ROTALIGN touch

On-board help

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Legal notices

Contents

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System packages

The ROTALIGN touch system is available in four different models.

- ALI 50.000-B — ROTALIGN touch **without** built-in camera and built-in mobile connectivity module
- ALI 50.000-CAM — ROTALIGN touch **with** built-in camera
- ALI 50.000-MOB — ROTALIGN touch **with** built-in mobile connectivity (which includes WiFi[1], RFID[2] and ALIGNMENT RELIABILITY CENTER 4.0 ARC 4.0[3])
- ALI 50.000 — ROTALIGN touch **full** version (comprises built-in camera and mobile connectivity)

Part number	Component	ALI 50.000	ALI 50.000-MOB	ALI 50.000-CAM	ALI 50.000-B
ALI 50.200	ROTALIGN touch computer	✓	✓	✓	✓
ALI 4.900	sensALIGN sensor	✓	✓	✓	✓
ALI 4.910	sensALIGN laser	✓	✓	✓	✓
ALI 4.960	sensALIGN rechargeable battery (2 No. in package)	✓	✓	✓	✓
ALI 50.651	ROTALIGN touch charger/adapter	✓	✓	✓	✓
ALI 4.651	sensALIGN charger/adapter	✓	✓	✓	✓
ALI 4.922-2	sensALIGN sensor cable	✓	✓	✓	✓
ALI 12.502-2	PC/USB cable	✓	✓	✓	✓
ALI 17.451	USB memory stick with ARC 4.0 software and product literature	✓	✓	✓	✓
ALI 4.905	Vibration check probe	✓	✓	✓	✓
ALI 2.118	Small chain-type bracket (2 No. in package)	✓	✓	✓	✓

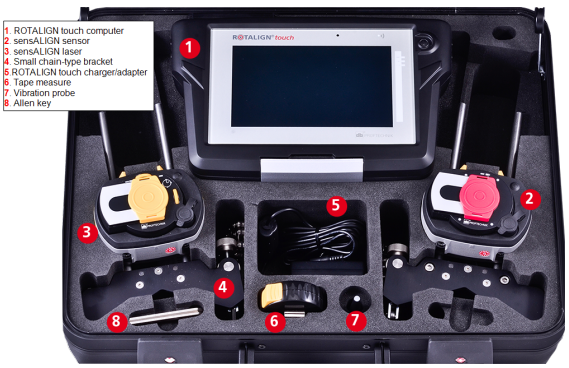
[1]WiFi is used to transfer asset measurements between ROTALIGN touch and Cloud drive via the software platform ARC 4.0

[2]This identification technology is used to identify assets to be aligned.

[3]This software platform which is also referred to as ARC 4.0 allows the management of plant assets in a structured form, displaying trends. It also allows job preparation and transfer of asset measurements in Cloud drive.

Part number	Component	ALI 50.000	ALI 50.000-MOB	ALI 50.000-CAM	ALI 50.000-B
ALI 2.170	115 mm [4 1/2”] support post, white (4 No.)	✓	✓	✓	✓
ALI 2.171	150 mm [5 15/16”] support post, black (4 No.)	✓	✓	✓	✓
ALI 2.173	250 mm [9 7/8”] support post, green (4 No.)	✓	✓	✓	✓
ALI 2.174	300 mm [11 13/16”] support post, yellow (4 No.)	✓	✓	✓	✓
ALI 2.114	300 mm chain	✓	✓	✓	✓
ALI 3.589	Tape measure mm/inch	✓	✓	✓	✓
ALI 2.911	Lens cleaning cloth	✓	✓	✓	✓
0 0739 1055	2.5 mm allen key	✓	✓	✓	✓
ALI 50.800	ROTALIGN touch case	✓	✓	✓	✓
Functionality	Built-in camera	✓	✗	✓	✗
Functionality	Built-in mobile connectivity	✓	✓	✗	✗

See package components in the images below.



Home screen

The home screen is displayed when ROTALIGN touch is switched on. The home screen may also be accessed by tapping the "Home" icon.

Tapping the respective icon accesses the following respective functions:

- **(1)** The "Horizontal alignment" icon is used to access the **horizontal alignment** application.
- **(2)** The "Soft foot" icon is used to access **soft foot** measurement.
- **(3)** The "Vertical alignment" icon is used to access the **vertical alignment** application.
- **(4)** The "Live Trend" icon is used to access the **Live Trend** application.
- **(5)** The "Vibration check" icon is used to access the vibrations measurement application.
- **(6)** The "RFID" icon is used to open assets assigned to respective RFID tags.
- **(7)** The "New asset" icon is used to start a new asset (this may be a pump-motor combination).

  Note
  For any opened asset, different applications that may include Shaft Alignment, Live Trend, Vibration Check, and soft foot measurement, may be performed.

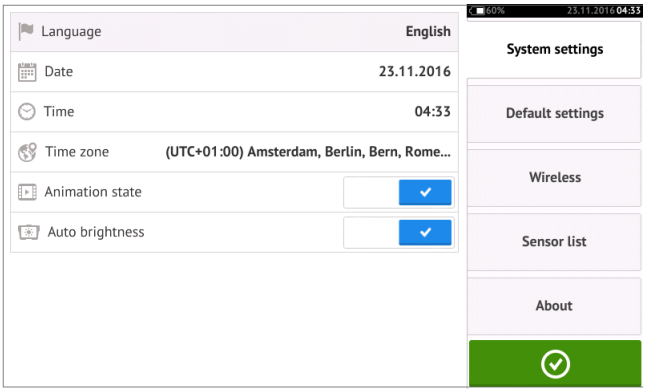
- **(8)** The "Camera" icon is used to access the built-in camera.
- **(9)** The "Asset park" icon is used to display all saved assets.
- **(10)** The "Resume" icon is used to resume last asset opened (provided it was saved) when the system is switched on.
- **(11)** The "Gallery" icon is used to display all images taken using the system's built-in camera.
- **(12)** The "Upload" icon is used to save asset measurements in the **Cloud drive**.
- **(13)** The "Download" icon is used to open asset measurements from the **Cloud drive**.
- **(14)** The "**Configuration**" icon is used to configure ROTALIGN touch settings (which include language, date, time, default settings), and access its built-in mobile connectivity.
- **(15)** The "Back" icon is used to return to previous screen.
- **(16)** The "Power-off" icon is used to turn the ROTALIGN touch computer off.

- **(17)** The "Camera LED on/off" icon is used to turn the camera LEDs on/off.
- **(18)** The "Help" icon is used to access the on-board help file.

Configuration

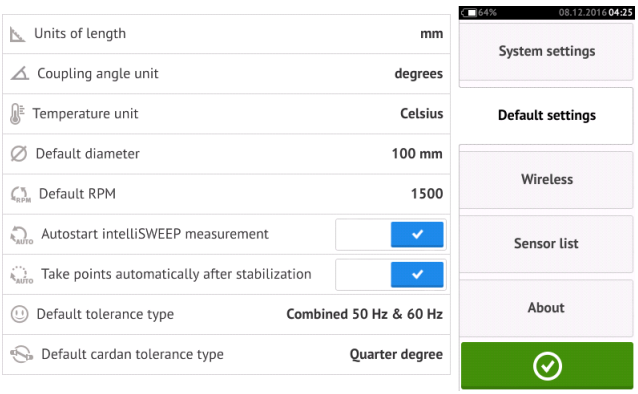
The following settings and items may be accessed via the configuration icon:

- 'System settings' is used to set the system language, date, time and time zone, regulate the transition between the dimension, measure and results screen, and display brightness.

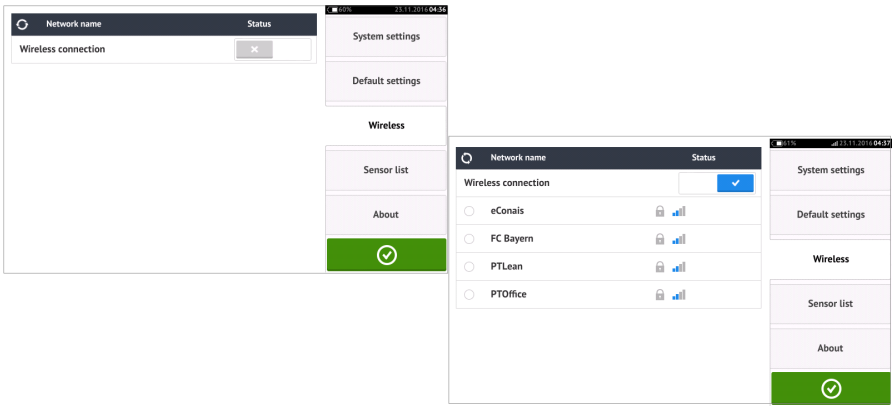


- 'Default settings' is used to set units of length, angle and temperature; the default diameter may also be set here. It is also used to activate or deactivate the automatic start of IntelliSWEEP as well as automatic taking of readings after stabilization, especially in point measurement modes. Type of tolerance to be used may also be set here.

> **Note**
> The set time zone is coupled to the default RPM unless the default RPM is edited independently. Setting the time zone to say "Central America" results in a default RPM of 1800. Setting the "London" time zone results in a default RPM of 1500.

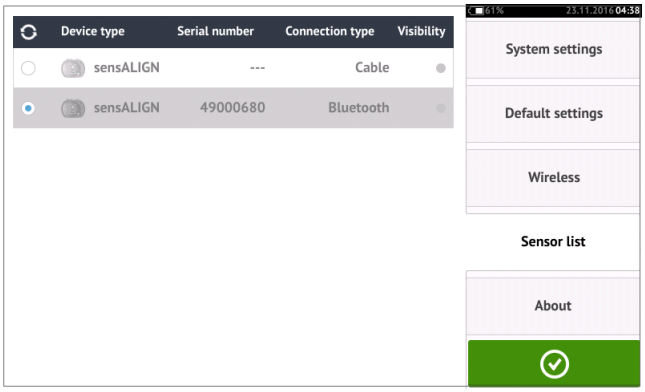


- When activated, 'Wireless connection' is used to connect ROTALIGN touch to available WiFi networks.

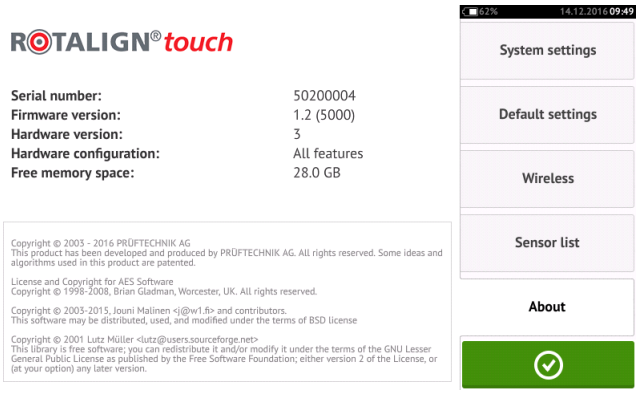


Note
ROTALIGN touch computer can be connected only to WiFi networks that do not open separate web browsers to login.

- '**Sensor list**' displays all available sensALIGN sensors.



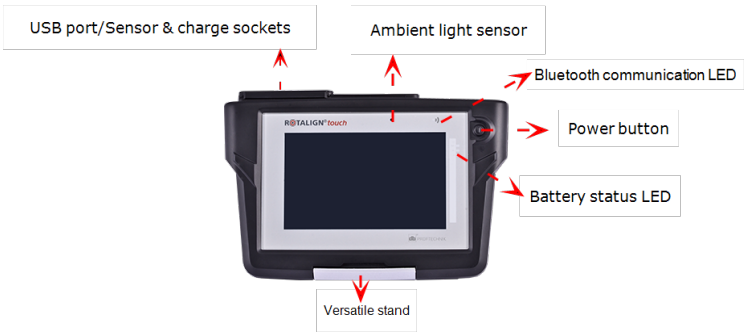
- The computer serial number, firmware version of the application and available memory space are displayed on the 'About' screen.



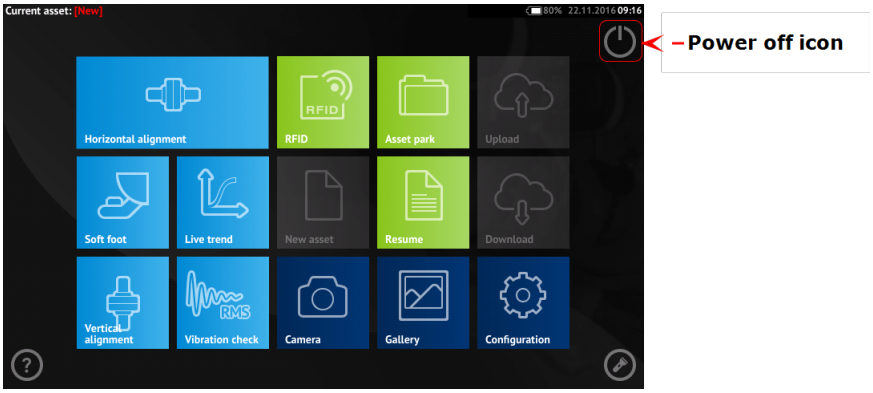
Components

ROTALIGN touch computer

ROTALIGN touch computer has a multi-touch screen and is operated by tapping and swiping. The computer is turned on by pressing and holding down the power button at the front of the computer until it beeps.



