FLUKE®

Reliability

Balancing, Data Collector & Vibration Analyzer

VIBXPERT 3

○ Users Manual

Contents

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Safety and general information

Symbols

Symbol	Description
⚠	WARNING. RISK OF DANGER.
⚡	WARNING. HAZARDOUS VOLTAGE. Risk of electric shock.
📖i	Consult user documentation.
CE	Conforms to European Union directives.
UK CA	Conforms to UK legislation.
♻	This product complies with the WEEE Directive and its marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Do not dispose of this product as unsorted municipal waste. For information about take-back and recycling programs available in your country, see the PRÜFTECHNIK website.
♻	Denotes that the product is made of parts that are recyclable.

General safety

A *Warning* identifies conditions and procedures that are dangerous to the user.

A *Caution* identifies conditions and procedures that can cause damage to the Product or the equipment under test.

⚠️ ⚡ *Warning*

To prevent possible electrical shock, fire, or personal injury:

- Read all safety information before you use the product.

- Carefully read all instructions.

- Do not alter the product and use only as specified, or the protection supplied by the product can be compromised.

- Do not use the product around explosive gas, vapor, or in damp or wet environments.

- Use only approved power adapters to charge the battery.

- Do not use the product if it operates incorrectly.

- Use only specified replacement parts.

- Have an approved technician repair the product.

- Do not look directly into the stroboscope light source with either the naked eye or any optical tools (for example, binoculars, telescopes, microscopes). Optical tools can focus the light source and be dangerous to the eye.

- Do not look into the stroboscope light source. Do not point the light source directly at persons or animals or indirectly off reflective surfaces.

- The effects of light can trigger photosensitive epilepsy. Users with neurological proclivity for epileptic seizures must not operate the stroboscopes.

- Interference with active implants (e.g. pacemakers) cannot be ruled out. Wearers of active implants must not operate the stroboscope.

- Use the product only as specified.

- Do not open the product. Have the product repaired only through an approved technical site.

⚠️ ⚡ *Caution*

- As with any software that processes data, data may be lost or altered under certain cir-
  cumstances. Fluke strongly recommends that you keep a backup or printed record of all
  important data.

- Fluke assumes no liability for data lost or altered as a result of improper use, repairs,
  defects, battery replacement/failures or any other cause.

- Fluke assumes no responsibility, directly or indirectly, for financial losses or claims from
  third parties as a result of use of this product and any of its functions, such as loss or
  alteration of stored data.

Intended use

VIBXPERT 3 is used only to measure electrical signals in industrial environments with the tech-
nical specifications taken into account. Care must be taken to ensure that the device is not
dropped or knocked about. Sensors and cables are used only in specified areas. Applicable
technical specifications for sensors and cables are found in the PRÜFTECHNIK product catalog
which can be downloaded from www.pruftechnik.com.
No liability will be assumed when components or operation procedures as described in this
manual are altered without permission of the manufacturer. Use VIBXPERT 3 as intended or
the device protection can be compromised.

Items in the box

VIBXPERT 3 has different packages that depend on functionality.

> **Note**:Check and make sure that the delivered package items agree with the purchase
> order and the packing list. You can also refer to the PRÜFTECHNIK product catalog which
> is available for download at www.pruftechnik.com. Contact Fluke Reliability or your local
> sales representative if any package items miss or are damaged.

Handling precautions

VIBXPERT 3 and the related sensors are precision instruments and must not be dropped or subjected to physical shock.

Transport of devices that use lithium batteries

When you return lithium-ion battery operated devices to an approved technical site for inspection, service, calibration check or repair, make sure that the batteries are not defective. If you suspect a defect in the battery, DO NOT ship the unit with the defect battery back to PRÜFTECHNIK. You may contact your local representative for further information.
The relevant material safety data sheets for all PRÜFTECHNIK batteries are posted on the PRÜFTECHNIK website at www.pruftechnik.com. The package and dispatch regulations for any given battery are described under section 14 in the material safety data sheets.

Transport of magnetic components

To make sure that stray magnetic fields do not affect the avionics in aircraft, the aviation industry has put forward stringent regulations for air transportation of magnetic material. The magnetic field strength of such components must not exceed specified limits. To comply with this regulation, a cover plate for all PRÜFTECHNIK magnetic components is available. The plate lowers the magnetic field strength significantly, and keeps the magnetic field strength well below the necessary limits, and therefore cause no restrictions for air transportation. The relevant safety data sheets are available for download and reference on the PRÜFTECHNIK website at www.pruftechnik.com.

Storage

Use the provided case to transport the system and the related components. If the system is not used for an extended period, the system components must be stored in a cool, dry and well-ventilated location. Connect VIBXPERT 3 regularly to the power supply to avoid complete discharge of the rechargeable battery.
Observe the storage temperatures specified in the technical data.

Care

VIBXPERT 3 and the related system components must be kept clean. Wipe the device housing with a soft cloth dampened with a mild detergent. Do not use abrasives or solvents. Use a soft lint-free dry cloth to clean the display.

Maintenance

VIBXPERT 3 is essentially maintenance-free, but these points are to be observed:

- The manufacturer recommends that measurement accuracy be checked every 2 years. The date for the check is indicated by the colored wheel label affixed to the back of the device.

- Please return the device to an approved technical site for inspection by the indicated date. Make sure to backup data before you send the device to be inspected or repaired.

Disposal

Dispose of old devices in a professional and environmentally sound manner.

- Delete personal data on the product before disposal.

- Remove batteries that are not integrated into the electrical system before disposal. Dispose of batteries separately.

Introduction

How to use the on-board help

Tap ![Help icon] the start screen **Help** icon to access the on-board help.

Tap ![help icon] on any screen to access context sensitive help for the specific screen.
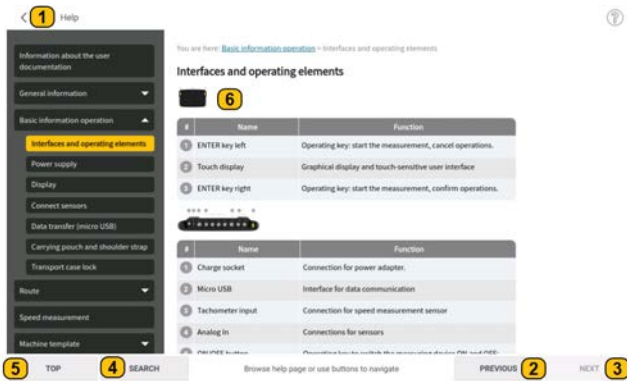
1	Tap ‹ to return to previous screen in the given path.
2	Tap **PREVIOUS** to go back to last help page visited.
3	Tap **NEXT** to go forward with visited help pages.
4	Tap **SEARCH** for a full-text search. A search field together with an onscreen keyboard appears.
5	Tap **TOP** to return to the beginning of the help page.
6	Throughout this on-board help, image thumbnails have been used. Tap the image thumbnail to enlarge the image for better viewing. To zoom out and proceed, tap the enlarged image.

User interface concept

The home screen which shows when the device is turned on contains short cut icons necessary to operate VIBXPERT 3 . The shown icons depend on the registered application.

The home screen icons are used to quickly access the items shown .

In VIBXPERT 3 , the focus is on the full machine train and not individual measure locations. Machine templates are used create full asset to be measured, and includes all machines on the train, all measure locations, and measure tasks for the locations.

> **Note**:In this help, the term measure locations is used to refer to the locations where sensors are mounted when an asset is measured. In eMaint condition monitoring the measure locations are referred to as test points and the terms are therefore inter-changeable.

The results, based on the used measure tasks, are immediately available. Additional applications such as balancing, coast down/run up, and bump test, are started within the selected asset by means of an application switch. All results related to an asset are saved within the asset, and can be saved in the file manager.

VIBXPERT 3 uses ***Routes*** to collect route data. A route is a compilation of assets and their measure locations. The measure locations are assigned necessary measure tasks. A route is arranged for maximum efficiency during data collection. Routes are created in eMaint condition monitoring, a web-based software, then transferred to the device by cloud transfer.

To quickly determine machine speed,VIBXPERT 3 uses ***Speed measurement***. In analysis, this function can also be accessed via the measurement screen hamburger menu (☰).

System packages

At this time, VIBXPERT 3 is available for field balancing. The standard VIBXPERT 3 balancing package will subsequently be upgradeable.

VIBXPERT 3 standard balancing package VIB 5.010-B (5437195)

This 2-channel package has these items:

Item no.	Description
5355008 (VIB 5.000)	VIBXPERT 3 device
5335476 (VIB 5.028)	VIBXPERT 3 Ruggedized trolley case
5335483 (VIB 5.054-GT)	Shoulder strap
5335490 (VIB 5.054-HS)	Hand strap (2 no.)
5192630	Power supply
5245530 (SYS 3.543)	USB-C data cable
5149479 (VIB 6.142 R)	Mobile Industrial accelerometer (2 no.)
VIB 5.037-2.9	Straight cable for line drive transducer (2 no.)
5147219 (VIB 3.420)	Magnetic holder for curved surfaces (2 no.)
5149855 (VIB 6.631)	Laser trigger / RPM sensor
5149870 (VIB 6.632)	Bracket (stand) for Laser trigger
VIB 5.032-2.9	VIBXPERT 3 cable for laser trigger / RPM sensor
5157126 (VIB 3.306)	Reflective tape

Upgrades and full signal analysis packages will be given when released.

> **Note**:Check and ensure that the delivered package items conform to the purchase order and the packing list. Reference may also be made to the PRÜFTECHNIK product catalog. Contact Fluke or your local sales representative if any package items are damaged or missed.

Home screen

The home screen appears when the device is switched on. If necessary, use ＜ to trace path back to home screen.
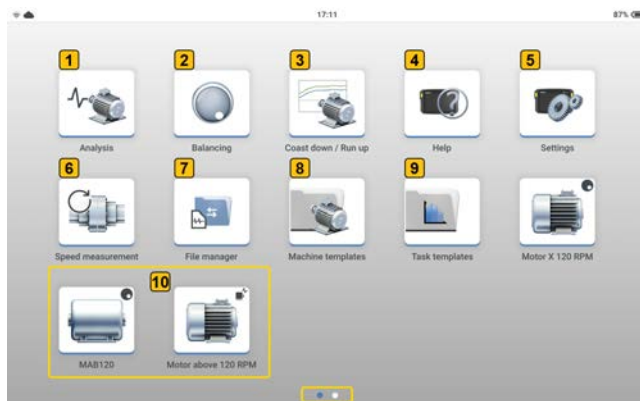
> **Note**:Icons shown on the home screen are different, and depend on the registered application.

Tap the respective icon to accesses the respective function.

|	
1	Use *Analysis* to start the data collection and vibration analysis application. Tap the icon to start the application from a machine template or from the necessary asset. Tap *Open assets* icon to open the file manager, then select the necessary asset. Alternatively, tap *Machine templates* icon to open the *Machine Templates List*, then select necessary template.

2	Use *Balancing* to start the balancing application. Tap the icon to start the application from a machine template or from the necessary asset.
	Tap *Open assets* icon to open the file manager, then select the necessary asset.
	Alternatively, tap *Machine templates* icon to open the *Machine Templates List*, then select necessary template.
3	Use *Coast down / Run up* to start the run up or coast down test. Tap the icon to start the application from a machine template or from the necessary asset.
	Tap *Open assets* icon to open the file manager, then select the necessary asset.
	Alternatively, tap *Machine templates* icon to open the *Machine Templates List*, then select necessary template.
4	Use *Help* to access the device on-board help.
5	Use *Settings* to apply necessary device and measure settings.
6	Use *Speed measurement* to determine machine speed (RPM) or the alternating frequency.
7	Use *File manager* to administrate saved measure results.
8	Use *Machine templates* to create machine hierarchy or when measuring similar machines.
9	Use *Task templates* for predefined measurement data set. The task parameters available include: measure quantity, lower and upper frequencies, measure time, number of lines, delta frequency, window, sampling rate (refer to "Task templates" on page 63).
10	Use the machine template shortcuts to open template of choice. The symbols at right top corner of the icon shows the application that will be started.
	– starts the vibration analysis application.
	– starts the balancing application.
	– starts the coast down / run up application.
	Note: To create machine template shortcuts, refer to "Machine templates" on page 42 .

The dots at the bottom of the screen show the number pages for the home screen.

Move applications icons on the home screen

- Touch and hold down any application icon on the home screen. A context menu is shown.
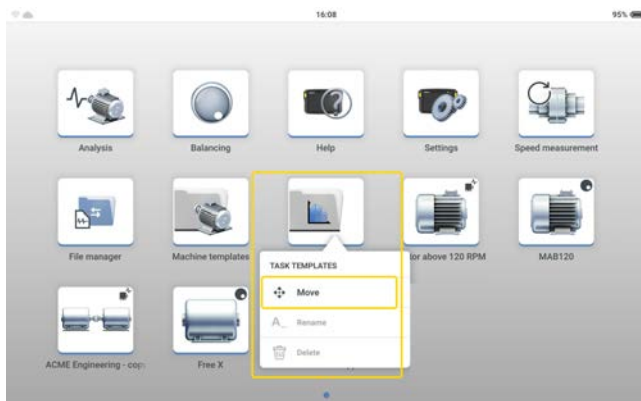
> **Note**: For factory default applications, only the menu item ***Move*** is active. User created shortcut icons can be renamed and deleted.

- Tap the menu item ***Move***. The icons begin to jiggle.

- Drag the icon to the necessary location. This could be on the same home screen or on another home screen page.

- When finished, tap the screen to stop the jiggle.

Interfaces and operating elements

Overview
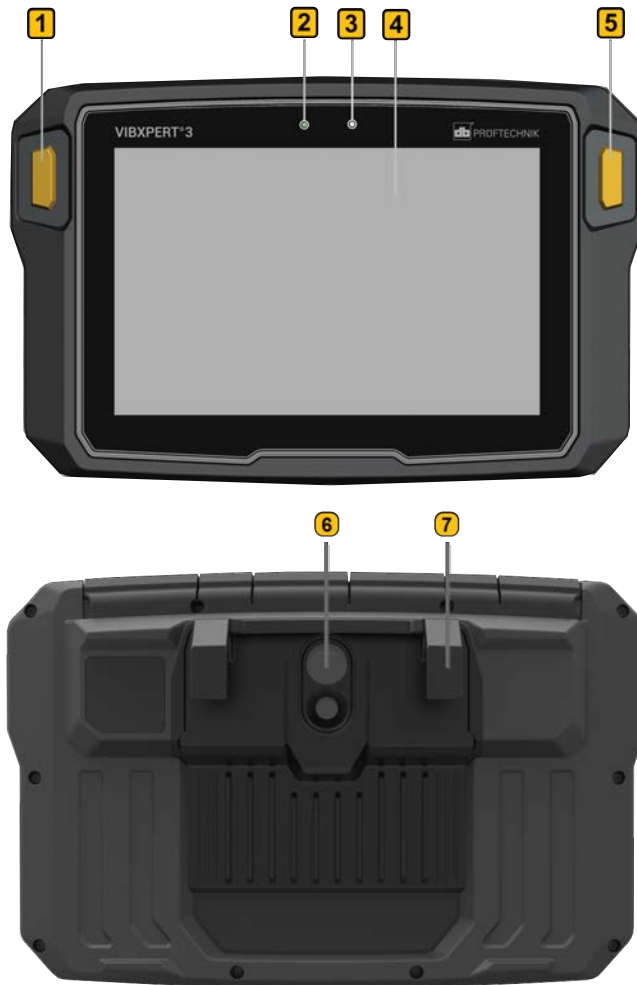
Label	Part	Function
1	ENTER button (left)	Start to measure and/or cancel action and/or confirm action
2	Battery charge LED	Shows battery charge capacity when device is in sleep mode.
3	Ambient light sensor	Adjusts display brightness automatically
4	Multi-touchscreen	Graphical display and touch-sensitive user interface
5	ENTER button (right)	Same as **1**

Label	Part	Function
6	Stroboscope	Strobe light to verify machine speed or the alternating frequency
7	Stand	Retractable stand to hold device in different positions

Note:The two yellow ENTER buttons (**1** and **5**) are by default connected to the action buttons in the application. The ENTER buttons can be used to activate action buttons such as NEXT / MEASURE .

Label	Part	Function
1	ON/OFF button	Switch device ON and OFF; activate/deactivate sleep mode
2	Channel 6	Analog input— connection for sensor
3	Channel 5	Analog input — connection for sensor
4	Channel 4	Analog input — connection for triaxial sensor or VIBCODE sensor
5	Trigger point 2	Connection for sensor to measure rotational speed or trigger signal
6	Trigger point 1	Connection for sensor to measure rotational speed or trigger signal
7	Channel 3	Analog input— connection for sensor
8	Channel 2	Analog input— connection for sensor

Label	Part	Function
9	Channel 1	Analog input — connection for triaxial sensor or VIBCODE sensor
10	Micro USB port	Communication interface to a PC
11	Charging socket	Connection for charger
12	Stand	Retractable stand to hold device in different positions

> **Note**:When a triaxial sensor is connected, then the two analog input channels next to the occupied channel cannot be used.
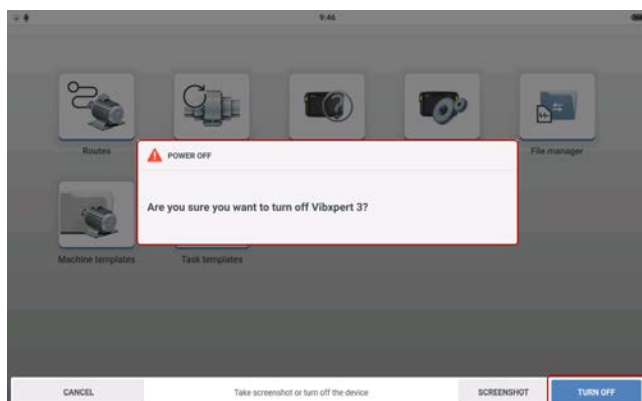
Notes on operation

Switch VIBXPERT 3 on

Press and hold down the ON/OFF button until the device peeps. The battery status LED lights up green. After a short period, the home screen shows in the display, and the battery status LED switches off.

Switch VIBXPERT 3 off

Press and hold down the ON/OFF button briefly. A hint to switch the device off is shown. Tap *TURN OFF* to confirm.

Sleep mode

The device can be made to either sleep or switched off. When the device is in sleep mode, it uses very little power and starts instantly when the ON/OFF button is pressed. When in sleep mode, the battery status LED lights green. The duration necessary before the device enters sleep mode is set under **Power Manager** in device settings.

Power supply

The device has an internal, rechargeable battery. To charge, connect the device to a mains supply via the provided charger/adapter. The charger/adapter is connected to the charging socket (refer to images above and below). The battery status LED lights green when charging. The battery capacity is shown on the right top corner of the display.

- Charge the non-removable battery only with the supplied charger/adapter. Follow the safety instructions supplied with the charger.
- Maximum charge temperature is 40°C (104°F).
- Do not deep discharge the battery (<15%).
- Observe the storage and transport conditions given in Handling precautions.

Shoulder and hand straps

A shoulder strap and two hand straps are provided with VIBXPERT 3 to give more comfort when the device is used to measure extended routes.

Use the buckles to adjust the length of the hand straps. When the size of the hand straps is correct, use the Velcro fasteners to wrap the straps. This gives you a reliable and comfortable grip.

Use the buckles and the two Velcro fasteners to adjust the length of the shoulder strap to the necessary size.

Use the snap hooks and attach the shoulder strap to the hand strap eyelets. Use any two diagonally positioned eyelets. This makes left- or right-handed operation possible.

> **Note**:When the device is carried with either the hand straps and/or the shoulder straps, the display must face the operator. This makes sure that the device cools as necessary, and meets radio transmission requirement. Also, the display is protected.

Settings

These settings can be checked and edited if necessary:
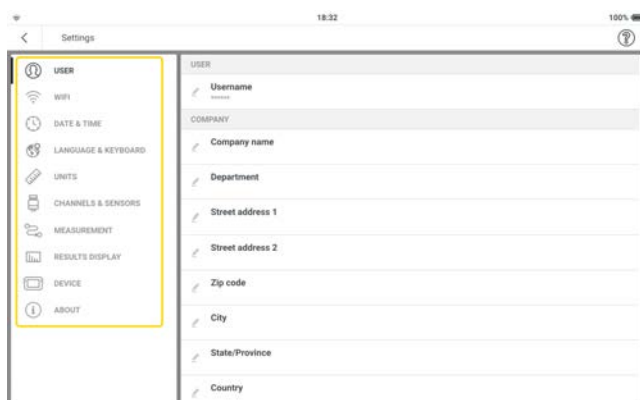
- **User**: used to set user and company details.

> **Note**:Due to General Data Protection Regulation (GDPR) the user name must be anonymized. Entered name will be shown in asterisks (each asterisk representing a character). This entered user name will be shown in the report if turned on in **Report setup**.
> The entered company name, address and zip code are shown on the report.

Tap ✐ then use the alphanumeric keyboard and edit user item as necessary. The name entered can be seen in the field if **Show** is on (✅ indicates on). Tap **APPLY CHANGES** to confirm changes.

- **Wi-Fi**: used to identify and connect the device to available Wi-Fi networks.

Tap ❌ to turn the device Wi-Fi on (✅ indicates on). Tap the name of the necessary Wi-Fi network. Enter the network password using the alphanumeric keyboard then tap **APPLY CHANGES** to confirm. The connected network IP address will be shown below the network name.

If necessary, a connected network can be forgotten. Tap the network with IP address shown, then tap **FORGET NETWORK**. To connect to this network again, the password must be entered. Network cannot be connected automatically.

- **Date & Time**: used to set time and date automatically or manually; set the 24-hour format; show date on status bar

Tap ❌ to turn on the necessary function (✅ indicates on). When **Set time automatically** is on, manual edit (✐) is off.

When **Set time automatically** is off (❌ indicates off), tap ✐ to set time and date

manually. Use the pop-up calender and the pop-up clock and set time and date respectively. Tap SET TIME or SET DATE to confirm respective changes.

- **Language & Keyboard**: used to change user interface (UI) language and UI keyboard layout. Only one UI language can be set at a time but selection of several UI keyboard layouts is possible. If several UI keyboard layouts have been selected, this keyboard icon ( ) is active. Tap to cycle through the available keyboard layouts.

  Tap **Language** or **Keyboard** then use the related drop-down menu to select UI language or UI keyboard layout(s).

- **Units**: used to set the measurement system to either metric or imperial. The accuracy in decimal places is can also be set. If the units of any quantity is set to differ from the selected measurement system, then the system name **custom** is shown.
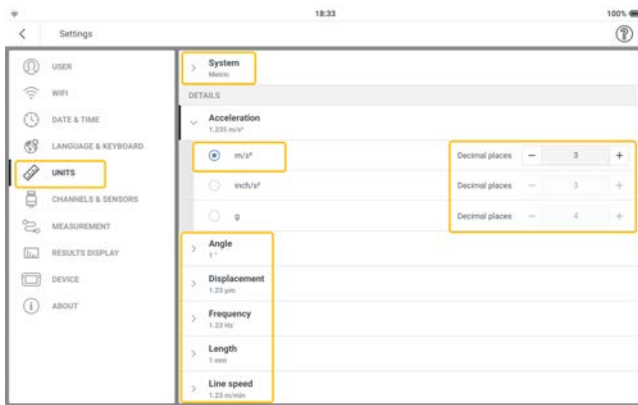
  If the user changes to the default measurement system, a hint to override any customized settings is shown.

- **Channels & Sensors**: used to show all the factory-configured and user defined sensors; set default sensor for related channel; set up additional sensors .

- **Measurement**:

  Default measurement screen — the default format in which assets to be measured are shown, is list.

  Show route summary — when on ( ), an overview of the route is shown when route measurement is started. When off ( ), the overview is not shown.

  Detail route guidances — when on ( ), a step-by-step guidance to the route measurement will be applied and all steps must be confirmed. When off ( ), measurement points are accessed directly.

  Machine speed finder — when on ( ), the asset RPM is calculated using the vibration measurements. The calculated RPM must be confirmed and possibly verified for

every measurement point. When off ( ), the asset RPM is determined at only the reference measurement point then transferred to all measurement points on the asset via the stored kinematic model.

> **Note**:Use Machine speed finder only when a reference speed point in relative mode is available on the asset, and the asset comprises several machine trains configured as a production line.
>
> **Practical tip**:Turn Machine speed finder on for all measurement points on the machine train, if the speed briefly fluctuates during asset measurement.

Sensor live values

Vibration location default — used to set the default parameter that is shown at a vibration location when live sensor data is on. The set parameter is valid for all measure locations on the asset. Only two parameters can be selected.

Displacement location default — used to set the default parameter that is shown at a displacement location when live sensor data is on. The set parameter is valid for all measure locations on the asset. Only two parameters can be selected.

- *Results display*: used to configure the results screen using characteristic overall values

  Display result after measurement — used to set the time to show live results. This includes time waveform, spectra and overall values. Use the drop-down menu and select necessary time option. If time is based on status, make sure that the correct status is selected.

  Data display — used to set the overall values for the measurement quantities. These values are shown on the on the right frame in results screen under the overall values page . Use the quantity drop-down menu and select necessary overall value.
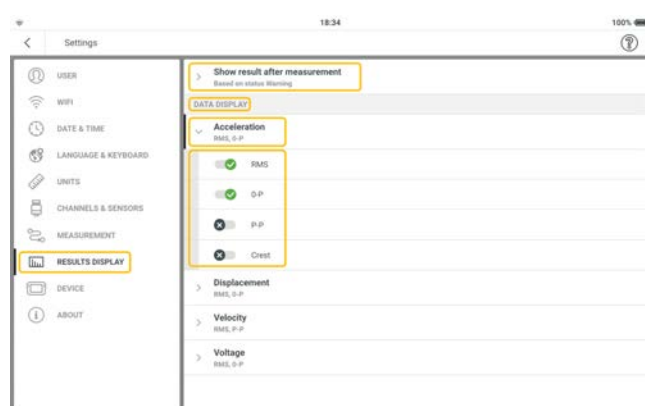
- *Device*: used to change the appearance of the display; control the brightness of the display; set the power options

  Color scheme — used to set display appearance either light or dark. Use the drop-down

menu and select necessary appearance.

Auto brightness — when on ( ), the display brightness is controlled to match current light conditions using the built-in ambient light sensor. When off ( ), display brightness is controlled using the ***Brightness*** slider.

Brightness — drag the slider to the right or left to control display brightness. This can be done even if ***Auto brightness*** is on.

Sleep — use the drop-down menu and select the time interval for the device to be inactive before the device automatically enters sleep mode. If Never is selected, the device will not go to sleep mode.

Power off — use the drop-down menu and select the time interval for the device to be inactive before the device switches off automatically. If Never is selected, the device will not switch off.

Show battery percentage — when on ( ), shows the battery capacity percentage on the top-right corner of the display. When off ( ) only the battery icon is shown.

- ***About***: used to edit the name of the device, show device serial number, storage capacity, firmware and hardware versions, calibration due date, registered applications, legal information and licenses, and reset device to factory settings.

Device name — tap then use the alphanumeric keyboard and edit the name of the device. Tap ***APPLY CHANGES*** to confirm changes. The device name is shown when the device is connected to a PC.

Registration information — shows all licensed applications, and is used to register additional applications (refer to "License additional applications" on page 29).

Legal information — shows necessary legal and open source software information. Tap ***Legal information*** to see the information. Tap ***NEXT*** to go through the pages. Tap ***BACK*** to leave the pages.

Reset to factory settings — used to go back to default settings.

> **Note**:If this step is done, all data and settings on VIBXPERT 3 will be deleted.

Tap ***Reset to factory settings***. A hint is shown that warns that data will be deleted.
Tap ***ENTER CODE*** and enter the code shown in the on-screen keyboard window.

Channels and sensors — basic settings

Channels & Sensors menu item shows all available sensors and the channel default sensors.
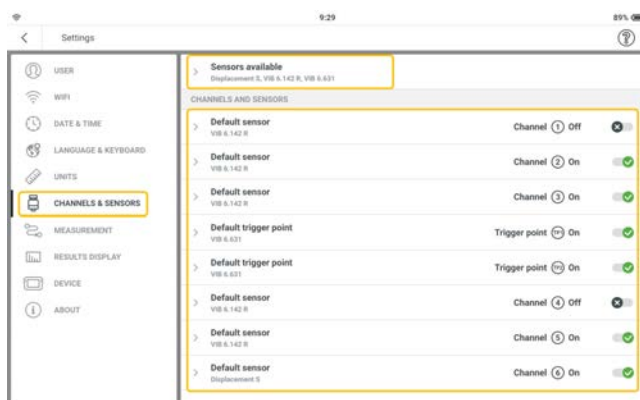
Sensors available in VIBXPERT 3

Tap *Sensors available* to see all listed sensors.
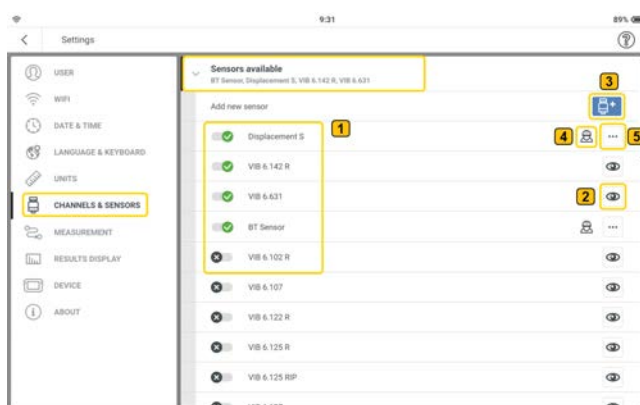
The listed sensors are, all available factory-configured and user defined sensors.

