CALIMASTER 2

Operating instructions

Contents

Introduction

What is CALIMASTER 2

CALIMASTER 2 is a measuring instrument manufactured by PRÜFTECHNIK, especially developed for testing the following vibration measurement devices: VIBSCANNER, VIBSCANNER EX, VIBSCANNER 2, VIBXPERT, VIBXPERT EX and VIBXPERT II.
CALIMASTER 2 is used to verify that the vibration measurement devices are working within the defined measurement limits. Should the limits be exceeded, CALIMASTER 2 adjusts the device under test (DUT) by determining a set of adjustment parameters and writing this data into the DUT.
CALIMASTER 2 must be calibrated annually by an ISO/IEC 17025:2005 accredited institute.
For calibration of CALIMASTER 2, the calibration instructions outlined in "Appendix" on page 23 must be forwarded to the assigned calibration institute. The issued calibration certificate must be archived and an electronic copy sent to the quality department at PRÜFTECHNIK.
For questions regarding the **operation of CALIMASTER 2**, please contact the product service team at PRÜFTECHNIK.
The PRUFTECHNIK quality department is responsible for questions related to the **calibration of CALIMASTER 2**.

This document is valid for CALIMASTER 2 using the integrated web server app only. DO NOT use this document if working with CALIMASTER (the first edition) or CALIMASTER 2 PC software version. CALIMASTER 2 is distinguished from its predecessors by the PRÜFTECHNIK logo affixed on the top right corner of the front panel.

The front panel has 9 sockets. Previous versions have 5 sockets. The web server version is designated VIB 2.261.

Note   As long as no web server link has been established, the PC software may continue to be used.

CALIMASTER 2 package

CALIMASTER 2 package VIB 2.265 consists of the following items:

VIB 2.261 CALIMASTER 2 calibration unit

VIB 2.254 Ethernet cable (CALIMASTER 2)

ALI 50.651 Power supply/charger

VIB 5.322-X Adapter cable

VIB 2.256 Cable (analog) – blue sleeves – CALIMASTER 2 package contains 2 no. VIB 2.256

VIB 2.257 Trigger cable (CALIMASTER 2) – yellow sleeves

VIB 2.263 Temperature cable (CALIMASTER 2)
Note: This cable is not interchangeable and must only be used with its dedicated CALIMASTER 2 (refer to "Appendix" on page 23)

VIB 2.262 Optical trigger cable (CALIMASTER 2)

VIB 5.138 Spiral cable (CALIMASTER 2)

LIT 02.200.EN CALIMASTER 2 operating instructions, English (this manual)

VIB 2.255 Transport case (CALIMASTER 2)

Setting up CALIMASTER 2

Before starting measurements

Note   The PC must have an Ethernet port dedicated to CALIMASTER 2. An additional port may be required for LAN and/or Internet connections.

Note   Only **Google Chrome** is to be used. DO NOT use any other web browser with CALIMASTER 2.

Note   Refer to "Appendix" on page 23 for information on how to set up the browser to be able to view PDF pop-ups generated through CALIMASTER 2.

Connecting CALIMASTER 2 to PC
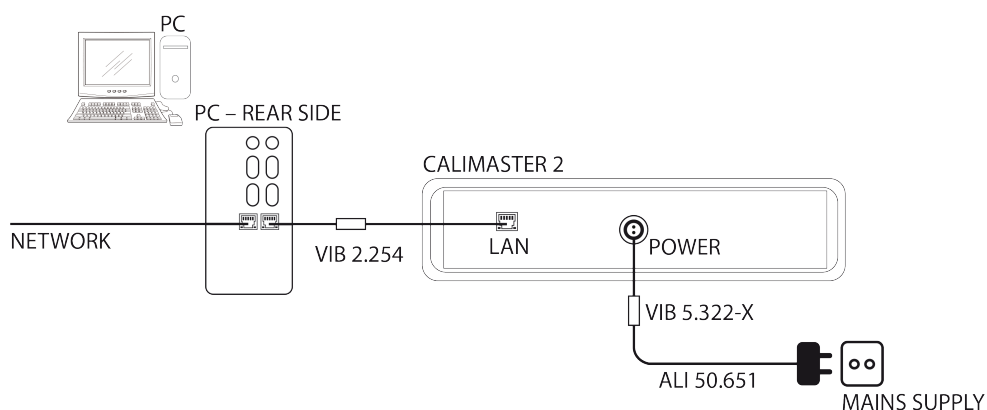
1. Connect CALIMASTER 2 to the mains supply using the adapter cable **VIB 5.322-X** and the power supply/charger **ALI 50.651**.
   CALIMASTER 2 LED lights red. The LED lights green after CALIMASTER 2 has booted. This will take ca. 1 1/2 minutes.
2. Connect CALIMASTER 2 to the PC using the Ethernet cable **VIB 2.254**. The Ethernet cable end with the ferrite bead must be connected to the CALIMASTER 2 LAN socket.

Setting up the PC for use with CALIMASTER 2

CALIMASTER 2 network settings

Note   The standard IP address of any issued CALIMASTER 2 is 192.168.1.**XYZ** where **XYZ** represents the last three digits of the CALIMASTER 2 serial number.
For example: If a given CALIMASTER 2 has the serial number 0122, then its corresponding standard IP address is **192.168.1.122**
The serial number of CALIMASTER 2 on its bottom.

Note   The emergency IP address is **169.254.1.1**
The emergency IP address may be used on a single CALIMASTER 2 only. If this IP address is used, it is NOT possible to operate multiple CALIMASTER 2s on a single Ethernet hub.

Note Ensure that the set PC IP address allows access to CALIMASTER 2. You may refer to "Network settings" on page 23. If not familiar with IP network settings on the PC or do not have permission to change PC address, contact the IT department for assistance.

Web server application

The web server app runs directly on CALIMASTER 2 and does not require installation of any special software. The web server site is accessed by entering the following information in the browser address bar: IP address:6543/app/index.html. In our example, the information to be entered in the address bar **(1)** would be 192.168.1.115:6543/app/index.html.
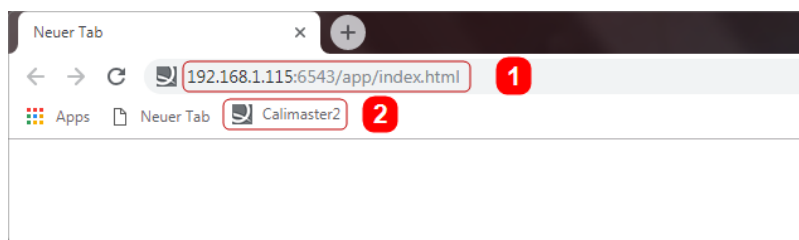
For quick access, a bookmark **(2)** or a desktop link should be created.

Measurement steps

Measurement using CALIMASTER 2 involves calibration and adjustment and is performed in the following order:

Calibration is performed when the device calibration due date is reached.

If a calibration measurement is successful, a certificate is printed.

If a calibration fails, perform an adjustment. A second calibration will start automatically as soon as the adjustment is completed successfully. A certificate may then be printed.

Note In the unlikely event that an adjustment measurement fails, repeat the adjustment. If however, the adjustment still fails, restart CALIMASTER 2, the device under test and the web server application. If the situation remains unchanged then the device under test must be sent in for repair.

Note After measurement, new data is automatically written in the internal flash memory of the device under test. In the case of VIBSCANNER, a hint will appear on the browser requiring that the VIBSCANNER be connected to the mains. Use the supplied universal VIBSCANNER charger **VIB 5.420-INT** for this purpose; otherwise data will not be written into the device.
Only VIBSCANNER requires use of the universal charger.
This process is NOT required for VIBSCANNER 2.