The computer is turned off by tapping the power-off icon [ ] appearing in the home screen.



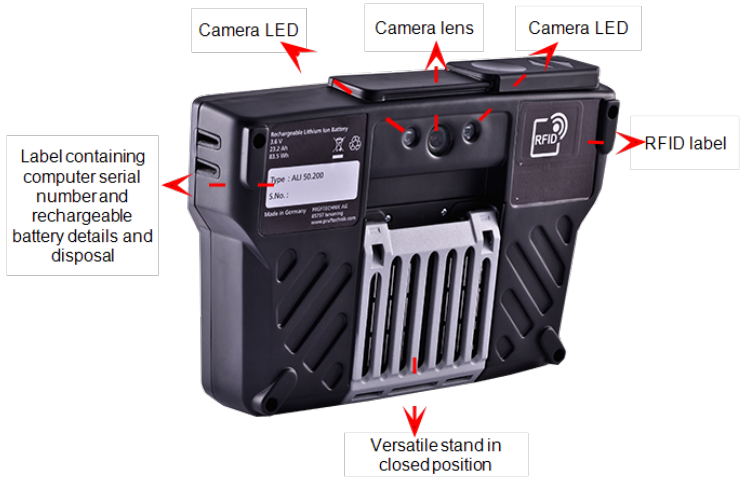
Computer interfaces, built-in camera, and labelling

ROTALIGN touch computer has three connectors housed under the sliding dust cap located at the top of the computer.

ROTALIGN touch computer has an internal, rechargeable battery which is charged by connecting ROTALIGN touch computer to a mains supply via the provided charger/adapter. The charger/adapter is connected to the power connector (refer to image above). The battery status LEDs show battery charging status and approximately how much charge is left in the battery. ROTALIGN touch computer may continue to be used for measurement while charging.

Activity	Battery status LEDs
Computer off and not charging	All three LEDs off
Computer on with charge capacity < 10 %	Bottommost LED blinks red
Computer on with charge capacity > 10% but < 40 %	Bottommost LED lights steady green
Computer on with charge capacity > 40% but < 69%	Bottommost and middle LEDs light steady green
Computer on with charge capacity ≥ 70%	All three LEDs light steady green
Charging detected	All three LEDs blink once or twice [blue or white if the output voltage is 12 V]
Charging with charging state < 40%	Bottommost LED blinks green
Charging with charging state > 40% but < 70%	Bottommost and middle LEDs blink green
Charging with charging state ≥ 70%	Bottommost and middle LEDs light steady green while top LED blinks green

ROTALIGN touch computer has a built-in camera at the back of the unit which may be used to capture machine images.

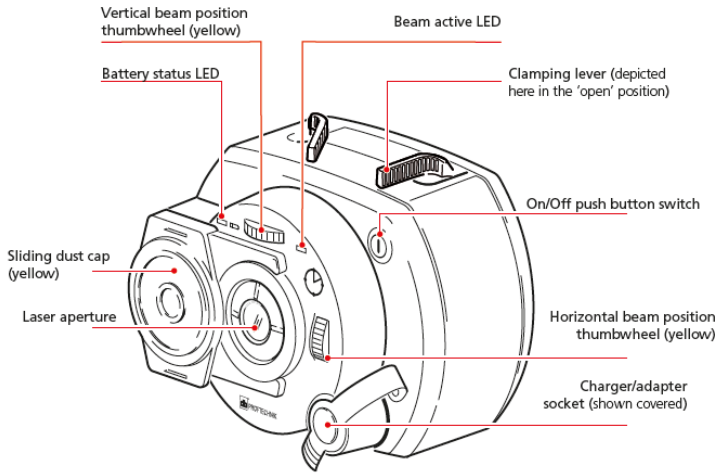


sensALIGN laser

The semiconductor laser diode emits a ray of red light (wavelength 635 nm) which is visible where it strikes a surface. The Class 2 laser beam is emitted with a diameter of approx. 5 mm (3/16”).

sensALIGN laser is turned on by pressing and holding the On/Off switch briefly. The “beam active” LED lights red.

WARNING
With sensALIGN laser on, DO NOT stare into the laser beam!



The beam is adjusted during set-up by changing its vertical and horizontal angles using the position thumbwheels, so that the beam strikes the sensALIGN sensor lens perpendicular to the lens surface.

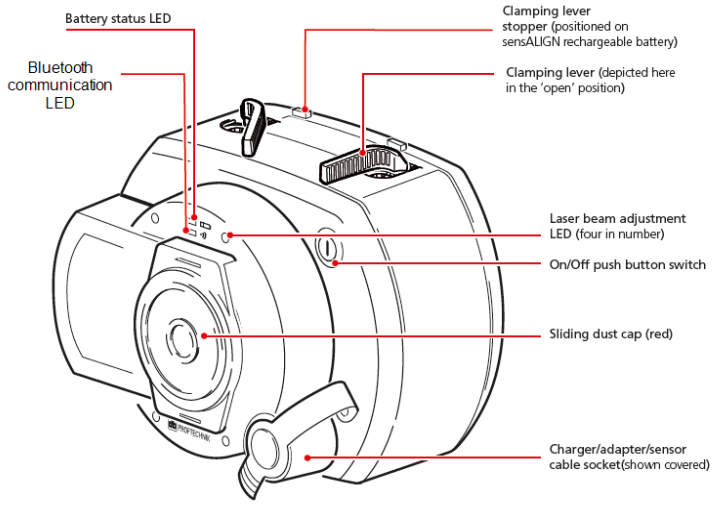
sensALIGN laser is water and dust resistant (IP 65). The internal optics and electronics are internally sealed, preventing possible contamination.

Information regarding the battery status, the rotational angle, the temperature and the serial number of the sensALIGN laser are transmitted through the laser beam into sensALIGN sensor. This information is further relayed to ROTALIGN touch computer.

sensALIGN laser is powered using sensALIGN rechargeable battery (3.7 V 1.6 Ah Lithium Polymer rechargeable battery). The rechargeable battery is attached to the laser and is to be charged only using the sensALIGN charger/adapter , and is possible only when the battery is attached to the laser.

sensALIGN sensor

sensALIGN sensor contains two position detectors, which measure the exact position and inclination of the laser beam as the shafts are rotated. Integrated in the sensor is Bluetooth technology for wireless transmission of measurement data to ROTALIGN touch computer. sensALIGN sensor also transmits sensALIGN laser data to the computer. The intelligent sensALIGN sensor technology is used to determine shaft rotational angle and machine vibration.



Positioned at the front of sensALIGN sensor are following indicator LEDs:

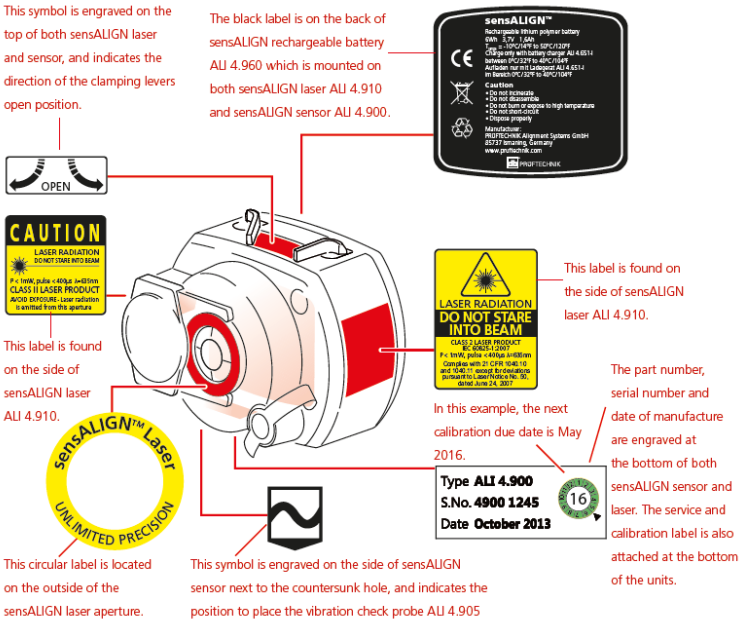
›› Battery status LED

›› Bluetooth communication LED

›› Four beam adjustment LEDs

sensALIGN laser and sensor labeling

The labelling diagram represents both sensALIGN sensor and sensALIGN laser. It shows the engraved symbols, markings and labels as they appear on the respective measurement head. The laser safety labels are affixed on the housing of sensALIGN laser at the positions shown in the diagram. The rechargeable battery label is located on the rear of sensALIGN rechargeable battery.

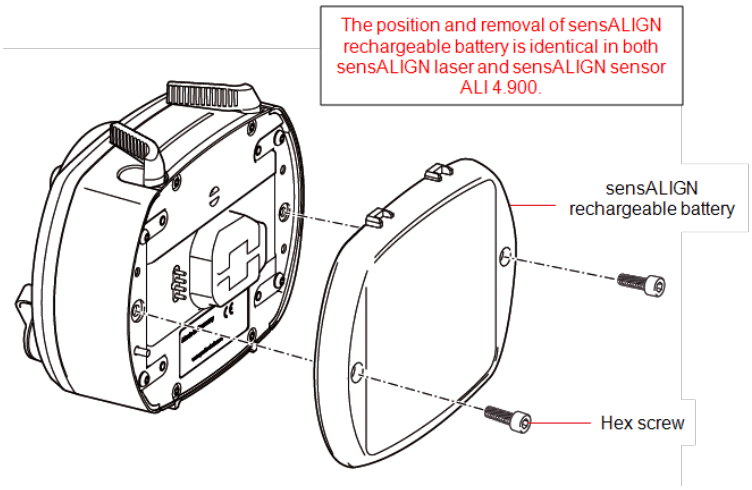


sensALIGN rechargeable battery

Both sensALIGN laser and sensALIGN sensor are powered using the sensALIGN rechargeable battery. The battery is charged via the charger/adapter socket using the sensALIGN charger/adapter. If the battery capacity is greater than 50% [acceptable capacity for measurement], the battery status LED on both sensALIGN laser and sensor lights up green for 2 seconds on switching on. During the charging process, the battery status LED blinks green. When the battery is fully charged, the LED lights steady green if the charger remains connected.

Activity	sensALIGN laser battery status LED	sensALIGN sensor battery status LED	sensALIGN laser beam active LED
Switch on	Lights up green for 3 seconds when battery run time is > 10 hrs	Lights up green for 3 seconds when battery run time is > 10 hrs	Lights steady red when in beam finder mode
	Blinks green every 3 seconds when battery run time is between 5 – 10 hrs	Blinks green every 3 seconds when battery run time is between 1 – 5 hrs	Blinks red when in measurement mode
	Blinks red every 3 seconds when battery run time is between 1 – 5 hrs	Blinks red every 3 seconds when battery run time is insufficient for longer measurements	Note that measuring can take place with both modes
	Blinks red constantly when battery run time is < 1 hr	Blinks red constantly when battery run time is < 1 hr	
Charging battery	Blinks green when charging	Blinks green when charging	LED off
	Lights steady green when fully charged	Lights steady green when fully charged	
	Lights red when a failure occurs during charging.	Lights red when a failure occurs during charging	

To replace the rechargeable batteries, use the provided 2.5 mm allen key [0 0739 1055] to undo the two hex screws that affix the battery to either sensALIGN laser or sensor.



Used batteries should be disposed of in an environmentally-sound manner!

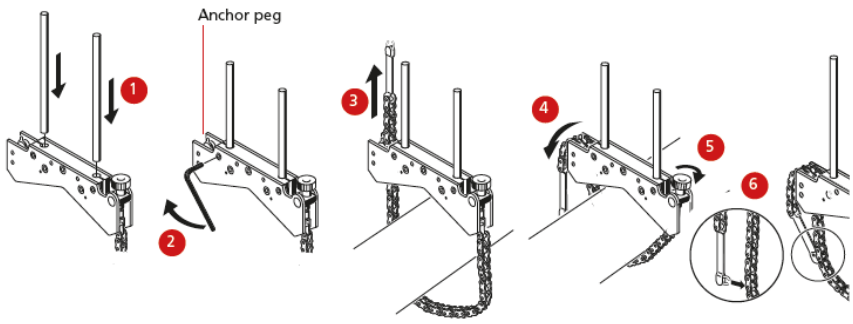
Mounting components

Mounting brackets

Mount the brackets on either side of the coupling on either the shafts or on the solid coupling hubs, and both at the same rotational position.

Please note the following in order to obtain the highest possible measurement accuracy and to avoid damage to equipment:

CAUTION
Ensure that the brackets fit solidly onto their mounting surfaces! Do not use self-constructed mounting brackets, or modify the original bracket configuration supplied by PRÜFTECHNIK (for example, do not use support posts longer than those supplied with the bracket).



