

Instruction manual

CV-10

Mobile calibration system



Original instruction manual

 WARNING

For **continuous safe and correct use** of the product:

- **Read and understand the instruction manual** before you start working with the product.
- **Observe the safety instructions and warnings.**
- Keep the instruction manual **for the entire product life cycle**.
- **Have** the instruction manual **available at any time**.

Disregarding the instruction manual, especially the safety instructions and warnings, could result in **death or serious injury**.

Imprint

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The entire documentation is not subject to any automatic updating. It reflects the present state of the art upon delivery. Contact the manufacturer for the current version.

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1 Introduction and scope of supply

In the present instruction manual, the term **product** comprises the following components:

- 1 x SPEKTRA Mobile Calibration System CV-10
- 1 x wide-range power supply (Mean Well GEM40I18-P1J or Mean Well NGE45I18-P1J)
- 1 x Mean Well plug set (4 parts)
- 1 x SPEKTRA Software
- Accessories (2 x open end wrench, 1 x USB flash drive, 3 x adapter)

The following items are included in the **standard scope of supply** if relevant:

- 1 x instruction manual
- 1 x order-specific information, for example application note

Refer to your order confirmation to see which components are explicitly included in the scope of delivery. The provisions stipulated therein apply additionally or replace the specifications of the instruction manual.



Figure 1-1: Mobile Calibration System (open case)

Related documentation (safety-relevant):

- CV-10 Mobile Calibration System Software Operation Manual

The information contained in these documents must be observed.

Further documentation (relevant for usage):

- Compendium of Vibration Calibration, SPEKTRA GmbH
(information about methods and basics of vibration calibration)

2 For your safety

2.1 Structure and explanation of safety warnings

At the beginning of every product life phase, the applicable safety warnings are pointed out in the subsection "Safety notes". These safety warnings must be observed for the entire product life phase. If you are only referring to a specific subsections of a product life phase, the preceding safety warnings must be observed nevertheless.

The safety warnings are categorized by the level of risk and are classified as follows:

DANGER

... indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

... indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

... indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

... indicates a situation which, if not avoided, could result in property damage.

i

... indicates important information.



... indicates a link to related or further documentation.

2.2 Visualization styles and pictograms

The following visualization styles and pictograms are used in the instruction manual:

<i>italic</i>	important additional information
bold	emphasis
<u>underlined</u>	cross-reference to other sections
(1)	action
▪	list



Do not dispose of the product into household waste.

Electric and electronic equipment that is no longer usable must be collected separately and disposed of in an environmentally correct manner.

2.3 Definition of personnel

To perform activities on the product safely and efficiently, the authorized personnel need to have certain qualifications and specific knowledge. These three groups of such personnel are defined as follows:

The **operator** of the product is a person who works directly on the product. He or she has professional application knowledge and an understanding of how the product must be operated to solve certain tasks.

Qualified service personnel have professional know-how concerning functionality, operating principles and theoretical background of the product. These persons are able to detect risks at an early stage, to prevent potential hazards and to initiate countermeasures.

Qualified specialists have detailed information about the construction and physical behavior of the product due to education and experience. Only employees or authorized service partners of SPEKTRA form this third group of personnel.

The following overview shows which type of person is allowed to carry out which activity:

Activity	Operator	Qualified service personnel	Qualified specialist
Extraordinary or emergency situation	X	X	X
Transport, packaging and storage	X	X	X
Installation	X	X	X
Operation	X	X	X
Recalibration	-	(X)	X
Troubleshooting	(X)	X	X
Cleaning and maintenance	X	X	X
Repair and replacement	-	-	X
Disassembly and disposal	-	-	X

X - applicable; (X) - applicable only after instruction by qualified specialist; - - not applicable

2.4 General safety notes

2.4.1 Personal safety and personal protective equipment

Stray magnetic field

The Mobile Calibration System CV-10 consists of an electrodynamic drive including a permanent magnet system. The permanent magnet system is located inside of the vibration exciter and generates a permanent stray magnetic field. While in operation, an alternating electromagnetic field will be added to the static magnetic field. Generally, its amplitude will be lower than that of the static magnetic field.

The intensity of the stray magnetic field increases disproportionately the closer a person or an object gets to the permanent magnet system. However, humans do not have a sensory organ for perceiving magnetic pull or influence of the stray magnetic field.

Accordingly, for the electrodynamic drive, the following residual risks exist:

- **Persons with active medical implants**, e.g. cardiac pacemakers, implanted defibrillators or insulin pumps, must **keep a distance of at least 30 cm from the vibration exciter**.

Cardiac pacemakers could otherwise be switched into test mode and could cause discomfort; implanted defibrillators may no longer work. Always comply with applicable regulations.

- **We recommend keeping away from the product equipment and objects** that could be damaged by the stray magnetic field, e.g. watches, magnetic stripe cards or hearing aids.

Ear protection

The sound pressure level of the product depends on the frequency and acceleration. At maximum acceleration, sound pressure levels of 80 dB (A) can be reached which can lead to hearing loss.

For safety reasons, wear ear protection, especially if the product is operated at maximum acceleration.

Protective covers

The product has protective covers which protect, amongst others, against electric shock. Do not modify the protective covers when they are installed. Opening the components of the product is **not permitted** for the operator as well as for qualified service personnel.

Obligations of customers or end users

The customer or end user of the product is responsible for safe use and has the following obligations:

- Organization of personnel training / instructions
*The personnel who carry out the work **are only permitted** to perform tasks that are within their defined field of activity.*
- Arrangement of tests and safety tests
- Arrangement of recalibration

Compliance with applicable regulations

In every product life phase, always comply with your company's regulations regarding stray magnetic fields, the handling of electrical equipment and use of chemicals as well as accident prevention and general safety at the workplace. Customers or end users of SPEKTRA products must respect and consider national and local as well as international applicable regulations.