CALIMASTER 2 measurement connections

Connecting CALIMASTER 2 to VIBXPERT/VIBXPERT II
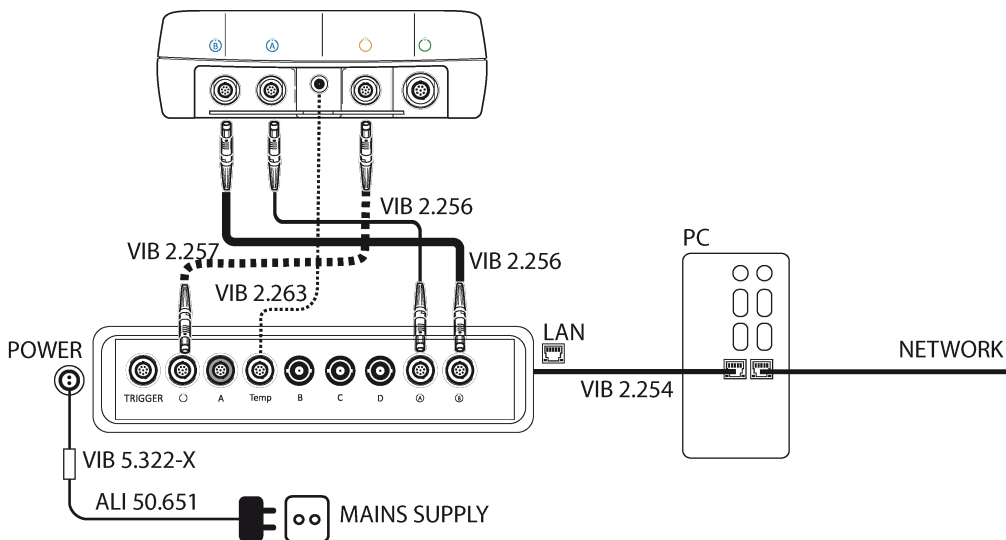
The schematic above shows how the devices VIBXPERT and VIBXPERT II are connected for measurement with CALIMASTER 2.

Note CALIMASTER 2 and the device under test having markings that help the user identify the appropriate cable sockets.

Note Cables must be inserted and removed with care, and should never be turned as that could damage the cable pins.
Note correct connector orientation indicated by the markings on the connector and the socket.

Note When connecting the two analog cables VIB 2.256 to sockets A and B on both CALIMASTER 2 and the device under test, ensure that the cables do not crossover.

The circled A socket [Ⓐ] in CALIMASTER 2 must be connected to the circled A socket [Ⓐ] of the device under test.

Connecting CALIMASTER 2 to VIBSCANNER
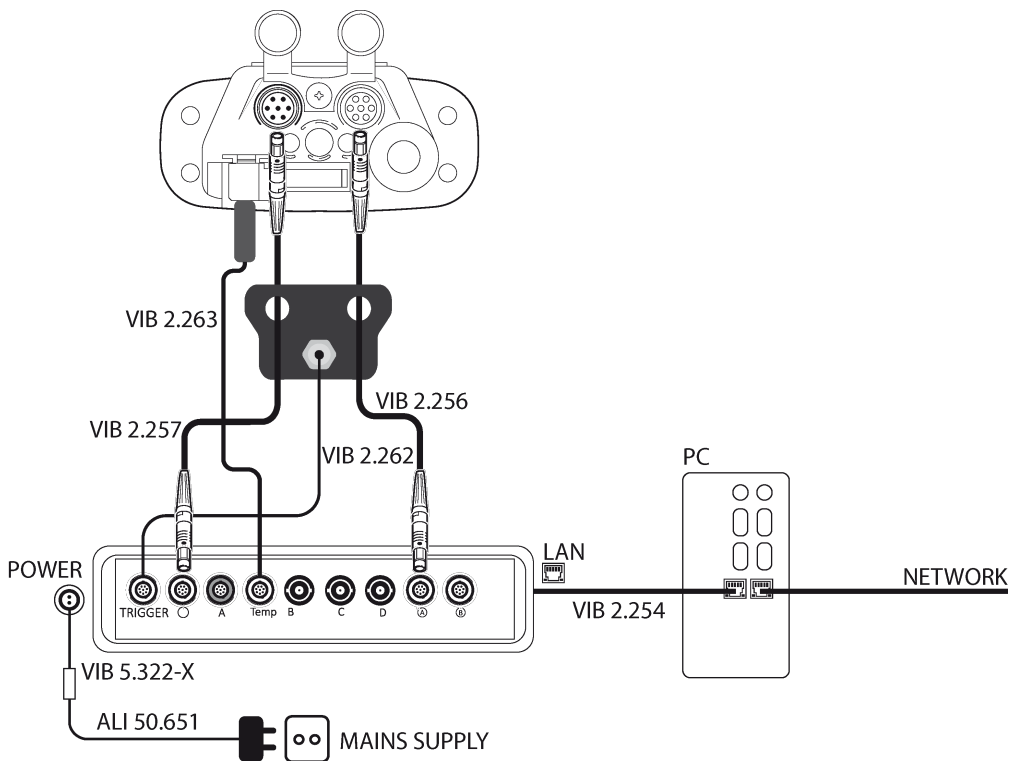
The schematic above shows how the device VIBSCANNER is connected for measurement with CALIMASTER 2.

Note Cables must be inserted and removed with care, and should never be turned as that could damage the cable pins.
Note correct connector orientation indicated by the markings on the connector and the socket.

Connect the device under test (VIBSCANNER) to CALIMASTER 2 as follows:

1. Connect the optical trigger cable **VIB 2.262** to CALIMASTER 2.
2. Connect one end of the analog cable **VIB 2.256** (blue sleeves) to the CALIMASTER 2 socket marked with a circled A [ⒶA].
3. Connect one end of the trigger cable **VIB 2.257** (yellow sleeves) to the CALIMASTER 2 socket marked with ⟳.
4. Thread the free ends of the two cables **VIB 2.256** and **VIB 2.257** through the two holes on the plate of the optical trigger cable **VIB 2.262**.
5. Connect the free end of the analog cable **VIB 2.256** to the blue channel on VIBSCANNER. The free end of the trigger cable **VIB 2.257** is connected to the yellow channel on VIBSCANNER.
6. With both cables **VIB 2.256** and **VIB 2.257** connected to VIBSACNNER, push the plate on the optical trigger cable to be flash with VIBSCANNER interface.
7. Connect the temperature cable VIB 2.263 to CALIMASTER 2 and the VIBSCANNER temperature probe socket.
    Note: This QLA socket is accessed by removing the internal temperature probe.

Connecting CALIMASTER 2 to VIBSCANNER 2

The schematic above shows how the device VIBSCANNER 2 is connected for measurement with CALIMASTER 2.