- Choose the shortest support posts which will still allow the laser beam to pass over or through the coupling. Insert the support posts into the bracket..
- Fasten them in place by tightening the hex screws on the sides of the bracket frame.
- Place the bracket on the shaft or coupling, wrap the chain around the shaft and feed it through the other side of the bracket: if the shaft is smaller than the width of the bracket frame, insert the chain from the inside of the bracket as shown in the diagram; if the shaft is larger than the bracket width, insert the chain into the frame from the outside.
- Catch the chain loosely on the anchor peg.
- Turn the bracket thumbscrew to tighten the assembly onto the shaft.
- Clip the loose end of the chain back onto itself.

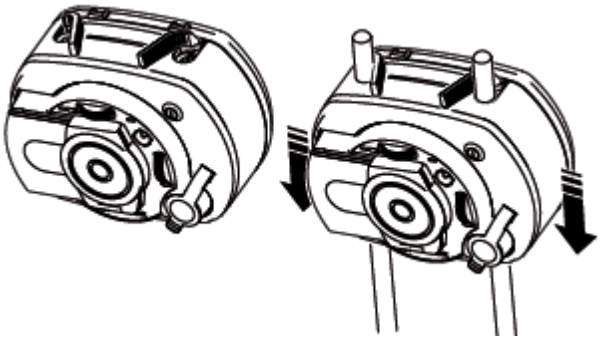
The bracket should now be tight upon the shaft. Do not push or pull on the bracket to check, since this could loosen its mounting.

To remove the brackets, loosen the thumbscrew, then remove the chain from its anchor peg.

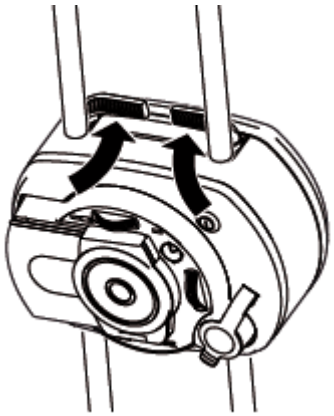
Mounting sensALIGN sensor and laser

Mount sensALIGN laser on the support posts of the bracket fixed on the shaft of the left machine (usually reference machine), and sensALIGN sensor on the support posts of the bracket fixed on the shaft of the right machine (usually moveable machine) – as viewed from

normal working position. Before mounting both sensALIGN laser and sensor, make sure that the yellow clamping levers are in the open position by placing them to the front. This enables components to slide onto the support posts.



Fix both sensALIGN laser and sensor onto the respective support posts by locking the yellow clamping levers. Lock the levers by pushing them backwards until they rest on the stoppers.

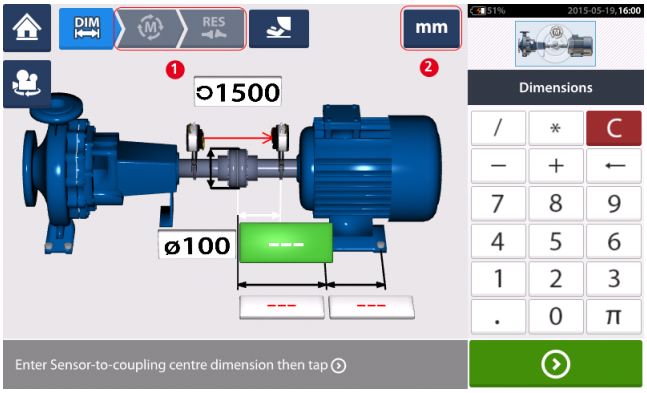


Ensure that the laser can pass over or through the coupling and is not blocked.

Both sensALIGN laser and sensor should be at the same height, as low as possible, yet just high enough for the beam to clear the coupling flange. They should also visually appear to be rotationally aligned to each other.

Make the final adjustments, loosening the brackets slightly if necessary, then rotating them and re-tightening.

Dimensions screen



- **(1)** Grayed out icons are disabled within the active screen. The 'Measure' icon is enabled after all dimensions have been entered.
- **(2)** Tap the measurement units icon mm to set desired units. The icon toggles between "mm" and "inch".

Tap the dimension fields and enter all required dimensions. The user may elect to tap the 'Next' button to proceed to enter next dimension. Dimensions may be entered only when the dimension field is highlighted green.

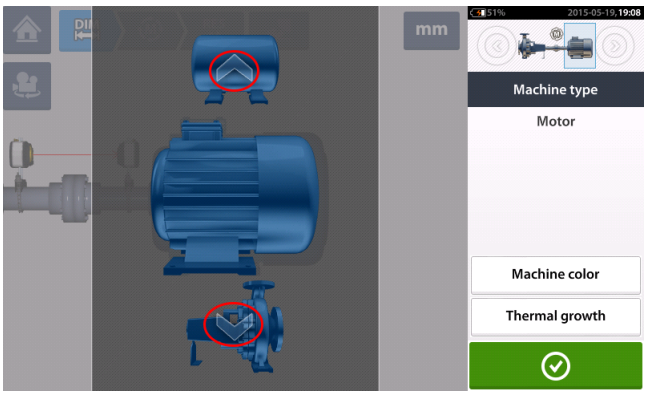
The rotate machine view icon is used to rotate the view of the machines and mounted components on the display.

Machine and coupling properties may be edited by tapping the respective machine or coupling.

When all required dimensions have been entered, the 'Measure' icon appears.

Tap to proceed with measurement.

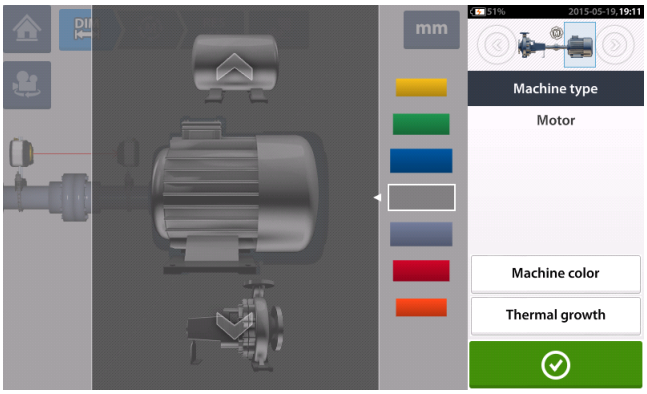
Machine properties



Swipe the machine carousel up or down and select desired machine. Position desired machine at the centre of the carousel then tap  to confirm selection and return to the dimensions screen.

Machine colour

The desired machine colour may be set from this screen by tapping the item "Machine colour". A colour palette appears.

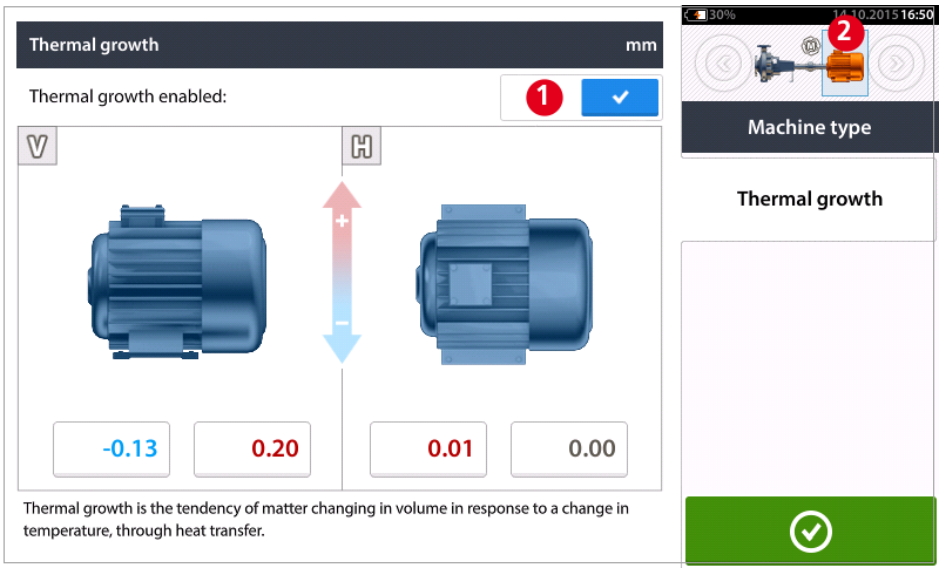


Swipe the colour palette up or down to select the desired colour then tap  to confirm selection and return to the dimensions with the machines having the desired colour.

Thermal growth[1]

Access the thermal growth screen by tapping the item "Thermal growth".

Thermal growth values can be entered only when machine feet have been defined.



To enter any specified thermal growth value at the required foot position, tap the corresponding value box then proceed to enter the thermal growth value using the onscreen key-

[1]Movement of shaft centerlines associated with or due to a change in machinery temperature between the idle and operating conditions.

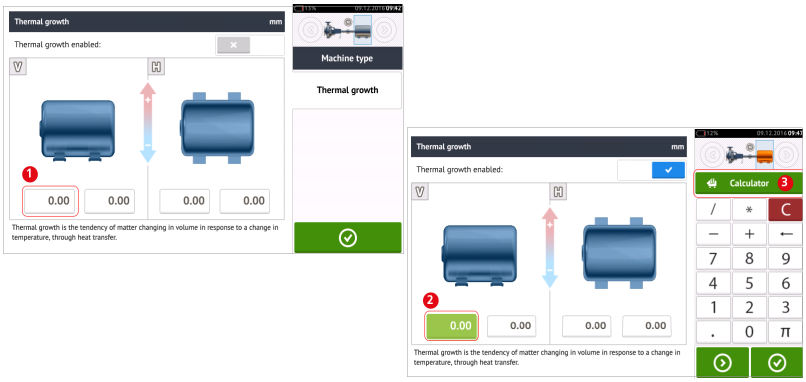
board. Cycle through the value boxes using  . Alternatively, tap the desired foot position.

Thermal growth values are activated by swiping the icon  to the right [**1**]. When thermal growth values are enabled, the corresponding machine within the mini train inset at the top-right corner appears in orange [**2**]. After thermal growth values have been entered, tap  to proceed.

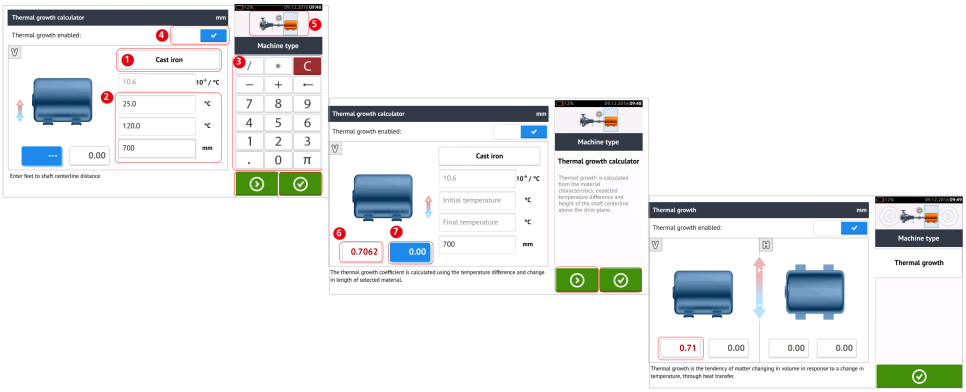
Thermal growth calculator

The calculator is used to calculate thermal growth compensation if no other values are available. Thermal growth is calculated from the material coefficient of linear thermal expansion, expected temperature difference and length of the shaft centerline from the shim plane.

After accessing the thermal growth screen, tap value box of feet pair [**1**] where thermal growth is to be entered. The box is highlighted green [**2**], and the 'Calculator' tab [**3**] appears.



Tap 'Calculator' tab [**3**] to access the thermal growth calculator screen.



Tap (**1**) and select machine material. The corresponding linear thermal expansion appears. Enter the three values [**2**] required to calculate the thermal growth value for the selected feet pair using the onscreen keyboard [**3**]. The three values are:

>> ambient temperature (initial temperature)

>> machine running temperature (final temperature)

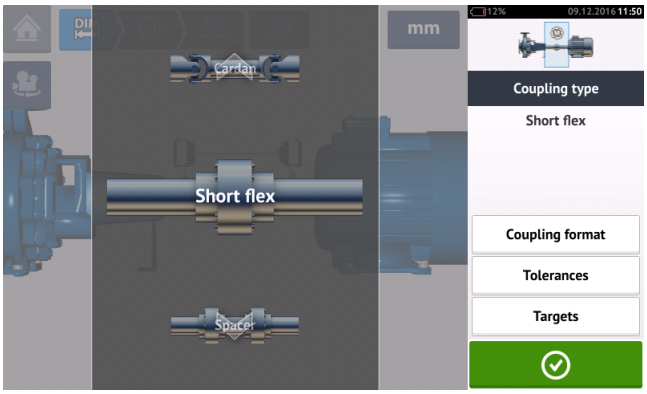
>> distance from machine base (or shimming plane) to the shaft centerline (length)

With thermal growth values enabled [**4**], the corresponding machine within the mini train inset at the top-right corner appears in orange [**5**].