2.4.2 Electrical safety

Power supply

The product has two power supply options. It features a built-in battery (lead-gel accumulator) that acts as an internal power supply for the product. The 18 V wide-range power supply allows the product to be connected to an external power supply.

Use the product only under safe and proper conditions. Never touch the product's components - especially the power supply's power plug - with wet hands.

internal power supply (battery)

To charge the built-in battery (lead-gel accumulator), use the supplied wide-range power supply. The power supply must be connected to an external power source. Only charge the battery if the product is placed on its four feet. If the product is tilted to the right side, the battery may not vent correctly when charging. Use the product only under safe and proper conditions.

external power supply (wide-range power supply)

Before connecting the wide-range power supply to an external power source, check that the required mains voltage indicated on the product matches the mains voltage available at the workplace. The plug openings must be free of contaminants and moisture when connecting. Pull out the power plug on the plug housing, never pull the cable.

Never use the power supply in humid environments or at high ambient temperatures.

Remaining electrical charge

For a short time after disconnecting from the power supply, capacitors inside the product are still electrically charged.

For safety reasons, wait at least 2 minutes after switching off the product before starting any activity with the product or connected components.

Damage

Use the product only under safe and proper conditions. To ensure continuous safe and correct use of the product as well as to avoid potential electrical hazards, inspect the product and connected components for damage on a regular basis.

2.4.3 Workplace safety

Stability	To avoid falling and damage to the product or its surroundings, the product requires stability. The product stands secure when it is placed on an even and solid underground. A surface slope of max. 2° can be balanced using the adjustable feet on the bottom of the case.
Environmental conditions	Protect the product against lasting periods of heat, cold, direct sunlight, moisture and wet conditions during transport. Do not operate the product close to water, open fire sources or in potentially explosive environments, such as in the presence of flammable liquids, gases or dust. Only use the product in compliance with the specified environmental conditions. Outdoor use is permitted. But never use the power supply in humid environments or at high ambient temperatures.

2.4.4 Safe operation

Safe operation	Safe operation is achieved when the product is used within the technical specifications and according to the instruction manual.
Unsafe operation	Operation of the product is no longer safe if the following conditions apply to the product or to individual components of the product: ▪ visible damage /defects ▪ (possible) damage resulting from shocks, vibrations or other impacts to components of the product ▪ usage outside of the specified environmental conditions ▪ unusual behavior of the product during operation
Actions	As soon as safe operation is no longer possible, follow the steps below: (1) Remove the product from further operation and mark it accordingly as unsafe. If you have any questions or problems, contact a qualified specialist.

2.4.5 Handling and usage

Handling	Handle the product with care – do not to throw or drop it. Even a fall from a short height, shocks, vibrations or mechanical stress could result in changes to product properties or lasting damage.
Frequency range	Do not operate the product outside of the specified frequency range. Otherwise, this could damage the product.
Coupling surface	Exceeding the permissible tightening torque and incorrect attachment of the sensors will result in damage of the coupling surface of the integrated vibration exciter. The maximum tightening torque of 2 Nm must not be exceeded when mounting the sensors directly on the coupling surface of the vibration exciter. If an adapter is used during calibration, also only max. 2 Nm are permissible. Fix the (gluing) adapter with an open-end wrench so that it does not exceed the tightening torque of 2 Nm when mounting the sensor.
Change of outside temperature	Due to outside temperature changes (from cold to warm), condensation can form inside the product which could result in damaging the product. Let the product rest for a certain time (at least 24 h) before switching it on. Only use the product in compliance with the specified environmental conditions (refer to section 3.3 Environmental conditions.)
Under supervision	Do not leave the product unattended during operation. Observe the product continuously to immediately detect signs of unsafe operation.
Commercial purpose	The product is intended solely for commercial use.
Electromagnetic fields	Do not operate the product near strong electromagnetic fields. This could negatively influence the behavior of the product and / or could lead to disruptions or failures.

2.4.6 Extraordinary and emergency situations

Fire

In case of fire, follow the steps below:

- (1) Depending on the situation, use suitable fire-fighting equipment that prevents the fire from spreading and keeps the damage as low as possible.
- (2) Wear suitable protective clothing and use respiratory masks.
- (3) A qualified service person or qualified specialist must check the product and connected components for potential damage that could have been caused by the fire or by the fire-fighting equipment.
- (4) Only continue operation if safe operation can be ensured for every component in the entire product structure.

If you have any questions or problems, contact a qualified specialist.

2.5 Intended use

The intended use is defined by the content of this instruction manual and the given actions and in particular contains the following:

- calibration of sensors
- measurement of physical quantities: acceleration, velocity and stroke (displacement)

The product is intended for the generation of physical quantities such as dynamic force and acceleration and those physical quantities derived from them. In compliance with the technical specification of the product and the specified product limits, the supplied physical quantities may be used to calibrate sensors or test components. Use is only permitted with system components supplied or installed by SPEKTRA.

The product must only be used for the intended purpose in its defined application area, as it is adapted to the respective circumstances. The risks of injury, material damage, and hazards to humans and animals are already reduced to the technically possible minimum through design measures and safety systems.

The product is intended solely for commercial use.

2.6 Foreseeable misuse

Using the product outside the specifications or other defined limits is deemed to be misuse. Disregarding of the intended use or of the defined application areas, or non-compliance with the safety instructions and warnings are also deemed to be misuse.