1	Shows preselected sensors; tap ⊗ to preselect necessary sensor (✓ indicates sensor selected). Preselected sensors are usually available to the user and appear listed first when sensors are assigned to measurement channels.
2	Tap 👁 to see the parameters of the selected sensor. The icon is available for only factory-configured sensors. Factory-configured sensors cannot be deleted from the list of available sensors.
3	Tap ⊟⁺ to add a single axis sensor to the list of available sensors. A window to edit the sensor parameters shows. Edit the parameters as necessary.

| 4 | The icon shows user defined sensors. User defined sensors can be deleted from the list of available sensors. |
| 5 | Tap the meatball menu to edit name and parameters of the added user defined sensor, or to delete the sensor. |

License additional applications

If additional VIBXPERT 3 applications are purchased, these must be registered on the device. The registration details are available in the supplied firmware registration certificate.

Register applications

- Make sure you have the firmware registration certificate at hand. The certificate contains the device serial number, the feature key and license code for the new applications.

- From the home screen, tap the settings icon.

- With the settings screen open select **About**>**Registration information**.
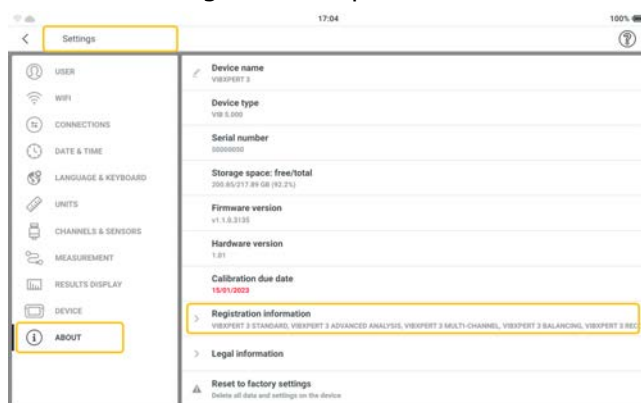
- With the Registration information window open, tap **ENTER KEY AND CODE** (**1**).
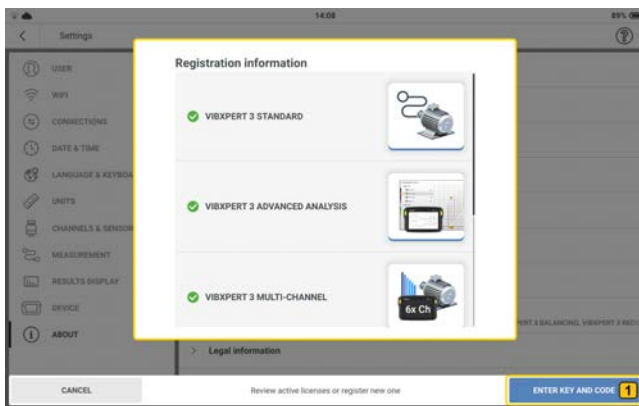
- Use the alphanumeric keypad and enter the feature key (**1**) given on the issued firmware registration certificate.
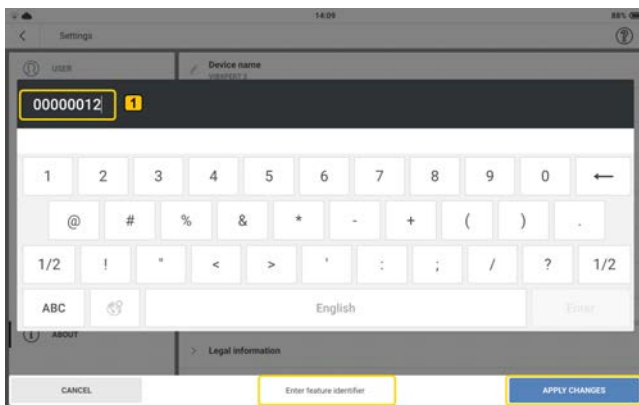
Tap **APPLY CHANGES** to confirm entry. The license code field is shown.

- Use the alphanumeric keypad and enter the license code (**1**) given on the issued firmware registration certificate.
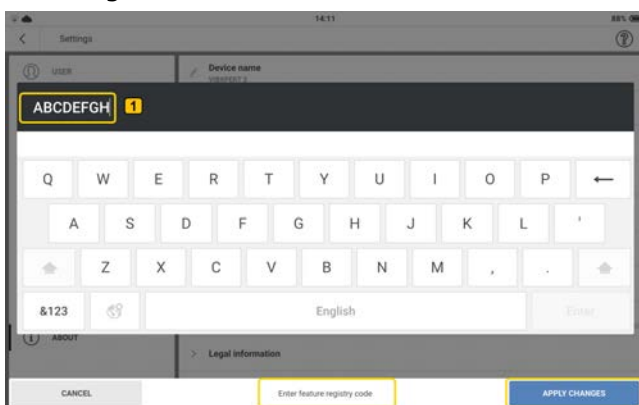
Tap **APPLY CHANGES** to confirm entry. If registration is successful, the hint **Feature successfully registered** is shown. All registered applications are then shown in **Settings** > **About** > **Registration information**.

Update VIBXPERT 3 to a newer version

> **Note**: A notification on firmware updates will be available.

- Download the update file to the necessary directory on a PC.
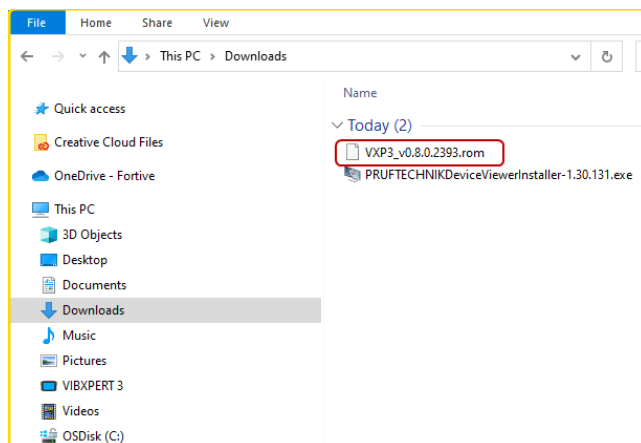
- Switch VIBXPERT 3 on then connect the device to the PC. Use the supplied USB-A to USB-C cable.
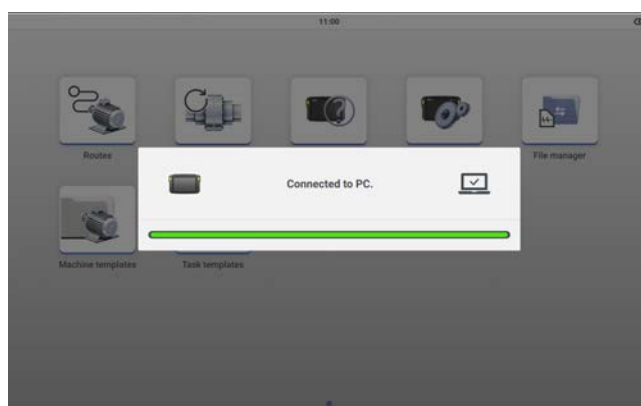
Note: Make sure VIBXPERT 3 remains connected to the mains supply during the firmware update process.

- VIBXPERT 3 is shown in the File Explorer.
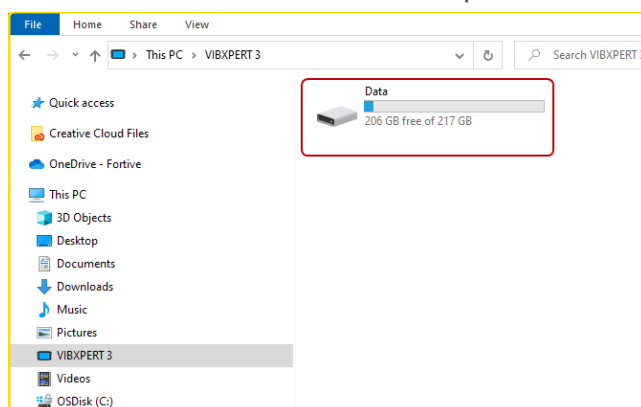
- Double click **Data** then **System Data** to access the **Update** folder.
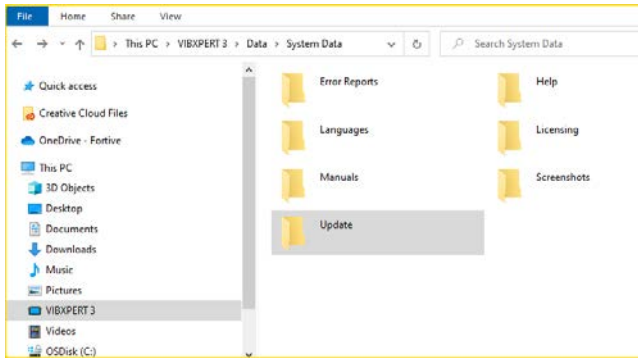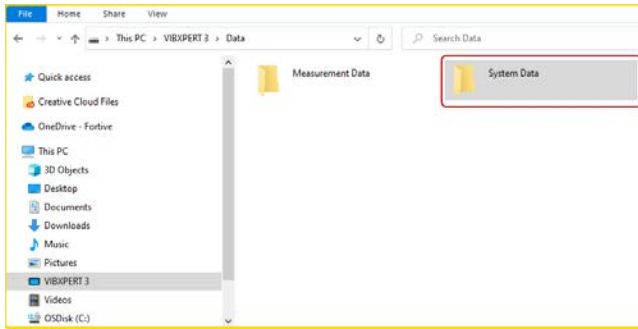
- Transfer the update file [**VXP3_vx.x.x.xxxx.rom**] to the **Update** folder.
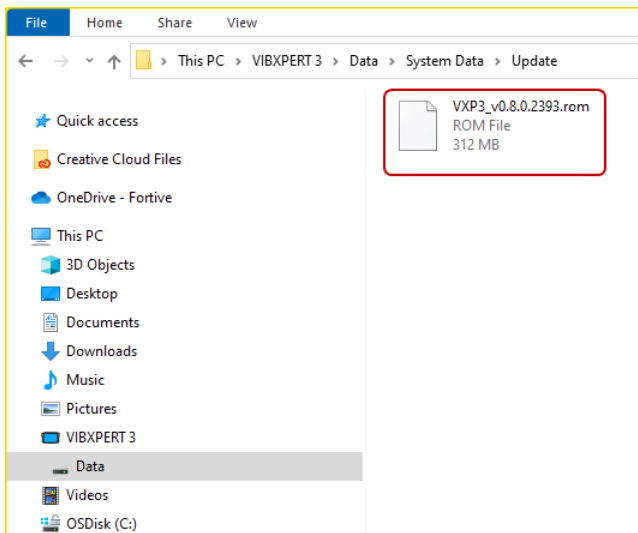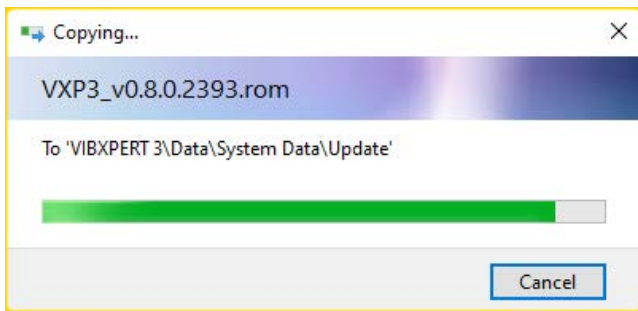
- After the update file has been copied in to the Update folder, disconnect VIBXPERT 3 from the PC. This hint is shown.
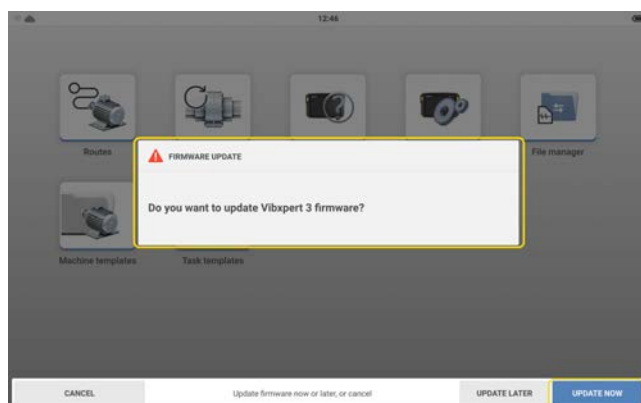
- Tap **UPDATE NOW** to proceed with the firmware update.
  Note: An option to update the firmware at a later stage is available. If this option is selected, update hint is shown when VIBXPERT 3 is switched on.

- During update, a progress bar is shown on the screen. This hint is also shown: ***Update in progress. Do not turn off the device.***

- Once the update is completed, this hint is shown.
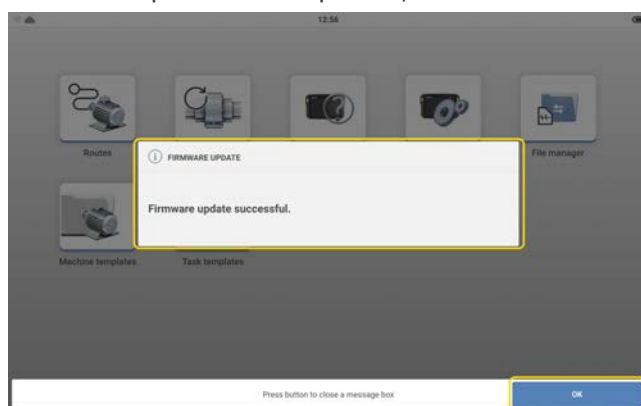
- Tap **OK** to close process.

RFID

Reader module

The device uses RFID – an automatic identification technology to:

- Identify assets to be measured
- Let the correct measure locations and their related measure tasks be measured

The device RFID reader module is on the back of device, and is identified by the RFID logo.

Identification is done with provided RFID tags. The tag is attached to an asset. To read the tag place the device reader module as close as possible to the tag (to within 5 mm if possible

> **Note**:Tags can be read only after the tag has been programmed. The tag can be programmed at any time.

How to program an RFID tag

The RFID functionality is useful in route measurements where many assets are measured. And therefore the program function is started in **Route List** screen.

- Tap the start screen **Routes** icon.

- From the list that is shown, tap and hold the necessary route. The Route List context menu is shown. Tap *Teach in*.
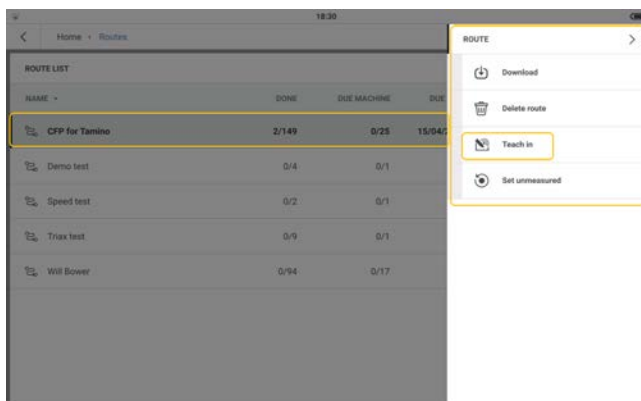
- Open route then navigate to the measure location to be assigned the tag. Select the location then place the tag as close as possible to the device reader module. A hint to assign the RFID tag is shown.
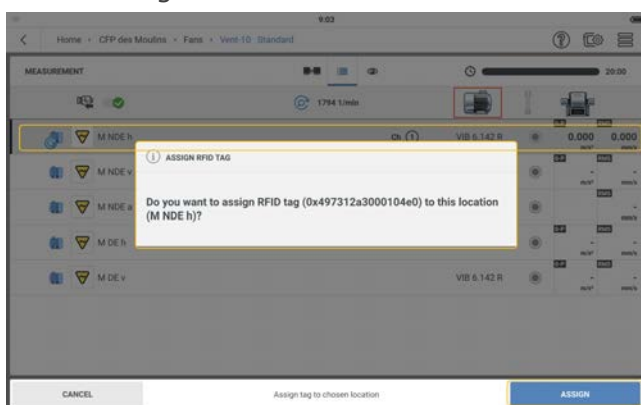
- Tap *ASSIGN* to complete.
- Physically connect the assigned RFID tag to the asset measure location.

How to use the connected RFID tag when the route is measured

- Tap the start screen *Routes* icon then navigate to the necessary route.

- Open route then place the device reader module as close as possible to the RFID tag (to within 5 mm if possible).
- The assigned measure location opens in the **Measurement** screen.
- Continue to measure the route asset.

How to change measure location recorded on an RFID tag

If necessary, the recorded measure location on an RFID tag can be changed.

-
  Tap the start screen ***Routes*** icon.

- From the list that is shown, tap and hold the necessary route. The Route List context menu is shown. Tap **Teach in**.
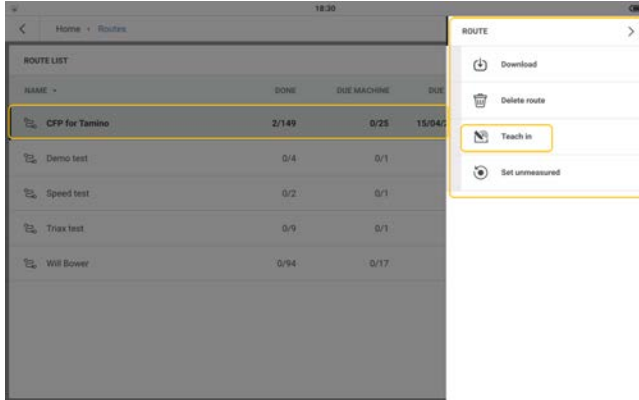
- Open route then navigate to the measure location to be assigned the tag. Select the location then place the tag as close as possible to the device reader module. A hint to assign the RFID tag is shown.
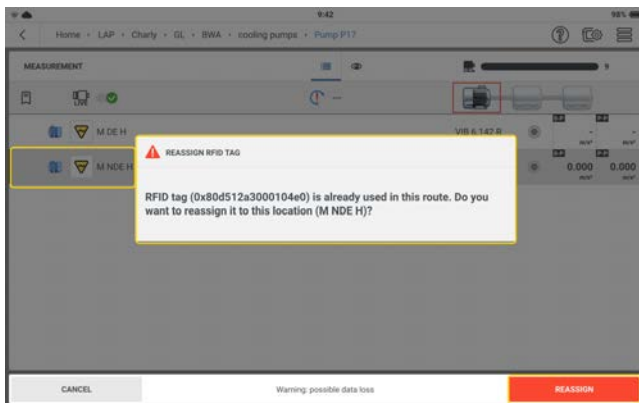
- Tap ***REASSIGN*** to complete.

- The changed RFID tag can now be physically connected to the new asset measure location.

File Manager

File manager is used to organize and list asset result files. The result files come from machine templates.

To access the file manager screen, tap [icon] the home screen **File manager** icon.
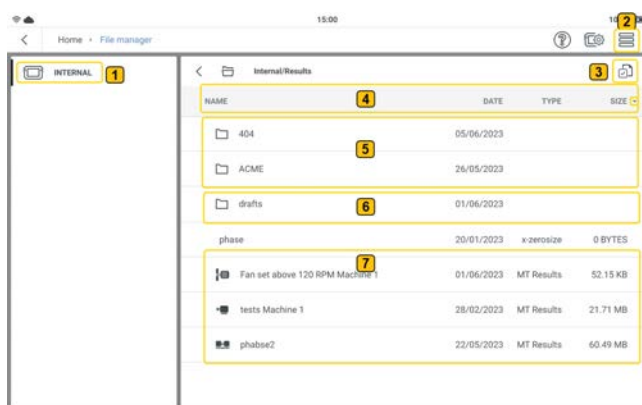
1	Shows the file hierarchy is internal with all folders and result files saved on VIBXPERT 3 .
2	Tap the hamburger menu icon to show the context menu items. If no folder or result file has been selected, the context menu will show only the item **New folder**.
3	Tap to activate the folders and files check boxes. The icon toggles color between black (check boxes inactive) and blue (check boxes active).
4	Tap any header item to sort the folders and results files by name or date or type or size. The arrow head next to the item shows the order in which the folders and the files have been sorted.
5	Shows user created folders.
6	Drafts folder is a default system folder and cannot be deleted. All template measure files that have been used but not saved end up in the drafts folder. This folder is useful if the device runs out of battery power.
7	Shows user created measure template result files.

If the folders and files check box icon is active ( ), files and folders can be selected for more steps.
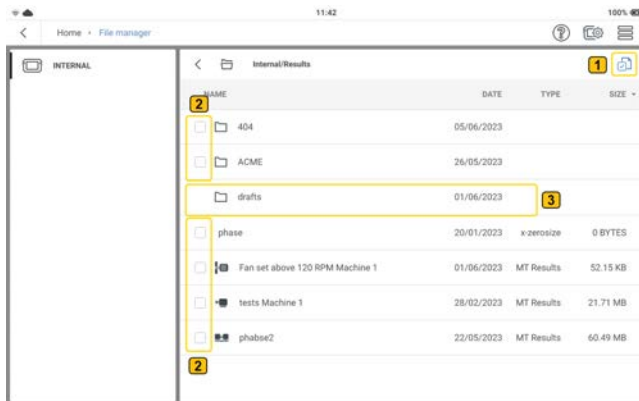
1	Shows check box icon ( ). To activate, tap .
2	Shows folders and result files check boxes. These appear when the check box icon (**1**) is active.
3	Shows the drafts folder. This default system folder cannot be checked, thus it cannot be renamed, copied or deleted. NOTE: If the drafts folder is open, the check box icon can be activated and individual template measure files deleted.

If the check box icon is active but no folder or file has been checked, the context menu will show only the item *New folder*. But if a single box has been checked, these menu items are shown:
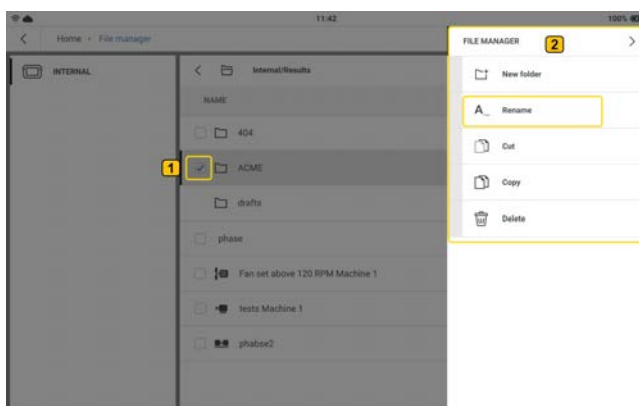
1	Shows a user defined folder checked.

2	Shows the context menu items with only one folder or result file checked. NOTE: If more than one check box is checked, the context menu item ***Rename*** is not shown.

Transfer files

The file manager is also used to transfer result files to different folders.

- From the home screen, tap the file manager icon. Folders and results files are shown.
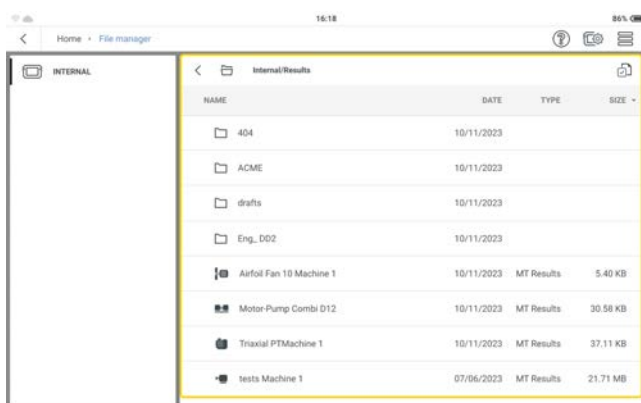
- Tap and hold the necessary results file (**1**), then use the context menu (**2**) that shows and cut or copy the file (**3**).

  If the necessary results file is in a separate folder, tap the folder (**4**) to show the file.
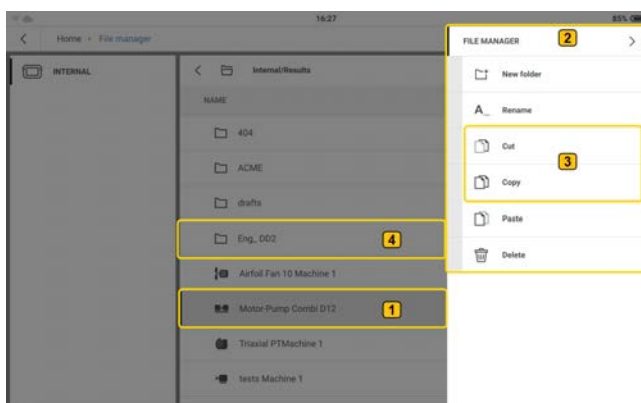
- Tap the folder where the results file is to be transferred, then tap ☰ to show the context menu.
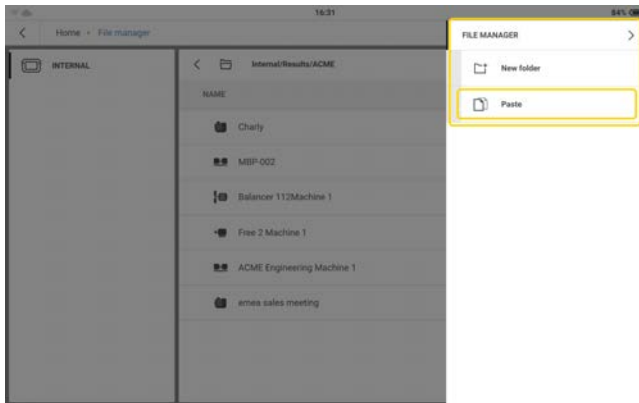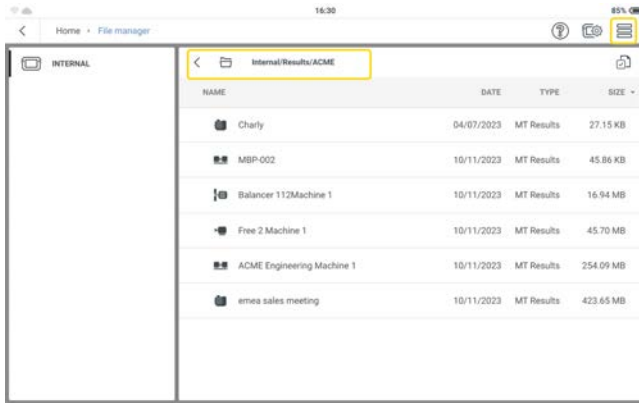
- Tap **Paste** to transfer file (**1**)to necessary folder.
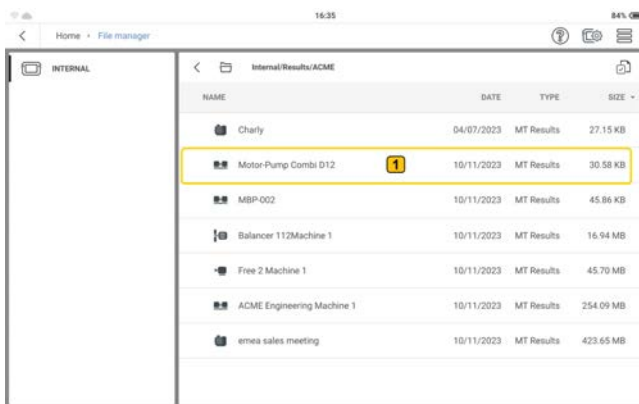
Transfer files between PC and VIBXPERT 3

If necessary, result files can be transferred between a PC and VIBXPERT 3.

It is also possible to create folders on a PC that can be transferred to file manager.

- Switch VIBXPERT 3 on then connect the device to the PC. Use the supplied USB-A to USB-C cable.

- Select VIBXPERT 3 > Data > Measurement Data > Results and navigate to Results folder.
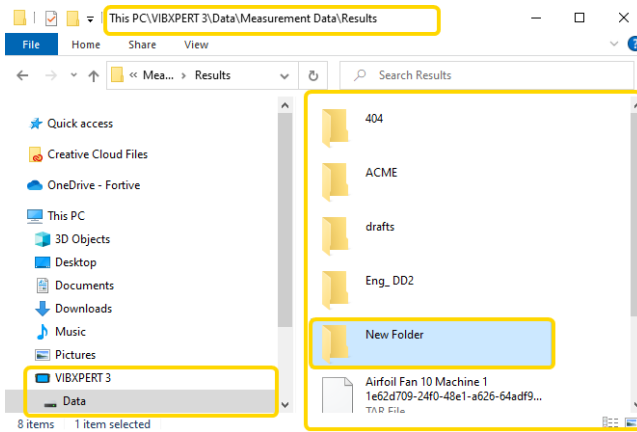
- If necessary, use Windows to create a new folder. This folder will be transferred to VIBXPERT 3.

- Result files can be moved to other folders on the PC. If necessary, these files can then be transferred to another VIBXPERT 3.