Tap  to simultaneously display the calculated thermal growth value for the respective feet pair (**6**) and toggle to the next feet pair (**7**).

Tap  to return to the thermal growth screen showing the calculated values.

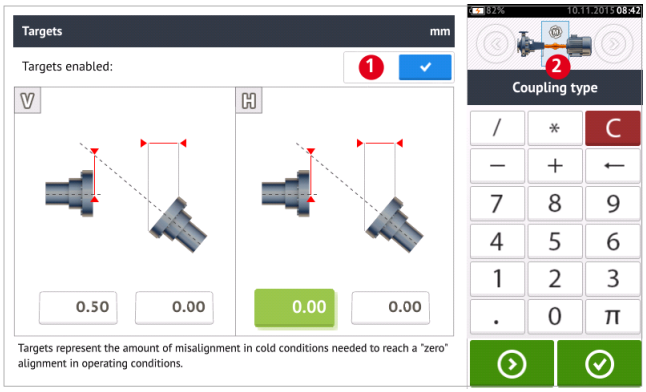
Coupling properties



Swipe the carousel up or down and select desired coupling type.

Targets[1]

Access the coupling targets screen by tapping the item "Targets".



To enter any target specifications at the coupling, tap the corresponding value box then proceed to enter the target value using the onscreen keyboard. Cycle through the value boxes using  . Alternatively, tap the desired value box.

Target specification values are activated by swiping the icon  to the right [**1**]. When target values are enabled, the coupling [**2**]within the mini train inset at the top-right corner appears in orange. After target values have been entered, tap  to proceed.

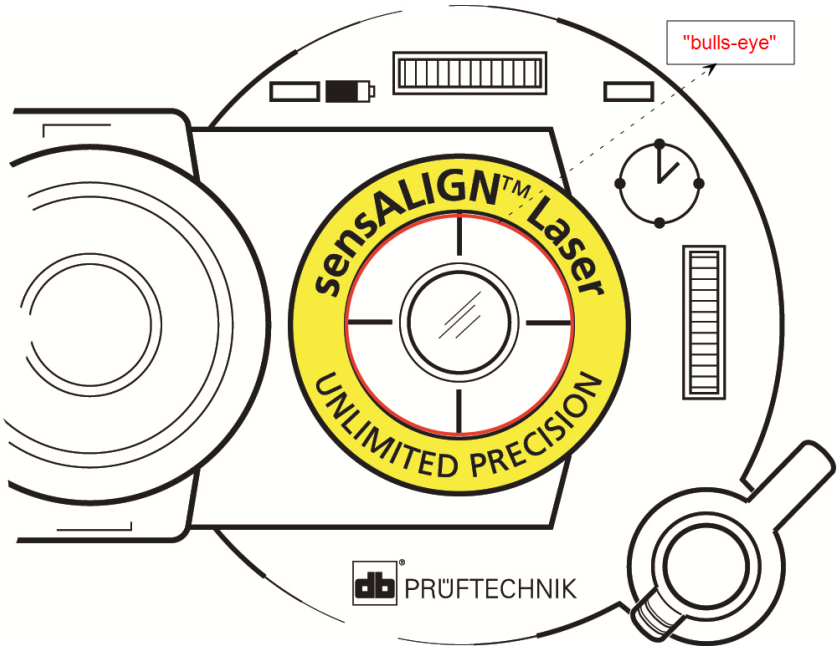
[1]Misalignment values specified as an offset and an angle in two perpendicular planes (horizontal and vertical) and used to compensate for dynamic loads.

Laser beam adjustment

1. Slide the sensALIGN laser dust cap to expose the aperture.

WARNING
sensALIGN laser MUST remain off.

2. With the laser OFF, carry out a preadjustment to ensure that the laser beam will be emitted perpendicular to the laser housing. Use the two yellow beam position thumbwheels to centre the 'bulls-eye' as accurately as possible.



3. Press the ON/OFF push button switch to turn sensALIGN laser on.

WARNING
Do not stare into the laser beam!.

4. With the lens covered, let the laser beam strike the centre of the sensALIGN sensor dust cap.

5. Slide the dust cap to open the lens. Observe the four sensALIGN sensor beam adjustment LEDs while adjusting the laser beam using the vertical and horizontal beam positioning thumb-wheels. The thumbwheels are used to adjust both the horizontal and vertical laser beam angles.

6. Carry out this adjustment until all four sensALIGN sensor LEDs are blinking green once every second.

7. If the LEDs are blinking green twice every second, the angle at which the laser beam enters the sensor is correct, but an offset is present. Eliminate the offset by sliding back the

sensALIGN sensor dust cap to cover the lens, then loosen the chain type bracket supporting sensALIGN sensor and move the sensor sideways. At the same time, release the sensALIGN sensor clamping levers and move the sensor upwards and downwards until the laser beam is centred on the dust cap.

Note
During this adjustment, DO NOT touch sensALIGN laser.

8. Open the sensor lens by sliding the dust cap and check the blinking of the four LEDs. If all four are blinking green once every second, then the laser beam has been correctly centred and measurement may proceed.

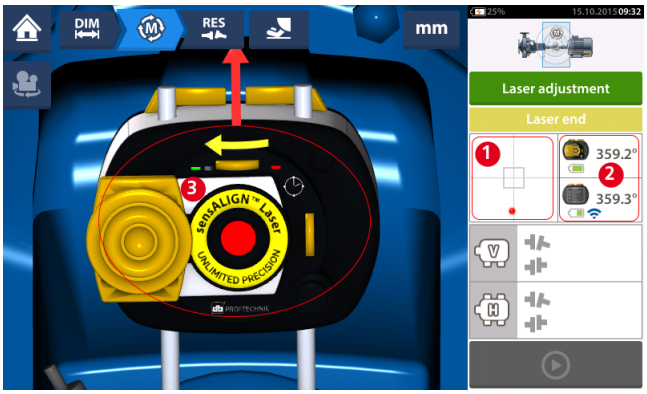
Understanding the beam adjustment LEDs

The four beam adjustment LEDs provide additional help when adjusting the laser beam position on sensALIGN sensor position detectors. The LEDs indicate the angle and position at which the laser beam enters the sensor. The LEDs blink either red or green depending on the angle at which the laser beam strikes the sensor. Green indicates a small angle while red indicates a large angle that must be corrected before beginning measurement.

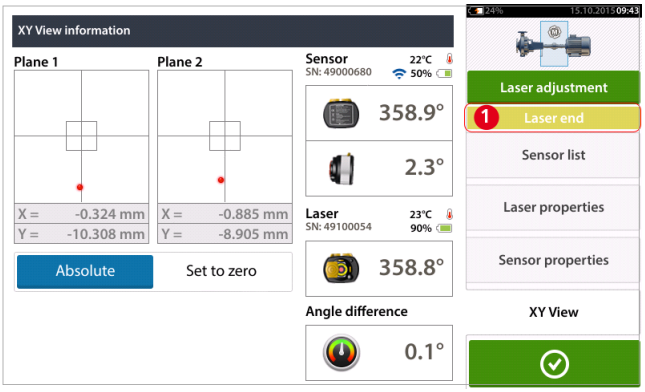
Activity	Laser beam adjustment LEDs
Switch on sensALIGN sensor	All four LEDs light up red then continue to blink every two seconds
Laser beam striking dust cap [laser off]	All four LEDs blink red every second
Laser beam entering sensor with a large angular deviation	One or more LEDs blinks red every second
Laser beam entering sensor with little or negligible angular deviation but with an offset	All four LEDs blink green twice every second
Laser beam entering sensor with neither appreciable angular deviation nor offset	All four LEDs blink green every second

XY View

The XY View function is used to facilitate the centering of the laser beam on the two sensALIGN sensor detector planes before proceeding with measurement.

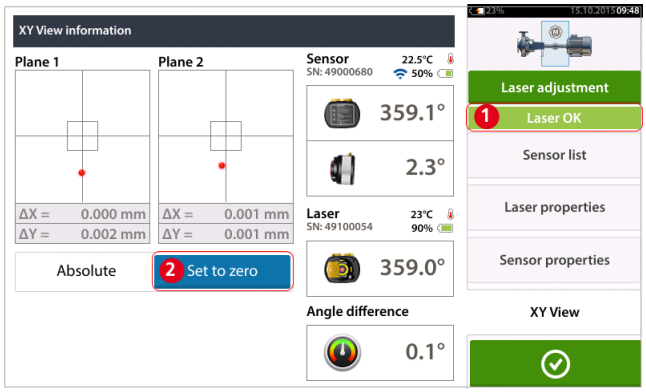


- Tap the shown detector area **(1)** to directly access the XY View screen.
- The XY View screen may be accessed using the menu item "XY View" which appears when the "sensor/laser area" **(2)** is tapped.
- The XY View screen may be accessed using the menu item "XY View" which appears when the laser **(3)** is tapped.



The two sensor detector planes are displayed on the XY View screen. Center the laser beam dots in both planes using both beam position thumbwheels. In some cases it may be necessary to move sensALIGN sensor along the support posts or sideways by loosening the chain type bracket and slightly rotating it.

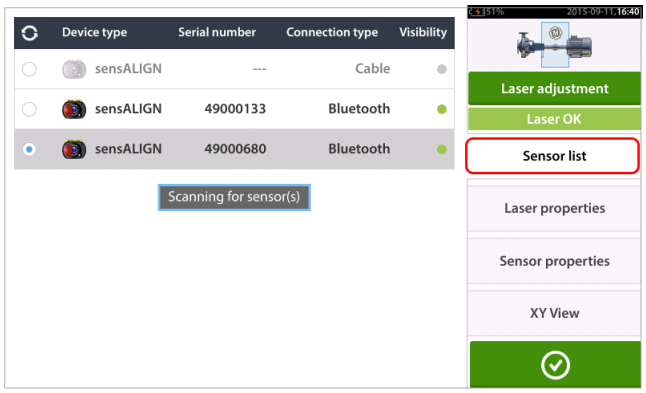
The "Set to zero" function may be used to check the effect of environmental and machinery vibration on the measurement. Note that the "Set to zero" is active only when the laser beam status [**1**] is "OK" or "Centered".



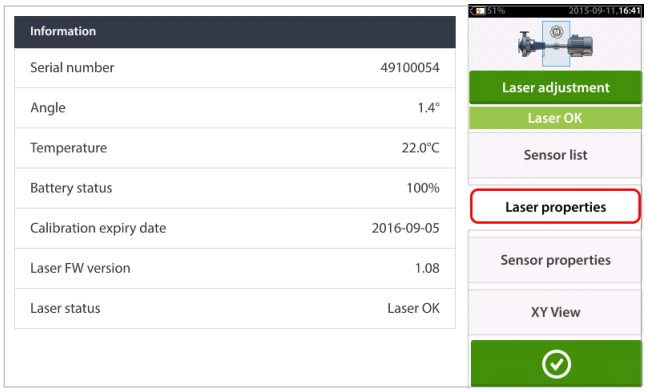
If the laser beam status is "OK" or "Centered" [**1**] tap "Set to zero" [**2**] to set the XY values of the two detector planes to 0,0. These values are then monitored to check the stability of the values. Tap "Absolute" to return to the absolute values.

Note that the menu items on the screen may be used to display following items:

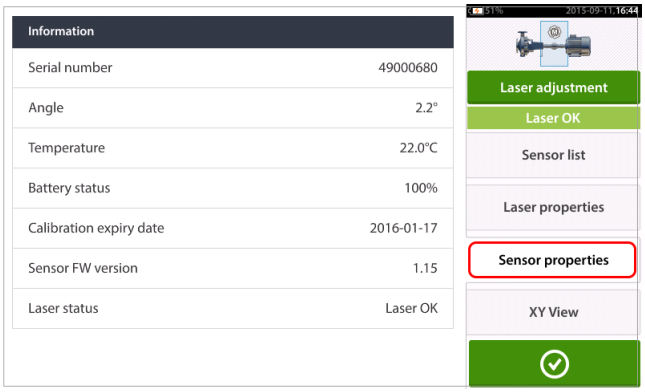
Sensor list – displays serial number of sensors detected or previously used, as well as type of connection used for communication.