Note Cables must be inserted and removed with care, and should never be turned as that could damage the cable pins.
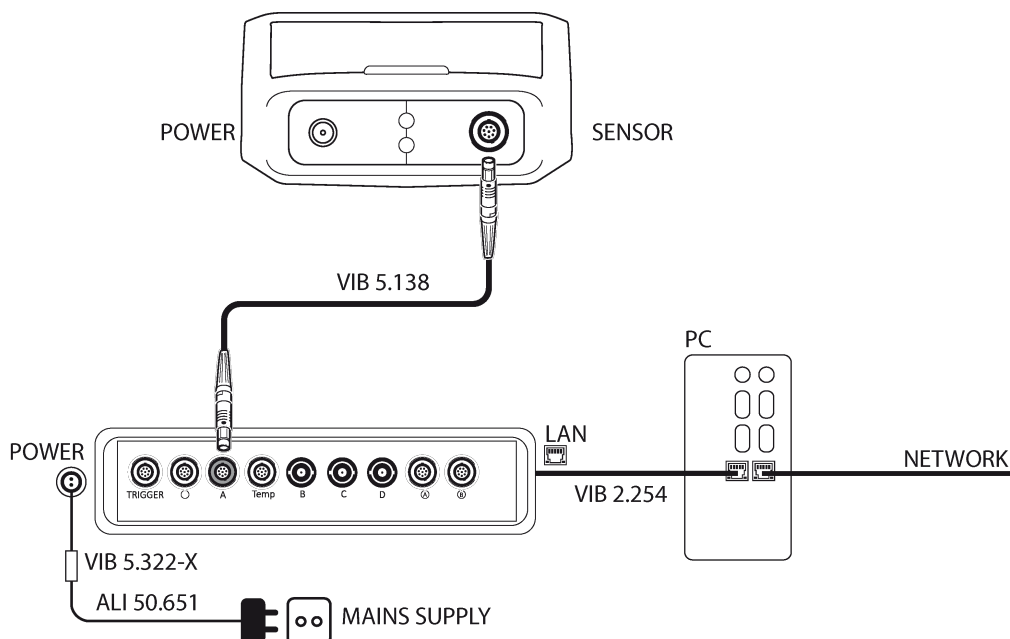Note correct connector orientation indicated by the markings on the connector and the socket.

1. Connect one end of the spiral cable **VIB 5.138** to the CALIMASTER 2 socket marked A.

2. Connect the other end of the spiral cable to the VIBSCANNER 2 analog measurement socket.

Points to observe when carrying out CALIMASTER 2 measurements

- VIBXPERT, VIBEXPERT EX, VIBXPERT II, VIBSCANNER, VIBSCANNER 2 and CALIMASTER 2 are high precision instruments. These instruments are susceptible to electromagnetic disturbance. To minimize this disturbance, the instruments must be kept away from other electronic devices including any extra CALIMASTERs. The distance to the test PC must also be kept at a maximum.

- Do not change the environmental condition during the measurements. Avoid direct sunlight striking any part of the measurement system. Measurement should be carried out at temperatures between 20°C to 26°C (68°F to 79°F).

- Allow CALIMASTER 2 and device under test a 30-minute "warm-up" to attain the ambient temperature before starting a measurement.

- DO NOT disconnect the device under test when a calibration or adjustment is in progress.

- When changing devices under test, disconnect current device then wait until its information disappears from the browser window (takes about 30 seconds). Now connect the new device under test. Information about the newly connected device will appear on the

browser. Check and confirm if this information corresponds to the newly connected device.

- If the device under test is not recognized, disconnect the device and wait for the "search window" appears on the browser. If the device is still not recognized, restart CALIMASTER 2 and the web server application.
- Before starting measurement, the battery on the device under test must be sufficiently charged. Neither calibration nor adjustment is possible if the battery charge capacity is less than 30%. The battery charge capacity is displayed on the browser when the device under test is connected.

Using the web server application

1. If not yet on, switch the PC on.

2. After connecting CALIMASTER 2 to the PC (see "Connecting CALIMASTER 2 to PC" on page 8)and the device under test (see "CALIMASTER 2 measurement connections" on page 10), switch both CALIMASTER 2 and the device under test on.
Note: For measurement, the device under test must be booted before being connected to CALIMASTER 2.

3. Start **Google Chrome**.
Note: The browser is to be started only after the CALIMASTER 2 online LED lights green.

4. Start the application by clicking the CALIMASTER 2 bookmark created previously (see "Web server application" on page 9).

5. The following screen appears.
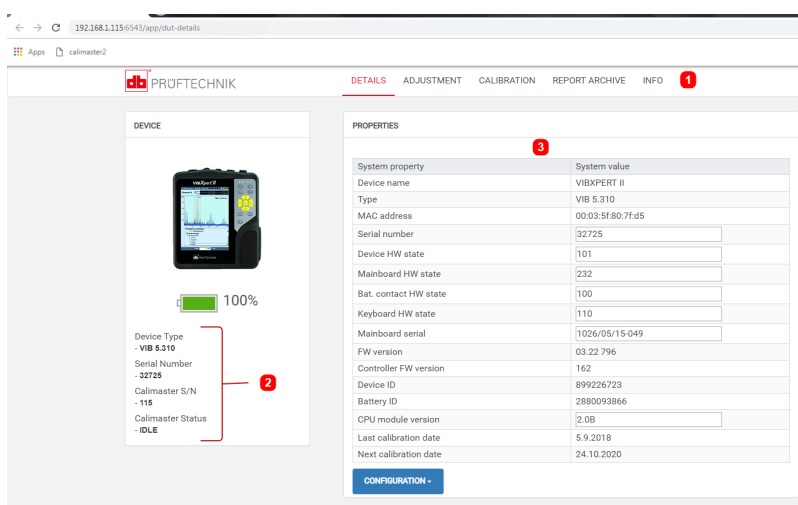
- **(1)** The main menu bar with its five menu items (Details, Adjustment, Calibration, Report Archive, and Info) is always visible. The menu bar items are used to start basic CALIMASTER 2 functions. Clicking the menu item "DETAILS" always reverts to this start screen.

- **(2)** This section of the left pane displays type of device under test and its serial number as well as the serial number and activity status of the CALIMASTER 2 in use.

- (3) With the menu bar item "DETAILS" selected, the properties of the device under test are displayed on the right pane.
Note: Information in the enclosed fields is editable and is saved in the device. It is therefore imperative that such changes are made when **the user knows exactly what is being changed**. For more details about changing the properties of device under test see "Editing revision numbers for device under test" on page 21, and the document "Properties – Production" (available only to the production department).

Note An error message is displayed when no device under test is connected.

Setting general CALIMASTER 2 information

The information entered in the address fields will appear on the certificates after calibration. If existing information is edited, a 'Change' hint appears next to the entry. After entering or editing information, click "SAVE" to store this data inside CALIMASTER 2 for future use.

Note: If information has been incorrectly edited and there is need to revert to the previous information, **provided the incorrect information has not been saved**, then click "LOAD DEFAULTS" to upload information last saved.

When the device under test is disconnected, its image on the browser disappears.

Note: Never connect a new device under test before the image of the previous device under test has disappeared from the browser.

Calibrating device under test

1. Use the 'Device' pane and confirm that the device under test is the one displayed on the browser.
   Additionally, check the device properties under "DETAILS", and the information under "INFO". The information under these two sections is required for reporting purposes, and will appear on the certificates after calibration.