As foreseeable misuse of the product, the following are explicitly emphasized:

- | | |
|----------------------------------|--|
| Mechanical / constructive | <ul style="list-style-type: none">▪ installation of the product with greater inclination than specified▪ Incorrect mounting of sensors or adapters on the coupling surface (eccentric center of gravity of large payload, too large adapters which may hit clamping ring, exceeding the tightening torque of 2 Nm)▪ Closing the case while sensor is mounted or during operation▪ Storage of objects on the operating panel▪ Charging the battery (lead-gel accumulator) when tilted to the right side |
| Wiring | <ul style="list-style-type: none">▪ Connecting the sensors to the wrong connectors▪ Using of USB connector contrary to specification▪ Using the RJ45 Ethernet connector contrary to specification▪ Using a different power supply |
| Operating errors | <ul style="list-style-type: none">▪ Incorrect specification of payload▪ Incorrect selection of sensor type (IEPE, DIR, 4-20 mA) |

At this point, it is stated that misuse must be avoided in all circumstances. The scope and the intended use must always be observed. SPEKTRA assumes no liability for damage or hazards caused by misuse of the product.

2.7 Modification of the product

Modification of the product is **forbidden**. Otherwise, it may cause injury, fire or other hazards.

However, if a user or any other non-authorized person makes changes to the product (e.g. the electrical connections or basic structure of the product), they act under their own responsibility. SPEKTRA assumes no liability for any damages and hazards that occur due to unauthorized product modifications..

3 Product description and technical specification

3.1 Product description and identification of the product

In the present instruction manual, the term **product** comprises the following components:

- 1 x SPEKTRA Mobile Calibration System CV-10
- 1 x wide-range power supply (Mean Well GEM40I18-P1J or Mean Well NGE45I18-P1J)
- 1 x Mean Well plug set (4 parts)
- 1 x SPEKTRA Software
- Accessories (2 x open end wrench, 1 x USB flash drive, 3 x adapter)

The Mobile Calibration System CV-10 consists of various components, which are installed in a sturdy case. There are four adjustable feet on the underside of the case which can balance a slope of max. 2 °. Inside the case there is a battery (lead-gel accumulator) which allows users to operate the product in different locations. The scope of delivery includes the corresponding power supply, including a plug set.

The integrated vibration exciter is mostly located below the front panel. The coupling surface of the vibration exciter is above the front panel and thus allows for the easy mounting of sensors.

The required interface connections, e.g. the BNC or TNC connector, are centered on the front panel. The ON / OFF button, the power supply connector and the USB connector are located at the top of the front panel. The operation panel with the corresponding display is integrated on the right side of the front panel. In addition, the front panel not only offers protection against unauthorized access, but also prevents dirt and water ingress.

The supplied accessories (two open-end wrenches, a USB flash drive and three adapters) can be stored in the pockets in the lid of the case. One of the three (gluing) adapters is made of magnetic stainless steel, in order to be able to attach sensors with a magnetic base. There is also a case for accessories, which is directly integrated in the front panel, in which the power supply fits.

The product is in its entirety a system which not only generates physical quantities such as dynamic force and acceleration as well as physical quantities which can be derived from them. It is a product that can calibrate or test sensors regardless of location. In addition, the signals from the sensors (according to interface specification) are recorded directly and processed electronically. These data are displayed on the

integrated display and can be stored for further use. It is possible to export the data via the USB connector. The product is controlled and relevant settings can be made via the operation panel.



Figure 3-1: Components of the product (shown without power supply and accessories)

3.2 Technical specification

The product has the following technical specification:

Force rating	20 N (4.5 lbf)
Frequency range	5 Hz...10 kHz (300 CPM...600 000 CPM)
Resonance frequency	> 14 kHz
Vibration stroke (displacement), max.	5 mm (0.2 in), peak-peak
Velocity, max.	0.7 m/s (28 in/s)
Acceleration, max.	200 m/s (20 g _n)
Transverse motion	
5 Hz...7 kHz	< 10 %
7 kHz...10 kHz	< 30 %
Measurement uncertainty	
5 Hz...1 kHz	1.5 % ¹⁾ (2.0 %) ²⁾
1 kHz...5 kHz	1.5 % ¹⁾ (3.0 %) ²⁾
5 kHz...10 kHz	3.5 % ¹⁾ (6.0 %) ²⁾

Power supply, max.	18 V
Coil DC resistance	0.2 Ω
Stray magnetic field, max.	15 mT on bottom of case
Direction of excitation	vertical
Payload, max.	0.9 kg (2 lbs)
Armature weight	0.06 kg (2.1 oz)
Coupling surface size	Ø 22 mm (0.87 in)
Sensor attachment	
mechanical interface	1/4"-28 core thread
tightening torque, max.	2 Nm
IP class	
closed	IP67
open	IP54
Dimensions (H x W x L)	
closed	170 mm x 339 mm x 295 mm (6.69 in x 13.35 in x 11.61 in)
open	420 mm x 339 mm x 295 mm (16.54 in x 13.35 in x 11.61 in)
Weight	9 kg (20 lbs)
1) Laboratory conditions: (+23 ±5) °C, max. acceleration: 30 m/s ² , max. payload: 30 g	
2) Worst case conditions: 0 °C...+50 °C, max. acceleration: 200 m/s ² , max. payload: 40 g	