Laser properties – displays detailed information of sensALIGN laser in use



Sensor properties – displays detailed information of sensALIGN sensor in use


Information
Serial number 49000680
Angle 2.2°
Temperature 22.0°C
Battery status 100%
Calibration expiry date 2016-01-17
Sensor FW version 1.15
Laser status Laser OK
Laser adjustment
Laser OK
Sensor list
Laser properties
Sensor properties
XY View

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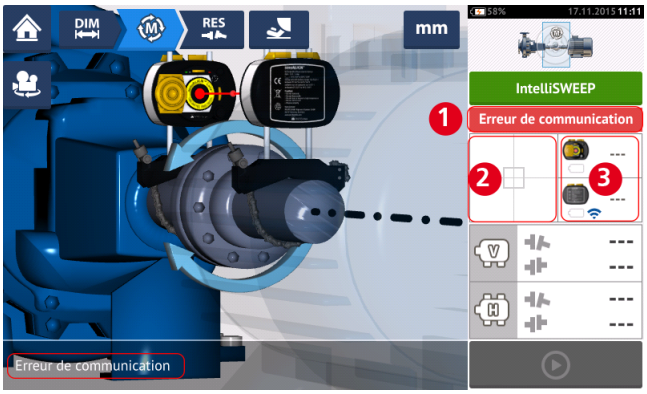
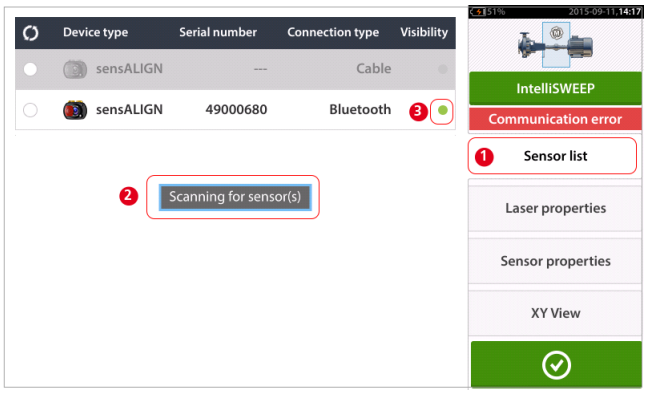
Initializing sensor

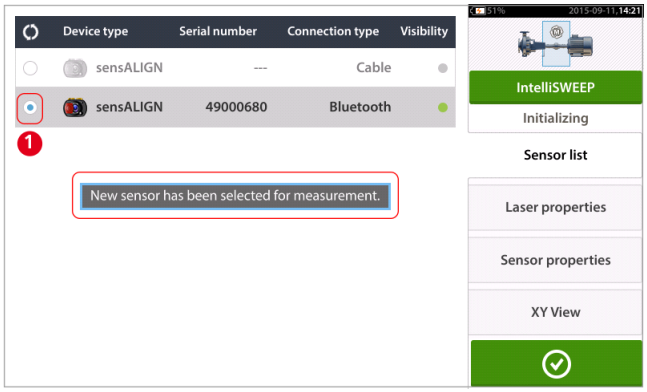
The hint "Communication error" [1] suggests that the sensor has not been initialized although the laser beam may have been correctly adjusted.



Tap either the detector area [2] or the sensor/laser area [3]to access the menu item '**Sensor list**'.



Tap menu item 'Sensor list' [1] to view scanned sensors. The hint 'Scanning for sensor(s)' [2] appears during the scanning process. As soon as the sensor is detected, it is listed down and a green bold dot [3] appears next to the detected sensor.



Initialize the sensor by tapping the listed sensor. A bold blue dot [1] signifies that the sensor is initialized.

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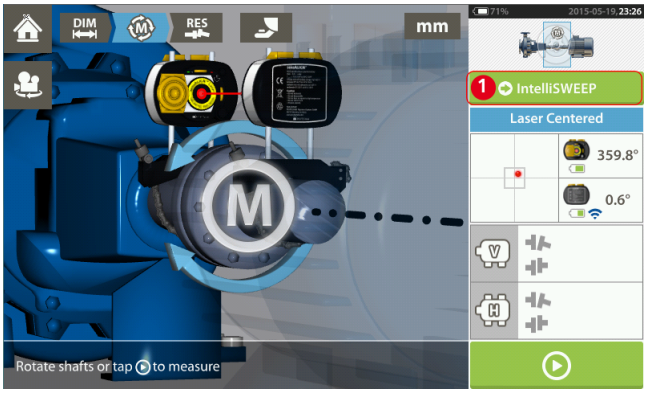
Measurement modes

The following measurement modes are available for horizontal machine configurations:

- IntelliSWEEP[1] – This is the measurement mode used to measure standard coupled machines with anti-friction bearings. It detects error influences such as coupling play, rough rotation and environmental vibration, and automatically eliminates the induced errors.
- IntelliPOINT[2] – This mode is used in cases where the uncoupled shafts can be stopped at definite positions (such as in dismantled cardan shafts). It is also used in cases where the shafts are coupled but torsional play exists. This mode ensures that measurement points remain on the same rotational arc hence increasing accuracy.
- IntelliPASS[3] – This mode is used in cases where the uncoupled shafts cannot be stopped at definite positions.
- Multipoint[4] – This is the mode used to measure uncoupled shafts, non-rotational shafts, sleeve bearings [journal (radial) bearings], white metal bearings , shafts that are hard to turn, shafts with herky-jerky rotation, situations with long spans or severe mis-alignment that will readily cause the beam to fall out of range.
- Static[5] – This mode is used to measure **vertical mounted machines**.

The desired measurement mode is selected while in the measurement screen.



Tap the measurement mode header [**1**] to access the measurement mode carousel.

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[1]A high definition measurement mode that actively assists the user by automatically detecting and eliminating error influences such as coupling backlash, rotational angle and vibration.

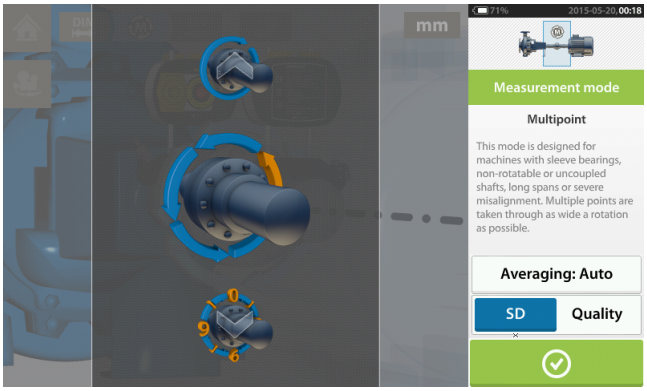
[2]This mode is used in cases where the uncoupled shafts can be stopped at definite positions. It is also used in cases where the shafts are coupled but torsional play exists.

[3]In this mode, the sahft supporting the laser is rotated such that the laser beam passes through the middle sector of the detector.

[4]This is a measurement mode for horizontal machines where measurement points are taken at any desired angular rotational position.

[5]Static Clock measurement mode is used for both vertical and horizontal machines. Measurements are taken with shafts positioned at any of the eight defined clock positions. In this measurement mode, the electronic inclinometer is inactive.

Swipe the carousel up or down and select desired measurement mode.



In the above example, **Multipoint** measurement has been selected. The quality of the measurement may be displayed either as a measurement standard deviation (SD) or measurement quality factor. The desired factor is set by tapping the corresponding item. The averaging is set by tapping the 'Averaging' button.

Averaging

In certain industrial conditions, it may be necessary to increase the number of measurements (recorded laser pulses) to be averaged when taking readings to attain the desired accuracy. Particular cases include environments with increased machinery vibration. An increased averaging also improves the accuracy when measuring sleeve bearings, white metal bearings and journal bearings.

Averaging is possible in ‘point’ measurements such as 'IntelliPOINT', ‘Multipoint’ and ‘Static mode’.

Set the averaging by tapping the 'Averaging' button [**1**]. A scale [**2**] used to set the averaging value appears on the screen. Tap desired averaging value which then appears in the 'Averaging' button [**1**].

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IntelliSWEEP measurement

This is the default measurement mode and is used to measure standard horizontal coupled machines. The mode actively assists the user by automatically detecting errors and providing subsequent hints to minimize the errors.

Once the laser beam has been centered, measurement may be started automatically when the shafts are rotated or by tapping  . Rotate shafts through as wide an angle as possible.

As shafts are rotated, and depending on the physical condition of the machines, the rotational arc changes color from red (quality < 40%) to amber (quality ≥40%<60%) to green (quality ≥60%<80%) to blue (quality ≥80%). Coupling results are displayed as soon as the measurement quality attains 40% (rotational arc turns amber).

Tapping  the 'Cancel' icon discards current measurement. Tapping  the 'Proceed' icon allows measurement results to be accessed or the measurement repeated.

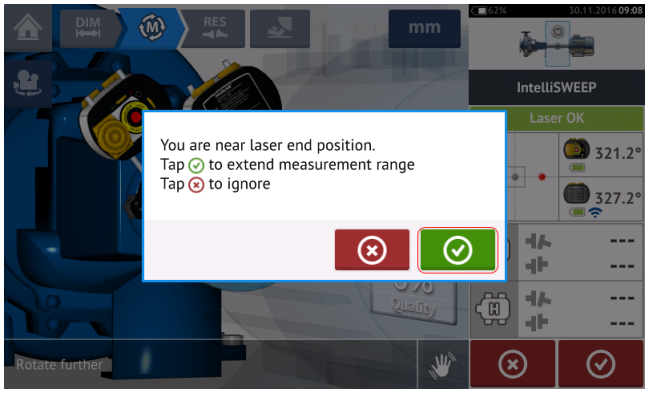
Note that the colour of the 'Proceed' icon  corresponds to the colour of the rotational arc which denotes the attained measurement quality.

- **(1)** Tap  to re-measure machines.
- **(2)** Tap  to view machine foot results.

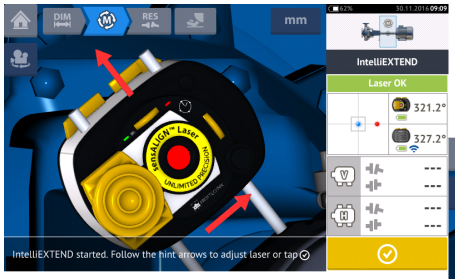
IntelliEXTEND

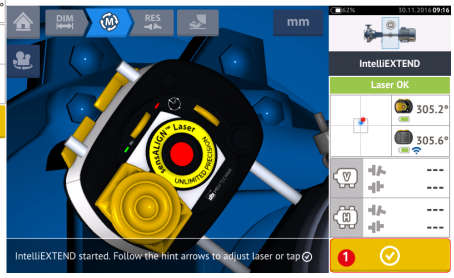
This feature automatically activates the extension of the measurement range while in intelliSWEEP measurement mode. This range extension allows the adjustment of the laser beam such that it does not miss the detector surface when measuring shafts with gross misalignment or angular misalignment over large distances.

- When taking measurement using **intelliSWEEP** and the laser beam approaches the end of the detector surface, a hint automatically appears on the display.



- Tap  to proceed to extend the measurement range. Follow the hints on the display and position the laser beam dot on the blue asterisk appearing on the detector area.





- With the laser beam centered, tap  (**1**) then continue with measurement by rotating the shafts further.

- After rotating the shafts through as wide an angle as possible, tap  (**1**) to proceed to results, then 

(**2**) to view results.

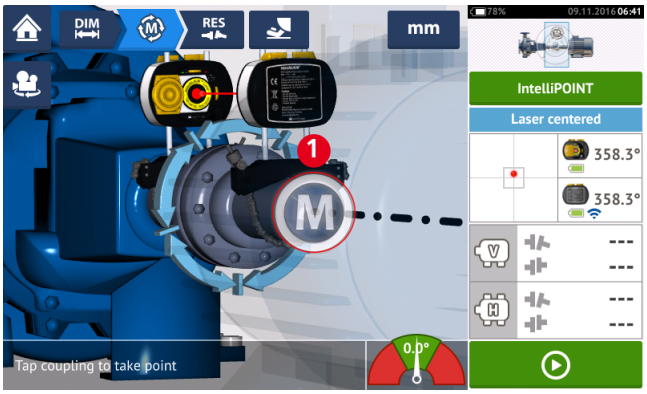
IntelliPOINT measurement

In this mode, the shaft supporting the laser is rotated to the position where the laser beam strikes the center of the sensor lens. Measurement is taken when the laser beam strikes the center of the detector.

After **centering the laser beam**, allow the measuring to stabilize by centering the needle in the green sector.

Note
To center the needle, both laser and sensor must be at the same rotational angle.

The letter '**M**' appears below **1** as shown in the screen below.



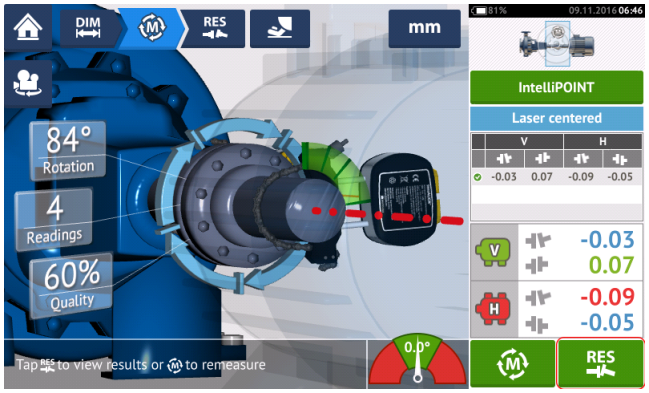
Tap '**M**' to take the measurement point.

Rotate the shaft supporting one of the measuring heads (say sensor) to the next position, then rotate the shaft supporting the other measuring head (say laser) until the needle rests in the central blue sector of the on-screen needle indicator (**1**). When the needle is in the blue sector, and value stabilization time has been attained, the letter '**M**' appears (**2**). Tap '**M**' to take the measurement point.