2. Click "CALIBRATION" to access the calibration window.

3. Click "START CALIBRATION" to begin the calibration measurement.
   Test cases run one by one. The calibration procedure does not stop even if a test case fails. If necessary, the calibration may be stopped by clicking "STOP CALIBRATION".
   To view the last test case, use the "Calibration" window scroll bar. Care must be taken NOT to click any test case as this would delete the particular case, and its respective measurement carried out.
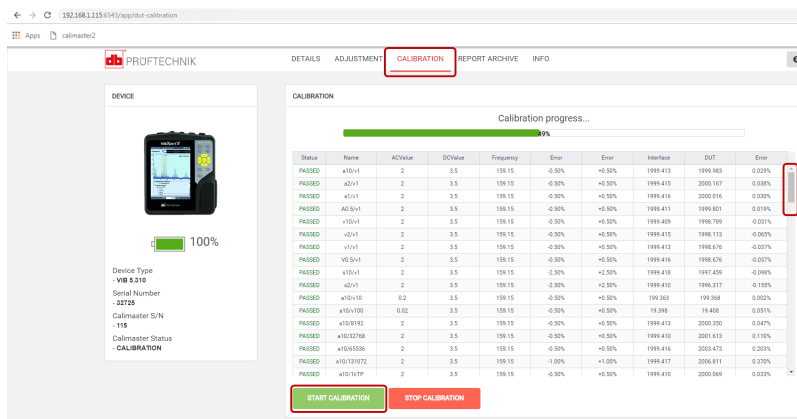
4. Once all test cases have been executed (calibration progress = 100%), a hint appears stating whether the calibration was successful or not.
   Note: If the calibration fails, an adjustment procedure must be performed. See "Adjustment of device under test" on the facing page.
   If all measurements have been done successfully, a 'Calibration succeeded" window appears with the hint to save the calibration date into the device under test, and print the calibration certificate.
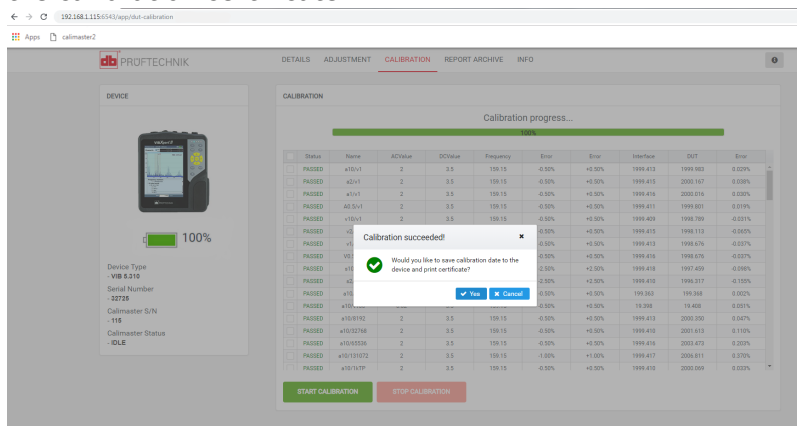
5. Click 'Yes' to save the calibration date in the device under test, and to save the calibration certificate in the designated location.
   Note: If a specific download location has not been specified, then the certificate is saved in the system default download location.
   At the same time, the certificate will open in a new tab as a PDF file. The certificate may be printed directly from the browser or from the download location.

db PRÜFTECHNIK

Inspection Certificate
Prüfzertifikat

Certificate number *Zertifikatsnummer*	32725__2018_09_25	We hereby confirm that the mentioned item has been tested in accordance with PRÜFTECHNIK standards, as well as being subject to an ISO 9001 certified quality management system. It remains the responsibility of the user to ensure that the inspection is repeated within a reasonable period. PRÜFTECHNIK recommends a maximum period of 24 months. The result only relate to the mentioned item. This certificate may be redistributed only in completeness, and may not be altered. Certificates without signature and official stamp are invalid.
Manufacturer *Hersteller*	Pruftechnik Oskar-Messter-Str 19-21 85737 Ismaning Germany	
Item *Gegenstand*	VIBXPERT II	
Type *Typ*	VIB 5.310	
Serial no. *Seriennummer*	32725 S/N	Hiermit bestätigen wir, dass der genannte Gegenstand unter Zugrundelegung von Werkstandards sowie unter Beachtung eines nach ISO 9001 zertifizierten Qualitätsmanagementsystems geprüft wurde. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Prüfung ist der Benutzer verantwortlich. PRÜFTECHNIK empfiehlt ein maximales Intervall von 24 Monaten. Die Prüfergebnisse beziehen sich ausschließlich auf den genannten Gegenstand. Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden. Zertifikate ohne Unterschrift und Stempel haben keine Gültigkeit.
Hardware version *Hardwareversion*	101	
Firmware version *Firmwareversion*	03.22 796	
Date of inspection *Datum der Prüfung*	25.9.2018	
Recommended date of next inspection *Nächster empfohlener Prüftermin*	13.11.2020	
Conformity *Konformitätsaussage*	The inspection results conform to the specified requirements. *Die Prüfergebnisse entsprechen den spezifizierten Anforderungen.*	

Gerhard Kugler

Company stamp *Firmenstempel*	**Date** *Datum* 2018-09-25	**Responsible person** *Verantwortlicher*

Document order no. Dokumentenbestellnummer	VIB 2.520.G	File name Dateiname	VIB 5.310_32725_20180925_1505.pdf	Page 1/5 Seite

Adjustment of device under test

An adjustment procedure is to be performed if the calibration has failed. An adjustment must also be performed if the mainboard has been replaced.

1. Use the 'Device' pane and confirm that the device under test is the one displayed on the browser.
    Additionally, check the device properties under "DETAILS", and the information under "INFO". The information under these two sections is required for reporting purposes, and will appear on the certificates.

2. Click "ADJUSTMENT" to access the adjustment window.

3. Click "START ADJUSTMENT". Offset compensation starts first (progress bar is shown). The next step is the adjustment of the device under test. The test cases run one by one (the second progress bar for adjustment appears).
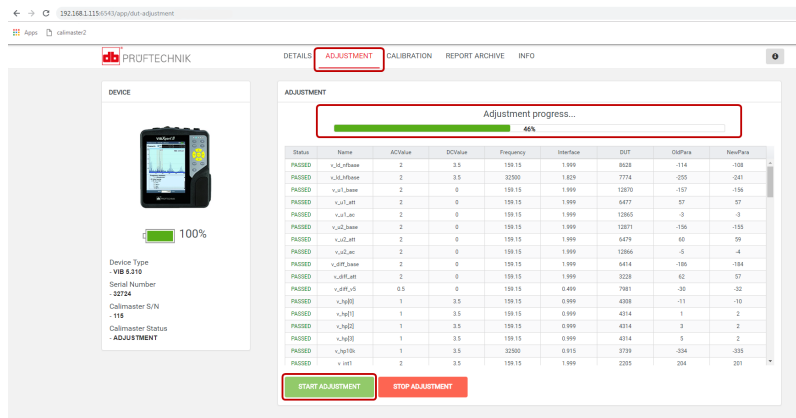
4. After all adjustment test cases have been executed successfully, the device under test saves these new parameters and is automatically rebooted (third progress bar is shown).

5. After rebooting, the calibration automatically starts. For calibration see "Calibrating device under test" on page 15.
Note: If offset compensation or at least one step of the adjustment test cases fails, a hint will appear.

Test conditions for adjustment and calibration

If adjustment is completed without errors but calibration is still not successful, the following test conditions must be checked and fulfilled:

- Temperature during adjustment and calibration should be constant (20°C to 26°C [68°F to 79°F]). The system must be protected from direct sunlight.
- Operate system away from strong electromagnetic fields.
- The device under test must be in normal operating condition before starting calibration and/or adjustment.
- The device under test must have a battery charge capacity greater than 30%. Otherwise, neither calibration nor adjustment will be possible.
- No special error messages appear on the browser while using CALIMASTER 2
- Use current **Google Chrome** browser and current CALIMASTER 2 firmware.
- Ensure all cable connections are correct. (Refer to "CALIMASTER 2 measurement connections" on page 10.)