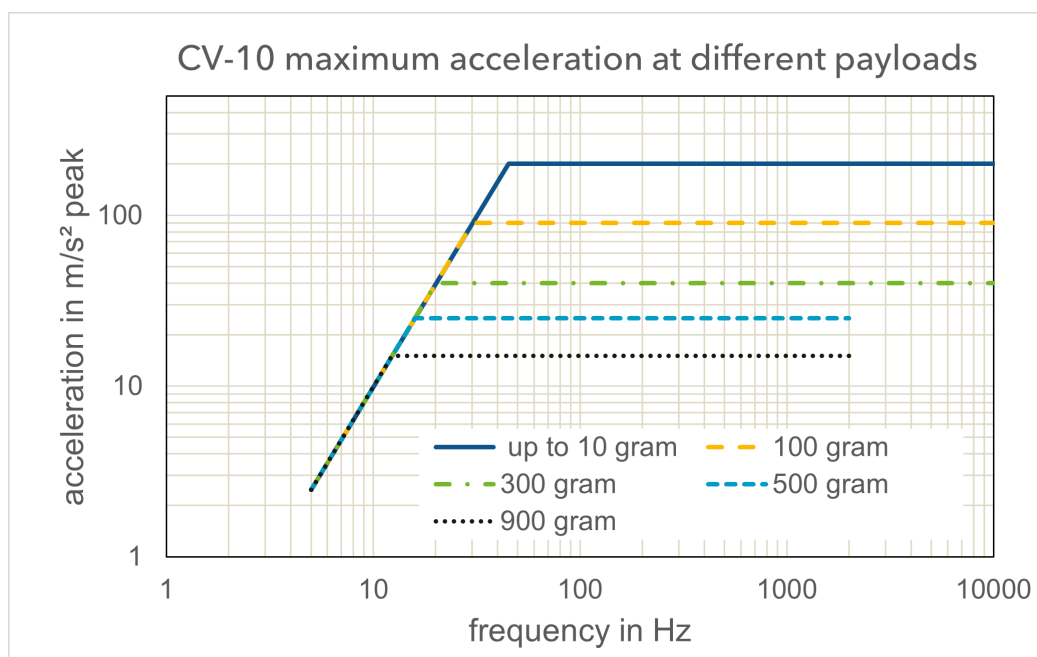


Figure 3-2: CV-10 performance diagram

**Internal reference
standard BN-09**

Sensitivity	1 mV / m/s ² (10 mV / g _n)
Frequency range	3 Hz...50 kHz
Resonance frequency	approx. 70 kHz
Operating voltage	18 V DC...30 V DC
Constant current supply	2 mA...20 mA
Voltage at operating point (BIAS voltage)	8 V DC...12 V DC
Discharge time	0.5 s...2 s
Settling time (up to 10 % of BIAS voltage)	> 5 s

Power supply

Manufacturer	Mean Well
Model	GEM40I18-P1J or NGE45I18-P1J
Type	wide-range power supply
Power supply	100 V...240 V, 50 Hz / 60 Hz
Output voltage	18 V
Output current	2.2 A (GEM40I18-P1J) or 2.5 A (NGE45I18-P1J)

Connectors

Connector for power cable	1 x sealed power jack, 0.08 in (2.0 mm) center pin
Ethernet connector	1 x RJ45
USB connector	1 x max. 500 mA
BNC connector	2 x
Reference	IEPE / DIR, voltage input 0...10 V
DUT	IEPE / DIR, voltage input 0...10 V, 4...20 mA connection (max. 24 V)
TNC connector	1 x
DUT	CHA
Extension connector	1 x extension connector

All specifications are at laboratory temperature unless otherwise specified.

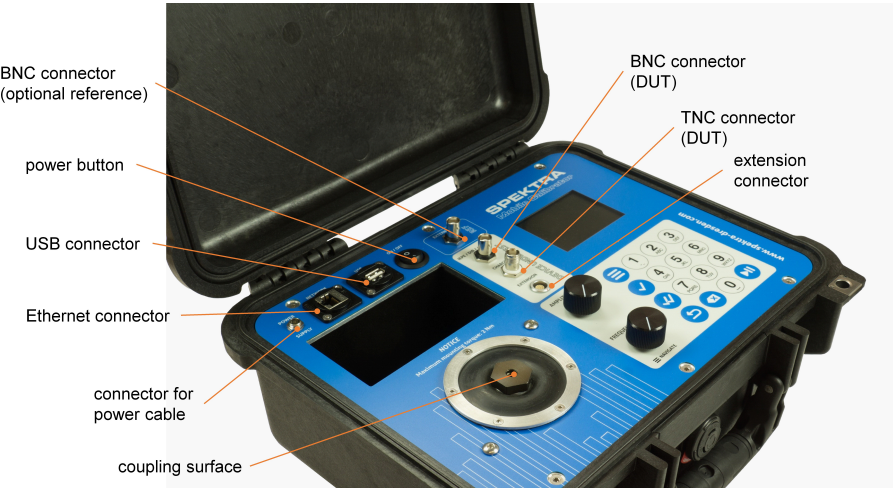


Figure 3-3: Overview of interfaces

3.3 Environmental conditions

To use the product safely and efficiently, the following environmental conditions have to be met:

Operation

Temperature 0 °C...+50 °C
Relative humidity, max. 20 %...100 %, no condensation
Altitude, max. 2 000 m at +25 °C, 800 mbar

Storage and transportation

Temperature -25 °C...+55 °C
Relative humidity, max. 5 %...80 %, no condensation

Protect the product against long periods of heat, cold, direct sunlight, moisture and wet conditions **during transport**. Do not operate the product close to water, open fire sources or in potentially explosive environments, such as in the presence of flammable liquids, gases or dust. Only use the product in compliance with the specified environmental conditions.

3.4 Options and accessories

SPEKTRA offers the following options / accessories for the product:

- PR Module

Options or accessories for the CV-10 Mobile Calibration System extend the product's functional range or facilitate its operation.

Only connect accessories to the product which is approved by SPEKTRA. Use them only in compliance with defined environmental conditions, e.g. never in humid environments.

PR Module

The PR Module enables users to calibrate piezoresistive (PR) sensors. The PR Module can be connected to the CV-10 Mobile Calibration System while the latter is switched on or off. They are connected to the CV-10's EXTENSION connector with the supplied cable.

Once the PR module has been correctly connected to the CV-10 and the CV-10 is switched on, a pop-up message will appear while the extension is initialized. The PR module is detected automatically.



Figure 3-4: PR Module for the Mobile Calibration System CV-10



For further and more detailed descriptions and / or specifications of the PR Module, refer to the respective **supplemental sheet** (included in delivery when ordered). For further details regarding setup and operation, refer to the CV-10 Mobile Calibration System **Software Operation Manual** ([section 4: PR module](#)).