> **Note**:DO NOT move files between folders on the device as they will be corrupted.
>
> DO NOT rename result files. This action will corrupt the files.

Machine templates

A machine template is used to measure machines of the same type. The locations to be measured are at the same position and the measure tasks are the same for each machine. Typical applications are service measurements or acceptance measurements (production tests). Available templates are shown on *Machine Templates List*. These include factory defaults that can be customized.

From the home screen, tap to open the list.
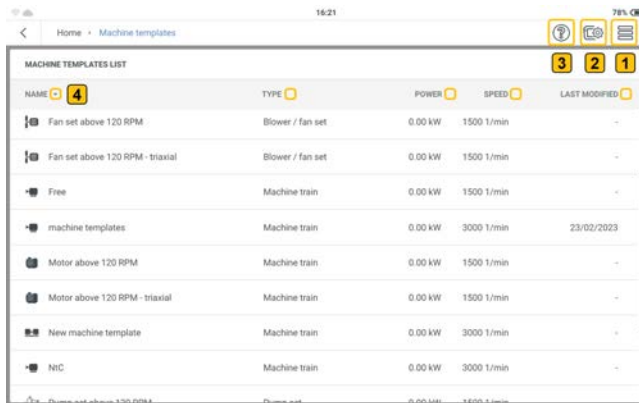
To help the user navigate through VIBXPERT 3 , all applications have these three icons ( ) in the top right corner of the screen. When tapped, the hamburger menu ( ) shows menu items related to the current context.

1	Tap ☰ to view menu items related to current context. In this example, as no item has been highlighted, the context menu item shown will be *New*. This is used to create a new measure template.
2	Tap 🖳 to open device and measurement settings screen.
3	Tap ⑦ to see context-sensitive help.
4	The arrow head is shown when a column title is tapped. The arrow head is then used to sort the templates by asset name, type of aggregate, power of aggregate, rotational speed, and date of last modification.

Machine template list menu items

If no machine template is highlighted, and then the hamburger menu (☰) is tapped, the context menu shows only the menu item *New*.

Highlight a machine template on the list, then tap ☰ to see the menu items available for the highlighted template. As an alternative, tap and hold the machine template to show the menu items available for the highlighted template.
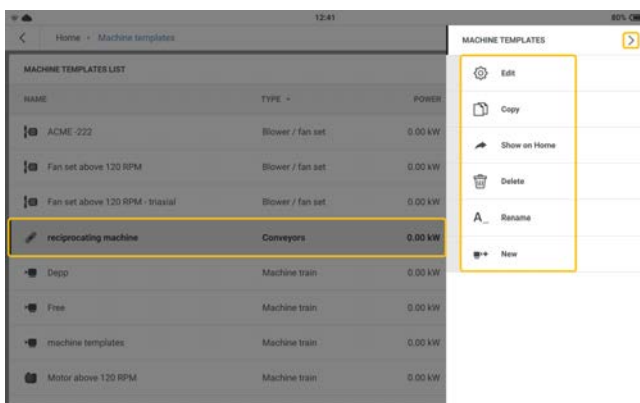

The context menu items are used to configure, create a copy, delete or rename the highlighted machine template. A short cut for the highlighted machine template can also be created on the home screen. If a short cut from the home screen already exists, then the menu item *Show on Home* will not be shown.

The context menu item *New* is used to create a new template.

Tap ⟩ to close the context menu.
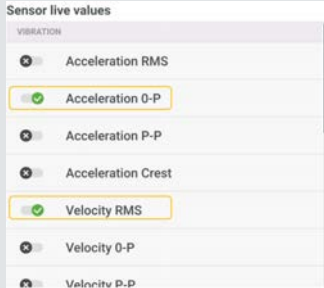
Machine template — an overview

- Tap necessary template. The measurement screen of the template is shown.
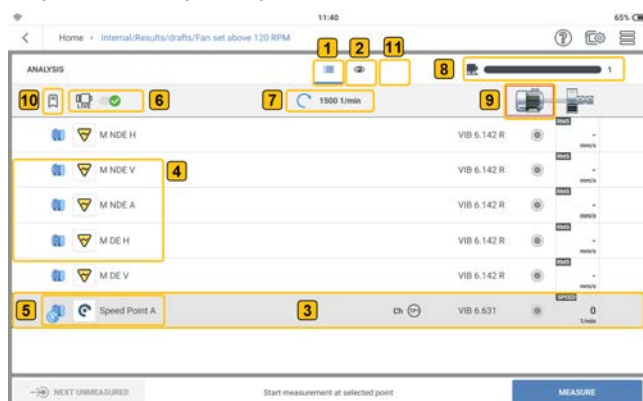

1 The list view is the default view. The measure locations for the selected machine (**9**) are shown in a list.

2	Tap 👁 to show the vibration and displacement parameters that can be selected to be shown live on the display. The parameters shown initially come from the settings item Sensor Live Values. The parameters can be changed here, but for only the selected machine train. A maximum of two parameters for vibration and/or displacement can be shown on the screen. **Sensor live values** VIBRATION ⊗ Acceleration RMS ✓ Acceleration 0-P ⊗ Acceleration P-P ⊗ Acceleration Crest ✓ Velocity RMS ⊗ Velocity 0-P ⊗ Velocity P-P
3	Shows currently selected measure location, device measure channel and type of sensor to be used to measure the selected location. The measure channel and sensor are selected in the device settings menu item **channels & sensors** . Live sensor values for the location are shown if the automatic sensor detection (**6**) is on.
4	Other measure locations on the machine
5	Shows a speed point merged with a measure location.
6	Live sensor data — (✓ indicates on; ✗ indicates off); when on, live values are shown
7	Machine train reference speed. This value is entered in configuration and the relative speed can be confirmed for the selected measure location with the stroboscope or speed finder. The absolute speed can be measured by the keyphasor.
8	Tap the progress bar to cycle through a summary of the machine train which includes: 🚂 – the machine train; ◎ – number of measure locations still to be measure on the train; 🕐 – estimated time to complete to measure the machine train.

|	
9	Shows currently selected machine. This is identified by the red rectangle outside the machine.
10	Tap 🔖 to show machine measure steps. This will include balancing, coast down and/or run up, bump test, or change of components and repairs.
11	In a balancing or coast down / run up application, the application measure setup tab ⦀ appears here.

Exit machine template without saving

If a machine template is selected for use but is not to be saved, use ‹ to return to the home screen. A window to save the template as an asset is shown.
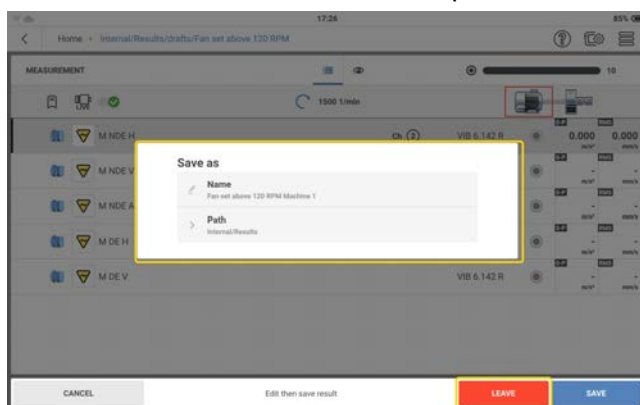
Tap *LEAVE* to exit the screen and return to machine template list, then tap ‹ to return to the home screen.

Create or modify a machine template

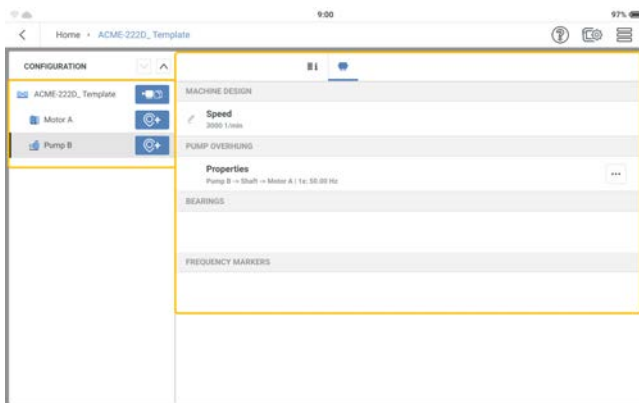• From Machine Templates context menu tap ◼️✚ .
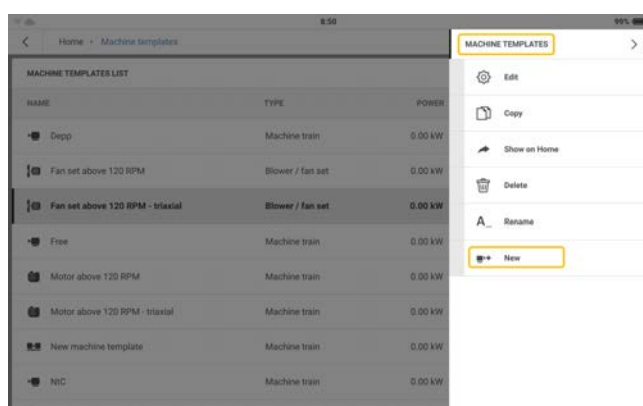
- Edit new template name as necessary.

- In the configuration screen, edit the asset as necessary. Start at the machine train level.
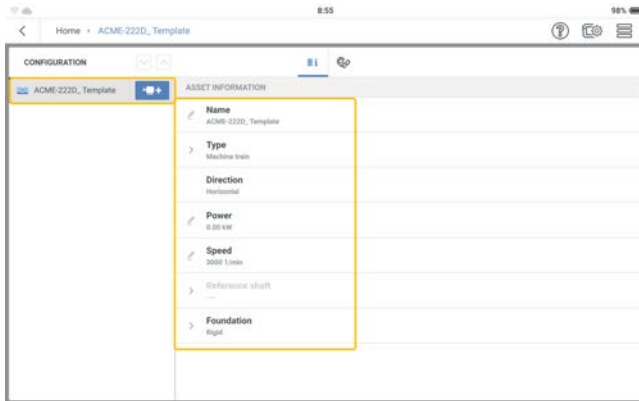
  Edit asset details as necessary.

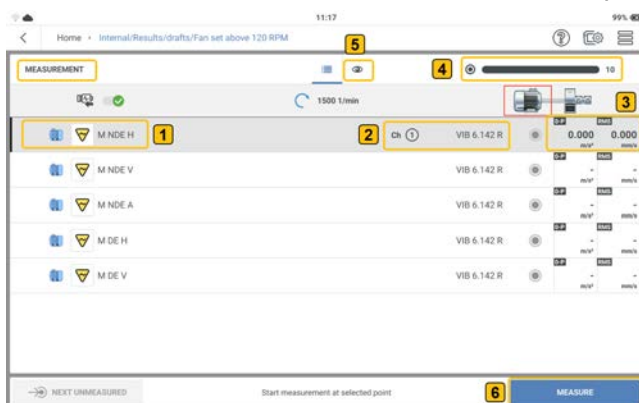- Add machines and measure locations as necessary .

> **Note**:
>
> Related measure tasks must be added for each measure location.
>
> The kinematic model must be valid.

Measure with machine template

- Before a measure job can begin, make sure that:

  The rechargeable battery is fully charged.

  The device settings are as necessary.

  The necessary sensors and cables are laid out and in good condition.

  Permanently mounted measure locations are in good condition. If necessary, clean them and repair any damage.

  Recesses for hand-held probes are prepared.

- From *Machine Templates List*, tap necessary template.
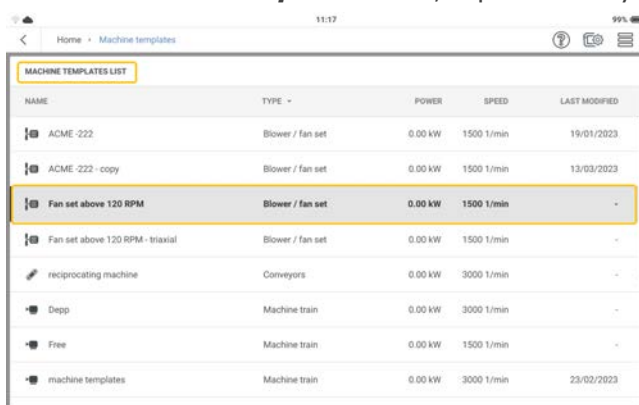
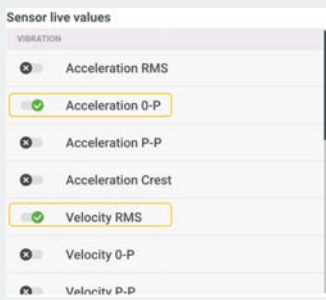

The measurement screen of the selected template is shown.

|	
1	Currently selected measure location
2	Shows channel and type of sensor to be used to measure the selected location. The measure channel and sensor are set in device settings .
3	Shows live values. The shown vibration and displacement parameters are set when 👁 (**5**) is tapped (see point **5** below).

4	Tap the progress bar **4** to cycle through a summary of the machine train which includes: – the machine train; – number of measure locations still to be measure on the train; – estimated time to complete to measure the machine train.
5	Tap (**5**) to show the vibration parameters that can be selected to be shown live on the display. A maximum of two parameters can be shown on the screen. **Sensor live values** VIBRATION Acceleration RMS Acceleration 0-P Acceleration P-P Acceleration Crest Velocity RMS Velocity 0-P Velocity P-P

• Tap to see the measurement screen menu items. These menu items are shown when the selected location HAS NOT BEEN measured:
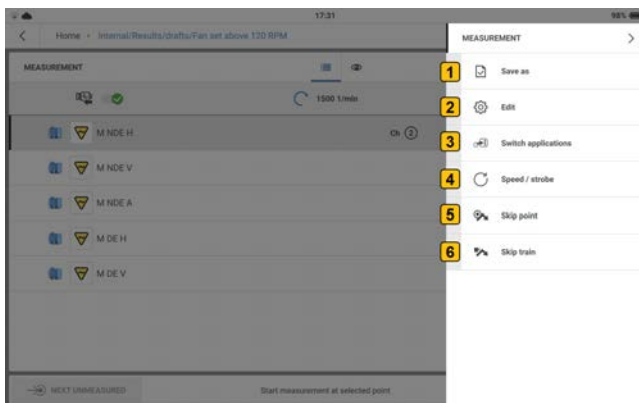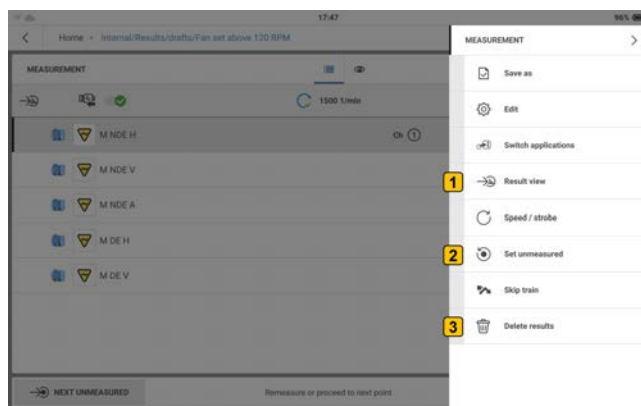
|	
1	Used to save asset result for future use. Tap then use the alpha-numeric keyboard and edit the name of the asset. Tap **APPLY CHANGES**> **SAVE** to save the asset in the selected path. Assets saved on the device are located in the file manager. **Note:** If a machine template is opened and cannot be saved (due to power interruption), a draft of the file is automatically saved in **drafts** folder in the file manager.

2	Tap ⚙ to open the ***Configuration*** screen where measure locations can be edited, given measure tasks, and band values set .
3	Tap 🔀 to switch applications from vibration analysis to field balancing or coast down and/or run up as necessary. With 🔀 it is possible to switch from any primary application to another supported application.
4	Tap ↻ to enter RPM manually or confirm the given RPM using a stroboscope or measure machine speed with keyphasor .
5	Tap ⟳ to skip all measure tasks for the selected location. This symbol (⟳) is shown on the skipped measure location.
6	Tap ⟳ to skip all measure tasks for the machine train. This symbol (⟳) is shown on all measure locations on the machine.

- When a location HAS BEEN measured, these menu items are shown:

1	Tap ⟶📊 to see results of the selected location.
2	Tap ⊙ to change the status of the selected location to unmeasured, then tap ***SET*** to make sure the status changes.
3	Tap 🗑 to delete results of selected location then tap ***ALL*** or ***LAST***; ALL deletes all results related to the measure location; LAST deletes results last measured.

- With the magnetic adapter attached to the necessary sensor and the related cable, mount the sensor to the machine to be measured, then connect the cable to the necessary channel on VIBXPERT 3.
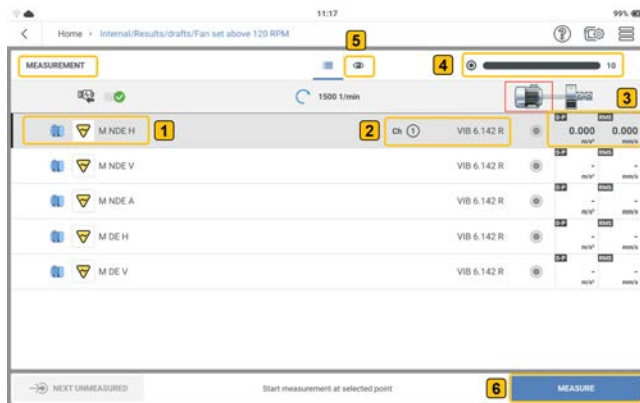
In the previous example, vibration is to be measured at location **1**. Channel 1 is used to measure (**2**).

- To measure, tap **MEASURE** (**6**). Alternatively, press either of the two yellow device ENTER buttons.

- After a location has been measured, results can be shown if necessary. The option to show results and hold the results on the screen is set in **Results Display** setting .
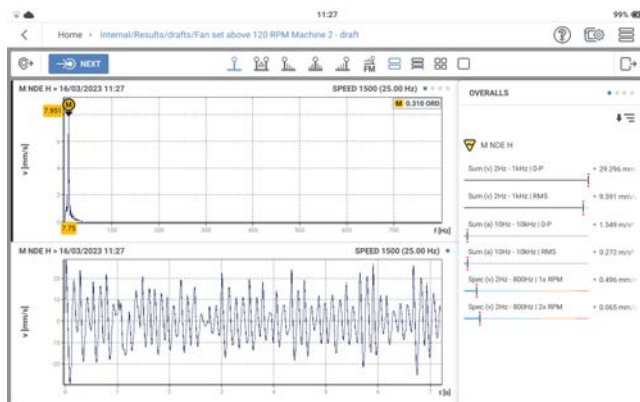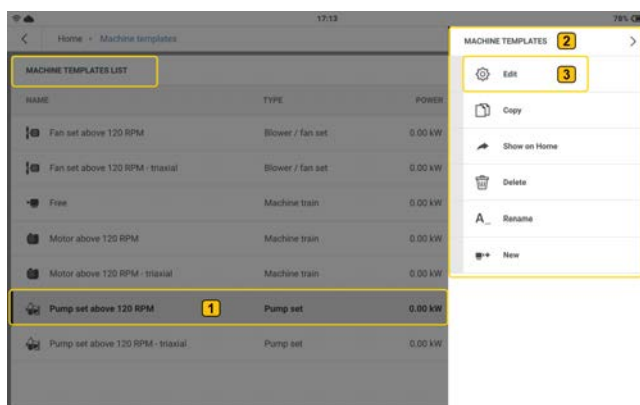
Measure configuration

Use the configuration screen to:

- Create asset — this can be a single machine or a machine train

- Duplicate machine with all measure locations (if already edited)

- Add and/or duplicate measure locations

- Edit measure location

- Add measure tasks and band values for measure locations

- Create measure location groups

Access the configuration screen as follows:

- From machine templates list

Tap and hold the necessary machine template (1). The machine templates menu items (2) are shown. Tap 3 to open the machine template configuration screen.

- From the measurement screen

Tap ☰ . The measurement menu items (1) are shown. Tap 2 to open the results configuration screen.
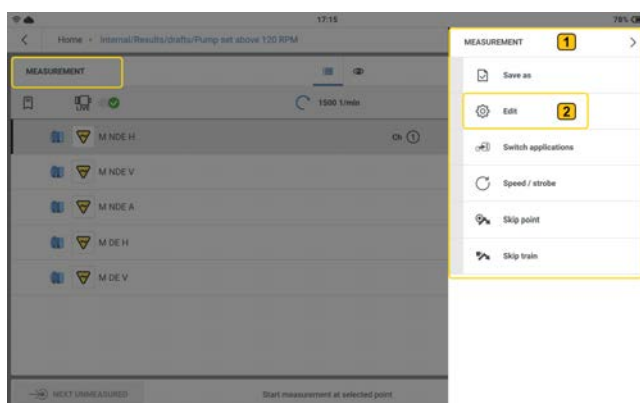
Menu items

	Machine Templates list		
⚙	Edit		Tap ⚙ to open the configuration screen where the asset can be edited.
🗐	Copy		Tap 🗐 to duplicate the highlighted machine template.
➤	Show on Home		Tap ➤ to create a home screen short-cut for the highlighted machine template.
🗑	Delete		Tap 🗑 to delete highlighted machine template. It is necessary to confirm the deletion.
A_	Rename		Tap A_ to rename the highlighted machine template.
▪◂+	New		Tap ▪◂+ to create a new machine template.

> **Note**:If you tap ☰ the hamburger menu icon in the machine templates screen with no template highlighted, only the menu item ***New*** (▪◂+) will be shown.
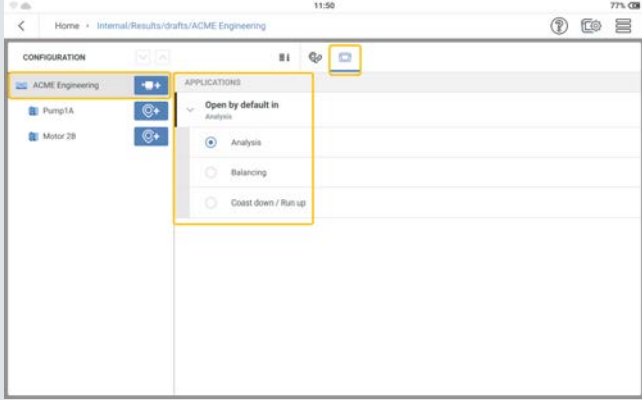
Create asset

> **Note**:To create an asset, use eMaint condition monitoring, or edit available templates, or create a new template.

Start at machine train which is the highest level of the hierarchy.

> **Note**:Lower levels include machine and measure locations. The different levels show different information.

1	Tap machine train level to edit asset. At machine train level, function tabs (**2**), (**3**) and (**4**) are shown and can be used.
2	Tap to edit asset name (*Name*), type of asset (*Type*), orientation of asset (*Direction*), asset *Power*, asset RPM (*Speed*), *Reference Shaft*, and type of *Foundation*. To edit this information, either tap then enter necessary values or name, OR tap and use the drop-down menu to select necessary item.
3	Tap to create measure location groups. This function helps compare results for the selected locations.
4	Tap to set the default application for the asset template when opened.
5	Tap to add a machine to the hierarchy.

In the machine level user can do these actions:

1	Tap necessary machine to edit machine information and machine model. At machine level, function icons ▤ (**2**) and ▦ (**3**) are shown and can be used.
2	Tap ▤ to edit selected measure name (*Name*), type of machine (*Type*) and machine **Power**. To edit machine power, the **Overwrite train power** function must be on. Tap ✕ to turn function on (✓ indicates on). To edit this information, either tap ✎ then enter necessary values or name, OR tap ❯ and use the drop-down menu to select necessary item.
3	Tap ▦ to see the machine model. A machine model simplifies the correlation between the various and complex vibrations within a machine. The model defines the machine components and includes type of bearing, line frequency, speed ratio calculation and information necessary to find fault frequency and calculate speed at each measure location. Refer to "Kinematic model" on page 58 .
4	Tap ▦ to duplicate the selected machine and the related measure locations.
5	If no measure location is selected, this icon (⊕) is shown. Tap ⊕ to add a measure location to the selected machine.

In the measure location level user can do these actions:

1	Tap necessary measure location to edit measure location information, add measure tasks and bands. The related function icons are: 📋i (**2**), 📋⌁ (**3**), and 📋▦ (**4**).
2	Tap 📋i to edit selected measure location name (*Name*), type of parameter to be measured at the location (*Type*), position of measure location on machine (*Direction*) and the machine RPM (*Speed*). The icon at the selected measure location shows the type of parameter to be measured (refer to Parameter icons below).
3	Tap 📋⌁ to see measure tasks related to the selected location and/or add tasks for the selected location.
4	Tap 📋▦ to see bands related to the selected location and/or add bands for the selected location.
5	Tap ▪+ to add a machine to the tree. This option is available only when a measure location is selected. If a machine is selected, this icon (▪◻) is shown. Tap ▪◻ to duplicate the selected machine and the related measure locations.
6	Tap ⊙ to duplicate the selected measure location. If no measure location is selected, this icon (⊙+) is shown. Tap ⊙+ to add a measure location to the selected machine.

| 7 | Tap ⌄ or ⌃ to reorder highlighted object by moving the object one position lower or higher respectively. Both measure locations and machines can be rearranged. |

NOTE: Use the configuration screen hamburger menu (☰) to delete machines and measure locations if necessary.

Parameter icons

Vibration:
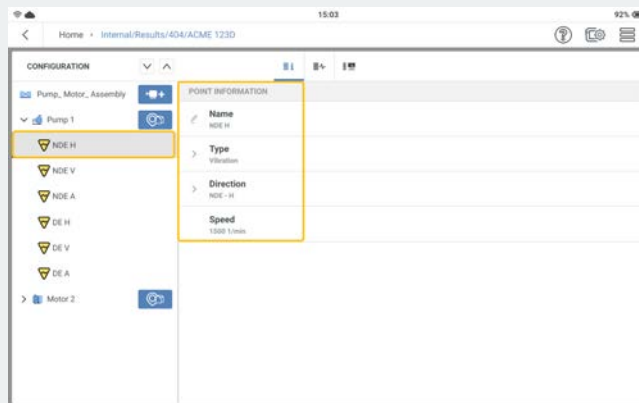
If a vibration parameter is selected to be measured, items to be edited are the measure location name (***Name***) and the position of the measure location on the machine (***Direction***).

Speed:
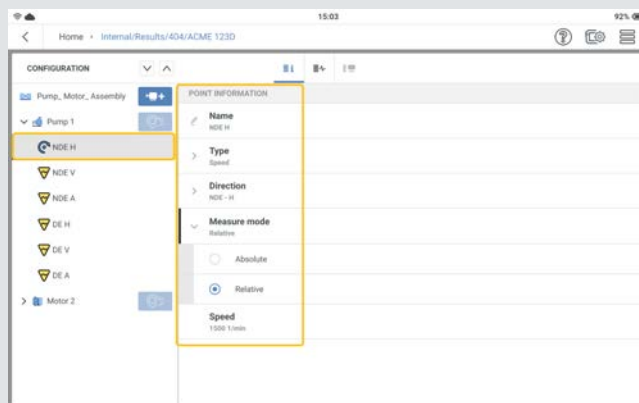
If speed is selected to be measured, items to be edited are the measure location name (***Name***), the position of the measure location on the machine (***Direction***), and how the speed is to be measured (***Measure mode***). This could be either relative or absolute. Relative speed can be measured with the speed finder. type of Absolute speed is measured using the keyphasor method .
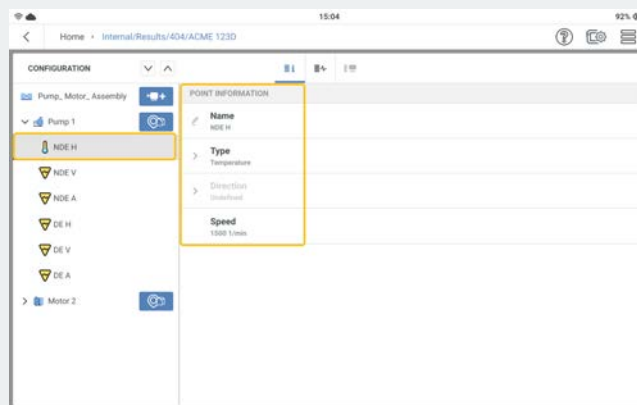
🌡️	**Temperature:** If temperature is selected to be measured, then only the measure location name (***Name***) can be edited.
▤	**Manual input:** If the parameter measured at the selected measure location is to be entered manually, then only the measure location name (***Name***) can be edited.
⚠️	**Displacement:** If displacement is selected to be measured, items to be edited are the measure location name (***Name***) and the position of the measure location on the machine (***Direction***).
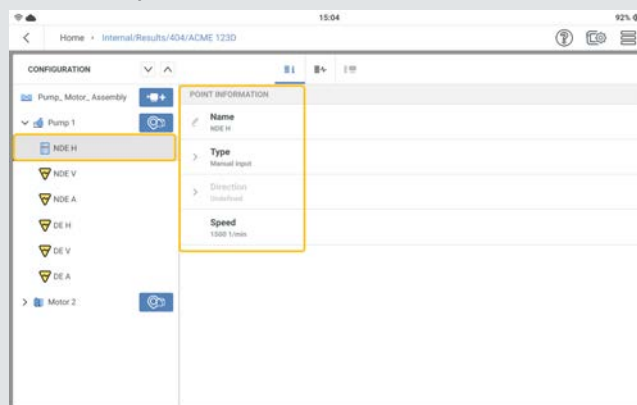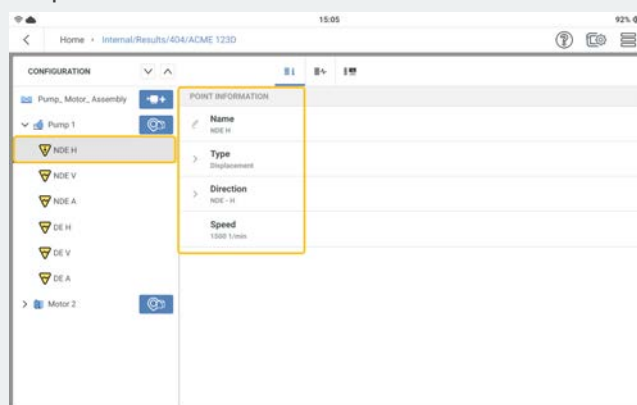
Kinematic model

Machines that rotate vibrate. The vibrations can be aligned with components of the machine in a spectral analysis. For a reliable frequency analysis, sources to the vibration frequencies to be expected, and their interdependency must be known. Even in a simple motor-pump machine train, complex vibration causes can exist. A kinematic model helps simplify the correlations. A kinematic model maps the kinematic conditions in a machine train. Based on a reference speed at a measure location on the train, VIBXPERT 3 uses a kinematic model to calculate the rotational speed at every measure location on the train machine. The reference speed is calculated or measured at the reference measure location.