Note In the unlikely event that an adjustment fails, this should be repeated. If however it fails again, restart CALIMASTER 2, the device under test and the browser. If the situation remains unaltered, then the device under test must be repaired. This could involve changing the printed circuit board.

Expert mode

## Calibration and/or adjustment on a subset of test cases

If necessary, calibration and/or adjustment may be conducted for only specified test cases. This type of measurement is usually for analysis.

1. If either the menu item "CALIBRATION" or "ADJUSTMENT" is selected, the corresponding window appears as shown below.
   **Note:** If neither calibration nor adjustment is in progress all the check boxes **(1)** remain unchecked.
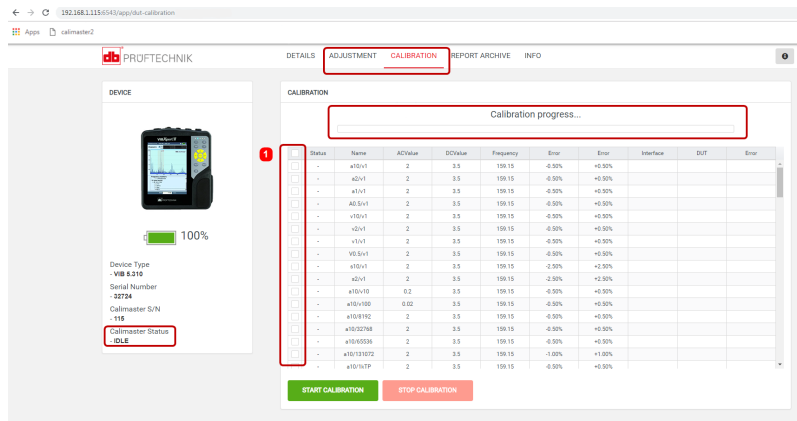

2. Click the topmost check box (next to the item "Status"). All check boxes will appear checked with all test cases struck through.
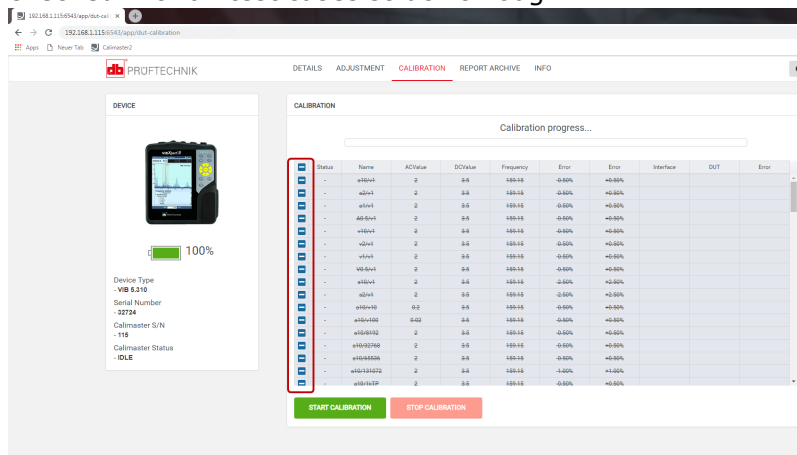
3. Click the check boxes of the test cases required. The selected boxes will be unchecked, indicating that measurement may be performed for these selected test cases.
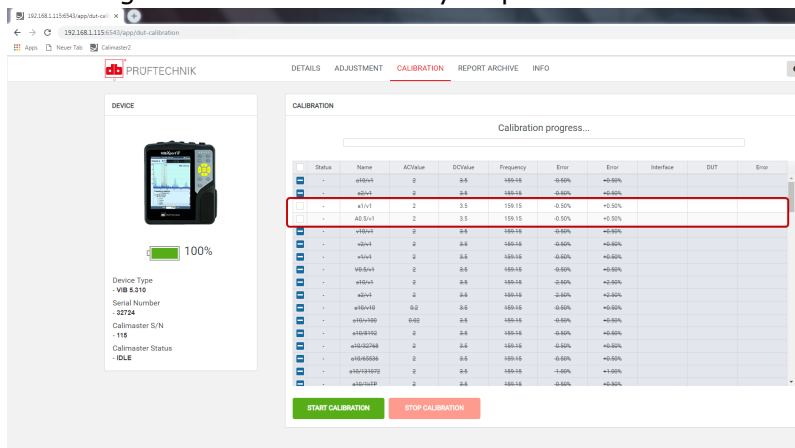

4. Click "START CALIBRATION" or "START ADJUSTMENT" to start the respective measurement. Only the selected test cases will be performed.
    With this subset measurement, no certificate is generated, and no data is transferred to the device under test.
    The hint "SKIPPED" appears in the status coulumn for all test cases not performed.
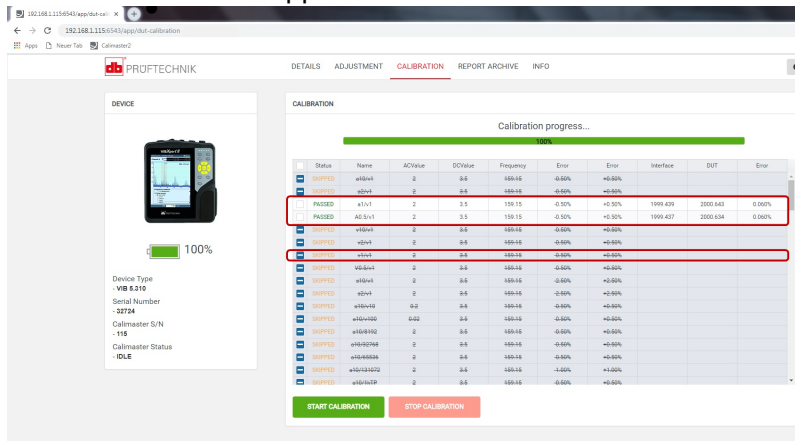
Alternative selection of subset test cases

Alternatively, instead of checking all test cases as described in (2) above, then selecting the required tests, unwanted test cases may be individually selected and measurement performed for the unchecked test cases.
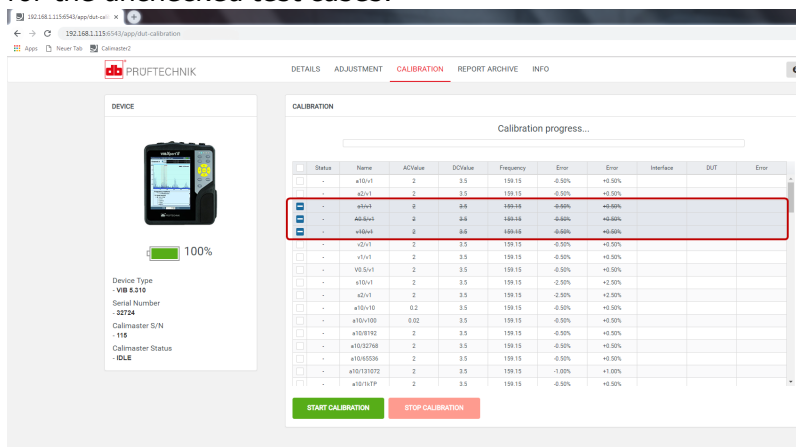
Editing revision numbers for device under test

If the mainboard of the device under test has been changed, the device serial number must be checked and entered in the serial number field. The serial number is necessary for licensing purposes which would otherwise be invalid if the correct serial number is not entered. The mainboard serial number and the hardware status of the new printed circuit board must also be entered, otherwise CALIMASTER 2 may not recognize the device. These changes are implemented under "PROPERTIES" in the web server application start screen.