If you have questions or problems, contact a qualified specialist.

4 Declaration of conformity

Below you can find an example of a declaration of conformity for this product.

The specific declaration of conformity for your product is included in your scope of supply.



EU-Konformitätserklärung EU Declaration of Conformity



Hersteller: <i>Manufacturer:</i>	SPEKTRA Schwingungstechnik und Akustik GmbH Dresden Heidelberger Str. 12 01189 Dresden, Germany		
Bevollmächtigte Person für technische Unterlagen: <i>Authorized person for technical files:</i>	SPEKTRA Schwingungstechnik und Akustik GmbH Dresden Heidelberger Str. 12 01189 Dresden, Germany		
Funktion: <i>Function:</i>	Mobiles Kalibriersystem <i>Mobile calibration system</i>		
Modell: <i>Model:</i>	CV-10		
Seriennummer: <i>Serial number:</i>			
Wir erklären in alleiniger Verantwortung, dass das Produkt den Bestimmungen der folgenden Europäischen Richtlinien entspricht: <i>We declare under our sole responsibility that the product is in conformity with the provisions of the following European Directives:</i>			
2006/42/EG <i>2006/42/EC</i>	2014/30/EU <i>2014/30/EU</i>	2011/65/EU <i>2011/65/EU</i>	(EU) 2015/863 <i>(EU) 2015/863</i>
Angewandte harmonisierte Normen: <i>Applied harmonized standards:</i>		EN ISO 12100:2010 EN 55032:2015 EN 61000-3-2:2014 EN 61000-6-2:2005 EN 61010-1:2010/A1:2019/AC:2019-04 EN 62368-1:2014 EN IEC 63000:2018	
Ort und Datum der Ausstellung: <i>Place and date of issue:</i>		Dresden, <i>Dresden,</i>	
_____ Martin Nicklich, Geschäftsführer / General Manager			

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registriert in Handelsregister HRG 10328
USt-IdNr.: DE 246 333 013

Dresdner Volkskassenspark eG
StAhr: UST 6749 0000 0537 9110 01
SWIFT-BIC: GENO DE 33 013

Commerzbank AG Dresden
BANK: 2504 0502 0000 0191 4789 00
SWIFT-BIC: DRES DE 33 000

5 Transportation, packaging and storage

5.1 Safety notes

NOTICE

Mechanical stress, vibration and shock

External forces affecting the product could result in changes of product properties or lasting damage.

Handle the product with care – do not throw or drop it.



Keep packaging material for later use, e.g. for shipment or extended storage periods.

5.2 Transportation, packaging and storage

The product is shipped in a standard cardboard box.

If the feet have been disassembled for transportation, attach them to the bottom of the case before putting the product into operation. The supplied accessories are stored in the pockets or in the case for accessories, which is directly integrated in the front panel.

Consider the weight of the product when transporting or moving it. Be aware that the center of gravity is not necessarily located in the middle of the product.

Use the provided packaging materials for storage of the product. Note that the product must be transported and stored under specific environmental conditions.

6 Installation

6.1 Safety notes

DANGER

Environmental conditions

Electric shock could result in death or serious injury.

Never use the power supply in humid environments or at high ambient temperatures.

WARNING

Stray magnetic field

The permanent stray magnetic field may cause disruptions and malfunctions of active medical implants, e.g. cardiac pacemakers, implanted defibrillators or insulin pumps.

Persons with active medical implants and pregnant women should be protected. Persons with active medical implants must keep a distance of at least 30 cm from the product. Customers or end users must always comply with the applicable regulations due to electromagnetic radiation.

CAUTION

Insufficient stability

When slipping, the product can crush body parts. This can also lead to damage to the product or its environment.

Place the product on an even and solid underground.

NOTICE

Stray magnetic field

Equipment and objects such as magnetic swipe cards, watches and hearing aids can be damaged by the stray magnetic field.

Keep all at-risk devices and objects that are not strictly required for using it away from the product.

6.2 Conditions for installation

Before installation, the following conditions must be fulfilled at the workplace:

- even and solid underground for installation of the product
- specified environmental conditions
- sufficient space to operate the product safely
- no parts on the front panel
- connection to the correct power supply

6.3 Unpacking and handling

The product is tested and checked for damage at SPEKTRA before shipping.

Before unpacking the product, inspect the packaging materials for external damage. **If damage is visible on the outside of the packaging materials or if shock indicators** affixed to the outside of the packaging materials have been activated, follow the steps below:

- (1) Stop unpacking and directly consult the transport company. Additionally, contact us.
- (2) Keep the damaged packaging materials as evidence.
- (3) Document the damage, e.g. by taking pictures.

Only start unpacking the product by following the steps below if the packaging materials show no **visible signs of damage**:

- (1) Carefully unpack the product and take it out of the cardboard box.
- (2) Inspect the outside of each component for potential damage caused by transport.
If damage is visible, stop unpacking and directly consult the transport company. Keep the packaging material as evidence.
- (3) Affix the feet to the bottom of the case if they have been disassembled for transportation.
- (4) Let the product acclimatize for a certain amount of time before switching it on.
Due to outside temperature changes (from cold to warm) condensation can form inside the product, which may result in damage to the product. We recommend 2 h for acclimatization.
- (5) Only start installation of the product when it has adapted to the specified environmental conditions.

6.4 Installation

The product is completely assembled and pre-set according to the customer's wishes when shipped.

For installing the product, follow the steps below:

- (1) Place the product on an even and solid underground.
- (2) Manually displace the armature of the vibration exciter to verify free mobility.
- (3) Push the ON / OFF button once to switch the product on.
- (4) Connect the product with the supplied power supply to the correct power supply system.
- (5) Charge the battery fully.
The display shows the current state of charge of the battery.
- (6) Stop charging as soon as the battery is fully charged.
- (7) Remove the power supply from the external power supply system.

