device 1→ Logical Number*, see chapter "Integrating a new Dx-SCT transmission unit" 80).
6. Change the transmit frequency of SCT 1 (under *Devices → Device 1 → Frequency*) to the desired transmit frequency **freq1**. For the most interference-free operation, the transmit frequencies should be as far apart as possible (i.e. **freq1** = 864 MHz for RCI 1 and **freq2** = 870 MHz for RCI 2).
7. Program the SCT 1 (*Devices → Device 1→Program*).

Warning Attention

Due to the changed transmission frequency, the SCT 1 is now no longer accessible!

8. After the *Program done!* message, switch off the SCT 1 (disconnect it from the power supply).

9. Now supply the SCT2 with voltage.
10. Repeat steps 3 - 8 with SCT 2. In deviation from step 5. assign the logical number 3.
11. Now change the transmit frequency of RCI 1 (*Devices → Base RCI*) to the frequency **freq1** set at SCT 1 and SCT 2. Confirm with *Program*.
12. Now switch on SCT 1 and SCT 2 by connecting each to the power supply.
13. Test whether SCT 1 and SCT 2 are found with *Devices→Device X →Search*. Exit the menu item with *OK*.
14. Now switch off RCI 1, SCT 1 and SCT 2 again and start RCI 2.
15. Switch on SCT 3 and proceed with the transmitter integration as described in steps 3 - 8. However, select a different transmit frequency (e.g. **freq2** = 870 MHz) and assign the logical number 1 for the SCT 3.
16. Now switch on SCT 4 and proceed as described in steps 3 - 8. Select the same transmit frequency as for SCT 3 (e.g. **freq2** = 870 MHz) and assign the logical number 3 for SCT 4.
17. Now change the transmit frequency of RCI 2 (*Devices → Base RCI*) to the frequency **freq2** set at SCT 3 and SCT 4. Confirm with *Program*.
18. Test whether SCT 3 and SCT 4 are found, as described in step 13.
19. Now the system is ready for operation.

Warning Attention

SCT 1 and SCT 2 are now configured via RCI 1, SCT 3 and SCT 4 are configured via RCI 2. If you want to change channel parameters such as the sampling rate, both systems must be configured separately.

13.5 Unstable received signal when connecting several Dx-SCTs

After programming the frequency and the "Logical Number", it is necessary to first program a channel on each Dx-SCT transmitter unit in order to obtain interference-free reception.

13.6 Firmwareupdate der Empfangseinheit Dx-RCI

13.6.1 Request firmware version

The firmware version of your D^x telemetry system can be read in the *Options* menu item under *Firmware Version*.

13.6.2 Install new firmware

You can get new firmware from our support:

hotline@imc-tm.de

or via the following link:

download "rcifirmware"

Please note before updating:

The *FIRMWARE.hex* is renamed to *FIRMWARE.sav* after the update. If this file is already in your root directory on the SD card of the D^x-RCI, it must be deleted beforehand.

In addition, the *SYSTEM* folder is present in your root directory; this must also be updated in the case of major updates. To do this, this folder must be replaced with a new version. You can find the System folder under the same link as the firmware.

13.6.2.1 Upload via Ethernet connection

If there is an Ethernet connection to your D^x telemetry system, you can conveniently upload the file using the upload function of your browser. To do this, open a web browser and call up the IP address of the D^x (see also the "Parameterization on the PC" chapter 77).

Select the *Download* menu item.