The kinematic model has predefined models for many common machine types.

Assets can be modeled in VIBXPERT 3. If machine trains are not mapped correctly, it is not possible to measure the machines. VIBXPERT 3 shows a hint that the machine model is invalid.
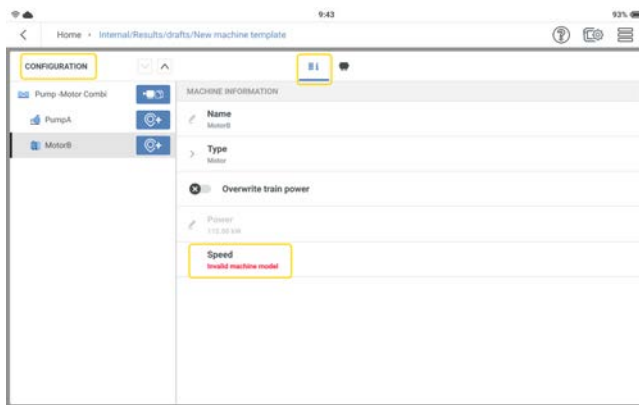
In the configuration screen, define the machine train and all measure locations. Assign all measure locations the necessary measure tasks .
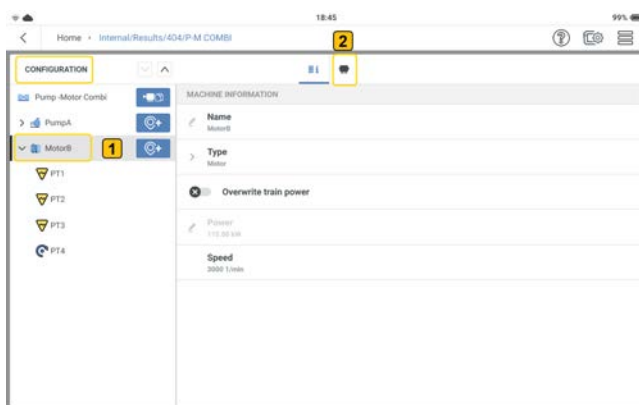
To complete the kinematic model for a machine train, tap a machine at the machine level (**1**). In the above case it is the motor. Then tap (**2**).
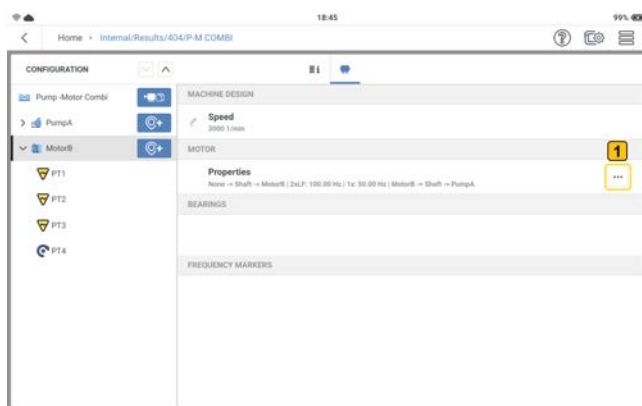
Tap the meatball menu [...] (**1**) to complete the scheme for the selected machine.
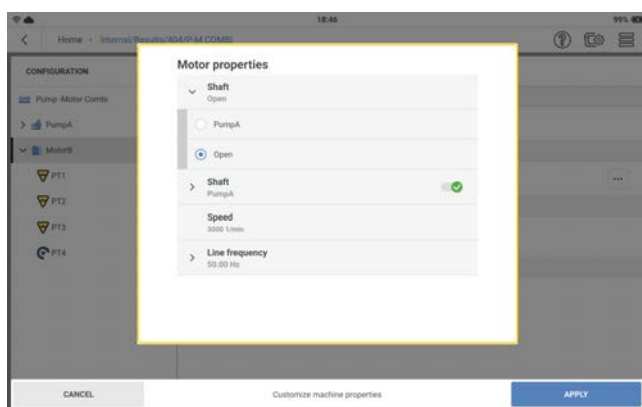
Set the properties as necessary. The shaft that connects two machines must be identified. If the shaft does not connect to a machine, it is left as Open. Select the correct line frequency.

> **Note**: Different machine types will have different properties.

Configure belt driven machine train

- From the home screen, tap the machine template icon. The machine templates list opens.

- Tap ☰ the hamburger menu to show the context menu items.
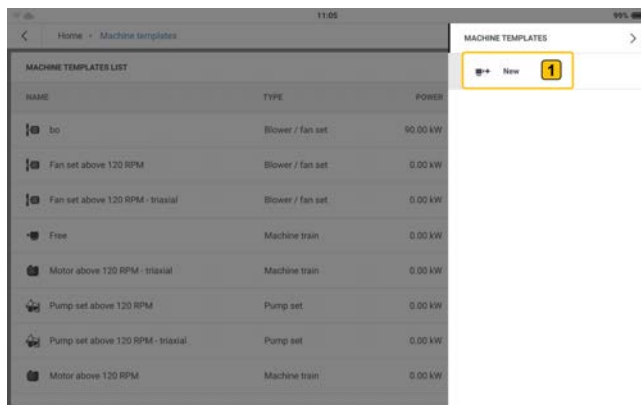
- Tap **New** (①) to create the necessary belt driven machine train template.

- Use the alphanumeric keyboard and edit the name of the template.

- Configure the belt driven machine train template as necessary.
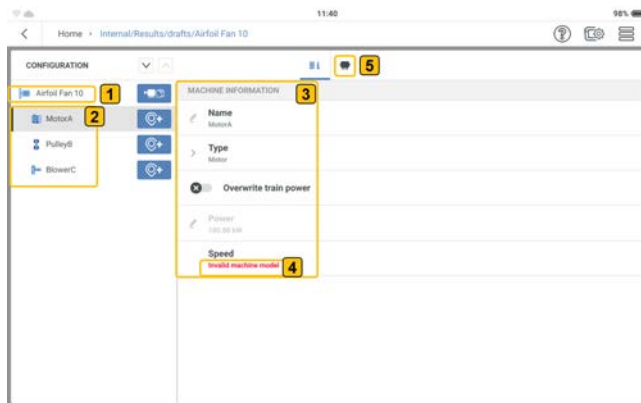
1	Shows machine train name.
2	Shows the type of machines in the machine train. In this example the three machines in the train are motor, belt drive and blower. The motor is the highlighted machine and the motor details are shown in **3**.
3	Shows details of machine highlighted in **2**. These details can be edited here.
4	Shows the hint that machine model requirements have not been complied with. Thus, the machine model must be corrected.
5	Tap 🖶 (**5**) to specify the correct machine properties.

- From the properties screen, tap the meatball menu ⋯ and edit the machine properties.
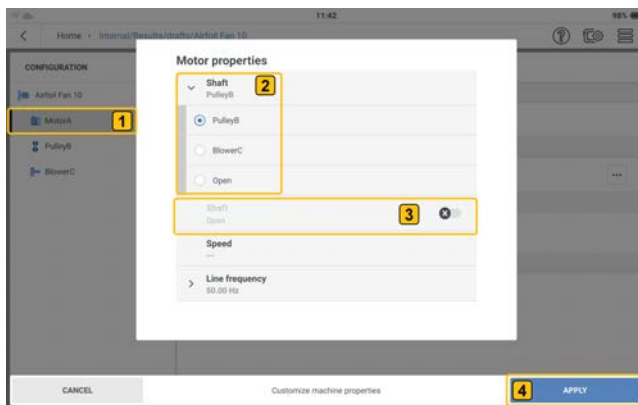
1	Shows selected machine; in this example, the motor.
2	Shows the shaft connections for the machine. Standard machines like motors and blowers have a single shaft connection. Belt drives have two shaft connections. In this example, the motor shaft is connected to the belt drive (PulleyB).
3	Shows a second shaft connection. In this example, their is only one shaft connection. Thus, the second shaft connection is set off.
4	Tap *APPLY* to confirm edited properties.

- Select belt drive, then tap the meatball menu ⋯ and edit the belt drive properties.
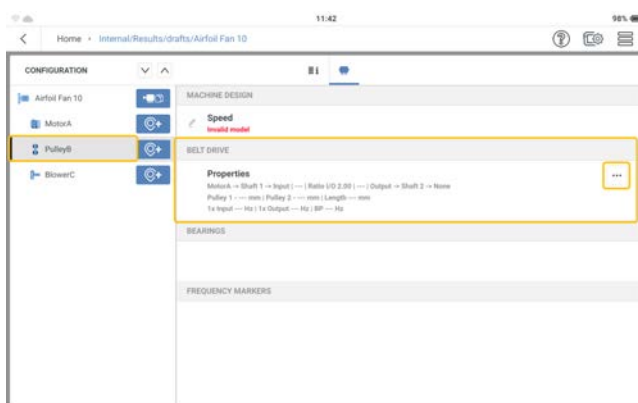
- In this example, the second belt drive shaft connection is set to the blower (BlowerC). Other drive belt properties to be edited are: pulley diameters and speed ratio. Tap *APPLY* to confirm edited properties.

- When all machine model requirements have been complied with, the measure locations can now be defined and the machine train measured.

Task templates

Use task templates screen to:

- show all available measure task, alarm and band templates

- create user defined measure task, alarm and band templates

- delete user defined measure task, alarm and band templates
  Note: System measure task, alarm and band templates cannot be deleted.

- set number of columns and column items to be shown
  Note: Tap any item in the headings bar **(X)** to sort the templates in ascending or descending order.

Tap ⊞ to see all available measure task templates.

Tap ⊞ to see all available band templates.

Tap 👁 to select up to five column items to be shown.

Select necessary items then tap *APPLY* to confirm selection.

Create a measure task

> **Note**:Any defined location cannot be measured if the necessary measure tasks have not been defined and assigned to the location.

- From the home screen, tap the task template icon. The task templates list opens.
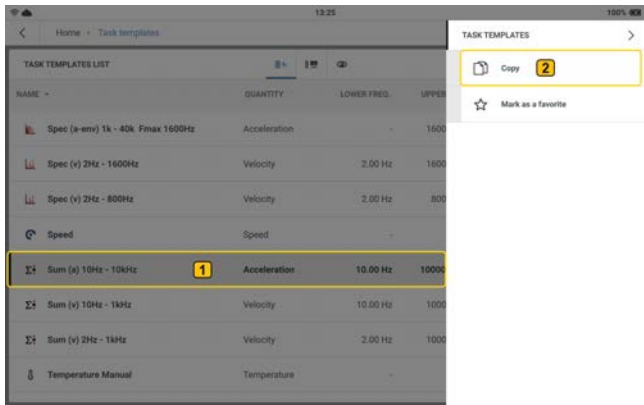
- Tap and hold the necessary task template (**1**). The task template context menu is shown. Tap ***Copy*** (**2**) to create a copy of the selected task template.

> **Note**:When a task with no factory template such as displacement is created, use an overall values template.

- Edit the task details as necessary.
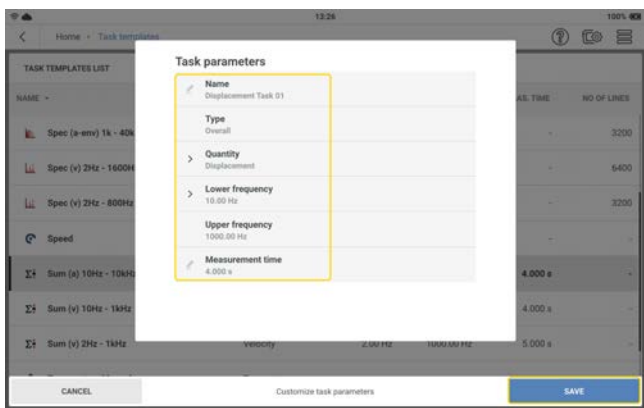
- Edit name – Tap ✎ then use the alphanumeric keyboard and edit task name.
- Quantity – Use the drop down and select necessary task. In this example the task is displacement.

- The lower frequency can also set with the drop-down menu.

- Measurement time can also be edited with the alphanumeric keyboard.

- After necessary changes have been applied, tap **SAVE** to add the task to the task template list.

> **Note**:User defined task templates can be deleted. Factory task templates cannot be deleted.

Measure task

What is a measure task?

To measure a location, the device requires information on type of parameter to be measured, type of sensor used, and if necessary, data for the evaluation of the result. If the RPM must be recorded, this information is also necessary. This data set is a measure task.

The device contains a full collection of measure tasks generated based on task templates. It is possible to create user defined measure tasks.
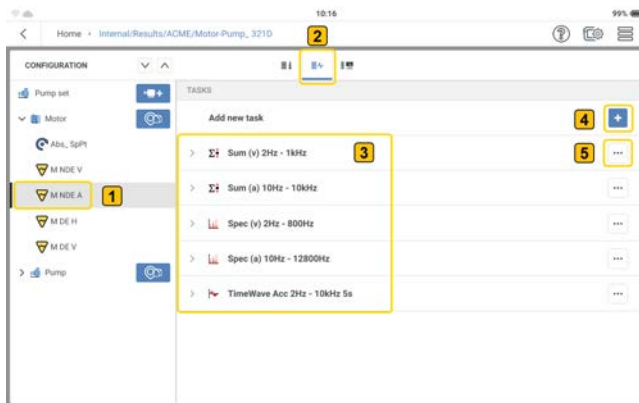
Measure tasks can be assigned to any measure location as shown in the previous image and described as follows:

1	The selected measure location with the name **M DE a** measures the parameter vibration.
2	Tap [icon] to see measure tasks assigned to the selected location **M DE a**.
3	The measure tasks assigned to the selected location **M DE a**.
4	Tap [icon] to assign a new measure task to the selected location **M DE a**.

5	Tap ... to: view selected task details (characteristic acceleration overall value for this example); edit task name and time to measure; delete selected measure task; save any changes made to the selected measure task
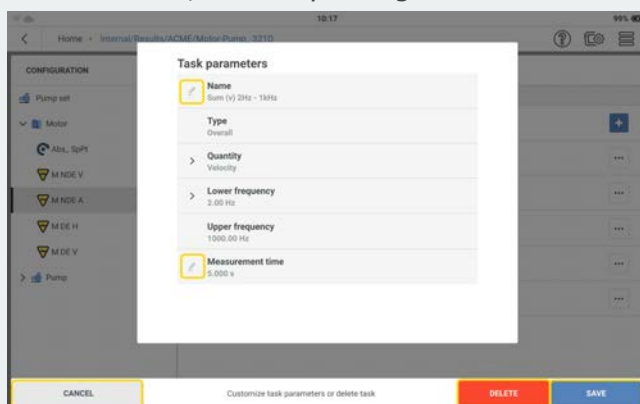
Note: Different tasks will have different task details.

Characteristic overall vibration values Σ↕

These values are used to evaluate machine, bearing and gear conditions. A good indicator of the vibration forces acting on a machine is the effective value (RMS) of the vibration velocity in the frequency range 10 - 1000 Hz or 2 - 1000 Hz. Evaluation criteria of the permissible vibration levels are specified in the ISO 10816-3 norm.

The highest signal amplitudes as peak values (0-peak, peak-peak) are recorded and used to calculate the crest factor.

Crest factor is the ratio of the highest amplitude to the effective RMS value of a vibration and is a measure of the intensity of the impacts in the form of a vibration. Crest factor is used to identify wear in roller bearings and gearing mechanisms, and cavitation. A harmonic vibration of amplitude 1 has 0.707 as its effective value and a crest factor of 1.41. If the crest factor is higher than 1.41, impacts with higher amplitudes occur.

Shock pulse ⬤

Shock pulse signal levels are indicated as a combination of carpet value (background level, indicative of lubrication condition) and maximum value (transient peak level, indicative of damage), both expressed in logarithmic [dB] terms. Bearing condition is determined by comparing normalized signal levels and their difference with reference values.

Carpet and maximum values are affected by e.g. rolling velocity (i.e. bearing size and rpm), signal damping, and lubrication. To evaluate the condition of the bearing and allow comparison between values measured on different bearings, a comparison measurement in the good condition or a normalization of the measured values is necessary.

Normalization — The bearing size and RPM are combined to give the initial value = dBi

External influences (rolling velocity, signal damping and lubrication) give the adjustment value = dBa

The adjusted initial value = dBi + dBa = dBia

The shock value = dBsv

Normalized shock pulse value dBn = dBsv - dBi - dBa = dBsv - dBia

Speed

Asset speed is set as follows:

- Manual entry — select machine in Configuration then edit the speed.
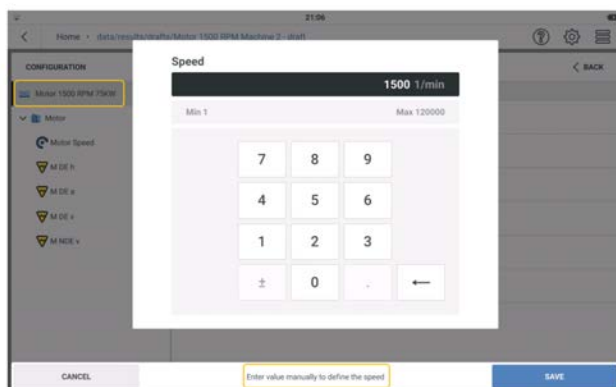
This option is used when an RPM sensor is not available and there is need to measure an asset that requires the RPM. Examples include roller bearing condition and order-based spectra.

- Machine speed finder — the asset RPM is calculated from the vibration signal at the measure point. During configuration, the possible asset RPM is entered at machine train level. The speed finder makes an analysis of the vibration signal with regard to RPM. The RPM values can deviate by up to 15% of the possible value. The measure point for the speed finder is the reference point for all other measure locations. The RPM at the other measure points in a machine train are calculated based on the machine train kinematic model. Start to measure.
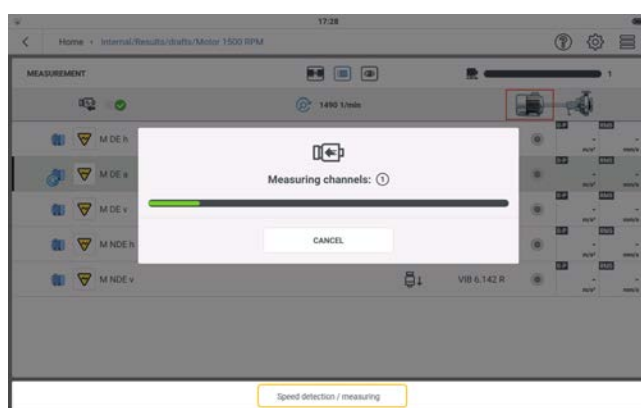
Three values calculated from the vibration signal are shown.
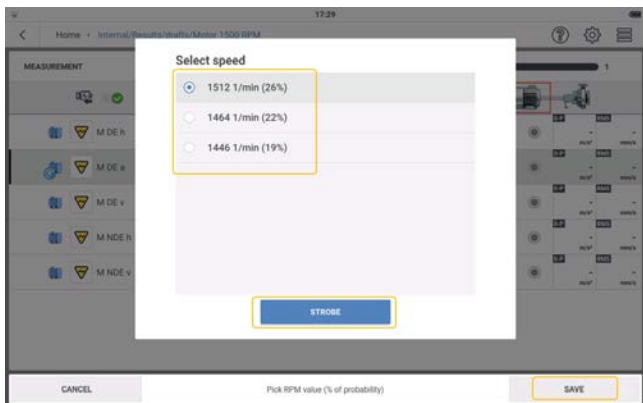
> Select RPM value with the highest probability.

> Tap **SAVE** if selected RPM value is accurate.

If necessary, tap **STROBE** to verify the RPM.

- Keyphasor — the laser-trigger sensor is used to measure RPM. The sensor detects the signals optically. A laser beam is emitted from the sensor and strikes a measure mark on the rotating shaft. The measure mark can amplify light (e.g. reflective foil) or attenuate light (e.g. a black, high contrast line on a light-colored surface). Each time the sensor detects a difference in brightness, it sends an electric impulse. The device calculates the shaft RPM based on the repeat rate of the pulses.

> **Note**:The reference measure point must be assigned a speed task and the laser-trigger sensor (VIB 6.631).
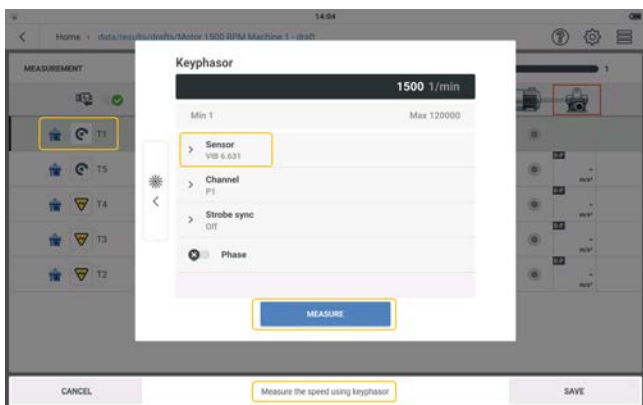
> **Note**:Asset RPM measured with the keyphasor can be started directly from the home screen. Use the **Speed measurement** application.

Machine and/or asset speed can be measured and/or confirmed with the three options available in the speed measurement application. The three options are: keyphasor; stroboscope; manual entry.

The options can be accessed as follows:

- Use the speed measurement application available on the home screen.

- Use the measurement screen context menu item **Speed / strobe**.

- If the measure setting **Machine speed finder** is on, a hint to verify or measure speed is shown. If hint is followed, the three options are available.

Temperature 🌡️

Get the temperature at a measure location with a temperature probe then enter this value in the device.
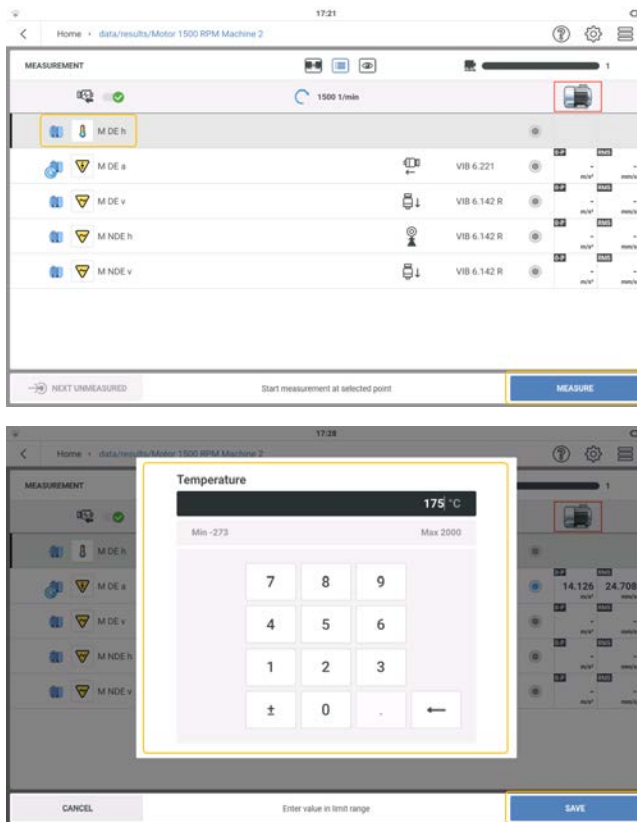
Select measure location then tap MEASURE.

Use the numeric keyboard and enter the measured temperature.

Envelope spectrum acceleration 📈

Envelope analysis is used to detect periodic impacts in the vibration signal of machines. Its primary use is in the diagnosis of roller bearing damage and gearing damage, and is based on the demodulation of amplitude modulated vibration signals.

Periodic impact sequences in a component excite high frequency machine resonances that serve as a carrier signal of the low frequency impact signal. To separate the low frequency modulation from the high frequency resonance, the signal is filtered with a high pass filter, rectified and then filtered using a low pass filter. The remaining signal consists of only the modulation signal, which is referred to as envelope.

Spectrum acceleration 📊

The amplitude spectrum of the vibration acceleration (broadband spectrum) is used to find the excitation regions of machines.

For example, in roller bearings, noise is excited in higher frequencies.

Spectrum velocity

The amplitude spectrum of the vibration velocity (machine spectrum) is used to machine problems such as imbalance and misalignment.

Time waveform

Time waveform is the raw signal used to show informational content of a machine from moment to moment. It is used in low speed applications, roller bearing damage and gear damage, and looseness.

Visual inspection

A visual inspection task is data collection based on defined conditions of a machine and that cannot be measured with electrical signals. For example, the degree of contamination of a machine, the belt tension on a drive or the fill level of a tank. These can all be ascertained without having to measure a signal.

Measure speed

Machine speed can be checked or measured at any time. And this can be either absolute or relative.

When a route is created, the reference RPM for the train is entered in eMaint condition monitoring. If necessary, the RPM can be confirmed or measured at the machine train.

Create speed point from machine template

- Create or use an applicable machine template .

- From measurement screen tap ☰ to open the measurement screen context menu.
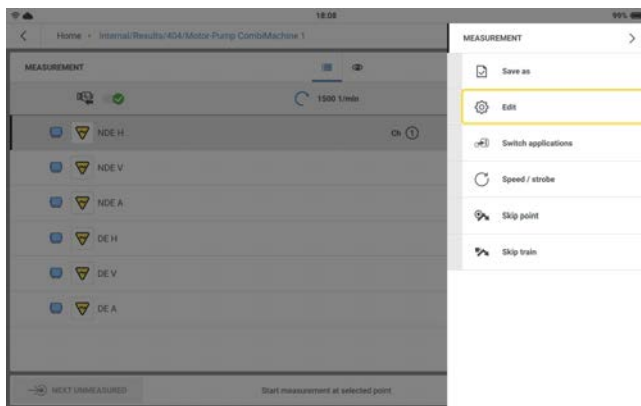
- Tap **Edit** to open the configuration screen.
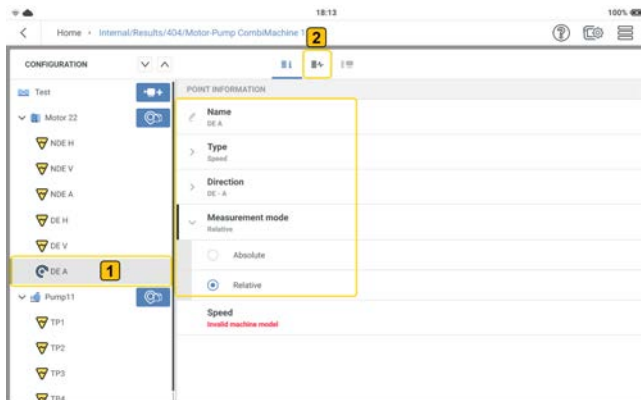
> **Note**:Usually, a speed point is located on the motor side.

- Create a speed measure location (**1**). (Refer to **Create asset** in "Measure configuration" on page 51 .

- Set **Type** to **Speed** and the mode to either **Absolute** or **Relative**. Edit Name and the plane where the sensor will be placed.