7 Operation

7.1 Safety notes

DANGER

Environmental conditions

Electric shock could result in death or serious injury.

Never use the power supply in humid environments or at high ambient temperatures.

WARNING

Stray magnetic field

The permanent stray magnetic field may cause disruptions and malfunctions of active medical implants, e.g. cardiac pacemakers, implanted defibrillators or insulin pumps.

Persons with active medical implants and pregnant women should be protected. Persons with active medical implants must keep a distance of at least 30 cm from the product. Customers or end users must always comply with the applicable regulations due to electromagnetic radiation.

CAUTION

Sound pressure level of more than 75 dB (A)

At maximum acceleration, a sound pressure level of 80 dB (A) can be reached, which can lead to hearing loss.

For safety reasons, wear ear protection when the product is operated at high frequencies or with maximum acceleration.

CAUTION

Insufficient stability

When slipping, the product can crush body parts. This can also lead to damage to the product or its environment.

Place the product on an even and solid underground.

⚠ CAUTION

Usage of solvents and adhesives

Wrong usage of solvents or adhesives may result in injury, e.g. chemical or physical burns.

Proceed with caution and care when handling solvents and adhesives. Additionally, follow the instructions of the solvents and adhesives used and make sure you comply with applicable regulations.

NOTICE

Mounting sensors

Exceeding the permissible tightening torque and incorrect attachment of the sensors can result in damage to the integrated vibration exciter.

Do not exceed the maximum tightening torque of 2 Nm when mounting the sensors. Likewise, the maximum permissible tightening torque is 2 Nm if an adapter is used during calibration.

NOTICE

Wrong kind of solvent or adhesive

A damaged membrane negatively affects the functionality of the vibration exciter.

Choose solvents and adhesives that will not damage the the membrane.



For further and more detailed descriptions and / or specifications of the product, refer to the relevant document listed in the **related and / or further documentation**.

If you have questions or problems, contact a qualified specialist.

7.2 Conditions at the workplace

Before operation, the following conditions must be met at the workplace:

- even and solid underground for installation of the product
- specified environmental conditions
- sufficient space to operate the product safely
- no parts on the front panel
- charged and functional battery
- connection to the correct power supply if operated with external power supply

7.3 Preliminary checklist

Before operating the product, always check if the following points are fulfilled:

- Is the product installed according to its conditions?
- Are there any loose parts on the front panel?
- Is the battery charged (if the product is being used as mobile)?
- Is the product connected to the correct power supply (if it is being used with connection to the external power supply)?
- Is the product switched off?

7.4 Mounting and removing sensors

Sensors can be attached to the coupling surface of the integrated vibration exciter by screwing or gluing.

Screwing

To mount a sensor by **screwing**, follow the steps below:

- (1) Make sure that the surface of the device and of the vibration exciter are clean and flat.
A clean and flat surface is a prerequisite for good measurement results.
- (2) Clean the coupling surfaces.
Adhesive residues can be removed with acetone or other suitable solvents. Make sure that the membrane is not damaged.
- (3) For better results, place a thin layer of silicon grease or Vaseline® (or equivalent) on the coupling surface prior to mounting.

- (4) Mount the sensor.
Do not exceed the maximum tightening torque of 2 Nm when mounting the sensors. Likewise, the maximum permissible tightening torque is 2 Nm if an adapter is used during calibration.

To **remove** a sensor, follow the steps below:

- (1) Stop all measurements.
- (2) Use a special wrench or torque wrench to remove the sensor.
If an adapter has been used during calibration, fix it with a torque wrench or other similar equipment to prevent it from turning.

Gluings

To mount a sensor by **gluing**, follow the steps below:

- (1) Make sure that the surface of the device and of the vibration exciter are clean and flat.
A clean and flat surface is a prerequisite for good measurement results.
- (2) Clean the coupling surfaces.
Adhesive residues can be removed with acetone or other suitable solvents. Make sure that the membrane is not damaged.
- (3) For better results, place a thin layer of silicon grease or Vaseline® (or equivalent) on the coupling surface or device prior to mounting.
- (4) Mount a (gluing) adapter to the coupling surface of the vibration exciter.
Do not exceed the maximum tightening torque of 2 Nm when mounting the sensors.
- (5) Glue the sensor centered on the (gluing) adapter.
Use a suitable adhesive to attach the sensor.

To **remove** a sensor from the (gluing) adapter follow the steps below:

- (1) Stop all measurements.
- (2) It is best to release the glued sensor by shearing it with a non-magnetic special or open-end wrench.
If an adapter has been used during calibration, fix it with an open-end wrench to prevent it from turning.
- (3) Remove the (gluing) adapter from the coupling surface.
- (4) Clean the coupling surface.
Adhesive residues can be removed with acetone or other suitable solvents. Make sure that the membrane is not damaged.

7.5 Charging the battery

To charge the battery, follow the steps below:

- (1) Place the product on an even and solid underground.
- (2) Connect the product with the supplied power supply to the correct power supply system.
- (3) Charge the battery fully.
The display shows the current state of charge of the battery.
- (4) Stop charging as soon as the battery is fully charged.
- (5) Remove the power supply from the external power supply system.

If the product is not used for a longer period of time, recharge the battery **every 6 months for 24 h**. This applies when the product is stored at room temperature. At higher temperature, shorter charging intervals are necessary. For more information refer to [Figure 6-1](#) below.

If you have any questions or problems, contact a qualified specialist.