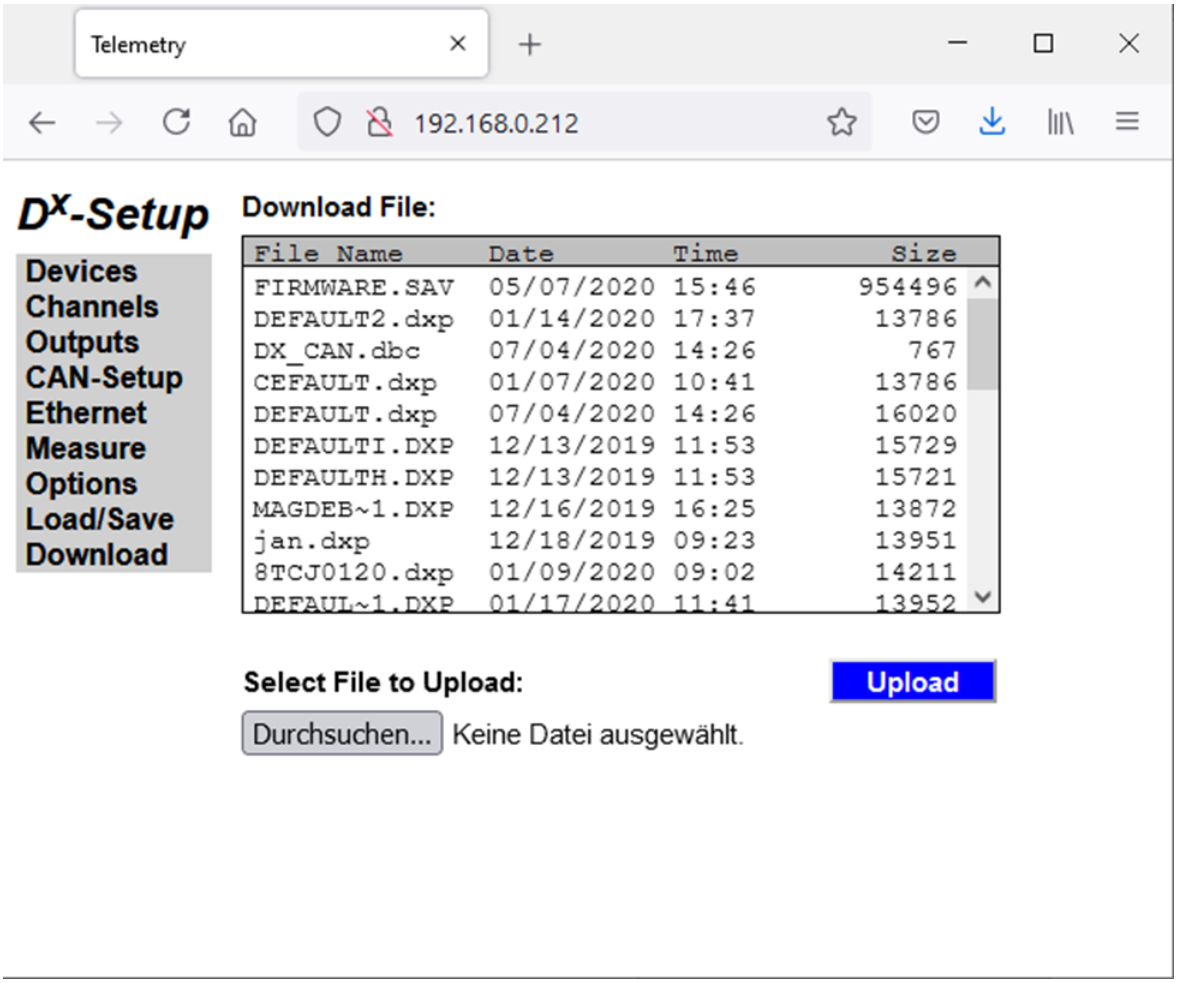


Fig. 120: Firmware-Upload

In the *Select File* to *Upload* section, use the *Browse* button to select the *FIRMWARE.hex* file and click *Upload*. The file will now be written to the root directory of the SD card.

Now switch the D^x-RCI off and on again
(see chapter "Switching the receiver unit on and off" 77). When the D^x-RCI is restarted, the new firmware is automatically installed.

Check the firmware version in the *Options* menu item.

13.6.2.2 Upload über SD-Karte

Switch off the D^{x}-RCI receiver unit. Remove the SD card (right side) and insert it into the card reader of your PC.

Save the *FIRMWARE.hex* file in the root directory of the SD card.

When the saving process is complete and the SD card can be removed, insert it back into the D^{x}-RCI receiver unit.

Start the D^{x}-RCI . When restarting, the new firmware will be installed automatically.

Check the firmware status in the *Options* menu item.

14 EU Conformity declaration

according to EN ISO/IEC 17050-1:2010

14.1 Declaration for 868 MHz ISM frequency systeme

EU-Konformitätserklärung

CAEMAX Technologie GmbH
Bunzlauer Platz 1
D-80992 München

erklärt hiermit, dass folgendes Produkt:

Produktbezeichnung	:	**D^x-Telemetrie**
Typenbezeichnung	:	**D^x-RCI-868**
		D^x -SCT
		D^x-ANT-RSU-868
Seriennummer	:	**Dx-RCI-xx-xxx**
		Dx-SCT-xx-xxx
		Dx-RSU-xx-xxx

den grundlegenden Anforderungen folgender Richtlinien entspricht:

- **Richtlinie 2014/53/EU des europäischen Parlamentes und des Rates vom 16. April 2014 über die Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung von Funkanlagen auf dem Markt und zur Aufhebung der Richtlinie 1999/5/EG**
- **Richtlinie 2011/65/EU des Europäischen Parlaments und des Rates vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten**

Die folgenden Normen und technischen Spezifikationen wurden angewendet:

EN 61326-1:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen
EN 61326-2-3:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 2-3: Besondere Anforderungen
ETSI EN 300 220-1:2017-02 **ETSI EN 300 220-2:2018-06**	Funkanlagen mit geringer Reichweite (SRD) – die im Frequenzbereich von 25 MHz bis 1000 MHz arbeiten

München	**19.11.2018**	**F. Ketelhut**
Ort	Datum	Unterzeichner

14.2 Declaration for 2.4 GHz frequency systems

EU-Konformitätserklärung

CAEMAX Technologie GmbH
Bunzlauer Platz 1
D-80992 München

erklärt hiermit, dass folgendes Produkt:

Produktbezeichnung	:	**D^x-Telemetrie**
Typenbezeichnung	:	**D^x-RCI-2400**
		D^x -SCTHT
		D^x-ANT-RSU-2400
Seriennummer	:	**Dx-RCI-xx-xxx**
		Dx-SCTHT-xx-xxx
		Dx-RSU-HT-xx-xxx

den grundlegenden Anforderungen folgender Richtlinien entspricht:

- **Richtlinie 2014/53/EU des europäischen Parlamentes und des Rates vom 16. April 2014 über die Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung von Funkanlagen auf dem Markt und zur Aufhebung der Richtlinie 1999/5/EG**
- **Richtlinie 2011/65/EU des Europäischen Parlaments und des Rates vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten**

Die folgenden Normen und technischen Spezifikationen wurden angewendet:

EN 61326-1:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen
EN 61326-2-3:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 2-3: Besondere Anforderungen
ETSI EN 300 440-1:2018-07	Funkanlagen mit geringer Reichweite (SRD) – Funkgeräte zum Betrieb im Frequenzbereich von 1 GHz bis 40 MHz

München	**22.11.2018**	**F. Ketelhut**
Ort	Datum	Unterzeichner

Figures

Figures

Figures

Index

T

U

W