Note
Measurements may be taken automatically without having to tap **M** after stabilization, if the auto function is enabled in **default settings**.

Rotate either head to the next measurement position; repeat the procedure to take measurements through at least three positions over at least 60° of rotation, but more measurements over a wider angle is recommended.

After taking sufficient measurement points, tap  to finish measurement.

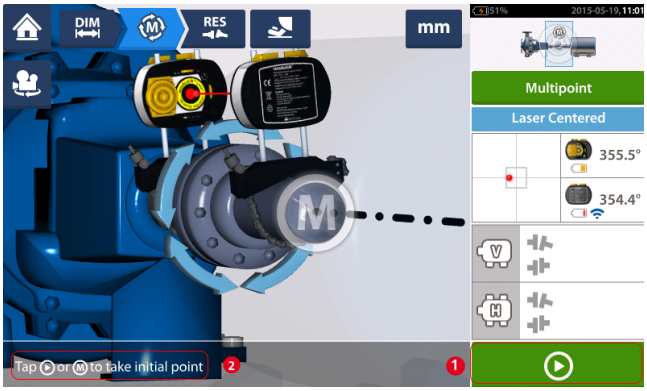


Tap  to view machine foot results.

Multipoint measurement

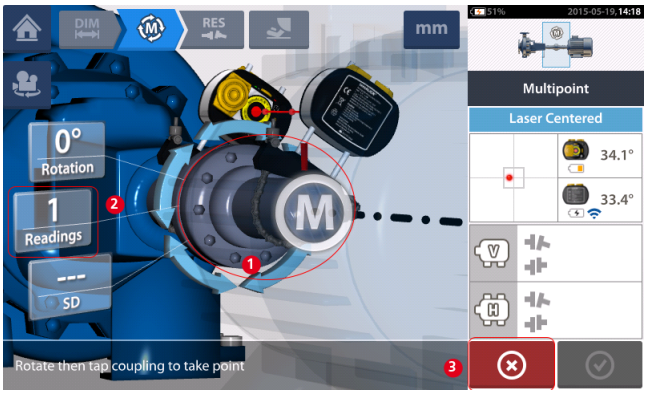
This mode is used to measure shafts which are either difficult to turn continuously or allow measurement only in certain rotational positions. The method can also be used to measure uncoupled shafts, nonrotatable shafts, sleeve bearings, white metal bearings and journal (radial) bearings, shafts that are difficult to turn, shafts with herky-jerky rotation, situations with long spans or severe misalignment that will readily cause the beam to fall out of range.

If not yet completed, enter **machine dimensions**, then **center laser beam**.



- **(1)** 'Next' icon – tap to take initial measurement point
- **(2)** Hint to tap 'Next' icon

Tap  the 'Next' icon to take the initial measurement point then rotate the shafts in their normal direction of operation, to the next measurement position.



- **(1)** Coupling area to be tapped to take next measurement
- **(2)** Number of points already taken
- **(3)** 'Cancel' icon – used to cancel current measurement and start new measurement

Tap the coupling area [**1**] to take the measurement point. Rotate shafts further, taking measurement points by tapping the coupling area [**1**]. Take as many measurement points through as wide a rotational angle as possible.

- **(1)** Rotational arc showing points taken and rotational angle covered by the shafts. The arc changes color from red [< 60°] -> amber -> green [> 70°]
- **(2)** Rotational angle completed by the shafts for current measurement
- **(3)** Number of measurement points taken for current measurement
- **(4)** Standard deviation attained in current measurement
- **(5)** 'Proceed' icon – tap to continue to view measurement results

The 'Proceed' icon  (whose color changes with the rotational arc) becomes active after three measurement points have been taken.

The horizontal and vertical coupling results are displayed when the shafts are rotated at least over 60°, and a minimum of three measurement positions are recorded. If however, **measurement quality** has been selected, the coupling results are displayed when the rotational arc **(1)** turns yellow.

Tap  the 'Proceed' icon to continue to view **results** or to re-measure.

If required, **Live Move** may be accessed via the 'Results' screen.

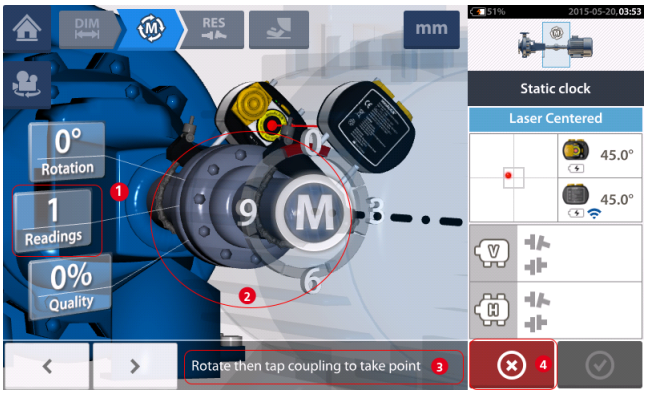
Static measurement

This measurement mode is used for uncoupled shafts, nonrotatable shafts and vertical foot-mounted or flange-mounted machines.

If not yet completed, **enter dimensions** then **centre laser beam**.

- **(1)** 'The 'left/right' navigation icons are used to position the displayed sensALIGN laser and sensor at an angular rotation corresponding to the actual position of the components as mounted on the shafts.
- **(2)** On-screen hint to position displayed laser and sensor then take measurement point

Turn the shafts to any of the eight 45° positions (i.e. 12:00, 1:30, 3:00, 4:30, 6:00, 7:30, 9:00 or 10:30 o'clock position viewed from sensor towards laser). Position shaft as accurately as possible using either an external inclinometer or protractor. Tap  to take the first measurement point.



- **(1)** Number of points already taken (in this example initial point)
- **(2)** Coupling area to be tapped to take next measurement
- **(3)** On-screen hint to position displayed laser and sensor then take measurement point
- **(4)** 'Cancel' icon – used to cancel current measurement and start new measurement

Rotate shaft to the next measurement position. The displayed laser and sensor must be at the same angular position as the mounted components. Use  or  to position the displayed sensALIGN laser and sensor then take next measurement point by tapping the coupling area [**2**].

Note
After taking a measurement point, the displayed sensALIGN laser and sensor move to the next clock position on the display.
If shaft rotation restrictions hinder the taking of measurements at particular shaft positions, bypass these using < or >.

Measurements must be taken in at least three positions over 90°, but more measurements over a wider angle is recommended.

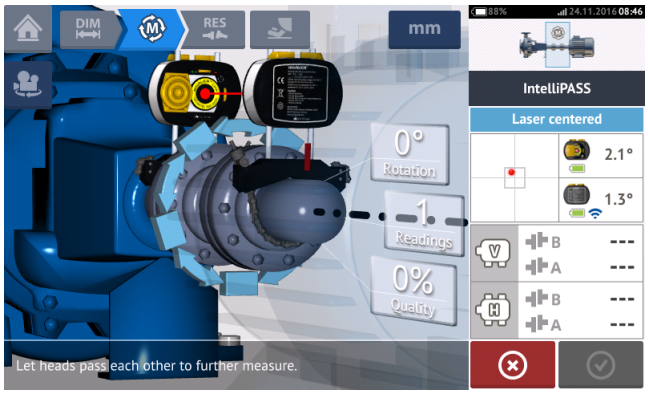
- **(1)** Rotational arc showing rotational angle covered by the shafts during measurement. The arc changes colour from red [< 60°] -> amber -> green [> 70°]
- **(2)** Rotational angle completed by the shafts for current measurement
- **(3)** Number of measurement points taken for current measurement
- **(4)** **Measurement quality** for current measurement
- **(5)** 'Proceed' icon – tap to continue to view measurement **results**

IntelliPASS measurement

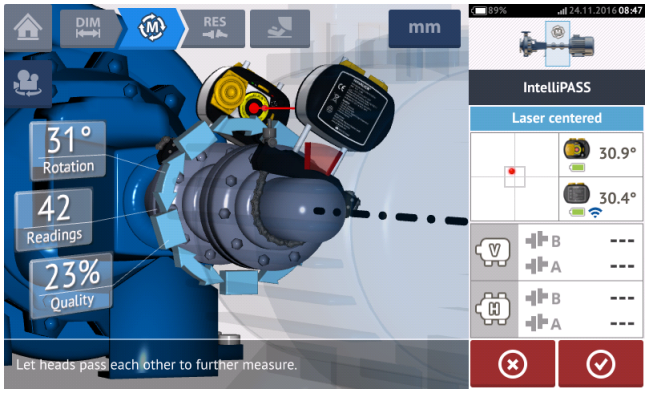
In this mode, the shaft supporting the laser is rotated so that the laser beam strikes the sensor lens as it passes it. Measurements are taken when the laser beam passes through the middle sector of the detector.

- **Center the laser beam**. A pulsating **M** (**1**) indicates that measurement may be taken.

- Tap **M** or  to take initial measurement point.



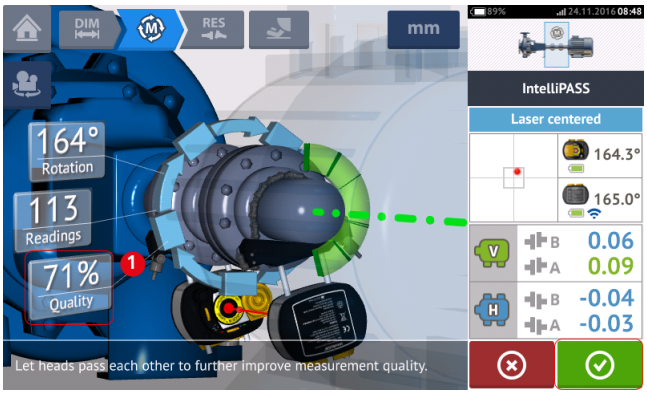
- Rotate the shaft supporting one of the measurement heads (say laser) to the next position, then rotate the shaft supporting the other head (say sensor) slowly past the opposite head. Measurement is automatically taken as the laser beam strikes and passes the sensor detector.



Note

The four sensALIGN sensor laser beam adjustment LEDs on the front of its housing blink green depending on the position at which the beam strikes the detector.

- Repeat step 3 taking measurements in as many positions and over as wide an angle as possible. It is recommended to aim for a high measurement quality (**1**).

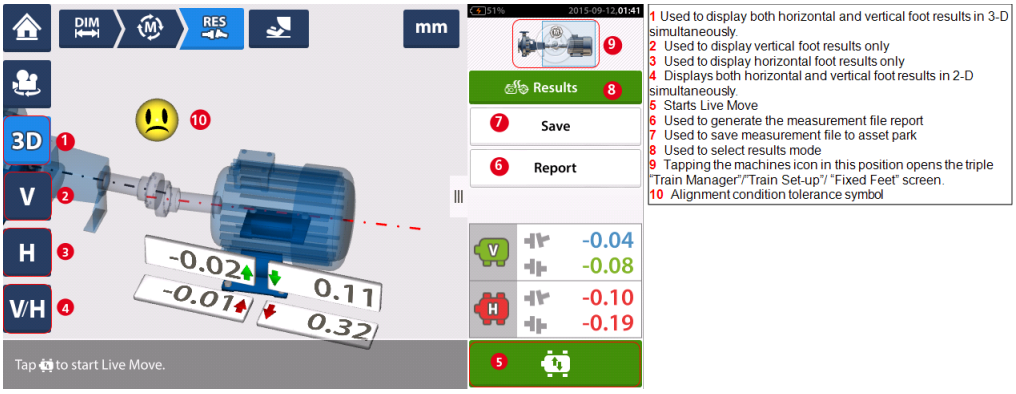


- After taking sufficient measurement positions, tap  to proceed to results.

- Tap  to view results.

Note
If only one shaft is not easily rotatable while the other can be freely rotated, always mount the sensor on the nonrotatable shaft (use the magnetic sliding bracket ALI 2.230). Do NOT mount sensALIGN laser on the not-easily-rotatable shaft, even if this means setting up your laser and sensor opposite to the way you normally would for alignment purposes. You can always invert the movable and stationary machines by using the 'rotate machine view' functionality.
Enter all dimensions in accordance with your actual set-up, following the normal orientation of the laser and sensor in the dimensions screen.

Results



In the results screen, the three icons  – dimensions, measurement and results – are active and may be used anytime.

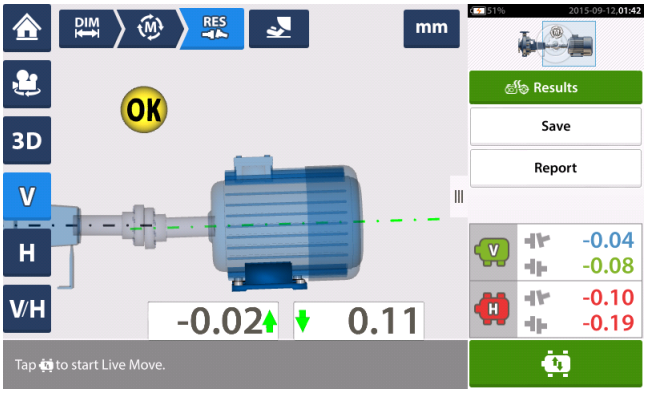
The 2D V and H foot results screens show the vertical (V) and horizontal (H) foot positions respectively.