- Tap ▤⋀ (**2**) to open tasks screen.
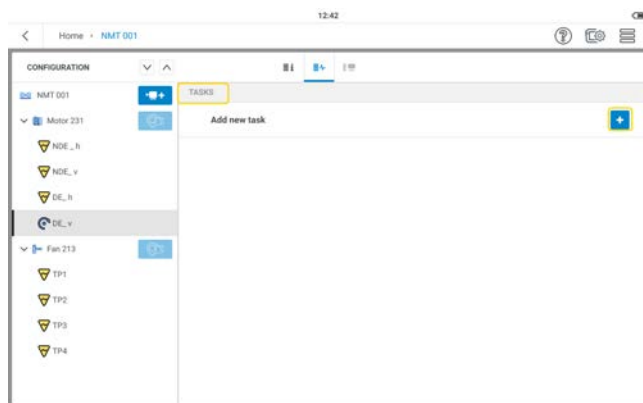
- Tap ➕ (**1**) to open speed tasks screen.
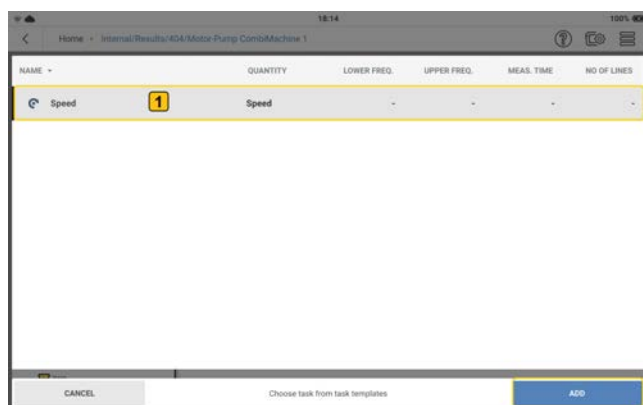
- Select task (**1**) then tap **ADD** to assign the task to the speed point.

- If relative mode was selected, the speed point is merged with a vibration point on the same machine and shaft. Speed is measured using the vibration signal at this location, and the speed finder calculates the machine speed.
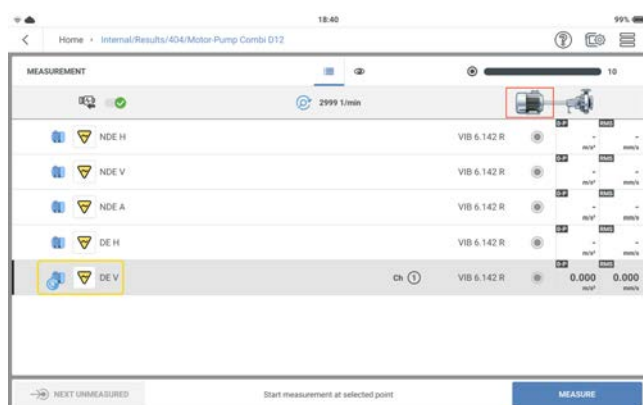
Speed finder is a method used to calculate the machine RPM. This method is based on complex algorithms, field tests, and vast experience in vibration analysis.

- If absolute mode was selected, the speed point is independent and must be measured using the laser trigger RPM sensor (Keyphasor method). This method is described in the RPM Sensor VIB 6.631 Installation and Operation instructions.

Start to measure from home screen

Tap the home screen **Speed measurement** icon.
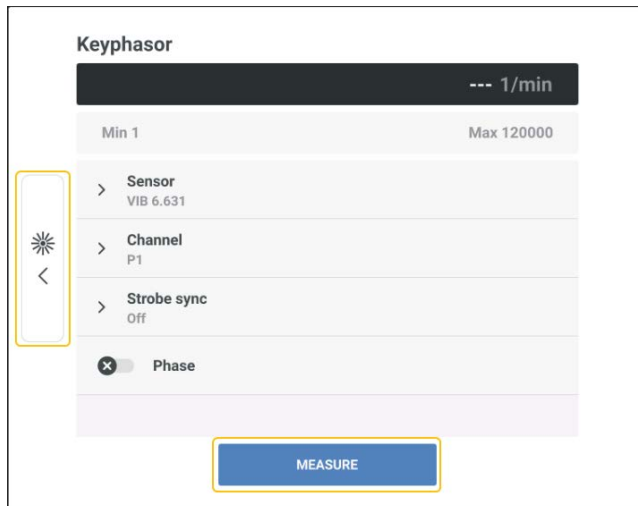
From this screen, the machine speed can be measured with the laser trigger sensor.

How the laser trigger RPM sensor works

The sensor detects the signals optically. There is no physical contact to the rotating machine. Red laser light is emitted from the sensor head and strikes a measure mark on the rotating shaft. The mark can amplify light (e.g. reflective film or attenuate light (black, high contrast line on a bright surface). Each time the sensor detects a difference in brightness, it sends an electric impulse. VIBXPERT 3 calculates the shaft speed based on the repeat rate of the pulses.

Measure RPM with the stroboscope

The stroboscope is used to:

- Verify the calculated RPM. This RPM is calculated using the speed finder which is turned on in settings .

> **WARNING**:When using the stroboscope, obey the safety instructions.
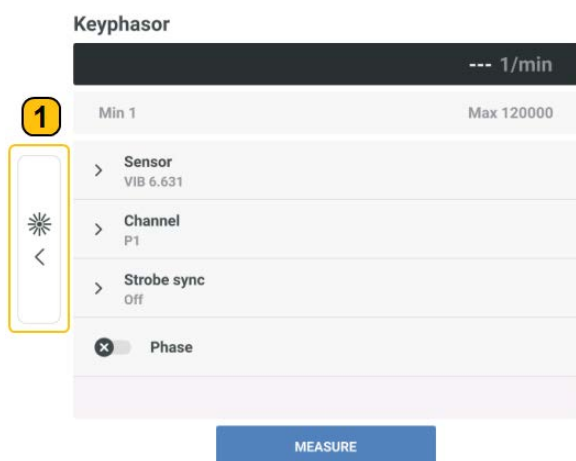
Tap **1** to open the strobe screen.

Tap ☀ or press device ENTER button (either of the two yellow buttons on the device) to turn

the stroboscope on.
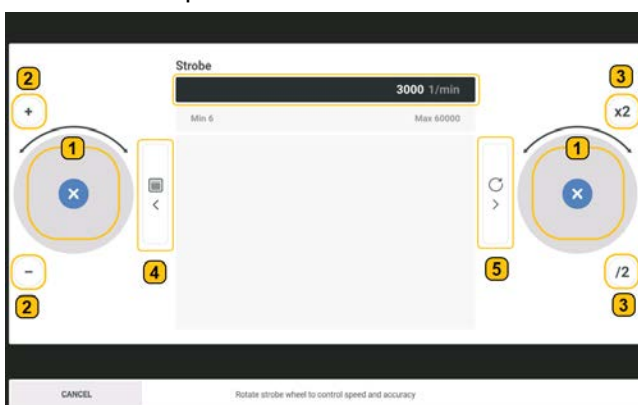
1	Swipe circular control clockwise to increase strobe light frequency, and anti-clockwise to decrease the frequency.
2	Used to fine adjust the strobe light frequency in steps of 1/60 Hz. Tap (**+**) to increase frequency, and tap (**–**) to decrease frequency.

3	Used to double or half the strobe light frequency. Tap (**x2**) to double frequency, and tap (**/2**) to halve frequency.
4	Used to open screen to manually enter machine RPM.
5	Used to open screen to measure machine speed with the laser trigger sensor.

When the stroboscope is turned on a default speed of 3000 RPM (50 Hz) is shown on the screen.

Direct the strobe light to the rotating object then adjust the strobe light frequency until the object appears to be stationary. This frequency corresponds to the speed of the object.

Stroboscope principles

Reference points such as fan blades, coupling bolts, shaft keyways help to measure speed of the object. If object to be measured does not have a reference point, then the object can be marked with colour or a tape provided the machine can be stopped and is not too hot.

If the frequency of the strobe light corresponds to the speed of the object, then the object is viewed as a still image. If the strobe light frequency is then double (tap **x2**). If the frequency is halved (tap **/2**) a single image is seen.

For a shaft with a single keyway, a still image of the keyway is seen if the strobe light frequency is 1/2, 1/3, 1/4, etc. of the RPM.

Near location

The objective of near measure locations or to put together measure locations is to monitor the measure locations at the same time. Measure locations are grouped together and measured simultaneously. This has the advantage that measured results are comparable as they were obtained under similar environmental and machine conditions. The measure locations should be close together.

When two or more locations are measured together, it is possible to find the phase difference between the locations. To measure phase we need to create near locations.

> **Note**:It is not possible to group measure locations when a route is measured.

Set up near locations

- Open or create asset to configure then tap the hamburger menu (▤). The screen menu items are shown.
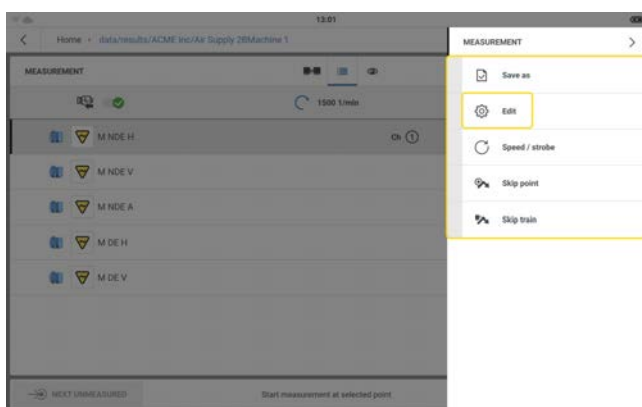
- Tap ⚙ (the Edit menu item). The **Configuration** screen is shown.
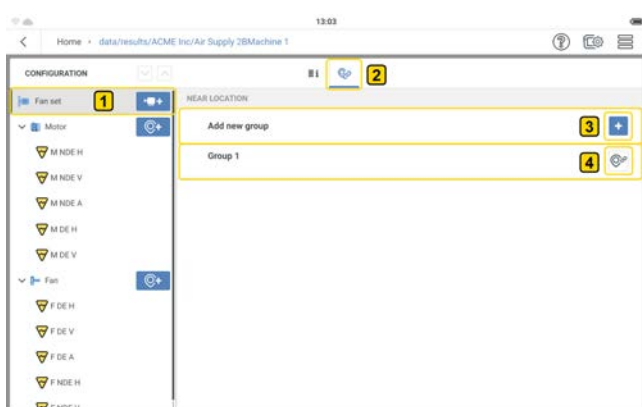
| 1 | Tap 1 the asset train level. The group icon ⚭ (2) is shown. |

2	Tap 🔗 (**2**) to show ***Add new group*** row.
3	Tap ➕ (**3**) to show ***Group 1*** row.
4	Tap 🔘 (**4**) to activate all measure locations.

- The ***Configuration*** screen with all measure locations active is shown.
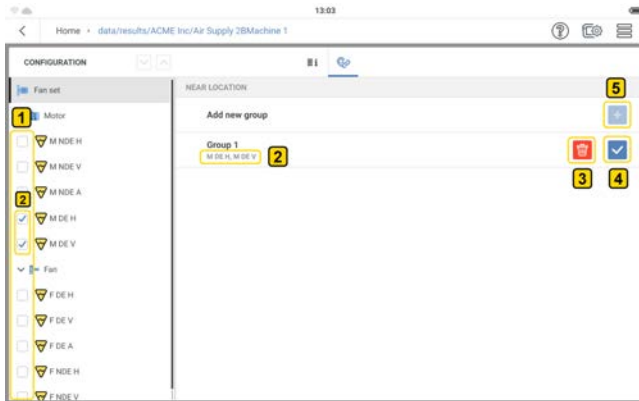
1	Check boxes are shown on all measure locations, an indication that all measure locations are active.
2	Shows the two near locations selected to form a group. In this example - group 1.
3	The trash icon (🗑) is shown after a near location group is created. If necessary, tap 🗑 to delete the group.
4	Tap ✅ the check mark icon to confirm group selection.
5	When a group selection has been confirmed, the Add new group icon (➕) becomes active. Tap ➕ to add new near location group if necessary.

- The near location group locations can now be measured at the same time but on different channels.
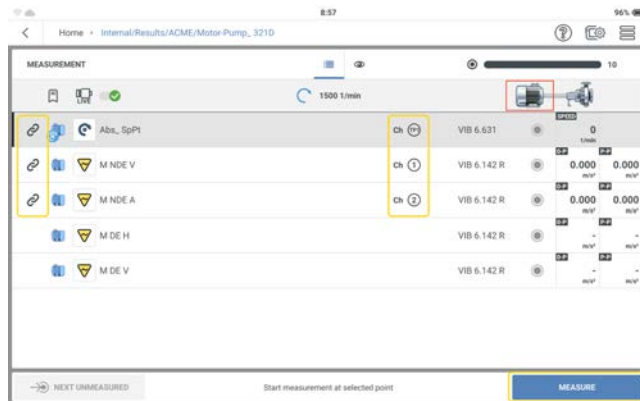
Refer to "Measure phase" on page 82 .

Measure phase

Phase is a measure of the relative timing between two or more signals. Phase is used as a diagnostic tool to identify asset faults like imbalance and misalignment. With these faults, the rotation frequency appears as a peak with elevated amplitude on the spectrum.

With VIBXPERT 3 you can measure phase synchronously (absolute) or cross channel (coherence) for relative phase.

Synchronous phase

In synchronous phase, the amplitude and the phase angle of the vibration signal are calculated from the RPM-synchronous components.

An absolute speed point is necessary for the near location that is created to measure synchronous (absolute) phase. The trigger sensor is used as the reference.

Create near location group to measure locations simultaneously. Refer to "Near location" on page 79 .

Cross channel phase (Coherence)

In cross channel phase there is no speed point, and multiple channels are used to find the signal amplitudes and the phase difference on the measured channels.

Triaxial sensor

A triaxial sensor measures vibration in three orthogonal directions (X,Y, and Z-axis) at the same time.

- When a triaxial sensor is used to measure an asset, its availability must be selected in device settings .
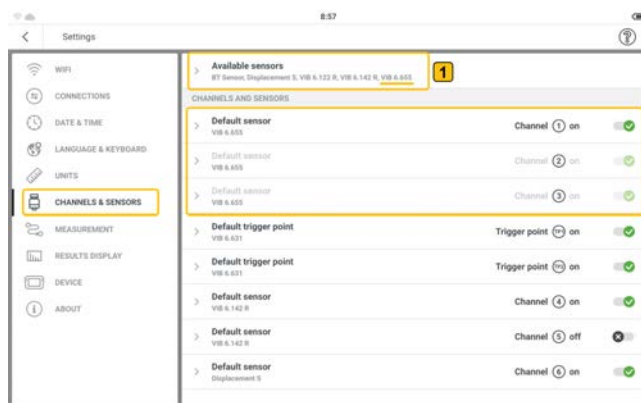
With VIBXPERT 3, we recommend the triaxial sensor VIB 6.655 (with X-axis vertical ori-entation).

- Tap **1** to show the *Available sensors* frame.
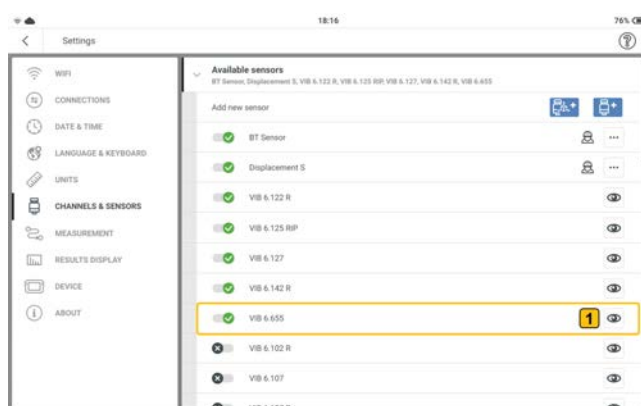
- Tap 👁 (**1**) to show the sensor orientation window.
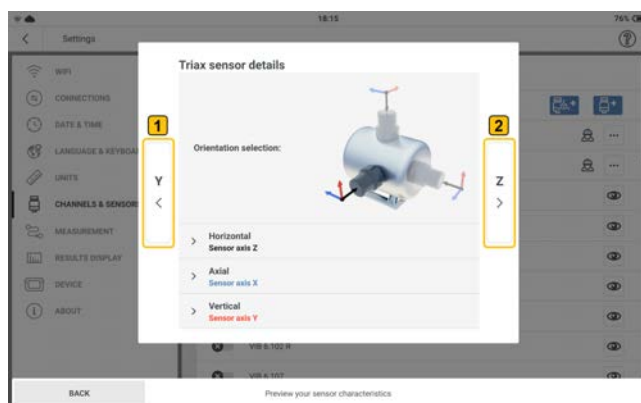
The direction of the sensor Z-axis shows the asset plane to be used in the configuration screen.

- Tap ① / ② to show the sensor X, Y and Z-axis parameters.

- In the configuration screen edit measure location details. Select **_Triax vibration_** as type of measure location.
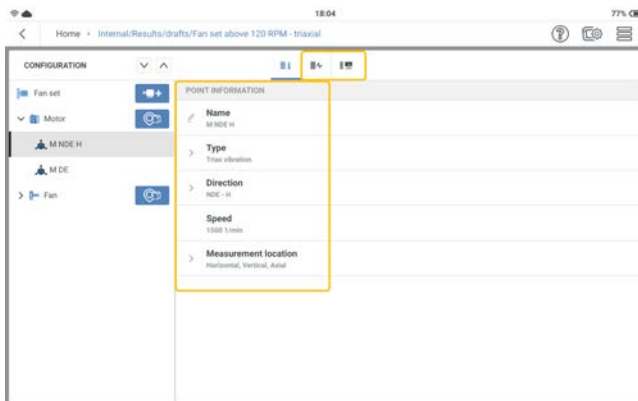
- Assign measure tasks and band tasks as necessary.
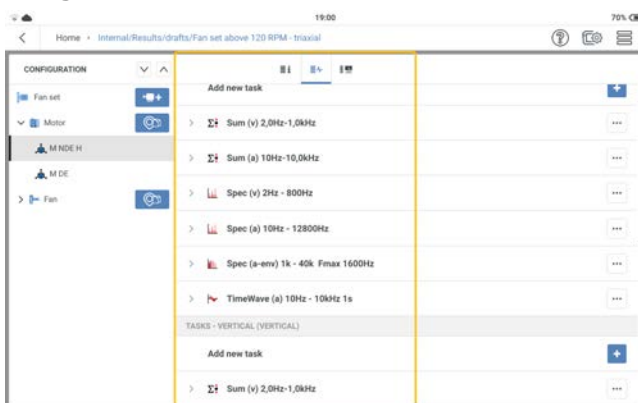
Measure

To measure a location, the triaxial sensor VIB 6.655 and the sensor cable for triaxial sensors VIB 5.237 are necessary.

> **Note:**As a triaxial sensor measures the 3 axes X,Y and Z at the same time, three measure channels are necessary. As a result, whenever a triaxial sensor is selected in device settings, three channels are occupied automatically.
> Thus, the triaxial sensor can be connected to only channels 1 or 4.

- Connect the sensor cable to the triaxial sensor then mount the sensor on the machine to be measured. Refer to the sensor orientation window described before.

  Make sure that the orientation of the sensor on the machine is related to direction selected in the configuration screen.
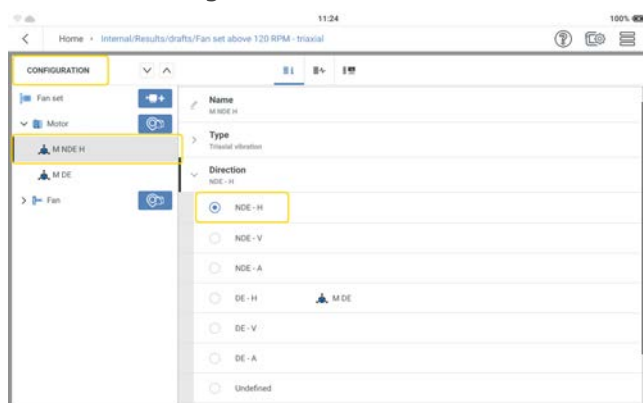
More information on sensor orientation is found in the measurement screen.
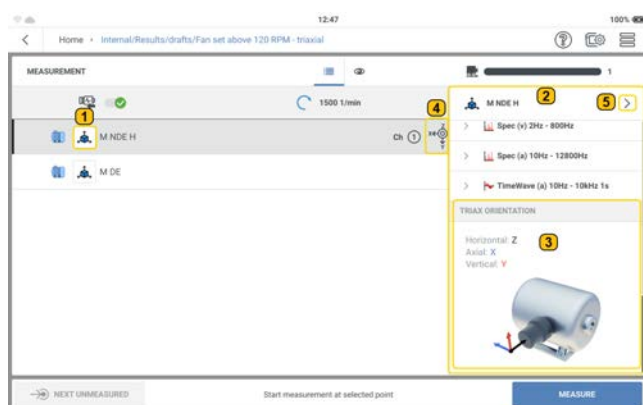
1	Tap ⬦ (**1**). The triaxial sensor information panel (**2**) is shown.
2	Scroll down the information panel (**2**) until the triaxial orientation (**3**) is shown.
3	The triaxial orientation graphic (**3**) shows how the sensor axes are related to the selected measure direction.

4	The triaxial sensor measure axes icon (⌖) gives more help on how the sensor is mounted.
5	Tap > (5) to close the sensor information panel (2).

- Connect the triaxial sensor to either channel 1 or 4 on the device.

1	In this example, the triaxial sensor VIB 6.655 is mounted vertically on the machine, and the related measure directions are shown on the sensor (3).
2	The sensor is connected to channel 1 (2) on VIBXPERT 3.
3	For evaluation in this example, the X-axis is horizontal, Y-axis is axial and Z-axis is vertical.

- In the measurement screen, select the triaxial sensor measure location.
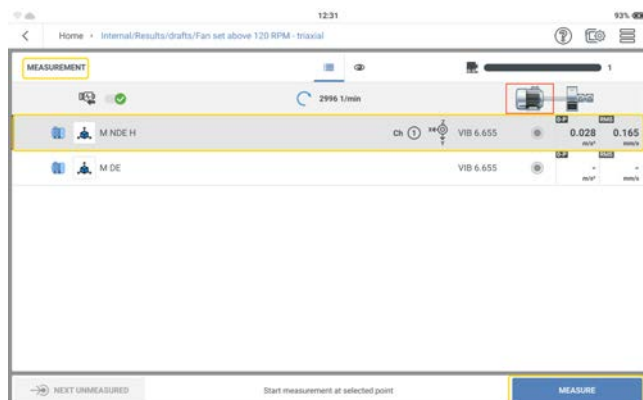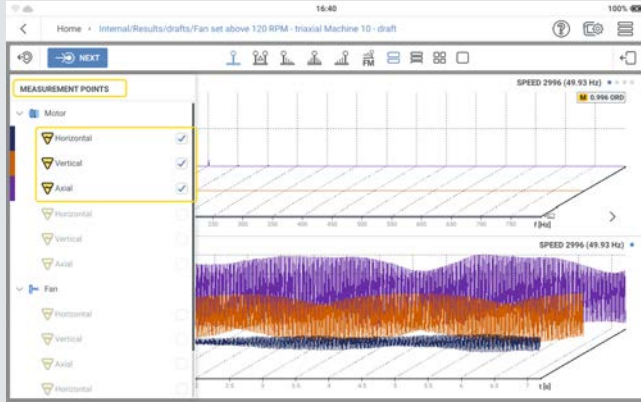
- To measure, tap **_MEASURE_**. Alternatively, press either of the two yellow device ENTER buttons.

- After a location has been measured, results are shown.
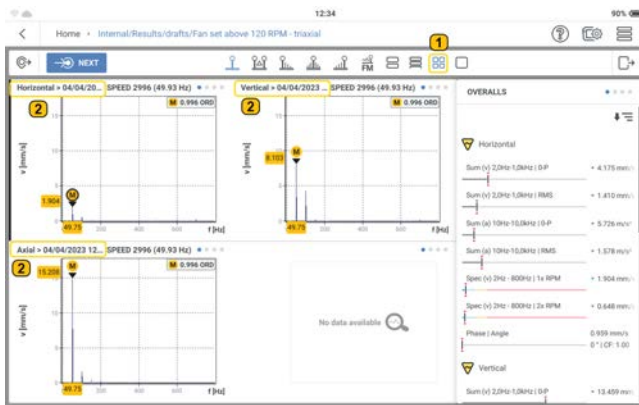
1	In this example, the main screen has been split into two, and shows the velocity spectrum and the time waveform. Scroll the pages to see other spectra .
2	Tap ❯ (**2**) to cycle through the three axes (**3**). The scale icon (⬅🔳) shows currently highlighted axis (horizontal in this example).
3	Shows highlighted axis (horizontal in this example).

4	Shows all selected axes. The axes are selected in the **Measurement Points** frame.
5	Tap ⊙→ (5) to open or close the measure points frame.

1	In this example, the quad view (1) has been selected. The main screen is split into four, and therefore all three axes are shown.
2	The three axes which have been selected in the measure points frame are shown.

Results

A vibration sensor measures acceleration. The measured acceleration is converted to overall values, spectrum, and time waveform (TWF). Spectrum includes standard spectrum, envelope spectrum and order-based spectrum. Overall values can be shown in any of the of these vibration amplitude related parameters: RMS; zero-to-peak (0-P); peak-to-peak (P-P); Crest. These amplitude related parameters are set under **Settings** menu item **Results Display**. After a location has been measured, results are shown. Results remain on the screen dependent on the **Results Display** setting. The shown results are dependent on the measure tasks assigned to the test point. All results are saved on the file. The file is saved in the **File Manager**.
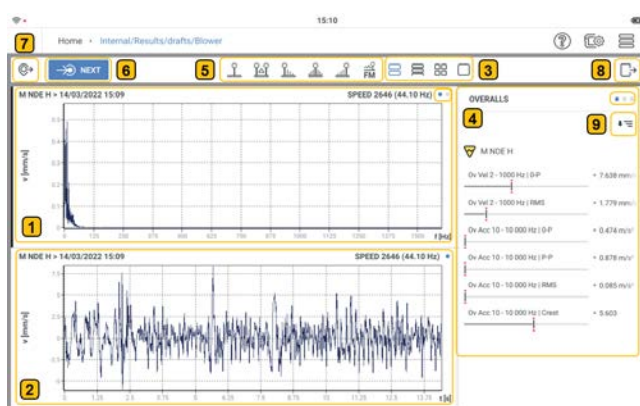
1	Shows the spectrum for the measure task assigned to the measure location. The dots on the right top corner of the spectrum graph shows the number of pages with spectrum and time waveform graphs. Swipe screen to cycle through the available pages.
2	Shows the time waveform related to the spectrum above.
3	The four icons are used to split the main screen. Tap ▤ to split main screen into two (as shown in image above). Tap ☰ to split main screen into three (list view). Tap ▦ to split main screen into four (quad view). Tap ▢ to show the main screen as a single view (full screen mode). The split screen function is useful when results for several measure locations are compared (see **7** below).

4	The number of pages that can be shown on this frame are indicated by the number of dots on the right top corner of the frame. The pages are overall values, max 10, cursors, and frequency markers. Swipe screen to cycle through the available pages. Overall — shows selected overall values Max 10 — shows the 10 highest amplitudes in the spectrum and their related frequencies Cursors — used to show selected value in full digits at the right top corner of the graph Frequency markers — used to identify the characteristic asset and component frequencies in a spectrum
5	Cursor family icons
6	Tap 〔→⊙ NEXT〕 to go to next unmeasured location. If all locations on the route or machine train have been measured a hint to state completion is shown.
7	Tap ⊙→ to open the *Measurement Points* frame. The frame shows all measure locations on the machine train. To show results of locations already measured for comparison, check the related boxes. ![screenshot of Measurement Points frame]
8	Tap ⎘→ to close the *Overall/Max 10/Cursors/FM* frame. This enlarges the main screen.
9	Tap ↓☰ to show more overall values.

The results shown in VIBXPERT 3 are based on a trending spectrum (refer to related topic).

In results, both x and y-axis parameters and/or quantities can be changed as necessary. The y-axis can be made to toggle from a velocity vibration parameter to an acceleration vibration parameter and vice versa.

The x-axis can be made to change the x-axis quantity units.
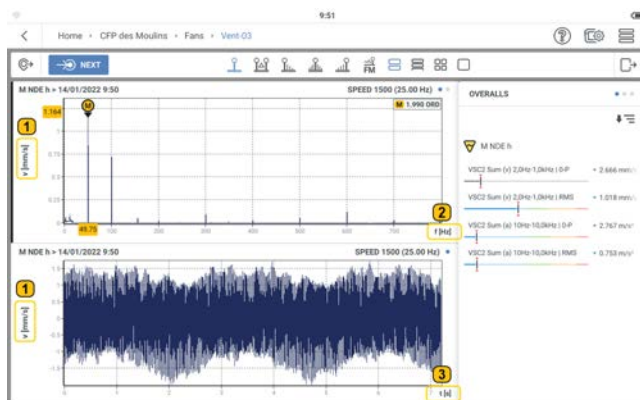
1	Tap the parameter label (**1**) to toggle the vibration spectrum between velocity and acceleration.
2	Tap the quantity unit (**2**) to change the frequency unit used in the velocity spectrum. Available units are orders (ORD), cycles per minute (cpm) and Hertz (Hz).
3	Tap the quantity unit (**3**) to change the time unit used in the time wave. Available units are seconds (s) and revolutions (Rev).

Overall values

Overall values are a simple way to find out whether the condition of machines gets worse or not. The overall values shown for a measure location are related to the overall measure tasks and frequency band for the location.