Any information edited has the suffix "Changed". This changed information may be saved in the device by selecting "CONFIGURATION" -> "SAVE TO DEVICE".
The properties may aslo be saved as a file by clicking "SAVE TO FILE" and read back later if necessary using the dropdown item "LOAD FROM FILE".

> **Note** Note It is important that edited values are crosschecked for correctness before being save to device under test. Incorrect values could lead to erroneous calibration and/or adjustment which could affect the device under test.

Measurement reports

For every calibration and adjustment measurement, a .csv file is generated **(1)**. The .csv files contains details of the device under test including all measurements carried on the device. This file is saved in CALIMASTER 2. A maximum of five files is saved for every single device under test. When this quota is reached, the oldest file is automatically overwritten. When a device under test is connected to CALIMASTER 2, the "REPORT ARCHIVE" pane **(2)** shows all the .csv files for that particular device stored in CALIMASTER 2. To view the files click the menu bar item "REPORT ARCHIVE" **(3)**.
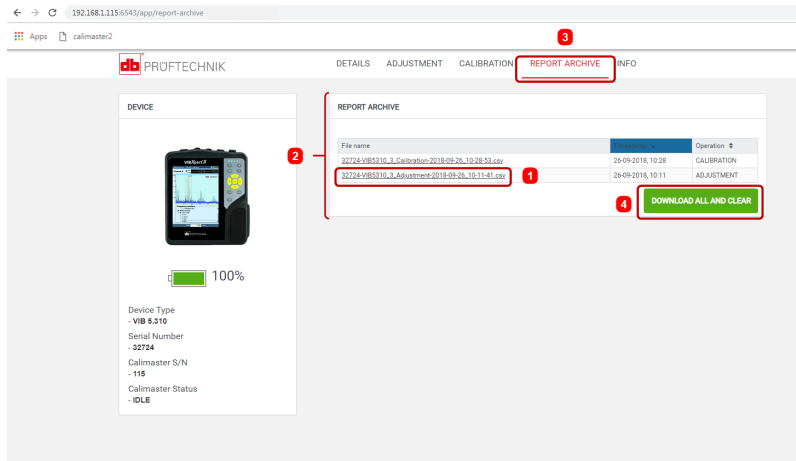
To view or save a single .csv file, click the file name **(1)**. The file will open in the spreadsheet software installed on the PC (in most cases MS Excel or OpenOffice Calc). The file may be viewed or saved using the installed spreadsheet software. Clicking "Download all and clear" **(4)** will download all .csv files stored in CALIMASTER 2. These files may then be saved to a designated folder. It is advisable to carry out this "download all" procedure at regular intervals especially if the particular CALIMASTER 2 is used to measure several devices. This action frees up space in CALIMASTER 2.

Note   Whenever the a motherboard or the CPU module is replaced the calibration .csv file must be sent to PRÜFTECHNIK as this information is needed for the internal PRÜFTECHNIK products database.

Appendix

Network settings

When using the standard IP address, it is possible to use multiple CALIMASTER 2s on one Ethernet hub.

Access to CALIMASTER 2 is possible only if the IP address of the PC Ethernet card is compatible with the CALIMASTER 2 IP address. The IP address bits masked with 1 in the Subnet Mask have to be identical. Those address bits masked with 0 have to be different.
The IP adress of CALIMASTER 2 should never be the same to that of the PC Ethernet card.

IP address examples

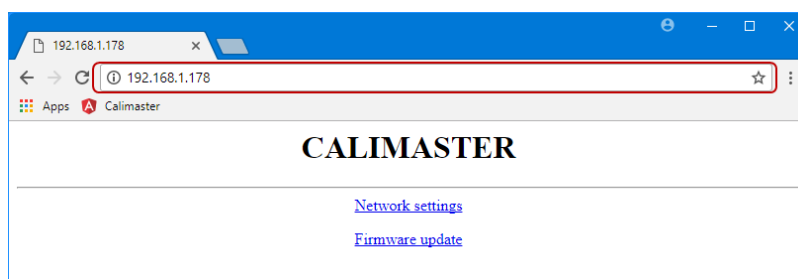| Subnet Mask	CALIMASTER 2 IP address	PC IP address	Status
255:255:255:0	192.168.1.122	192.168.1.10	Compatible
255:255:0:0	169.254.1.1	169.254.26.37	Compatible
255:255:255:0	192.168.1.122	192.168.22.124	Non-compatible
255:255:255:0	192.168.1.122	192.168.1.122	Non-compatible

Network addresses like [169.254.x.y], [172.16.x.y], and [192.168.x.y] are dedicated for private networks and cannot be routed through the public Internet. These private IP addresses should be used with CALIMASTER 2 to stop any external access.

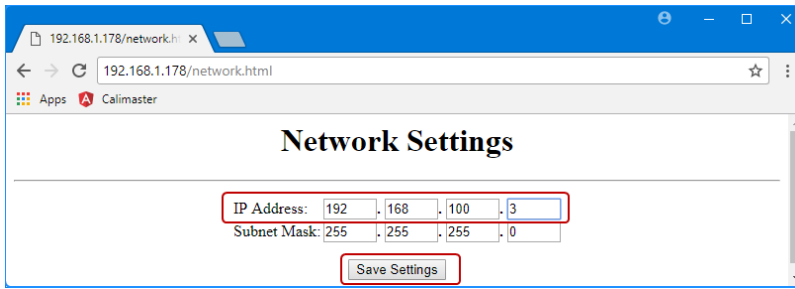**Setting CALIMASTER 2 IP address**

  Note Under normal circumstances, the assigned CALIMASTER 2 IP address
          DOES NOT require to be changed.

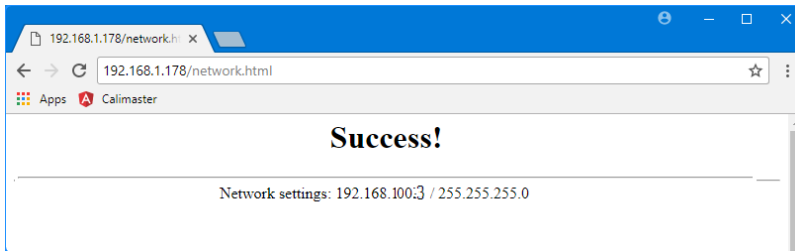Should the need arise requiring change of the CALIMASTER 2 IP address, proceed as follows:

  1. With CALIMASTER 2 connected to the PC and switched on, start the browser, then open a new tab (or window). Enter the CALIMASTER 2 standard or emergency IP address in the address bar.

  2. Click "Network settings", then change the CALIMASTER 2 IP address. Depending on the new IP address, it may also be necessary to change the Subnet Mask.

3. Click "Save Settings".
   If all settings are correct, "Success" appears on the browser.

> **Note** If any part of the CALIMASTER 2 IP address has been changed where the Subnet Mask is active (i.e. set to 1), then the PC IP address has to changed to be able to access CALIMASTER 2.
> If not familiar with IP network settings on the PC or do not have permission to change PC IP address, contact the IT department for assistance.