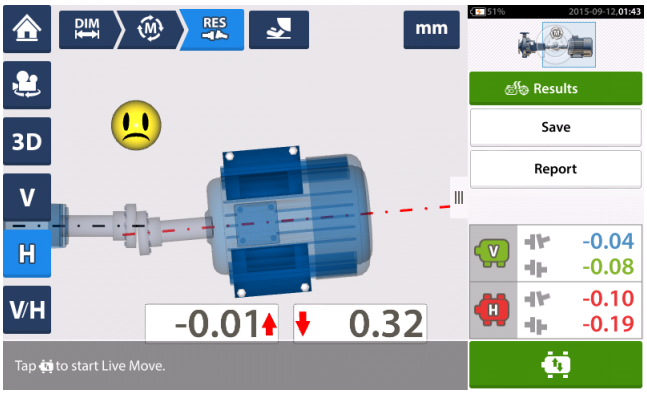
The colors of the bold arrows next to the feet correction values are directly related to the coupling alignment condition as follows:

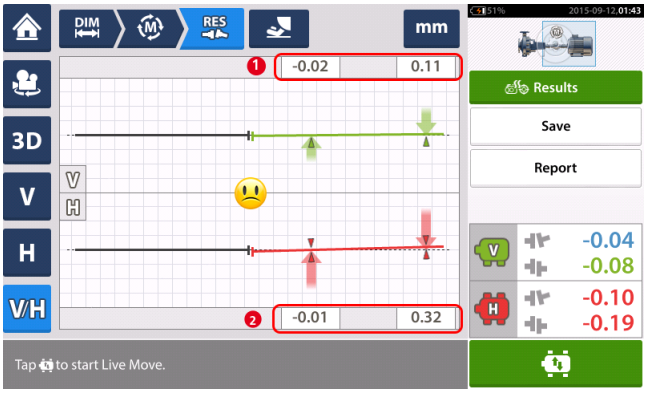
Blue – excellent [foot should not be moved]

Green – good [if possible foot should remain unaltered]

Red – poor [foot requires moving to attain a better alignment condition]







- **(1)** Vertical foot position results
- **(2)** Horizontal foot position results

Sign convention

Coupling gap is positive when open at top or side away from viewer. The viewer is considered to be standing in front of the machines as they appear on the display.

Offset is positive when the right shaft axis is higher than the left shaft axis or further away from the viewer than the left axis.

Both vertical and horizontal results show the foot position relative to the centerline of machine designated stationary. Positive values indicate that machine is upwards or away from viewer. Negative values indicate that machine is downwards or towards the viewer.

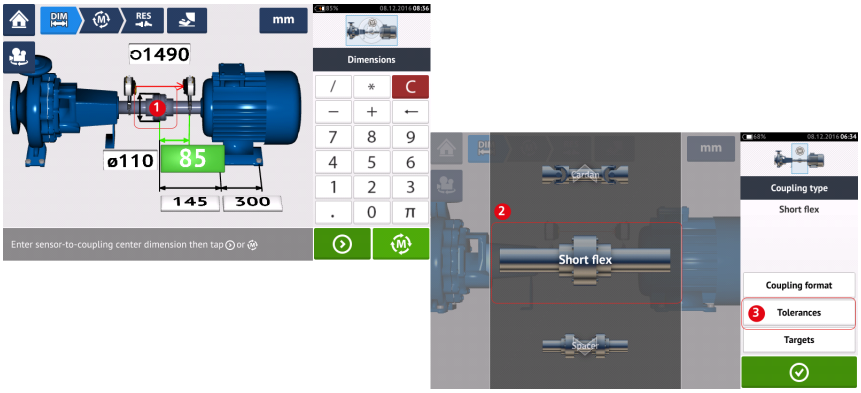
Tolerances

Alignment quality is evaluated through comparison with tolerances based upon entered machine dimensions and RPM.

The tolerance ranges are compiled as tables according to type of coupling, coupling format, and diameter (for the gap value) as well as RPM. When the coupling type is spacer, the tolerance table values are determined by the length of the spacer shaft and the RPM.

For cardan, tolerances are available for 1/2° and 1/4° limits.

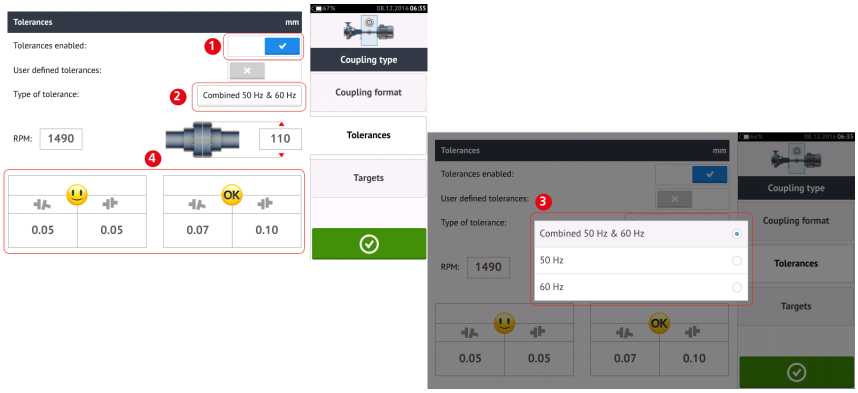
Tolerances are accessed via the dimensions screen.



Tap the coupling (**1**), then use the carousel that appears to select the desired coupling type (**2**). Tap 'Tolerances' (**3**) to access the coupling tolerance table.

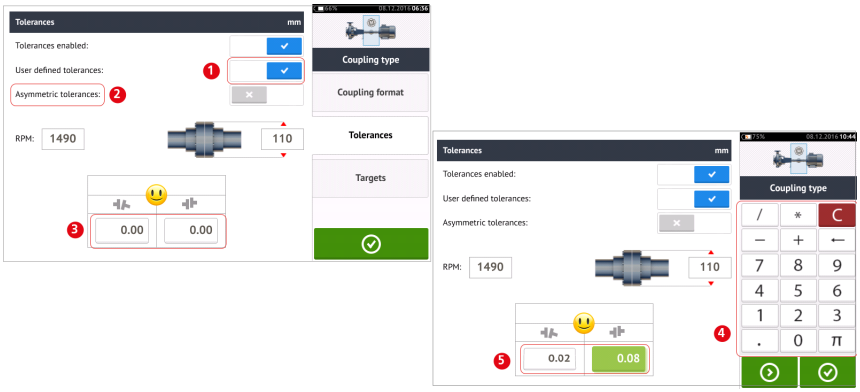
Available tolerance tables

The available tolerance tables are based on machine operating frequency.



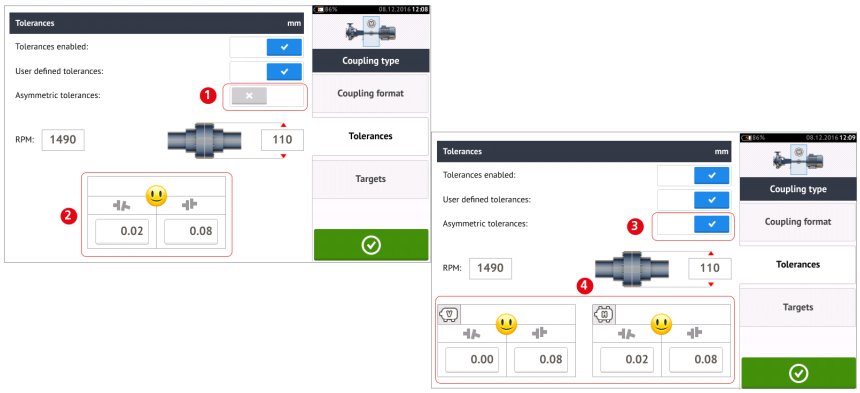
Swipe the icon (**1**) to the right to enable tolerances. Tap (**2**) to select desired type of tolerance. A pop-up menu (**3**) appears showing available tolerances. Tap desired type to display the corresponding tolerance table (**4**).

User defined tolerances



Swipe the icon (**1**) to the right to enable user defined tolerances. Asymmetric tolerances[1] (**2**) can be activated only when user defined tolerances are enabled. Tap (**3**) to edit user defined tolerances using the onscreen keyboard (**4**). The edited values are then displayed (**5**).

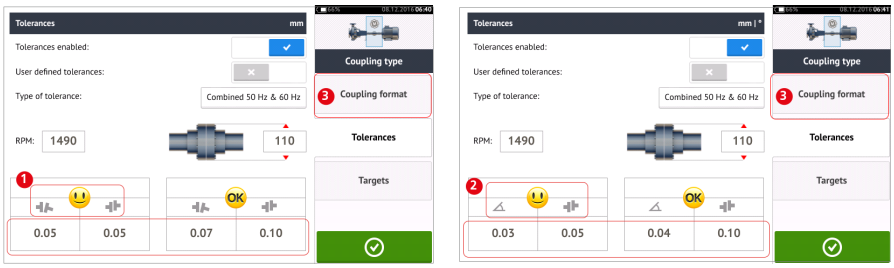
Asymmetric and symmetric tolerances



When asymmetric tolerances have not been enabled (**1**), the displayed specified tolerances (**2**) are symmetric. The gap and offset tolerances for both horizontal and vertical planes are identical.

If asymmetric tolerances are enabled (**3**) all four specified values are displayed (**4**).

Tolerance table based on coupling format



For the same type of tolerance, RPM, and coupling diameter, the tolerances value differ according to the coupling format selected. Coupling format (**1**) is gap/offset for short flex coupling, and (**2**) is angle/offset for short flex coupling. Change coupling format by tapping **3**.

Note

[1] In asymmetric tolerances, the tolerance values for the two coupling planes are not the same.

There are no tolerance tables for consolidated spacer shaft coupling formats. Consolidated formats consider the spoolpiece or jackshaft as an extension of either the right or left shaft.

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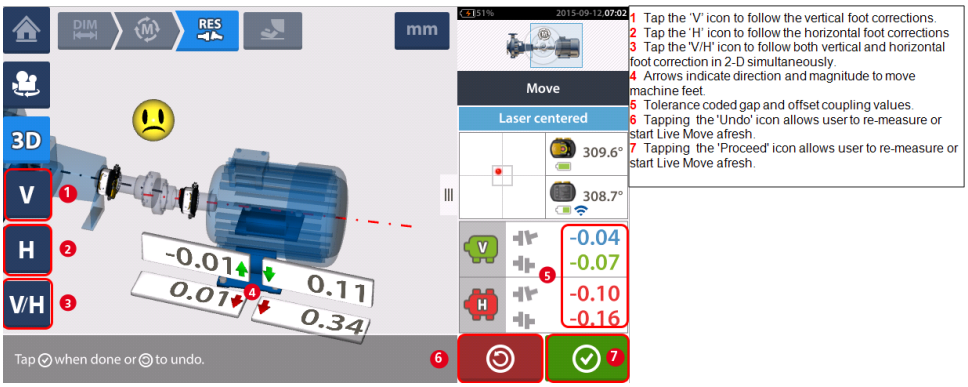
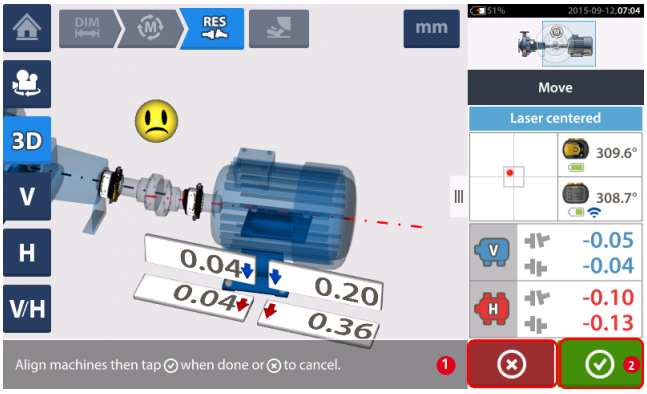
Live Move screen

Live Move is monitored in both horizontal (H) and vertical (V) planes simultaneously.

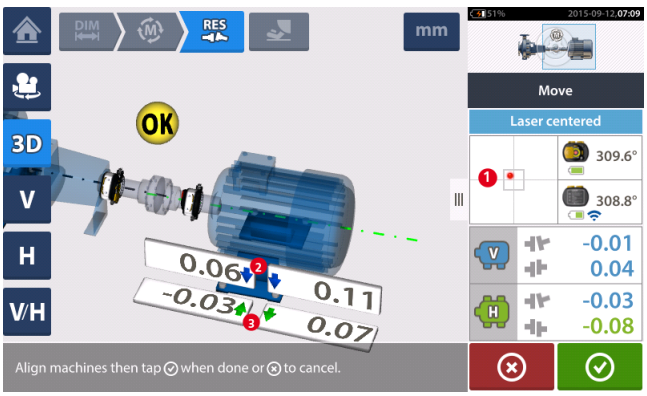


Once Live Move has been detected, the 'Cancel' icon  replaces the 'Undo' icon  .