In this example, the measure tasks and bands for the location M NDE H are shown. These are the overall values that are shown in results.
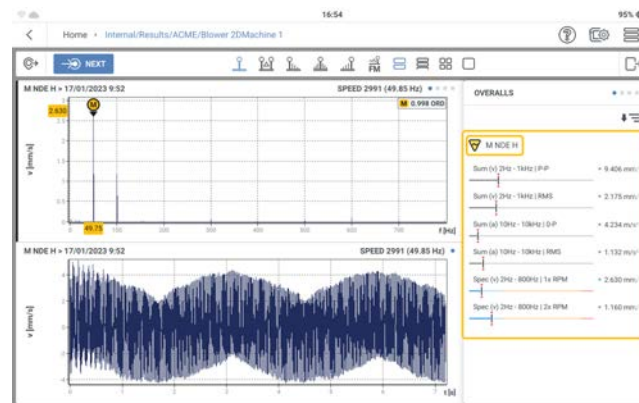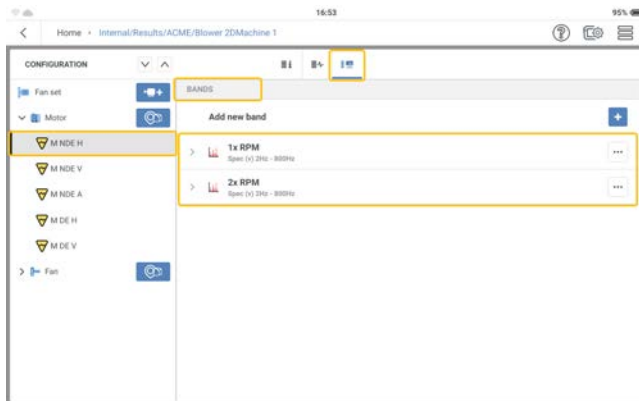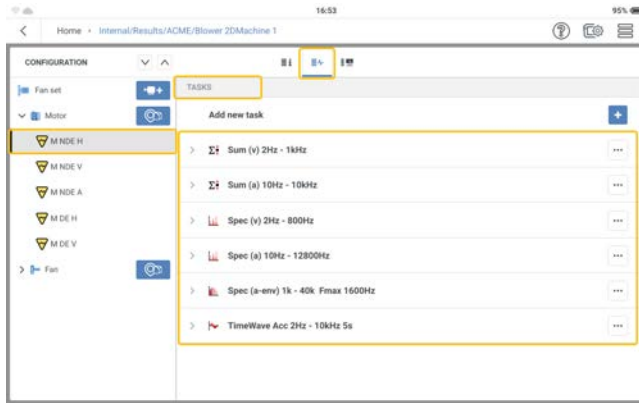
Trending spectrum

Vibration results shown in VIBXPERT 3 are based on the trending spectrum.

What is a trending spectrum?

A trending spectrum is a mode that measures vibration and delivers the measured signal as a spectrum (standard spectrum, envelope spectrum or and order-based spectrum), time wave-form, and trending parameters. Trending parameters include: RMS, Zero-Peak, Peak-Peak, Overall values

Understanding results

After a location has been measured, results are shown immediately.

> **Note**:Results remain on display depending on the time option selected under **Results Display** in Settings..

Shown results depend on the applied measure tasks. The measure tasks can be seen in the measurement screen.
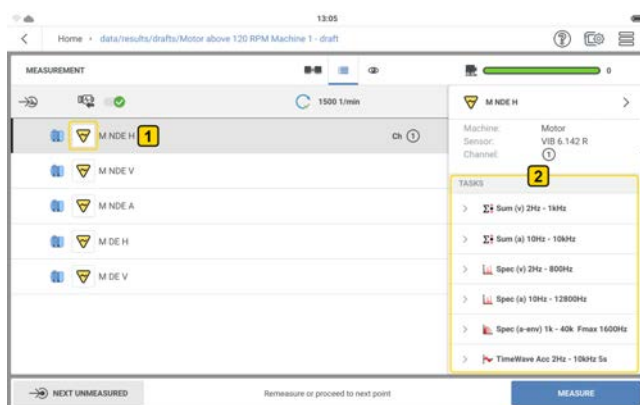
Tap ▽ the parameter icon (**1**) (in this case vibration) to see the applied measure tasks (**2**) for the selected location.
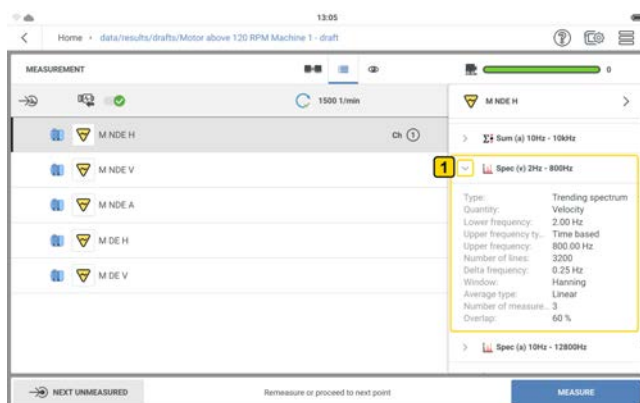
To see details of any of the applied measure tasks, tap the related task drop down menu (**1**).

In this example the applied measure tasks for the location are: overall velocity; overall acceleration; velocity spectrum; acceleration spectrum; time waveform (acceleration)

1 - the graph shows the velocity spectrum

2 - the graph shows the time waveform signal related to the velocity spectrum

3 - the frame shows overall values. The displayed overall values are based on the selected measure tasks.

Cursor

Use the cursor

Cursor functions are used in results analysis. Cursors are used to evaluate distances in a graph.

> **Note**:Cursors are active only on the visible section of the graph. Use the pinch function to zoom in and increase the size of the graph. The cursor function is active on only the visible section of the graph.
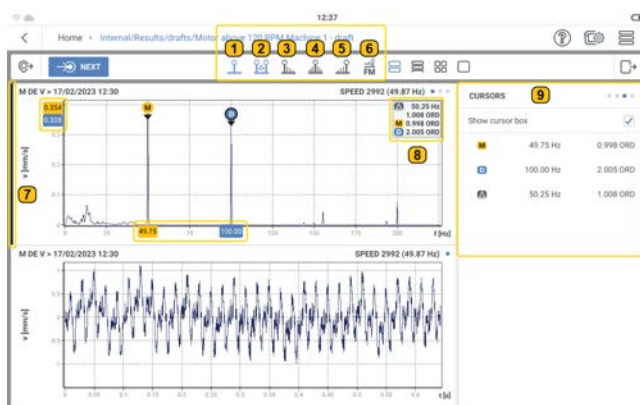
In this example, both main and delta cursor functions have been selected. To select a cursor function, tap the related cursor icon. This is highlighted blue.
These cursor functions are available:

1	– The main cursor is labeled **M** and is used in both the spectrum and time waveform graphs. The main cursor initially moves to the highest measured positive or negative value visible on the graph. To move the cursor, tap the necessary location on the graph. The cursor moves to the highest point within the necessary area. The cursor information box (**8**) shows the frequency at the main cursor in orders.
2	– The delta cursor is labeled **D** and is used in both the spectrum and time waveform graphs. The delta cursor always accompanies the main cursor. The delta cursor moves to the second highest value. The cursor information box (**8**) shows the difference between the main and delta cursors. The value shown has the x-axis units. In the spectrum graph, the information box shows also the values for the main and delta cursors in orders.

3 — The harmonics cursors are labeled to a maximum of 6 on the spectrum. The harmonics cursors accompany the main cursor and are equidistant to the main cursor and to each other. The cursor information box (**8**) shows the difference between the main cursor and the second harmonic. The value shown has the x-axis units. In the spectrum graph, the information box shows also the values for the main and delta cursors in orders.
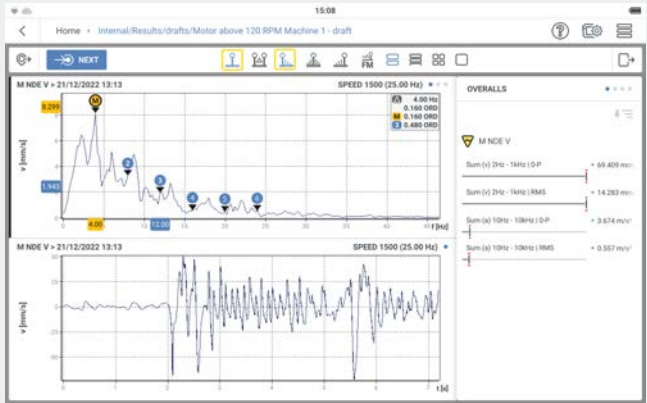
4 — The sideband cursors accompany the main cursor and they are on both sides of the main cursor. In the spectrum, they are labeled to a maximum of 6 on each side of the main cursor. The sideband cursors are equidistant to the main cursor and to each other. The cursor information box (**8**) shows the difference between the main cursor and the first sideband cursor on the left side of the main cursor. The value shown has the x-axis units. In the spectrum graph, the information box shows also the values for the main cursor and the first sideband cursor on the left of the main cursors in orders.

5 — The subsynchronous cursors accompany the main cursor and are shown at 1/2, 1/3, 1/4, 1/5 and 1/6 of the main cursor frequency. The cursor information box (**8**) shows the difference between the main cursor and the 1/2 cursor. The value shown has the x-axis units. In the spectrum graph, the information box shows also the values for the main and 1/2 cursors in orders.
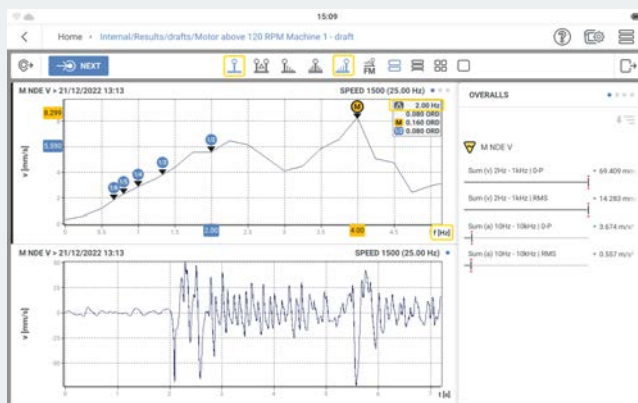
6 — The frequency marker is used to identify the characteristic asset and component frequencies in a spectrum. Frequency markers are related to the used speed. The main cursor shows the frequency at which the asset operates. An additional cursor shows the spectrum at twice line frequency (2 x LF).

Frequency markers are defined for each hierarchy in the asset. This is done in the kinematic model. Check the necessary hierarchy check box to show the wanted frequency marker.
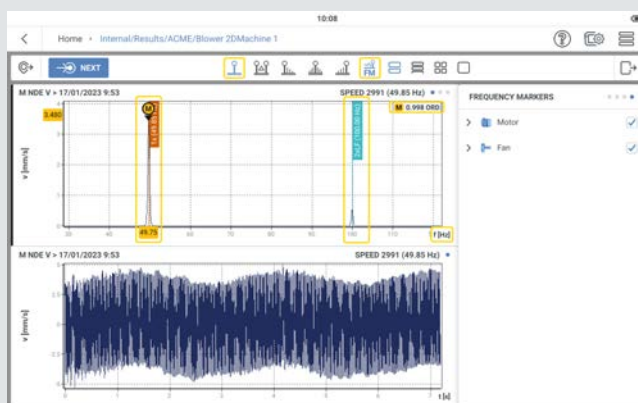
7 The bold line next to graph shows the currently selected graph. The cursor functions are active on only the selected graph.

8 The cursor information box shows necessary cursor information.

| **9** | The cursor frame shows both the main and delta cursor information. This information is available also in the cursor information box (**8**). The cursor frame shows also information for the currently selected cursor; this could be harmonics, sideband or subsynchronous. |

Change application

To change from one application to another in any asset, use the switch over function. The capability to switch over application ( ) is shown when an asset or a machine template is opened.

- Open either a machine template or a saved asset.
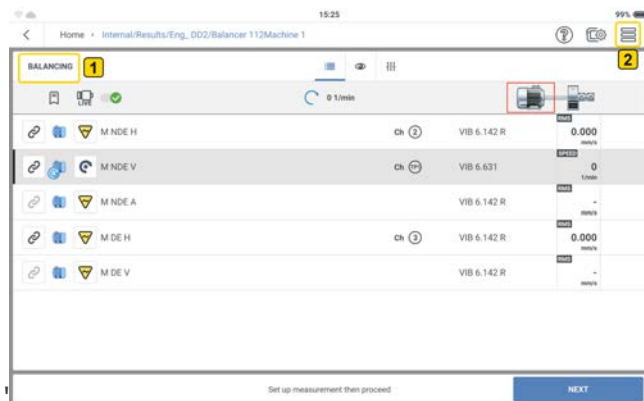
1 shows the application from which the asset or the machine template has been opened.

- Tap (**2**) to see the context menu items.
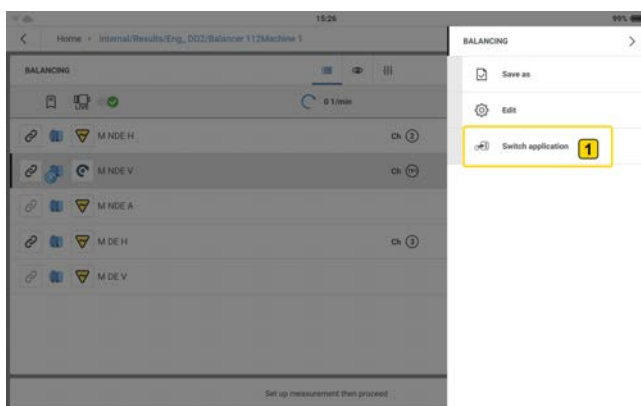
- Tap the menu item *Switch application* (**1**) to change to the necessary application.

In this example, the available applications are analysis and coast down/run up. This is because the change is started from balancing application. Thus, the icon is shown grayed out.

- Tap necessary application icon to start the application.

Prepare for the balancing procedure

What is balancing

Balancing is a procedure to try to improve the mass distribution of a body so that it rotates in its bearings without unbalanced centrifuge forces.

Rotating machines cannot be balanced to a zero unbalance state, but modern devices like VIBXPERT 3 can decrease unbalance to very low levels. To try and get very low unbalance in standard machines is not economical. VIBXPERT 3 measures and corrects imbalance. The imbalance can be measured with 1-plane balancing or 2-plane balancing. 1-plane balancing is used to correct static imbalance. Static imbalance occurs when the plane of imbalance and the center of gravity of the rotor coincide. Dynamic imbalance (or couple imbalance) occurs when the center of gravity of the rotor remains on the rotational axis of the rotor. 2-plane balancing is used to correct dynamic imbalance.

> **Note**:Machines must be disconnected before any work is done on them. The machines must be protected against being switched on accidentally.

Steps

- Use visual inspection to find the cause of the imbalance. If possible, try to correct the imbalance. You can do these: remove any coatings from the impeller; fasten any loose balancing weights; tighten any loose screws on the foundation.

  > **Note**:If the machine cannot be balanced in situ, mount it tightly on a rigid foundation. This can be directly on frames or on vibration isolators.

- Select the measure and balancing planes (refer to image below).
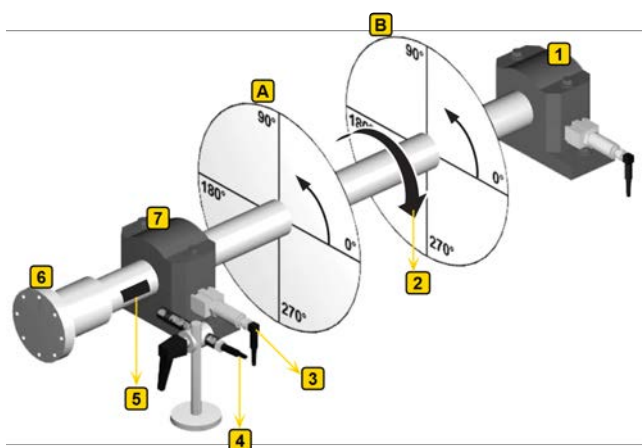
A and **B**	Correction planes
1	Non-drive end (NDE)
2	Shows direction of machine rotation
3	Shows the mounted vibration sensor
4	Shows the laser trigger/rpm sensor
5	Reference mark
6	Drive end (DE)
7	Shows the measure plane

Mount the sensor on the bearing housing at the measure location with the highest vibration values.

- The measure plane should be in the middle of the bearing and close to the balancing plane and the plane of the center of gravity (for example, impeller side or rotor).

- Vibrations are transferred through the outer ring of a bearing in a radial direction. Thus, mount the sensor on the side (horizontal) or on the top of the bearing (vertical).

- Attach the sensor as close to the bearing as possible. Prevent signal attenuation due to long transmission paths or bearing covers. Measure in the direction of vibration (mostly horizontal). If the measure direction is horizontal, mount the sensor on the lower half of the bearing housing.

- Use sensors which are screwed onto the machine or attach sensors using a magnetic adapter. Do not attach sensors to machine parts with intrinsic vibrations such as covers.

- Do not use hand-held probes to measure imbalance.

- If you measure imbalance in two planes, use the above instructions for both planes.

- Assess the machine smoothness.

- Measure the vibration velocity and record an FFT spectrum if the measured values are too high (see DIN ISO 10816-3). If high vibration signals appear at the rotational frequency, there is an imbalance that must be corrected.

- Save the measured values to be able to compare them with the values measured after the balancing procedure.

- Attach a reference mark on the shaft for the trigger sensor while the machine is at a standstill.

- Mount the laser trigger sensor with the related bracket on the machine.

- Connect the vibration sensors to VIBXPERT 3.

> **Note***:1*. The balancing RPM and the operation RPM must lie as close as possible. If this is not possible due to high vibration values, start at a lower RPM and approach the operation RPM step-by-step in several balancing runs. Minimum balancing RPM is 30 cpm (0.5 Hz).
>
> **2**. Monitor potential resonance points. If not sure, perform a coast down.
>
> **3**. The RPM must remain constant during a balancing run. If not, the balancing run must be started again.
>
> **4**. During measure, the rotor must get to operation temperature. For example, if the rotor works in a hot air stream.
>
> **5**. Frequently, static imbalance is dominant at vibration values above 10 mm/s. First, use 1-plane balancing to compensate for this, then continue with 2-plane balancing.
>
> **6**. Make sure all necessary measure components are correctly installed before the initial balancing run is started.

Balancing in one plane

- Open or create asset that is to be checked for imbalance.

> **Note**:To find imbalance, the machine to be measured must have an absolute speed point. The speed point will be measured with a laser trigger sensor.

- Tap the hamburger menu ( ) to show the measurement screen context menu items, then tap *Switch applications* .

- Tap (the balancing icon) to show the balancing screen.

1	Shows balancing screen.
2	Tap ![icon] (**2**) to set necessary parameters for balancing procedure.
	The shown parameters can be set.
	![Balancing measurement setup screen]
	Note: The item **Type** is used to select the amplitude parameter that is used in the balancing measure screen.
	If measured data is available, the data can be entered manually as amplitude and phase values in the balancing measure screen. To do this, the option **Enter user data** must be turned on (indicated by ![toggle]).
	![Balancing measurement setup dialog screenshot]
	After the necessary parameters have been set, tap **APPLY** to confirm set parameters.
3	![link icon] – icon shows available measure location. When the location is selected to measure balancing, the icon becomes darker (![darker link icon]).
4	Tap ![eye icon] to show the vibration and displacement parameters that can be selected to be shown live on the display (**5**). Default parameters are set in the Measurement setting Sensor Live Values, and can be changed here. A maximum of two parameters for can be shown on the screen.

5	Shows live data from connected sensors. Values shown only when sensor live data (**6**) is turned on (✓).
6	Shows sensor live data on. When switched off (✕) no values are displayed in **5** .
7	Shows screen hint. This hint is related to present action.
8	The **NEXT** button is active only when all necessary conditions are correct. In this example, the hint **7** shows an incorrect condition and as a result, the button is inactive. For the button to be active, these must be fulfilled: The necessary vibration or displacement measure locations must be selected; the measure location to determine the balancing rpm (machine speed) must be selected; balancing parameters set and validated correctly in balancing measurement setup; all selected measure locations must be given related sensors.
9	Tap 🔖 to show machine measure steps.

- Select the locations to measure for the balancing procedure.

> **Note**:Before the laser trigger sensor and the vibration sensors are mounted and connected to VIBXPERT 3 make sure that all preparations for the procedure have been correctly done.

1	The selected measure locations are shown with a darker measure location icon (🔗). Locations not selected have a grayed out icon (🔗).

2	Shows the device measure channels that will be used for the balancing procedure.
3	Shows live sensor data. In this example, the sensors have been already connected to the device.
4	Shows the measured machine speed. In this example, the laser trigger sensor has been mounted on the machine and connected to the device, but the machine is switched off.

- Mount the sensors as necessary then connect them to the applicable VIBXPERT 3 inputs.

- Switch the machine on. Wait until the machine has reached the balancing RPM and oper-ating temperature if necessary.

1	Shows current balancing step; in this case it is the first step which is initial run.
2	Tap A - B to show the ***influence setup*** window. This window is used to select the balancing procedure. This could be either balancing in one plane (for static imbalance or two planes (for dynamic imbalance). The locations used to calculate the balancing weights can also be selected in this window.

3	Shows the phase vector (amplitude and angle) of the measured signal, and the velocity RMS value. The Amplitude is the highest peak value, and the angle is the phase difference between the trigger signal and the highest peak.
4	Shows the measure locations used in the polar diagram. The polar diagram is used to show the balancing steps.
5	This button cycles through MEASURE, CANCEL and STOP. MEASURE is used to start the measure procedure; CANCEL is used to stop procedure if necessary; STOP is used to collect data after a stable measure procedure. Note: When measure is completed, the MEASURE button changes to REMEASURE.

- Tap **MEASURE** (**5**) to start the initial run. When the values are stable, the **STOP** button is shown.

- Tap **STOP** then switch the machine off.

Tap [⚙] to see detailed vibration results.

- Tap **NEXT** then proceed to enter the mass and angle for the trial run, and if necessary, select the corresponding rotor type.

1	Shows the vibration amplitude and phase angle of the synchronous signal measured in the initial run at the different measure locations.
2	Shows current balancing step; in this case it is the second step which is trial run.
3	If necessary tap ⦀ (**3**) to select applicable rotor type. Tap ❯ in **Machine type** to select necessary type of machine. Available options are: 1 plane overhung; 1 plane intermediate Tap ❯ in **Correction mode A** to select necessary correction mode. Available options are Free – for planes where the mass can be added or removed at any angular position; and Fixed – for machines that masses can be added or removed at applicable positions (for example, on the blade of a ventilator). If Fixed is selected, the option to edit the number of locations to be used in the balancing is shown. Use this option to define these locations. Tap ❯ in **Trial/Trim** mass to select as default, whether to add or remove masses.
4	Shows currently selected rotor type – in this case it is 1 plane overhung.

5	To edit trial mass and angle, tap the edit area. Use the on-screen keyboard and enter the trial run mass and angle, then tap **SAVE**. In this example, the values 1 g and 280° have been entered.
	Note: For the initial run, we recommend that the trial mass be placed opposite the location with maximum vibration amplitude.

- Tap **NEXT**, then tap **MEASURE** in the next screen to do the trial run with the attached trial mass. When the values are stable, the **STOP** button is shown.

- Tap **STOP** then switch the machine off.
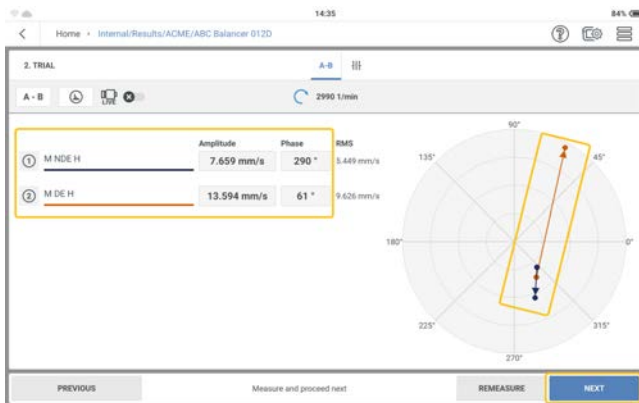
The screen shows the trial run results in digits and as a vector in the polar diagram. The arrow direction shows the path of the balancing run. In the trial run the imbalance should change to reduce the residual imbalance.

- Tap **NEXT** to see hint for the trim run.
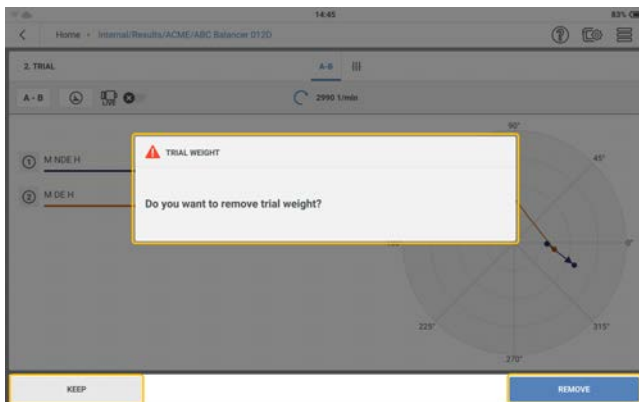
If imbalance reduces, keep the trial weight. If imbalance doubles, remove the trial weight.

- Select necessary weight action for the trim run. The correction screen is shown. In this example, the trial weight has been removed.

1	Shows current balancing step; in this case it is the third step which is the first trim run (first correction).
2	The crossed out trial weight shows that the weight has been removed from the machine.
3	Shows the recommended mass and angle of the trial weight after the initial run, with initial weight removed.

- Tap **NEXT** then repeat measure procedure as described above until the imbalance has been reduced or removed. Follow the hints shown on the screen.

Undo balancing steps

If balancing results do not get better after several trim runs, it is possible that a step was done incorrectly. To prevent this, you can return to a run that had a better result, then start the procedure from there again with different masses.

- Use the **PREVIOUS** button and navigate to the machine setup screen at which you want to start balancing again.

Tap ☰ to show the context menu items.

- Tap **_UNDO STEPS_** ([1]) to remove the selected run ([2]) and all subsequent trim runs.
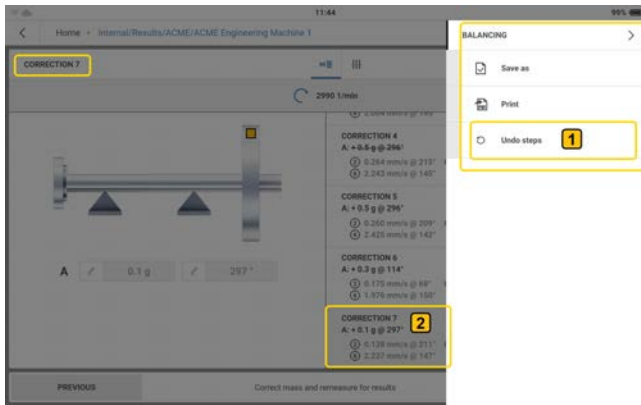
- The hint ([1]) is shown. The hint tells you that data from selected and subsequent trim runs will be deleted.
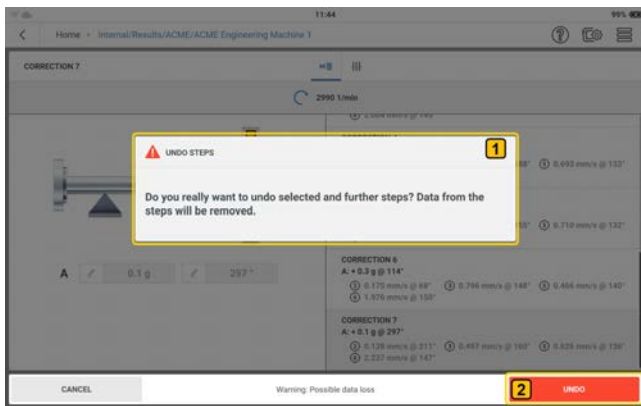
  Tap **_UNDO_** ([2]) to confirm and delete selected and subsequent trim runs.

- Before you proceed with the next measure procedure remove all masses that were added for the deleted trim runs. If mass was removed in a deleted run, then add this mass before you proceed.

Balancing in two planes

- Open or create asset that is to be checked for imbalance.

> **Note**:To find imbalance, the machine to be measured must have an absolute speed point. The speed point will be measured with a laser trigger sensor.
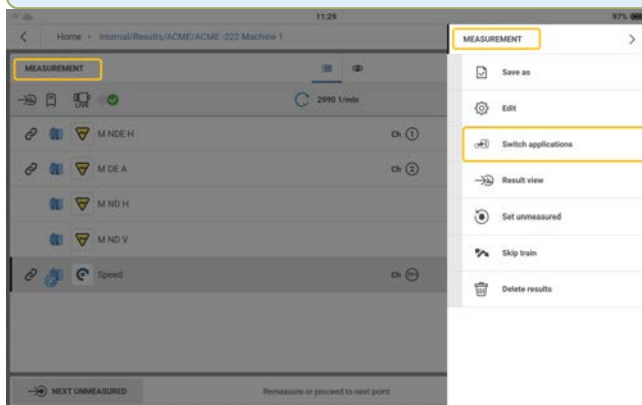
- Tap the hamburger menu ( ) to show the measurement screen context menu items, then tap **Switch applications** .
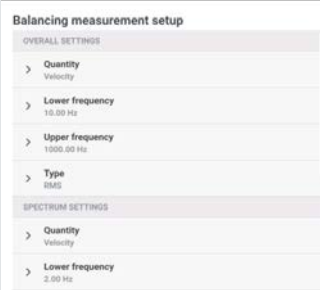
- Tap (the balancing icon) to show the balancing screen.
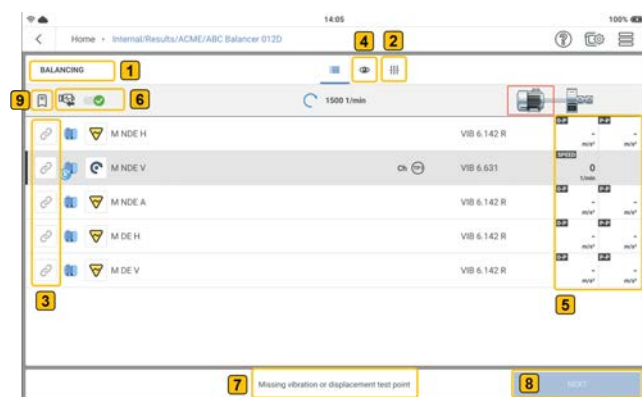
1	Shows balancing screen.
2	Tap ⟨icon⟩ (**2**) to set necessary parameters for balancing procedure.