Updating the CALIMASTER 2 firmware

CALIMASTER 2 is always shipped with the latest firmware and web server app version. If an update is necessary, this is carried out using a *.ptz file from PRÜFTECHNIK Condition Monitoring. The update procedure is as follows:

1. With CALIMASTER 2 connected to the PC and switched on, start the browser, then enter the saved CALIMASTER 2 standard IP address in the address bar.
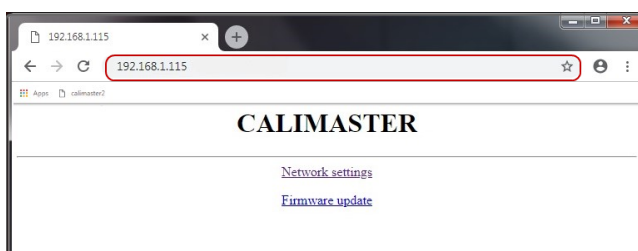
2. Click "Firmware update".
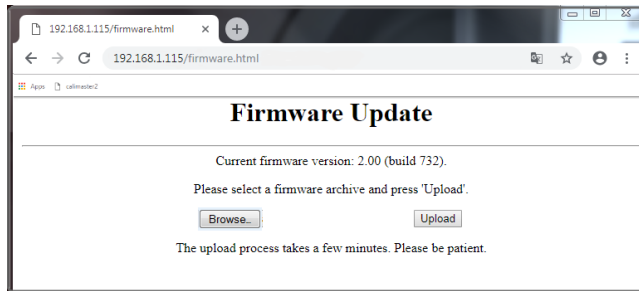
3. Click "Browse" to select the firmware update file.
4. Click "Upload". The update runs automatically and the browser restarts with the updated firmware automatically.

Allowing viewing of PDF pop-ups generated through CALIMASTER 2 in web browser

To be able to view PDF files generated through CALIMASTER 2 on the web browser, pop-ups must be allowed in Chrome.
Turn pop-ups on as follows:
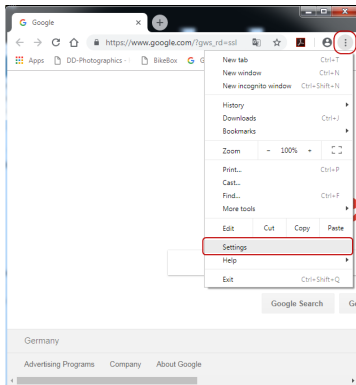
1. Start the browser then click the Chrome menu [⋮] on the browser toolbar.
2. Select "Settings".
3. Scroll to the bottom of the page to select "Advanced".
4. In the "Privacy and security" section, click "Content settings" button.
5. In the "Pop-ups and redirects" section, turn the setting to "Allowed".

Terms and definitions

The following terms are used in this document.

DUT Device under test, e.g. VIBXPERT II or VIBSCANNER 2

Calibration test case Configuring the DUT for a specific test case (e.g. an overall value measurement 10 Hz to 1 kHz) simulation of a sensor (e.g. a CLD) and a vibration signal by an electronic signal (done by the interface). Measuring the signal by the interface. Measuring the signal by the DUT. Transferring the DUT result to the interface. Comparing both results. Evaluating the test case result (failed or passed) by the CALIMASTER: Is the DUT result within the allowed limits, reference is the interface result.

Adjustment test case Same as calibration test case but instead of calculating the deviation percentage from the reference value, the ideal adjustment parameter of the DUT is calculated so that the deviation between DUT and interface measurement result is minimized. And therefore the raw data of the DUT is used.

Calibration Running the defined set of calibration test cases – If all test cases are successfully executed, a certificate and a results protocol is created and a new calibration date set on the DUT.

Adjustment Running the defined set of adjustment test cases – In case of success, the new set of adjustment parameters are written to the DUT and calibration starts automatically.

Adjustment parameter Electronic components are specified within defined limits, e.g. there are resistors whose electric resistance may vary by say 0.1 % or 1 % etc. Many of these components are serially combined in instruments. By so doing, the total deviation in the analog path is completely unacceptable. Therefore all measured values are adjusted by supplying a correction factor to every raw measurement result. This adjustment parameter is individually stored in the instruments.
As electronic components change their values with time, the calibration serves to verify whether the instrument is still within its limits. The adjustment brings the instrument back to its limits.

Offset compensation Offset compensation of the DUT is automatically done before an adjustment starts. Offset compensation should be done more frequently than adjustment. It can also be done directly at the DUT.

Note The following section on the calibration of CALIMASTER 2 is important for all calibration institutions charged with the responsibility of calibrating CALIMASTER 2.

Calibrating CALIMASTER 2 VIB 2.261 and the temperature cable VIB 2.263

Note The offset compensation of any given temperature cable is stored directly in CALIMASTER 2. For this reason, a given temperature cable must be solely used with the CALIMASTER 2 where this offset value has been saved.
If the temperature cable is changed, then the temperature offset compensation must be carried out before any measurements are performed.

The following items are required for the calibrations:

- A calibrated voltmeter capable of displaying 5.0 V with a 6 1/2-digit resolution and accuracy
- A PC with Google Chrome and a free Ethernet port
  The free Ethernet port is to be set to an emergency IP address such as 169.254.1.10, with the Subnet Mask at 255.255. 255.0. You may refer to "Calibrating CALIMASTER 2 VIB 2.261 and the temperature cable VIB 2.263" above

  Note If not familiar with IP network settings on the PC or do not have permission to change PC address, contact the IT department for assistance.

- Power supply/charger ALI 50.651 (for powering CALIMASTER 2);
  an Ethernet cable (for connecting PC to CALIMASTER 2); and
  2 measuring cables with 4 mm banana plugs (for connecting CALIMASTER 2 to the voltmeter)
- For the calibration of the temperature cable VIB 2.263, a calibrated thermometer with a minimum resolution and accuracy of 0.1 °C is required. In addition, a metal block with openings for the temperature cable sensor and a reference sensor are required.

  Note When calibrating the temperature cable sensor care must be taken to ensure that the metal block is protected against any external environmental conditions such as changes in temperature through draughts and direct sunlight. It is recommended to host the metal block and both temperature and reference sensors in an enclosure.

Environmental conditions for calibration

- The workstation must be ESD protected. This ensures that the internal circuitry of the electronic devices are protected from electrostatic discharge.
- Calibration must take place over the temperature range 20°C to 26°C.
- Relative humidity should be over the range 10% to 90%.
- Air pressure should be over the range 813 mbar to 1113 mbar.

Starting the calibrations

1. Use an Ethernet cable to connect CALIMASTER 2 to the PC.
2. Power CALIMASTER 2 via the provided power supply/charger.
3. With the PC running, start Google Chrome then enter the following information in the browser address bar: 169.254.1.1/cgi-bin/calibrate
   The following page opens.
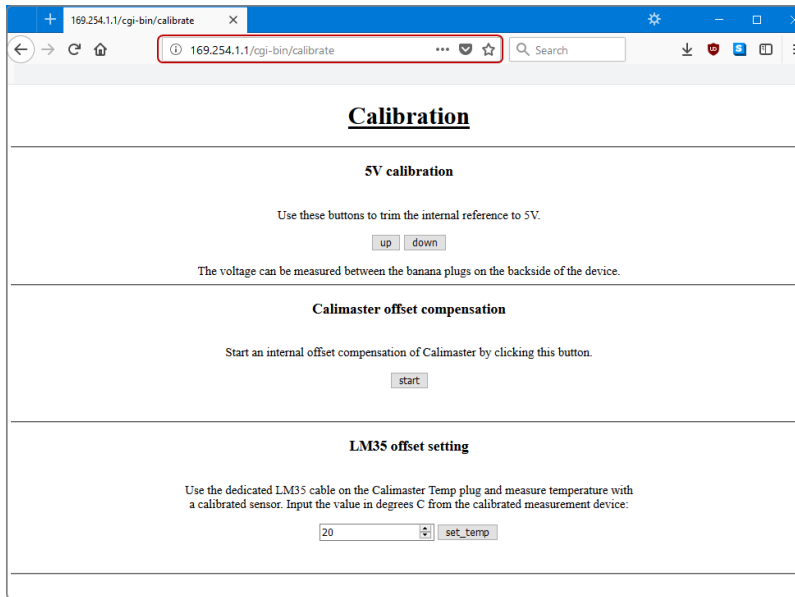
5 V calibration

Note It is recommended to perform this calibration annually.