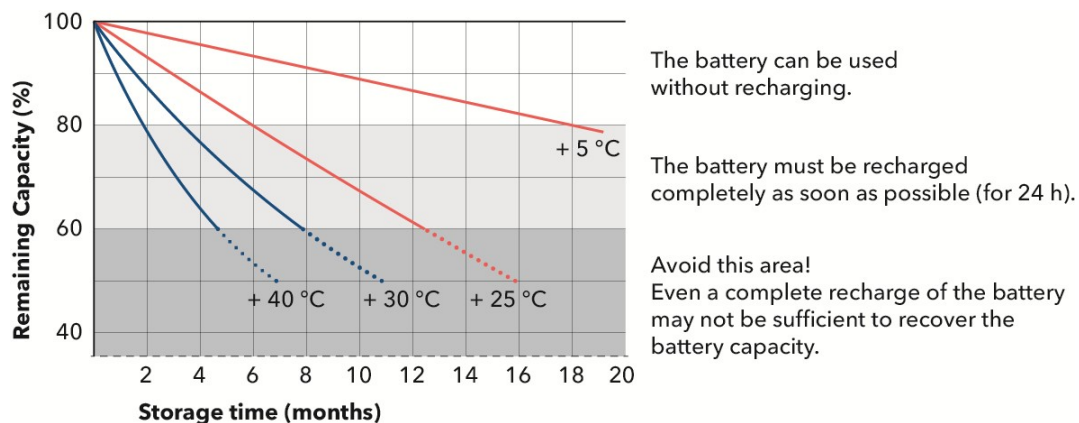


Figure 6-1: Battery capacity depending on storage time



The battery must only be charged at ambient temperatures up to +40 °C (+104 °F).

7.6 Operation

To operate the product, follow the steps below:

- (1) Go through the checklist in [section 7.3 Preliminary checklist](#).
- (2) Mount the sensor according to [section 7.4 Mounting and removing sensors](#).
- (3) Connect the sensor to the corresponding connector on the front panel of the product.
- (4) Push the ON / OFF button once to switch the product on.



For the relevant instructions and information about operation, handling and control of the product, refer to the **[CV-10 Mobile Calibration System Software Operation Manual](#)**.

To **remove or change a sensor**, follow the steps below:

- (1) Remove or change the sensor according to [section 7.4 Mounting and removing sensors](#).

To **interrupt or end operation**, follow the steps below:

- (1) Stop all measurements.
- (2) Push the ON / OFF button once to switch the product off.

7.7 Operation with proximity sensors

Proximity sensors require a special adapter. To install the adapter for proximity sensors, proceed as follows:

- (1) Screw the steel disc (target for the proximity sensor) to the coupling surface of the vibration exciter.
- (2) Screw the round rods into the CV-10 by means of their headless screws.
Two suitable threaded holes are located next to the integrated vibration exciter in the operating panel.
- (3) Tighten the bridge with the two knurled screws.
- (4) An adjusting screw with a clamp is attached to the bridge. Attach the DUT to the clamp.
You can fine-tune the distance between the DUT and the target attached to the vibration exciter by means of the adjusting screw.
- (5) If the DUT is located very off-center above the vibration exciter, you can gradually slide the clamp at the adjusting screw laterally. Before doing so, detach the DUT to prevent it from hitting the steel disc.

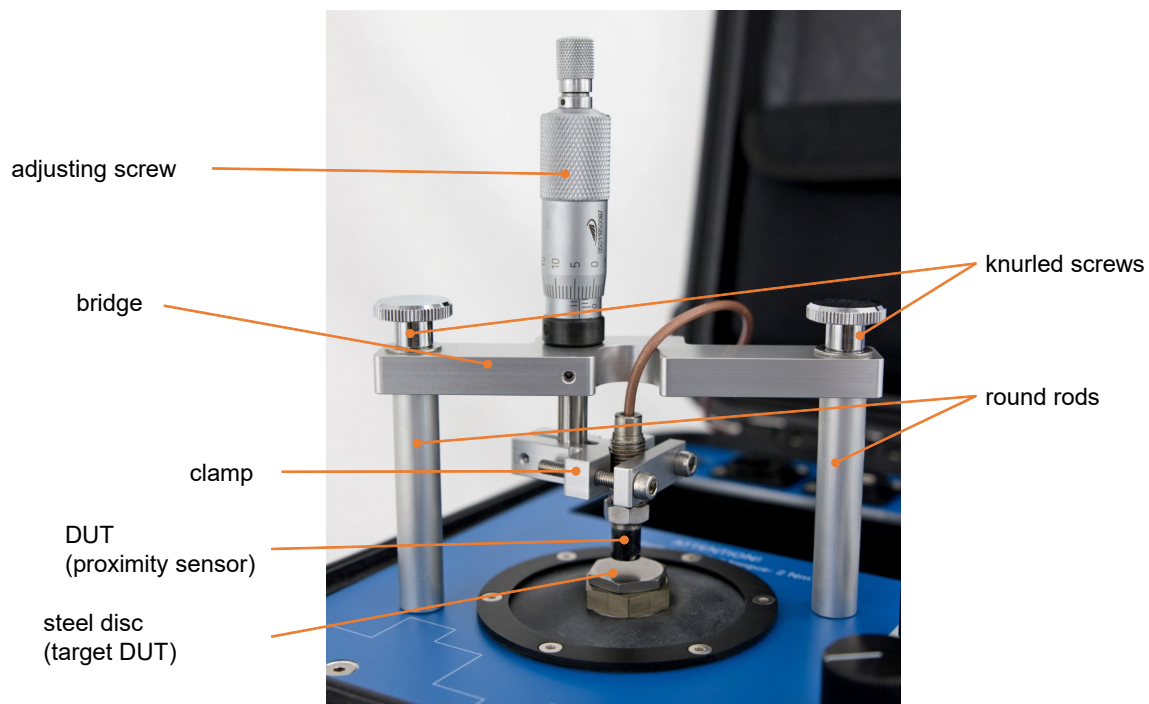


Figure 6-2: Adapter for proximity sensors

8 Cleaning, maintenance and recalibration

8.1 Safety notes

⚠ WARNING

Stray magnetic field

The permanent stray magnetic field may cause disruptions and malfunctions of active medical implants, e.g. cardiac pacemakers, implanted defibrillators or insulin pumps.