The shown parameters can be set.

Note: The item *Type* is used to select the amplitude parameter that is used in the balancing measure screen.

If measured data is available, the data can be entered manually as amplitude and phase values in the balancing measure screen. To do this, the option *Enter user data* must be turned on (indicated by ⟨toggle⟩).

After the necessary parameters have been set, tap APPLY to confirm set parameters.

3	⟨icon⟩ – icon shows available measure location. When the location is selected to measure balancing, the icon becomes darker (⟨icon⟩).
4	Tap ⟨icon⟩ to show the vibration and displacement parameters that can be selected to be shown live on the display (**5**). Default parameters are set in the Measurement setting Sensor Live Values, and can be changed here. A maximum of two parameters for can be shown on the screen.

5	Shows live data from connected sensors. Values shown only when sensor live data (**6**) is turned on (✓).
6	Shows sensor live data on. When switched off (✕) no values are displayed in **5** .
7	Shows screen hint. This hint is related to present action.
8	The **NEXT** button is active only when all necessary conditions are correct. In this example, the hint **7** shows an incorrect condition and as a result, the button is inactive. Refer to balancing in one plane for requirements.
9	Tap 🔖 to shown machine measure history.

- Select the locations to measure for the balancing procedure.

> **Note**: Before the laser trigger sensor and the vibration sensors are mounted and connected to VIBXPERT 3 make sure that all preparations for the procedure have been correctly done.

1	The selected measure locations are shown with a darker measure location icon (🔗). Locations not selected have a grayed out icon (🔗).
2	Shows the device measure channels that will be used for the balancing procedure.
3	Shows live sensor data. In this example, the sensors have been already connected to the device.

4	Shows the measured machine speed.

- Tap **NEXT** then [A - B] to show the **influence setup** window. This window is used to select the balancing procedure.
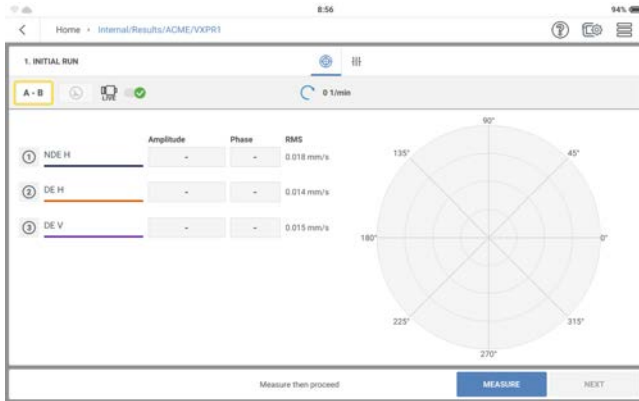
- Select necessary balancing mode. Tap the plane toggle ([toggle]) and select 2-plane balancing. When 2-plane balancing is selected, the measure locations can then be positioned on the necessary plane. Tap **APPLY** to confirm selections

- Mount the sensors as necessary then connect them to the applicable VIBXPERT 3 inputs.

- Switch the machine on. Wait until the machine has reached the balancing RPM and oper-
  ating temperature if necessary.

1	Shows current balancing step; in this case it is the first step which is initial run.
2	Tap `A - B` to show the *influence setup* window. This window is used to select the balancing procedure. Two plane balancing is used for dynamic imbalance. The locations used to calculate the balancing weights can also be selected in this window.
3	Shows the phase vector (amplitude and angle) of the measured signal, and the velocity RMS value. The Amplitude is the highest peak value, and the angle is the phase difference between the trigger signal and the highest peak.
4	Shows the distribution of the measure locations used to measure balancing. These are shown in numerical form.
5	Shows the two planes, A and B, used to measure balancing.

6	This button cycles through MEASURE, CANCEL and STOP. MEASURE is used to start the measure procedure; CANCEL is used to stop procedure if necessary; STOP is used to collect data after a stable measure procedure. ***Note:*** When measure is completed, the MEASURE button changes to REMEASURE.

- Tap ***MEASURE*** (6) to start the initial run. When the values are stable, the STOP button is shown.

- Tap ***STOP*** then switch the machine off.
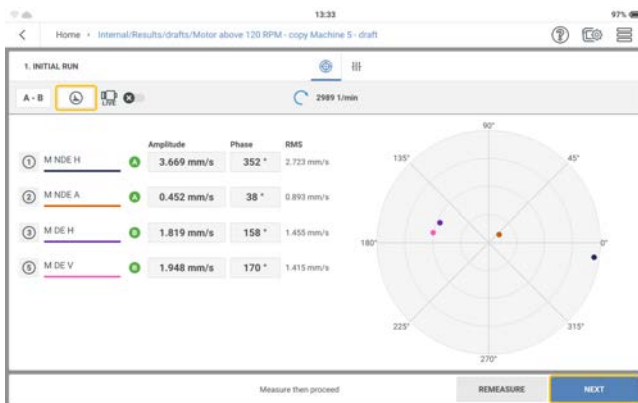
Tap [⬤] to see detailed vibration results.

- Tap ***NEXT*** then proceed to enter the mass and angle for the trial run, and if necessary, select the corresponding rotor type.
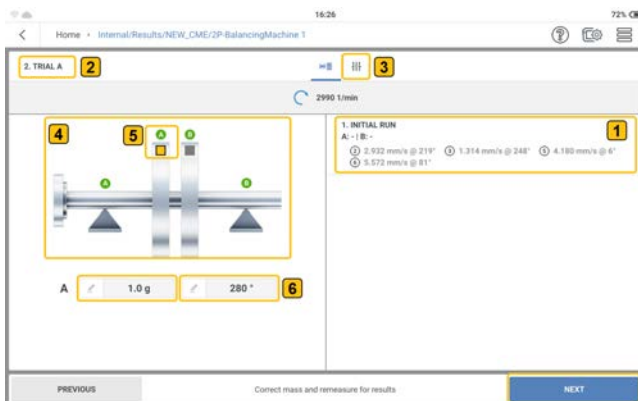
1	Shows the vibration amplitude and phase angle of the synchronous signal measured in the initial run at the different measure locations..
2	Shows current balancing step; in this case it is the second step which is trial run on plane A.

3	If necessary tap ⊞ (**3**) to select applicable rotor type. Tap › in ***Machine type*** to select necessary type of machine. Available options are: 2 planes overhung; 2 planes intermediate; 2 planes overhung and intermediate Tap › in ***Correction mode A*** to select necessary correction mode for plane A. Available options are Free – for planes where the mass can be added or removed at any angular position; and Fixed – for machines that masses can be added or removed at applicable positions (for example, on the blade of a ventilator). If Fixed is selected, the option to edit the number of locations to be used in the balancing for plane A is shown. Use this option to define these locations. ***Note***: The above steps are the same for ***Correction mode.***A combination of both Free and Fixed options is possible: Plane A can use Free while plane B can be Fixed. Tap › in ***Trial/Trim mass*** to select as default, whether to add or remove masses.
4	Shows currently selected rotor type – in this case it is 2 planes intermediate.
5	▢ – shows currently selected plane. It is the plane where the entered mass (**6**) will be added. To toggle to next plane tap ▢.
6	To edit trial mass and angle, tap the edit area. Use the on-screen keyboard and enter the trial run mass and angle, then tap ***SAVE***. In this example, the values 1 g and 280° have been entered. ***Note:*** For the initial run, we recommend that the trial mass be placed opposite the location with maximum vibration amplitude.

- Tap ***NEXT***, then tap ***MEASURE*** in the updated screen to do the trial run with the attached trial mass. When the values are stable, the ***STOP*** button is shown.

- Tap **STOP** then switch the machine off.
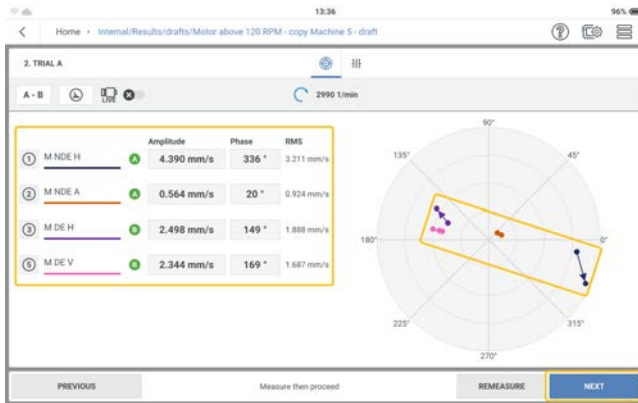
The screen shows the trial run results in digits and as a vector in the polar diagram. The arrow direction shows the path of the balancing run. In the trial run the residual imbalance should reduce.

- Tap **NEXT** to see hint for the trim run.
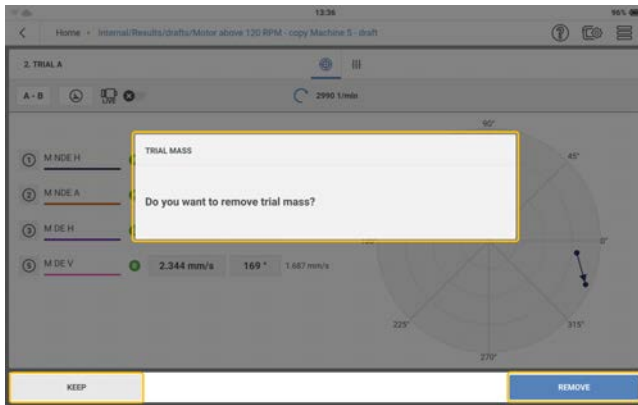
If imbalance reduces, keep the trial weight. If imbalance doubles, remove the trial weight.

- Continue to do a trial run with mass on plane A, then do a trial run with mass on plane B. After the two trial runs carry out correction on both planes. Repeat the correction steps until the balancing quality is less than 1 mm/s on all locations shown.
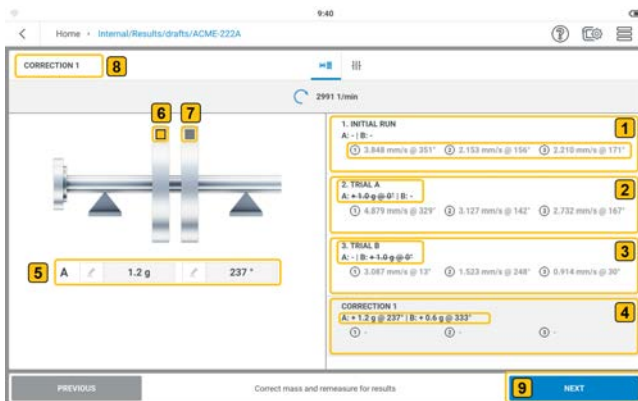
1	Shows the vibration overall values (velocity) in the initial run with no trial masses on both planes A and B.
2	Shows the vibration overall values (velocity) for the trial run with mass on plane A. The crossed out mass shows that the mass was removed from the machine before the next step.
3	Shows the vibration overall values (velocity) for the trial run with mass on plane B. The crossed out mass shows that the mass was removed from the machine before the next step.
4	Shows the recommended correction mass and related angle for both planes A and B. These values are entered in **5**.
5	In this example, values for the selected balancing plane A (**6**) are entered. Plane B values are entered when the plane is selected (**7**)
6	▢ – shows currently selected plane (A).
7	To change to plane B, tap ▢. This changes color to orange (▢).
8	Shows current balancing step; in this case it is the fourth step which is the first trim run (first correction).
9	Used to proceed to next step. Tap **NEXT** and follow hints on the screen. Repeat measure procedure as described above until the imbalance is reduced or removed.

Note:It is possible to apply correction masses on both planes at the same time. It is also possible to change the correction mode from free to fixed at any time in corrections.

Reports

Measure reports as PDF can be saved for future use or record purposes on the device non-volatile memory. Reports can be created to document the asset vibration and balancing condition as found and after correction if necessary.

When in the machine setup screen [](where balancing weights and related rotor position are shown), tap to show the context menu items.
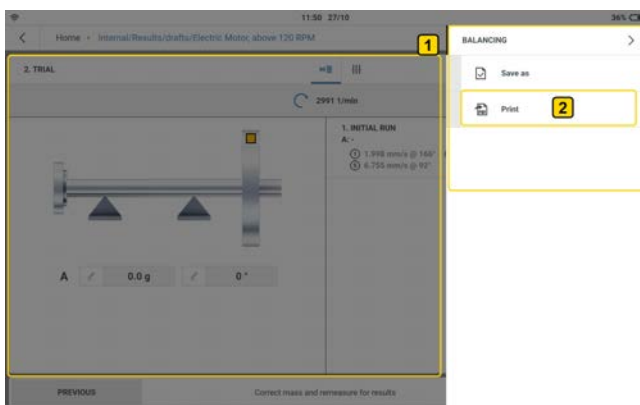
Tap to show the report setup screen.
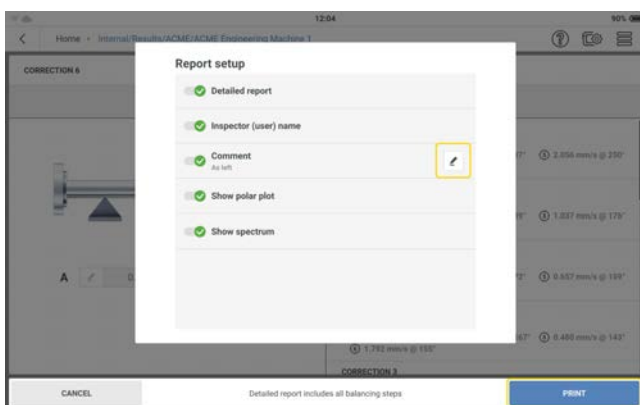
Use or and select items that are to appear on the report.

If **Detailed report** is selected on ( ), the report, if created after corrections will include all balancing steps from initial run to trial run and all corrections. If **Detailed report** is switched off ( ), the report will include only the initial run and the final correction.

Items that can be edited have an edit icon ( ) next to the name. Tap then use the alpha-numeric keyboard and edit the related item. Tap **APPLY CHANGES** to confirm entry.
Tap **PRINT** to proceed to create report.
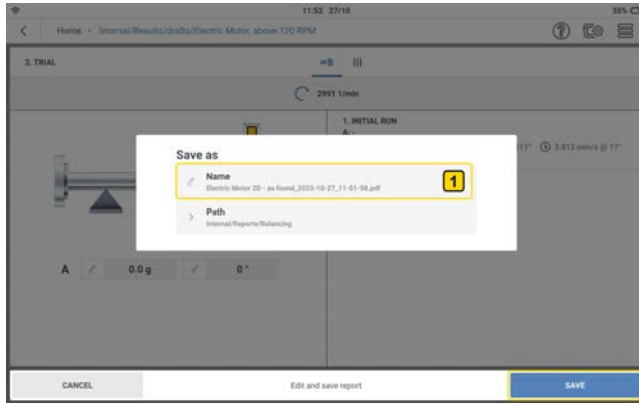
If necessary, tap to edit the file name.

Tap **SAVE** to save generated report as PDF in the necessary folder which is **Reports** > **Balancing**.

Share reports

- Switch VIBXPERT 3 on then connect the device to the PC. Use the supplied USB-A to USB-C cable.
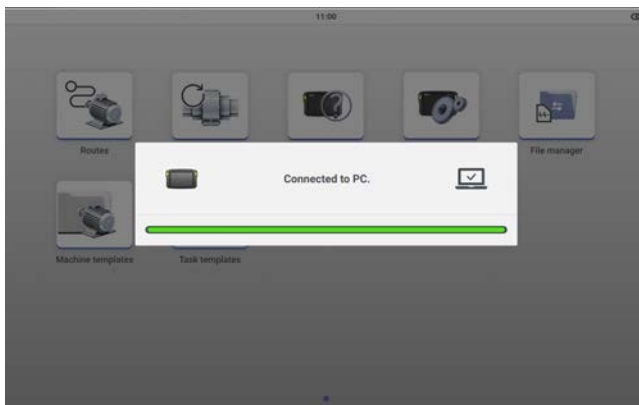
- With VIBXPERT 3 shown in the File Explorer, double click **Data** then **Measurement Data** to access the **Reports** folder.
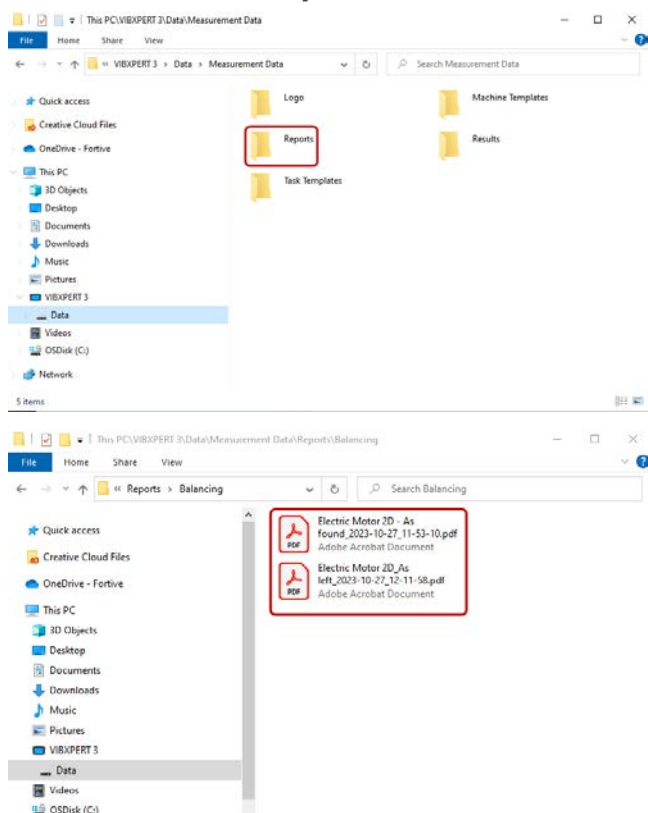
- Transfer the reports to the necessary location on the PC or to a flash drive for future use.

Report logo

Measure reports are created with a default PRÜFTECHNIK logo.

Company
Address 1
Address 2
12-345 City

db PRÜFTECHNIK
A Fluke Reliability Brand

Balancing report

File Name:	2 plane_Balancing_2023-11-30_16-19-57.pdf
Printed on:	30/11/2023 16:19
Measured on:	17/11/2023 10:12
Device serial No.:	VIBXPERT 3 50000027
User name:	John Doe

Balancing information

Asset name:	2 plane
Comment:	Have you tried turning it off and on again?

Balancing steps

1. INITIAL RUN   6000 1/min (100.00 Hz)
A: - | B: -

Point name	Amplitude 0-P @ Phase [mm/s @ °]	Overall RMS [mm/s]
1 New test point	2.498 @ 90	1.766
2 New test point	2.498 @ 90	1.766
3 New test point	2.498 @ 90	1.766
4 New test point	1.991 @ 45	1.408
5 New test point	1.991 @ 45	1.408
6 New test point	1.992 @ 45	1.409

2. TRIAL A   6000 1/min (100.00 Hz)
A: + 1.7 g @ 164° | B: -

Point name	Amplitude 0-P @ Phase [mm/s @ °]	Overall RMS [mm/s]
1 New test point	1.732 @ 35	1.225
2 New test point	1.733 @ 35	1.225
3 New test point	1.733 @ 35	1.225
4 New test point	1.241 @ 59	0.878
5 New test point	1.241 @ 59	0.878
6 New test point	1.241 @ 59	0.878

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If necessary the default logo can be replaced as follows:

- Rename the replacement logo as **LOGO.PNG**.

- Switch VIBXPERT 3 on then connect the device to the PC. Use the supplied USB-A to USB-C cable.

- With VIBXPERT 3 shown in the File Explorer, double click **Data** then **Measurement Data** to access the **Logo** folder.
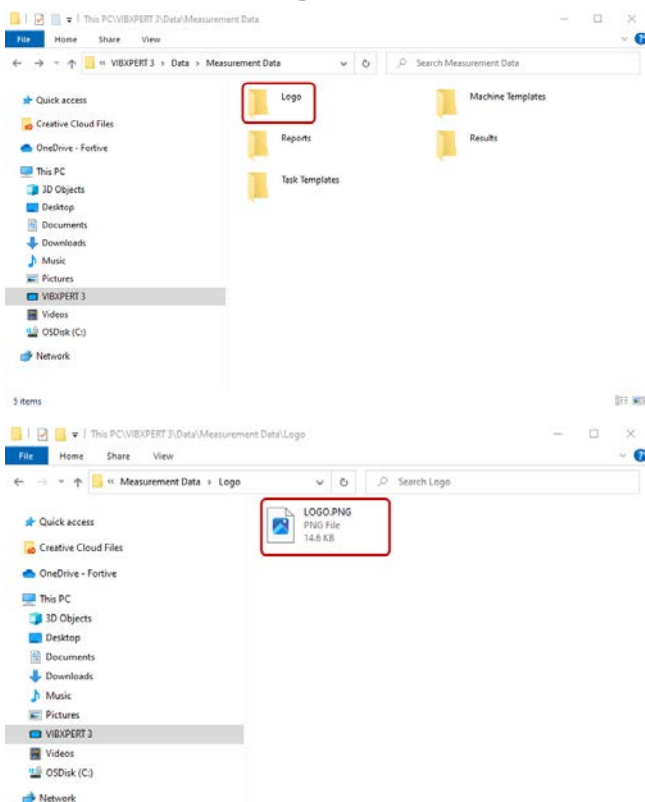
- Delete the **LOGO.PNG** file in the folder then replace it with necessary logo. This is the replacement logo with the name **LOGO.PNG**.

Generated measure reports will now have the necessary replacement logo.

Balancing report

File name:	Electric Motor 2D New Logo_2023-10-27_14-07-47.pdf
Printed on:	27/10/2023 14:07
Measured on:	27/10/2023 12:08
Device Serial No:	VIBXPERT 3 50000215
User name:	-

Balancing information

Asset name:	Electric Motor 2D

Balancing steps

1. INITIAL RUN   2991 1/min (49.86 Hz)
A: -

	Point name	Amplitude 0-P @ Phase [mm/s @ °]	Overall RMS [mm/s]
1	Motor NDE H	1.998 @ 166	1.554
2	Motor NDE V	1.863 @ 211	1.332
3	Motor DE H	3.812 @ 17	2.837
4	Motor DE V	6.755 @ 92	4.816

2. TRIAL   2988 1/min (49.81 Hz)
A: + 1.0 g @ 0°

	Point name	Amplitude 0-P @ Phase [mm/s @ °]	Overall RMS [mm/s]
1	Motor NDE H	1.315 @ 223	1.143
2	Motor NDE V	0.361 @ 326	0.469
3	Motor DE H	3.757 @ 28	2.822
4	Motor DE V	6.793 @ 99	4.872

CORRECTION 1   2988 1/min (49.80 Hz)
A: + 7.2 g @ 86°

	Point name	Amplitude 0-P @ Phase [mm/s @ °]	Overall RMS [mm/s]
1	Motor NDE H	13.666 @ 34	9.683
2	Motor NDE V	18.753 @ 108	13.259
3	Motor DE H	2.852 @ 216	2.192
4	Motor DE V	0.725 @ 58	0.782

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Run up and coast down

Why run up and coast down

Due to natural frequency, machines must not operate near frequencies that would cause resonance. Resonance occurs when the excitation frequency matches the resonant frequency or natural frequency of the machine. To prevent machinery damage due to resonance, the machinery must not operate near or at the natural frequency. The Coast down / Run up application is used to find these resonance frequencies.

The application is available as standard in these packages:

- VIBXPERT 3 Balancer (basic licence)
- VIBXPERT 3 Advanced Analysis

Run up and coast down curves record the changes in the vibration behavior of an asset when the machine starts up or shuts down. This application is used to determine the resonance frequencies of the machine.
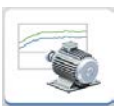
How to measure run up and coast down

In run up, we start to measure before the machine is switched on. VIBXPERT 3 records the current machine speed. When the set start speed is shown, VIBXPERT 3 begins to measure automatically. When the set stop speed is shown, VIBXPERT 3 stops to measure.

In coast down, we start to measure while the machine runs at the operating speed. VIBXPERT 3 begins to measure the speed. When the machine is switched off and the speed drops below the set start speed, VIBXPERT 3 starts to record data automatically. VIBXPERT 3 stops to measure when the set stop speed is shown.

> **Note**:As the measure procedure in Run up/ Coast down and Balancing are almost the same, refer to related topic ("Prepare for the balancing procedure" on page 101) for instructions on how to mount the sensors.

Steps
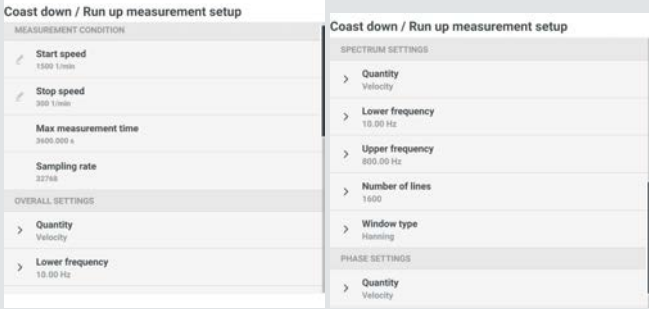
- From the home screen, tap the coast down/ run up icon to open or create asset that is necessary for coast down or run up test.
  Alternatively, coast down or run up can be started from either analysis or balancing through the use of the switch over function (refer to "Change application" on page 99).

> **Note**:If a new asset is created through a machine template, all measure locations will be off (🔗). If an asset where balancing was measured is used, the measure locations last used will be shown as selected (🔗).

In this example, no measure group has been created.

1	Shows by default the measure locations for the selected machine.
2	Shows the current application (coast down and run up).
3	Shows available measure locations. In this example, no measure group has been created. For a measure group, a speed point and a vibration measure location are necessary, but a displacement location can also be used to create a group. However, a displacement location and a vibration location can not be used in the same group. NOTE: If a displacement location is used, make sure that the location is given a displacement sensor (refer to "Channels and sensors — basic settings" on page 27). If a triaxial sensor is used, three measure locations (and thus three measure channels) are occupied.
4	Shows the device measure channels and available sensors that will be used in coast down/run up test. In this example, all measure channels are not shown as the necessary measure locations have not been selected. Measure channels are selected in ascending order, and given sensors by availability (refer to "Channels and sensors — basic settings" on page 27).

5	Shows the current vibration and displacement parameters for the selected measure location. These parameters are based on the sensor live values set in settings (refer to "Settings" on page 23). If necessary, tap ⊙ and temporarily select the parameters to be shown live on the display when live sensor data (**9**) is on. For details refer to "Live data compatibility table" on page 144.
6	Tap ⦀ (**6**) to set necessary parameters for coast down and run up tests. The shown parameters can be set.

Parameters can be edited or selected from a drop-down menu.
Tap ✎ then use the alphanumeric keyboard and edit the related item. Tap **SAVE** to confirm entry.
Tap › then select necessary item or value from the drop-down menu.
Note: The sampling rate is given by the maximum frequency, the maximum measure time, the number of locations measured and available disk space on the device. |
| **7** | Tap 🔖 to show the balancing runs, and coast down/run up tests done on the machine. Refer to "Understanding events" on page 141. |
| **8** | Shows hint for current screen. In this example, no measure location has been selected thus the hint that there is no test point available.
Note: For coast down and run up tests, a speed point, which could be either absolute or relative, is necessary for the measure procedure. |
| **9** | Live sensor data — (✓ indicates on; ✕ indicates off); when on, live values are shown (refer to "Live data compatibility table" on page 144). |

| 10 | Shows machine speed used in the kinematic model when live sensor data (9) is off (✕). If live sensor data is on (✓), the speed measured by the laser trigger RPM sensor is shown. |

- Select the locations to measure for the coast down/run up test.