The initial step in the calibration of CALIMASTER 2 is the levelling of its 5 V internal reference voltage.
The measuring ports of the internal reference voltage are located behind the two rightmost rubber stoppers on the back of CALIMASTER 2.

Use a thin, flat, and stiff object such as a screwdriver to remove the two rubber stoppers.

Note Care must be taken not to scratch the anodized CALIMASTER 2 rear.


The two 4 mm banana sockets are exposed. The black port is ground while the red one is the 5 V port.

Connect the measuring ports to the calibrated voltmeter as required.

The 5V reference voltage is of low impedance and can therefore allow some small amount of current (mA). For calibration, the output load should be as low as possible (implying high input resistance in the voltmeter). The cables connecting the measuring ports to the volmeter should be short and twisted. Although the power loss in CALIMASTER 2 is low (ca. 7 W) its enclosure results in an internal increase of temperature by 10°C. It is therefore recommended that CALIMASTER 2 should be allowed a warm-up time of at least 30 minutes before commencing with the calibration.

Note It is recommended that calibration measurements should be taken only when the CALIMASTER 2 online LED located on the front lights green.
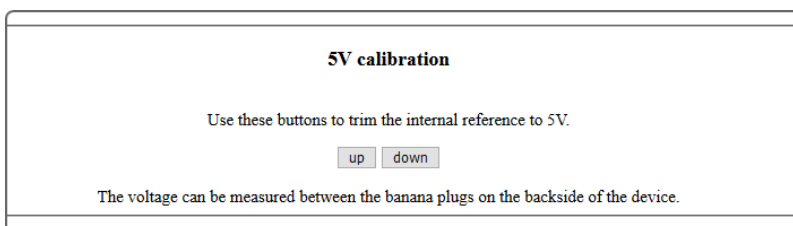
Adjust the voltage read out by clicking either the 'up' and/or 'down' in the "Calibration" browser page. Trim the voltage to 5 V as exact as possible. The reference voltage is increased or decreased via an internal digital potentiometer. The final value set is stored in the flash of the IGEPv2 controller in CALIMASTER 2 for future starts.

Note If the IGEPv2 controller board is replaced or a firmware update is carried on the board using a micro SD card then the 5 V calibration is nullified.
A firmware update carried out via Ethernet does not alter the set reference voltage.

5 V calibration threshold

The 5 V calibration has two defined acceptable voltage ranges.

- The range 4.99991 V – 5.00009 V is the no action range. This is the range that should be attained during calibration.
- The range 4.9975 V – 5.0025 V is the calibration limit. CALIMASTER 2 measurements are not admissible outside this range.

The following table is an overview of acceptable and unacceptable 5 V ranges.

Voltage range	Acceptability
< 4.9975 V	Value outside acceptable limits
4.9975 V – 4.9999 V	Value within limits; CALIMASTER 2 requires calibration
4.9991 V – 5.00009 V	Values within limits; no action required

5.0001 V – 5.0025 V   Value within limits; CALIMASTER 2 requires calibration
> 5.0025 V   Value outside acceptable limits

Note If values are way off limits during the calibration of CALIMASTER 2, please contact
PRÜFTECHNIK Condition Monitoring.

Internal offset compensation

Note It is recommended to perform this calibration annually.

CALIMASTER 2 requires an internal offset compensation. For this compensation, the analog
inputs for various input configurations are connected to ground or 2.5 V (derived from the ref-
erence voltage). Any deviation from the expected values are measured on the analog-to-
digital converter. These deviation values are saved in the various offset and gain values, and
taken into consideration during calibration and adjustment measurements.

Note The internal offset compensation should be carried out only on CALIMASTER 2 with
the correct 5 V calibration (refer to "5 V calibration" on page 28).

1. With CALIMASTER 2 powered, and the "Calibration" page on the browser open, ensure
that no other cable is connected to CALIMASTER 2.

Calimaster offset compensation

Start an internal offset compensation of Calimaster by clicking this button.
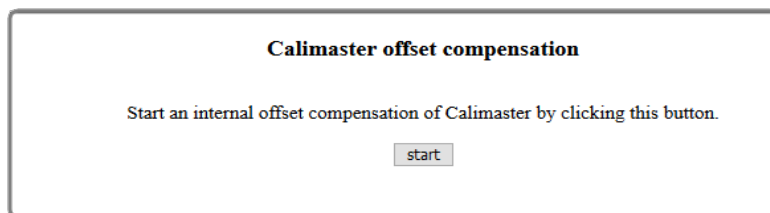
start

2. Click "start" then wait until all web browser actions are completed. This could take about
2 minutes.

LM35 (VIB 2.263) offset setting

Note Most CALIMASTER 2 in operation have been delivered with a dedicated temperature
cable VIB 2.263. If however a different temperature cable is to be used, then an off-
set compensation for the built-in LM35 sensor must be carried out.
Offset compensation for the dedicated temperature cable should be carried out peri-
odically.
Observe all the requirements stated in "Calibrating CALIMASTER 2 VIB 2.261 and the
temperature cable VIB 2.263" on page 27

Carrying out the offset compensation

1. Observing all given calibration instructions, insert the thicker black end of the tem-
perature cable deep enough in the metal block used for temperature measurement.

2. The temperature reference sensor connected to a calibrated thermometer is inserted in
the temperature measurement metal block.
Allow the reference sensor and the temperature cable a minimum time of at least 30
minutes together on the metal block.

3. With CALIMASTER 2 powered, and the "Calibration" page on the browser open, connect the blue end of the temperature cable to the CALIMASTER 2 "Temp" socket.

LM35 offset setting

Use the dedicated LM35 cable on the Calimaster Temp plug and measure temperature with a calibrated sensor. Input the value in degrees C from the calibrated measurement device:

[26 ⬍] [set_temp]

4. Enter the temperature recorded by the calibrated thermometer in the temperature field under "LM35 offset setting", then click "set_temp".
With this action, CALIMASTER 2 measures voltage output of the LM35 sensor converting it into a temperature, then calculates the difference between the two measured temperatures. The recorded temperature difference is displayed as "Current correction".

LM35 offset setting

Use the dedicated LM35 cable on the Calimaster Temp plug and measure temperature with a calibrated sensor. Input the value in degrees C from the calibrated measurement device:

Current correction: 0.512 deg C

[26] [set_temp]

This difference is recorded in CALIMASTER 2 and taken into account for any future temperature measurements.

Note It is recommended to click "set_temp" at least a second or third time within intervals of approximately 15 seconds. The displayed "current correction" values should be within a few hundredths of a degree. If the difference in the displayed values is much higher than the recommended "few" hundredths, measurement should be stopped for at least a few minutes to allow the temperature stabilize.

Note The temperature difference t_{diff} is taken into consideration only if tdiff $\leq +1.5°$C. The compensation value for a $t_{diff} > +1.5°$C is 0 (no compensation takes place).
Both the reference sensor and the LM35 sensor (enclosed in VIB 2.263) must be exposed to the same temperature, and the metal block must be protected from direct sunlight and draughts.

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