Persons with active medical implants and pregnant women should be protected. Persons with active medical implants must keep a distance of at least 30 cm from the product. Customers or end users must always comply with the applicable regulations due to electromagnetic radiation.

NOTICE

Improper cleaning

Wrong detergents may result in property damage.

Use only the defined materials for cleaning and maintenance of the product or its individual components. Never use water, chemicals or abrasive detergents unless this is explicitly requested.

8.2 Cleaning

Keep the product setup free from dust, dirt and other foreign materials.

Perform the following cleaning instructions periodically:

- (1) Press the power-button once to switch off the product.
- (2) Wipe off the product with a smooth, lint-free and antistatic cloth.

8.3 Recalibration

The product, which features an internal reference standard, should be recalibrated at regular intervals (we recommend: 1-2 years).

For that purpose, send the product to SPEKTRA . Use the original packaging to avoid any damage or transport difficulties.

If you have any questions or problems, contact a qualified specialist.

8.4 Adjustment of the battery status indicator

During the product life cycle, the display of the battery status may differ from the actual state of charge. In order to adjust the display, the device should be fully charged at regular intervals when the product is switched on.

If you have any questions or problems, contact a qualified specialist.

9 Troubleshooting

9.1 Safety notes

WARNING

Stray magnetic field

The permanent stray magnetic field may cause disruptions and malfunctions of active medical implants, e.g. cardiac pacemakers, implanted defibrillators or insulin pumps.

Persons with active medical implants and pregnant women should be protected. Persons with active medical implants must keep a distance of at least 30 cm from the product. Customers or end users must always comply with the applicable regulations due to electromagnetic radiation.



Troubleshooting must only be performed as described by operators and qualified service personnel. Further troubleshooting must only be performed by qualified specialists according to the definition of personnel.

If you have any questions or problems, contact a qualified specialist.

9.2 Displays and signals

The integrated vibration exciter generates signals (vibrations) during operation. These signals (vibrations) are hardly visible, but audible.

The product has an integrated display where information is displayed.



For further and more detailed descriptions, refer to the **CV-10 Mobile Calibration System Software Operation Manual** listed in the related documentation.

If you have any questions or problems, contact a qualified specialist.

9.3 Troubleshooting

Possible error patterns / causes of the product are listed below:

Error pattern, incl. cause: The integrated **vibration exciter does not react:**

- Is the product switched off?
- Is the battery fully charged?
- Can the vibration exciter move freely?
- Are there any loose parts on the front panel?

The integrated **vibration exciter does not adjust:**

- Is the battery fully charged?
- Can the vibration exciter move freely?
- Are there any loose parts on the front panel?
- If an external reference is used:
 - Is it correctly connected?
 - Is the correct type of sensor selected?
 - Is the characteristic curve of the external sensor stored on the product?
 - Is the operation with an external sensor correctly set in the firmware?

The **sensitivity of the DUT is not displayed / displays unusual values:**

- Is the battery fully charged?
- Is the vibration exciter settled?
- Is the DUT attached to the correct connector?
- Are the DUT cables wired correctly?
- Is the correct type of sensor selected for the DUT?
- Is the DUT mounted correctly on the vibration exciter?
- Are there any loose parts on the front panel?

A **connected USB flash drive is not identified:**

- Is the USB flash drive connected correctly?
- Does the USB flash drive have the right file format (FAT32)?
- Is the folder structure created according to specifications of the Software Operation Manual?

The **product cannot be switched on**:

- Is the battery fully charged?
- Is the power supply connected correctly?
- Has the ON / OFF button been pressed long enough to switch the product on?
- Is the product connected to the correct power supply?

The product continuously shows the boot display (SPEKTRA logo):

- Is the battery adequately charged, if the product is used portably?

Corrective action

To resolve error patterns, follow the steps below:

- (1) Reboot the software.
If this is not possible, press and hold the ON / OFF button for about 5 seconds to switch the product off.
- (2) Charge battery according to section 7.5 Charging the battery.
- (3) Continue operation.

If an error pattern can only be solved by repair, contact a qualified specialist.



For further and more detailed troubleshooting descriptions, refer to the **CV-10 Mobile Calibration System Software Operation Manual** listed in the related documentation, especially **section 7.2 Transfer Calibration**.

If you have any questions or problems, contact a qualified specialist.

10 Repair and replacement



Only qualified specialists are permitted to perform repairs on the product or replace any of its parts (see "Permitted user groups"). Under no circumstances must the product be opened by operators or qualified service personnel.

If you have any questions or problems, contact a qualified specialist.

11 Disassembly and disposal

11.1 Disassembly



The disassembly of the product must only be performed by qualified specialists according to the definition of personnel. Under no circumstances should the product be opened by users or service personnel.

If you have any questions or problems, contact a qualified specialist.

11.2 Disposal



Do not dispose of the product into household waste

The product itself and the packaging are made of different materials which need to be collected separately and disposed of in an environmentally correct manner.

Return the product to SPEKTRA using the provided packaging material. We will then organize the correct disposal.

12 Warranty

The warranty of the product is contractually regulated.

SPEKTRA shall assume no liability for any damage and hazards that arise because the instruction manual or the safety warnings are disregarded.

In particular, the following actions will void the warranty:

- Execution of activities by incorrect group of personnel
- Improper installation of the product
- Improper charging of the battery
- Insufficient cleaning
- Opening of the product
- Repair of the product
- Replacement of parts or cables
- Modification of the product
- Disassembly of the product

13 Contact

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