> **Note**: Before the laser trigger sensor and the vibration sensors are mounted and connected to VIBXPERT 3 make sure that all preparations for the tests are correctly done.
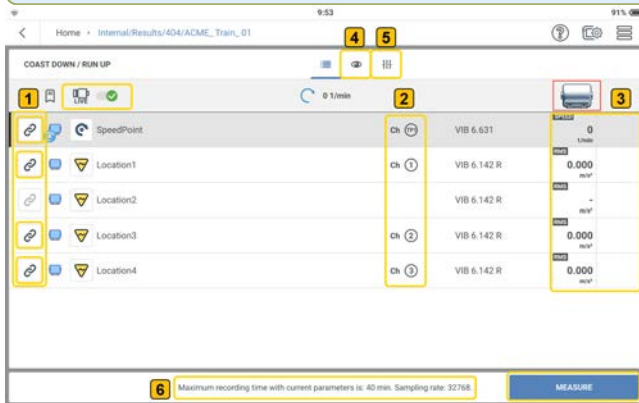
1	The selected measure locations are shown with a darker measure location icon (🔗). Locations not selected have a grayed out icon (🔗).
2	Shows the device measure channels that will be used for the coast down /run up test.
3	Shows live sensor data as live data is on (✓). In this example, the sensors have been already connected to the device.
4	Shows the vibration and displacement parameters that can be selected to be shown live on the display. For live values to be shown, specified overall settings must be selected. Refer to "Live data compatibility table" on page 144.
5	Shows these coast down/run up measure setup items: measure task, overall settings, spectrum settings and phase settings In run up, the start speed is lower than the stop speed. In coast down, the start speed is higher than the stop speed.
6	Shows hint for current screen. In this example, the maximum measure time and the sample rate for set parameters is shown.

- Mount the sensors as necessary then connect them to the applicable VIBXPERT 3 inputs.
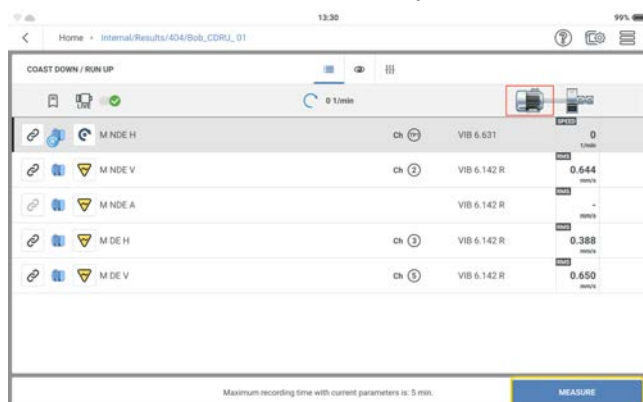
- Tap *MEASURE* then switch the machine on.
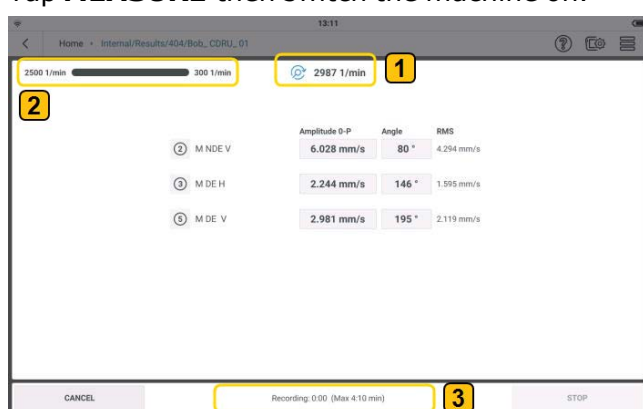
In this example, a coast down test is to be made, thus switch the machine off as soon as the machine operation speed is reached.

1	Shows actual machine speed.
2	Shows the start speed and the stop speed. In this coast down example, the start speed has not been reached, thus the progress bar has not started.
3	Shows the data collection status, and the maximum measure time. In this coast down example, no data has been recorded because the start speed has not been reached.

Note:For run up test, the start speed is lower than the stop speed. The machine is switched off after the operation speed is reached.

- When the start speed is reached, the collection of data starts and this is shown in the progress bar.

1	Shows actual machine speed.
2	The progress bar shows data collection. In this coast down example, the start speed has been reached.
3	Shows the data collection status, and the maximum measure time. In this coast down example, some data has been recorded. If the maximum measure time is reached before the stop speed is reached, collection of data will stop.
4	If necessary, data collection when started can be stopped. Tap **STOP** to end collection.

- When data collection is completed, the progress bar is full and results are shown automatically.

Coast down /run up results

In a run up or coast down test, raw time waveform is recorded, and the signal processed based on the used coast down/run up measure setup. When postprocessing is finished, results are shown. The default result screen shows a Bode plot.

Bode plot

The Bode plot shows the frequency response of the measured asset. The plot has two graphs: one shows the amplitude in relation to the instant machine speed and the other shows the phase angle in relation to the instant machine speed.

1	This upper graph shows the amplitude progression.
2	This bottom graph shows the phase angle.
3	Shows the screen title. The title shows the measure timestamp and locations selected to be shown. If a single location is selected, then the title shows the name of the selected location. If more than one location is selected, the title shows multiple points selected. In this example, multiple points have been selected.
4	This is the Bode plots icon (≋). In this example, the icon is on.
5	This is the main cursor icon (☿), and it is labeled M when used on the graphs. In this example, the icon is on. Cursors for both graphs are synchronized (**7**). For details on cursors, refer to "Cursor" on page 95"Cursor" on page 95

6	Shows the amplitude, phase angle, and instant machine speed of the color coded measure locations. This information is in the cursors frame and shows the values of activated cursors. In this example only the main cursor is active.
7	Similar cursors in the upper (amplitude) and lower graph (phase) are synchronized.
8	Shows the frequency at the selected cursor. If the delta cursor icon is on, and the delta cursor on the graph is selected, its frequency value is shown. Use [+] or [−] to move selected cursor to necessary frequency. NOTE: The position of [+] and [−] are interchanged for coast down and run up. [+] will be on the left side in coast down, and on the right side for run up.
9	When parameter and units is tapped, postprocessing is started. The parameter is cycled through acceleration, velocity and displacement.
10	Tap frequency label to cycle through the machine speed units.
11	This is the delta cursor icon (⌂), and it is labeled **D** when used on the graphs. In this example, the icon is not on. Cursors for both graphs are synchronized. For details on cursors, refer to "Cursor" on page 95"Cursor" on page 95
12	Tap ⌇ to show the progression of the characteristic overall values relative to the machine speed. See section on overall values below.
13	Tap ◎ to show the Nyquist diagram. See section on Nyquist diagram below.

14	Tap ⦿ to open the **Measurement Locations** frame. The frame shows all measure locations on the machine train. To show results of locations already measured for comparison, check the related boxes.
	Tap ⦿ to close the frame.
15	Tap ⦿ to close the **Cursors** frame. This enlarges the main screen. Tap ⦿ to show the cursors frame.

Nyquist diagram

Nyquist diagram shows the amplitude and phase of the graph in polar coordinates.
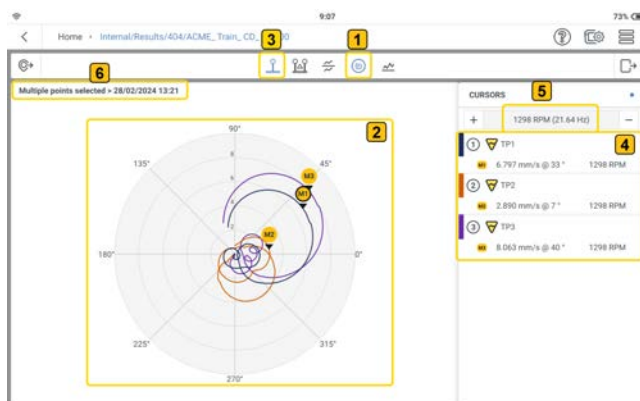
1	Tap ⦿ to show the Nyquist diagram. The diagram shows vibration amplitude and phase angle in polar coordinates.
2	Shows the polar plot of the run up or coast down. In this example, plots are shown for multiple points as shown on the graph title (6), and the main cursor is active.

3	In this example, the main cursor icon (🔲) is on. The cursor position on the polar plots is shown as 🔵M1 . The main cursor positions on the plots are labeled in incremental order, and start with M1. The cursors are synchronized and can be moved to necessary frequency positions with ⊞ or ⊟ . Alternatively, tap the polar plots at the necessary frequency positions to move the cursors to these positions.
4	Shows the amplitude, phase angle, and instant machine speed of the color coded measure locations. This information is in the cursors frame and shows the values of activated cursors. In this example only the main cursor is active.
5	Shows the frequency at the selected cursor. All identical cursors are at the same frequency. A black circle (🔵) on a cursor label shows the type of cursor that is active. In this example, it is the main cursor. If the screen is in dark mode, the circle is white. Use ⊞ or ⊟ to move selected cursor to necessary frequency.
6	Shows the screen title. The title shows the measure timestamp and locations selected to be shown. If a single location is selected, then the title shows the name of the selected location. If more than one location is selected, the title shows multiple points selected. In this example, multiple points have been selected.

When the delta cursor is activated, this situation occurs:
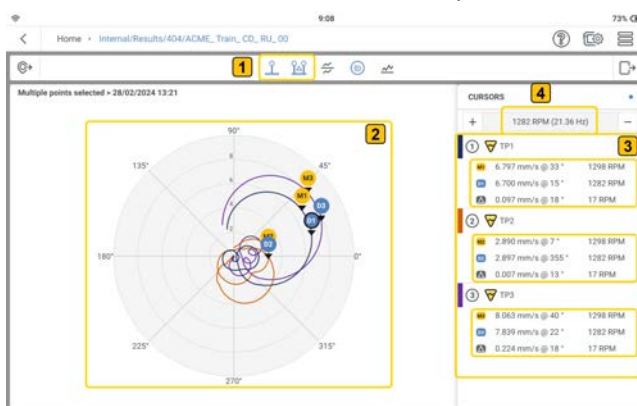
1	Tap 🔲 to show delta cursor values. For details on cursors, refer to "Cursor" on page 95"Cursor" on page 95

2	When delta cursor is on, the delta cursor position on the polar plots is shown as ![D3] . The delta cursor positions on the plots are labeled in incremental order, and start with D1. The delta cursors are synchronized and can be moved to necessary frequency positions with ![+] or ![−] . Alternatively, tap the polar plots at the necessary frequency positions to move the delta cursors to these positions. NOTE: The delta cursors can be moved only when they are active. This shown by a black circle on the cursor label (![D1]). If the screen is in dark mode, the circle is white.
3	The cursor frame shows the main and delta cursor amplitude, and phase angle, of the color coded measure locations. The calculated Δ values for the locations are also shown.
4	Shows the frequency at the selected cursor. All identical cursors are at the same frequency. A black circle (![D1]) on a cursor label shows the type of cursor that is active. If the screen is in dark mode, the circle is white. In this example, it is the delta cursor.

Overall value

The overall value graph shows the progression of the characteristic overall vibration values relative to the frequency. The vibration values are set in the measure setup and can be in RMS, 0-P or P-P.

1	Tap ![icon] to show the overall RMS values. The diagram shows characteristic overall values relative to the machine speed.
2	In this example, both main and delta cursor icons are on.

3	Shows RMS values for the selected measure locations relative to the machine speed. In this example, multiple measure locations have been selected. Both main cursor (**M**) and delta cursor (**D**) are shown because their related icons are on. In this example, the main cursor is the active cursor, hence the black circle on the label. If the screen is in dark mode, the circle is white.
4	This is the cursors frame and shows the values of cursors that are on. If the delta cursor is also on, the calculated Δ values are shown.
5	Shows the frequency at the selected cursor, which is identified by a black circle on the cursor label. In this example, it is the main cursor. If the screen is in dark mode, the circle is white. Use $+$ or $-$ to move selected cursor to necessary frequency.
6	Postprocessing is done when parameter and units is tapped. The parameter is cycled through acceleration, velocity and displacement. The timestamp for results from postprocessing is shown with an asterisk. **A** – Acceleration RMS from postprocessing **B** – Shows postprocessing graphs **C** – Timestamp with asterisk(*) identifies a postprocessing result
7	Tap frequency label to cycle through the machine speed units.
8	Shows the screen title. The title shows the measure timestamp and locations selected to be shown. If a single location is selected, then the title shows the name of the selected location. If more than one location is selected, the title shows multiple points selected. In this example, multiple points have been selected. Results from postprocessing are shown with an asterisk.

Understanding events

An event in VIBXPERT 3 can be a correction such as balancing or a diagnosis such as coast down and/or run up test.

Events icon ( ) is shown in all applications, but correct events are listed after specified steps are made in either balancing, or coast down and/or run up test.

Event creation in balancing

- Open or create asset that is to be checked for imbalance.

- Follow the balancing steps until the selection of the measure locations (refer to "Balancing in one plane" on page 104).
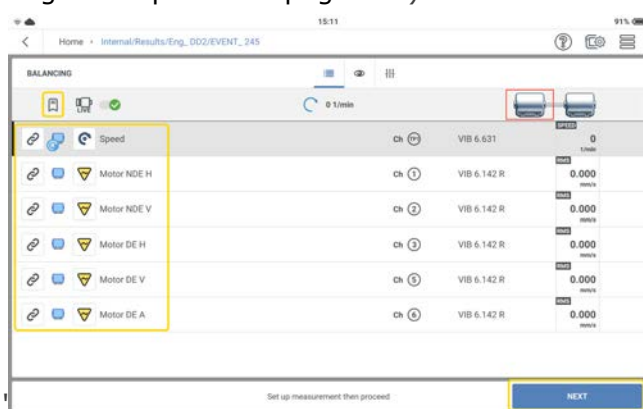
- Tap **NEXT**. This event is created and then listed. If you stop to measure because there is not sufficient time or because of low battery capacity, you can start to measure where you stopped.

- When you open the asset again, tap to open the events list. Tap the necessary balancing event and then start to measure again.
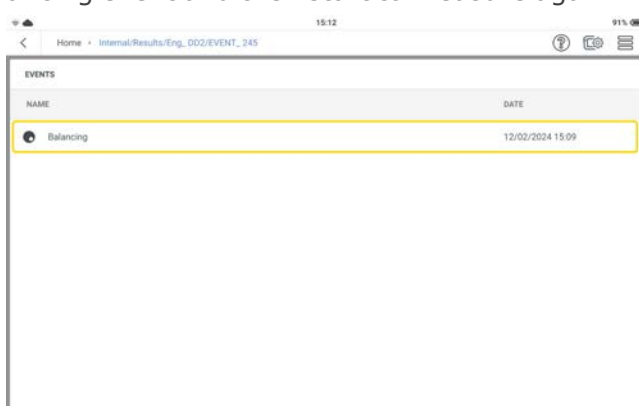
Analysis of previous steps can be made and measured again.

Event creation in coast down/run up

- Open or create asset that a coast down and/or a run up test is to be made.

- Follow the coast down and/or run up test steps until MEASURE is shown (refer to "Run up and coast down" on page 129).
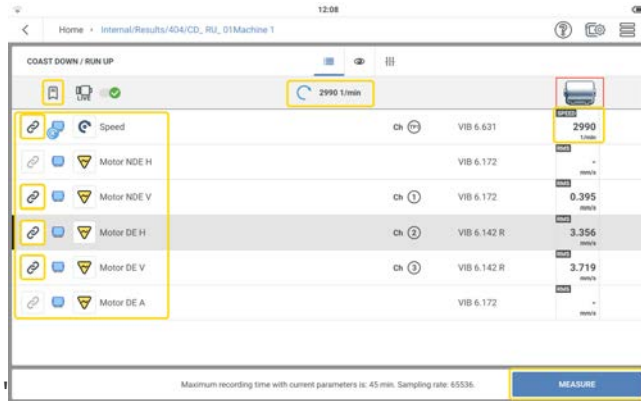
- Tap *MEASURE* then switch the machine on.
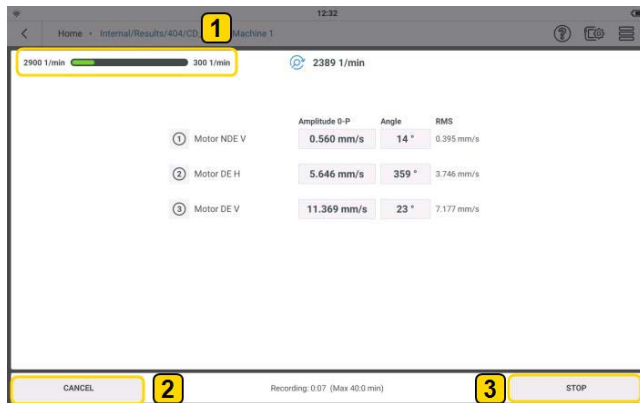
The progress bar () shows the collection of data. Once collection of data starts, this event is created and then listed, unless data collection is canceled (). If the collection of data is stopped (), this event is created and listed.

- When you open the asset again, tap to open the events list. Tap the necessary coast down and/or run up event to see the results.
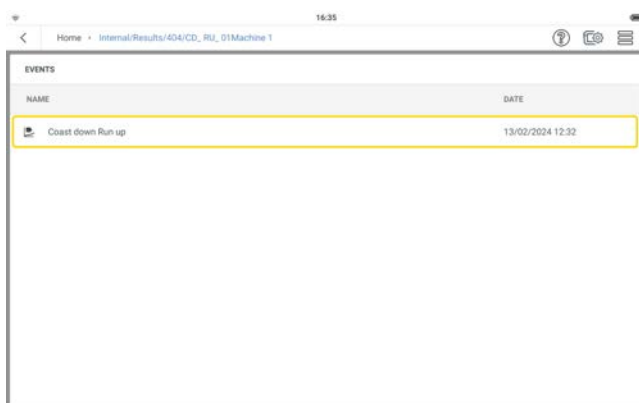
Analysis of the results and temporary postprocessing can be made. New results are not saved.

Events list

Events list shows all corrective and diagnostic measure actions that have been done on the selected asset. These events can be renamed or deleted if necessary.
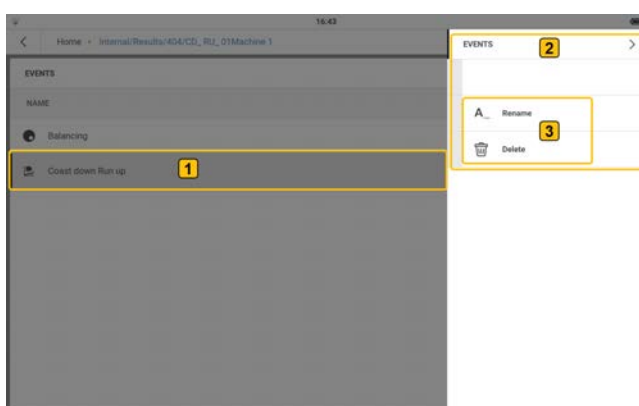
To rename or delete an event, tap and hold the necessary event (**1**), then use the context menu (**2**) that shows and rename or delete the event (**3**).

Live data compatibility table

In balancing and coast down and/or run up tests, the live sensor values shown are not dependent on measure tasks given to the measure locations. Tap 👁 to show the vibration and displacement parameters that can be selected to be shown live on the display. Scroll to the bottom of the *Sensor live values* screen to see all parameters.
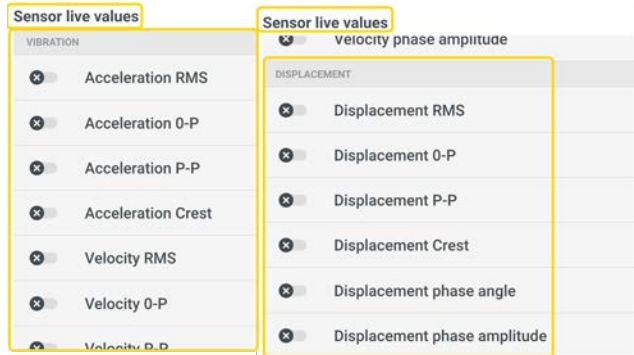
The table below shows the parameters that can be selected to be shown live if necessary.

	Parameter
VIBRATION	Acceleration RMS; Acceleration 0-P; Acceleration P-P; Acceleration crest; Velocity RMS; Velocity 0-P; Velocity P-P; Velocity crest; Velocity phase angle; Velocity phase amplitude
DISPLACEMENT	Displacement RMS; Displacement 0-P; Displacement P-P; Displacement crest; Displacement phase; Displacement phase amplitude

Tap 🎚 to show the necessary parameters for either balancing or coast down and/or rup up tests. Scroll to the bottom of the *Coast down / rup up measurement setup* screen to see all parameters.
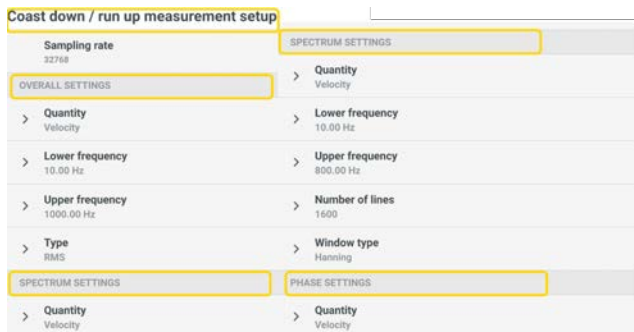
The table below shows the parameters necessary to show live sensor values on the display.

	Quantity	Type
OVERALL SETTINGS	Acceleration; Velocity; Displacement	RMS; 0-P; P-P
PHASE SETTINGS	Acceleration; Velocity; Displacement	

The table below shows the setup combinations required for live sensor values to be shown.

👁	⫴	Live sensor values (Vibration)	Live sensor values (Displacement)
VIBRATION > Acceleration RMS *DISPLACEMENT* > Displacement RMS	*OVERALL SETTINGS QUANTITY* > Acceleration *TYPE* > RMS	*YES* RMS Acceleration	*NO*
VIBRATION > Acceleration RMS *DISPLACEMENT* > Displacement RMS	*OVERALL SETTINGS QUANTITY* > Velocity *TYPE* > RMS	*NO*	*NO*
VIBRATION > Acceleration RMS *DISPLACEMENT* > Displacement RMS	*OVERALL SETTINGS QUANTITY* > Displacement *TYPE* > RMS	*NO*	*YES* RMS Displacement
VIBRATION > Acceleration RMS *DISPLACEMENT* > Displacement RMS	*OVERALL SETTINGS QUANTITY* > Acceleration *TYPE* > 0-P	*NO*	*NO*
VIBRATION > Velocity P-P *DISPLACEMENT* > Displacement P-P	*OVERALL SETTINGS QUANTITY* > Velocity *TYPE* > P-P	*YES* P-P Velocity	*NO*

👁	🎚	Live sensor values (Vibration)	Live sensor values (Displacement)
VIBRATION > Velocity P-P *DISPLACEMENT* > Displacement P-P	*ALL SETTINGS* *QUANTITY* > Displacement *TYPE* > P-P	*NO*	*YES* P-P Dispalcement
NOTE: For a displacement measure location, a displacement sensor must be configured correctly in settings, and given a measure channel. The measured group has a speed point and only displacement locations. If a vibration location is selected before the displacement location, then it is not possible to include a displacement location, and vice versa.			
VIBRATION > Velocity phase angle Velocity phase amplitude *DISPLACEMENT* > Displacement phase angle Displacement phase amplitude	*OVERALL SETTINGS* *QUANTITY* > Velocity *TYPE* > RMS *PHASE SETTINGS* *QUANTITY* > Acceleration	NO	NO
VIBRATION > Velocity phase angle Velocity phase amplitude *DISPLACEMENT* > Displacement phase angle Displacement phase amplitude	*OVERALL SETTINGS* *QUANTITY* > Velocity *TYPE* > RMS *PHASE SETTINGS* *QUANTITY* > Velocity	YES Velocity phase angle Velocity phase amplitude	NO

👁	🎚	**Live sensor values (Vibration)**	**Live sensor values (Displacement)**
VIBRATION > Velocity phase angle Velocity phase amplitude *DISPLACEMENT >* Displacement phase angle Displacement phase amplitude	*ALL SETTINGS QUANTITY >* Velocity *OVERALL SETTINGS TYPE >* RMS *ALL SETTINGS QUANTITY >* Displacement *OVERALL SETTINGS TYPE >* RMS	YES Displacement phase angle Displacement phase amplitude	YES Displacement phase angle Displacement phase amplitude
VIBRATION > Acceleration crest Velocity crest DISPLACEMENT > Displacement crest	No crest in balancing and coast down and/or run up	NO	NO

Technical data – VIBXPERT 3

Parameter	Details
Measure channels	
Number	6 synchronous analog channels 2 trigger points
Channels 1–6	Frequency range: 0 to 50 kHz Voltage: -20 to +20 V Input impedance: 78 kΩ IEPE Linedrive
Connectors	1 and 4: Triaxial sensor, single axis sensor and VIBCODE 2,3,5 and 6: Single axis sensor
Dynamic range	108 dB (total)
Sampling rate	up to 131 kHz per channel (Trigger 1 MHz)
Signal pro-cessing	6 x 24 bit ADCs (Trigger 2 x 14bit)
Measure range/accuracy	Vibration acceleration: dependent on used sensor Shock pulse: -10 dBsv to 80 dBsv +/- 2 dBsv
Speed (RPM)	10 to 120 000 cpm ±0.1% or ± 1 cpm (the smaller is applicable)
Fulfilled standard	DIN ISO 2954:2012 (2-1 kHz, 10 Hz -1 kHz, 10-10 KHz)
Display	
Type	Capacitive touchscreen Optically bonded for high contrast and increased shock resistance
Active area	(220 x 137) mm (7 7/8" x 5 25/64") (1280 x 800 pixels)
Size	256 mm (10 5/64'')
Color depth	16.7 million colors
Viewing angle	< 150°
Operation	Multi-touch — gesture control Glove-compatible

Parameter	Details
Illumination	Backlit, adjustable
Ambient light sensor	Yes
Power supply	
Battery type	Lithium-Ion rechargeable battery
Nominal voltage	7.2 V
Energy density	72 Wh
Charge time (typical)	6.5 hrs (0 to 100% @ 25 °C / 77 °F) 3.5 hrs (0 to 80% @ 25 °C / 77 °F)
Charge temperature	10 °C to 40 °C (50 °F to 104 °F)
Operation time (typical)	8 hours (based on brightness at 50%, sensor measures in preview mode)
Charger	100-240 V~, 50-60 Hz (input) 12 V 3 A (output)
Energy saving mode	Yes
Computer	
Processor	ARM Quadcore 1.6 GHz
Operating elements	Multi- touchscreen, ON/OFF button, 2 ENTER buttons
Memory	microSD card, 256 GB for measured data, permanently installed 4 GB RAM
USB	1 x USB 2.0, device interface
RFID	RFID reader module for PRÜFTECHNIK transponder ALI 50.628-25 Complies with ISO 14443a and ISO 15693 Read distance: maximum 3 cm / 1 3/16"
WiFi	IEEE 802.11a/b/g/n/ac Throughput: < 200 Mbps Security: WPA2

Parameter	Details
Stroboscope	Frequency range: 0.1 – 1000 Hz
	Resolution: 0.06 1/min.
	LEDs: Risk group 1 per IEC 62471
LED	1x RGB LED (display for battery and charge statuses)
Environment / General	
Connections	Charge socket for charger
	USB type C port for data cable
	2 x plug-in connector (8-pole) for signal cable
	4 x plug-in connector (3-pole) for signal cable
	2 x plug-in connector (4-pole) for trigger
Housing	2-component housing:
	Premold: PC (LEXAN), black
	Overmold: TPE (Thermolast), black
Dimensions	Approx. 326 x 210 x 56 mm (12 53/64" x 8 17/64" x 2 13/64") [LxWxH]
Weight	Approx. 2.2 kg (4.85 lbs.)
IP Rating	IP65, dust-proof and spray water-protected
Temperature range	Operation: -10 °C to +50 °C (14 °F to 122 °F)
	Storage: -20 °C to +60 °C (-4 °F to +140 °F)
Humidity	0% to 90 %, non-condensing
Certification	CE, RoHS, FCC, FCC/IC , UK CA
Output Channels (Trigger 1 and Trigger 2)	
Stroboscope control	TTL output
Frequency range	0.1 to 1000 Hz
Resolution	0.05 Hz
Frequency range	10 Hz to 20 kHz

Declaration of conformity

The system fulfills the EC Guidelines for electric devices and those relating to electromagnetic compatibility as indicated in the respective conformity certificates. The certificates may be

downloaded from the PRÜFTECHNIK website: www.pruftechnik.com

LIMITED WARRANTY AND LIMITATION OF LIABILITY

This Fluke product is warranted to be free from defects in material and workmanship under normal use and service for two years from the date of purchase. This warranty does not cover fuses, disposable batteries, or damage from accident, neglect, misuse, alteration, contamination, or abnormal conditions of operation or handling. Resellers are not authorized to extend any other warranty on Fluke's behalf. Fluke's warranty obligation is limited, at Fluke's option, to refund of the purchase price, free of charge repair, or replacement of a defective product returned within the warranty period. To obtain service during the warranty period, contact your nearest Fluke authorized service center to obtain return authorization information, then send the product to that Service Center with a description of the problem. THIS WARRANTY IS YOUR SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES; EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. FLUKE IS NOT LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, ARISING FROM ANY CAUSE OR THEORY. SINCE SOME STATES OR COUNTRIES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF AN IMPLIED WARRANTY OR OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, THIS LIMITATION OF LIABILITY MAY NOT APPLY TO YOU.