- **(1)** Tapping  the 'Cancel' icon prompts the 'Cancel Move' hint.
- **(2)** Tapping  the 'Proceed' icon allows Live Move to be started afresh or the machines be remeasured.

If the laser beam is centered, tapping  starts Live Move automatically.



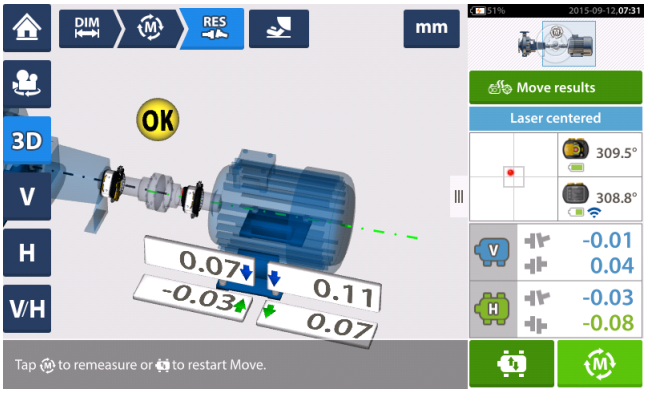
If the laser beam is not centered, tap the detector area on the screen [**1**] to access the **XY View**.

CAUTION
Do NOT attempt to move the machine using heavy sledgehammer blows. This can cause bearing damage, and also produce inaccurate Live Move results. Jack bolts on the feet or other mechanical or hydraulic devices are recommended for moving machines.

Correct the alignment condition by shimming and moving the machines laterally following the bold vertical [**2**] and horizontal [**3**] arrows. The color coded bold arrows signify the attained coupling tolerance as follows: Blue (excellent condition); Green (good condition) and Red (poor condition). Machines should be moved to within acceptable tolerances indicated by a happy smiley [ ] (excellent tolerance) or an OK icon [ ] (acceptable tolerance) while observing shaft alignment best practices.

Note
The system monitors both horizontal and vertical Live Move concurrently. If the vertical view (V) is selected when the function Live Move function is started, only the vertical condition will be displayed (although both planes are being monitored simultaneously). Likewise, if the horizontal view (H) is selected, then only the horizontal condition will be displayed (but both planes monitored simultaneously).

After moving machines to within tolerance, tighten the foot bolts then tap .



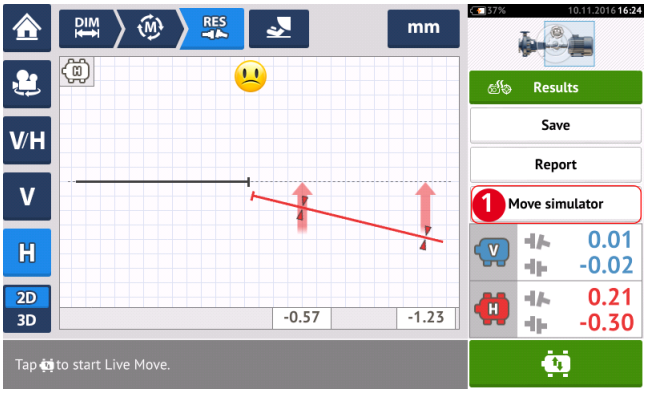
Tap to remeasure and verify the Live Move results, and confirm new alignment condition.

Move simulator

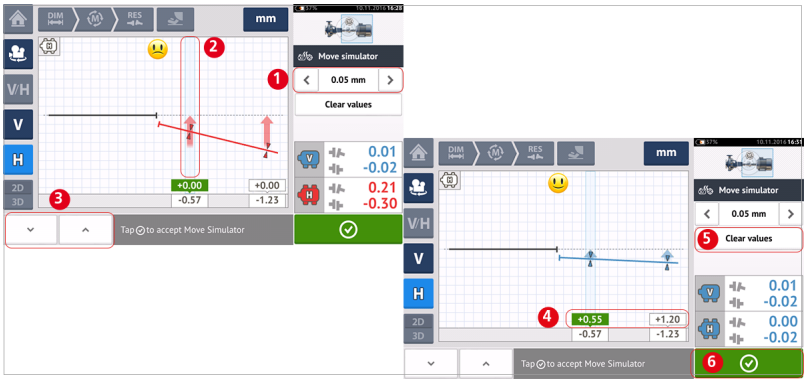
As the name suggests, the Move simulator is used to simulate shim values and horizontal movement corrections that are required to correct the alignment condition. The simulator takes into account the shim thickness available and the amount by which the machines can be physically moved.

Note
Move simulator can be used on a single plane only (either **V**ertical or **H**orizontal). Simulation is possible for the current (or "as left") measurement only. And the simulation may be carried out in 2D or 3D view.

The Move simulator is initiated from the results screen. After taking a measurement, display the results in either 2D or 3D and on a single plane only.



Tap 'Move simulator' (**1**).



Tap  to increase movement step value or  to decrease step value (**1**). The step value ranges from 0.025 mm – 1.0 mm for metric units and 1.0 thou – 40.0 thou for imperial units.

Tap machine feet pair to be simulated. A light blue cursor appears on the selected feet pair (**2**).

With the cursor on the selected feet pair, tap  to move the machine downwards (in **V**ertical view) or towards viewer (in **H**orizontal view) by the movement step value factor. Tapping  moves the machine upwards (in **V**ertical view) or away from viewer (in **H**orizontal view) by the movement step value factor(**3**). Carry out the simulation while observing the displayed color-coded shaft and coupling, the bold tolerance arrows and the smiley. Aim for a

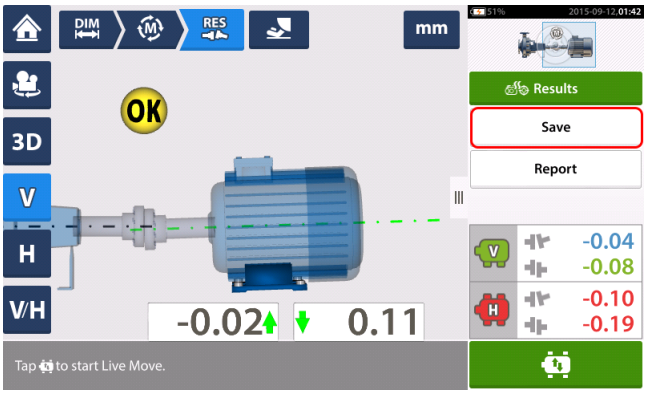
happy smiley (indicated by blue shaft and tolerance arrows) or an 'OK' smiley (indicated by green shaft and tolerance arrows). The amount and direction in which the machine should be moved are displayed on the value boxes (**4**) above the measured feet values.

To remove the simulation values, tap 'Clear values' (**5**).

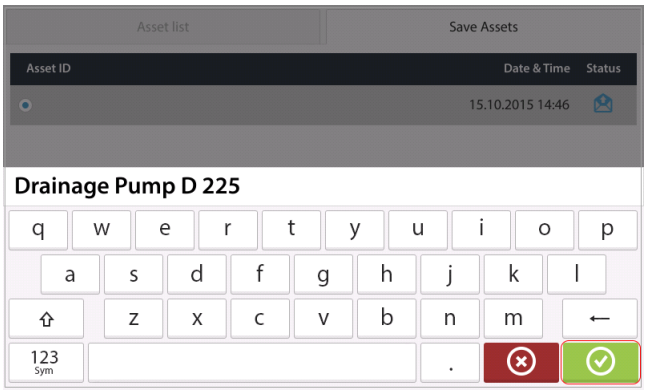
Tap  (**6**) to exit the Move simulator.

Saving asset measurements and generating reports

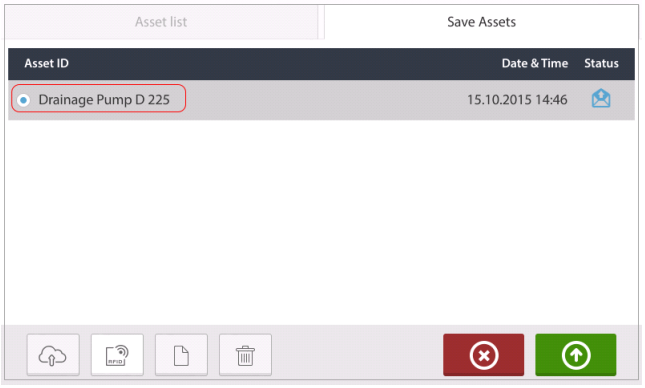
Before switching off the instrument, dimensions, measurements, results and all settings can be saved for analysis, future use or record purposes in the instrument's memory or in the Cloud. Asset measurements are saved from the results screen.



To save an asset measurement, tap the menu item "Save" then use the on-screen keyboard to enter the measurement file name.



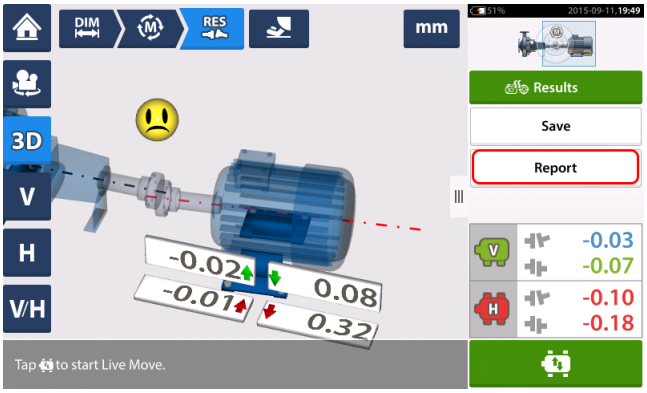
Once asset name has been entered, tap  to save the asset under "Asset park[1]". The asset is listed as an Asset[2] ID.



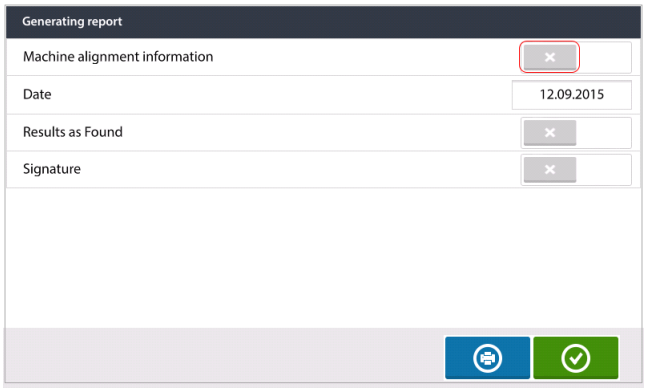
[1]Asset park is the location where asset measurements are saved.

[2]Asset refers to machinery and equipment within a plant.

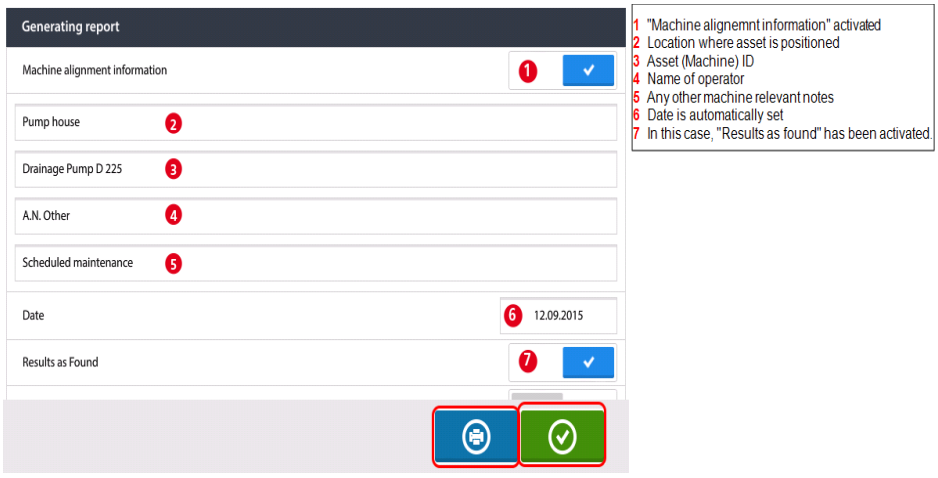
Asset measurement reports may be saved directly from the system as a PDF to a USB storage device. A USB storage device must be connected to ROTALIGN touch computer via the USB port. Measurement reports are generated from the results screen.



Tap the menu item "Report". The "Generating report" screen opens.



If not yet done, activate "Machine alignment information" by swiping the icon to the right. Once activated, enter the necessary information using the on-screen keyboard. The other two items "Results as found" and "Signature" may be activated by swiping the icon to the right if desired.



Tap  to save the asset measurement report as PDF to the connected USB storage device.

Tapping  saves the machine alignment information, then returns the user to the Results screen.

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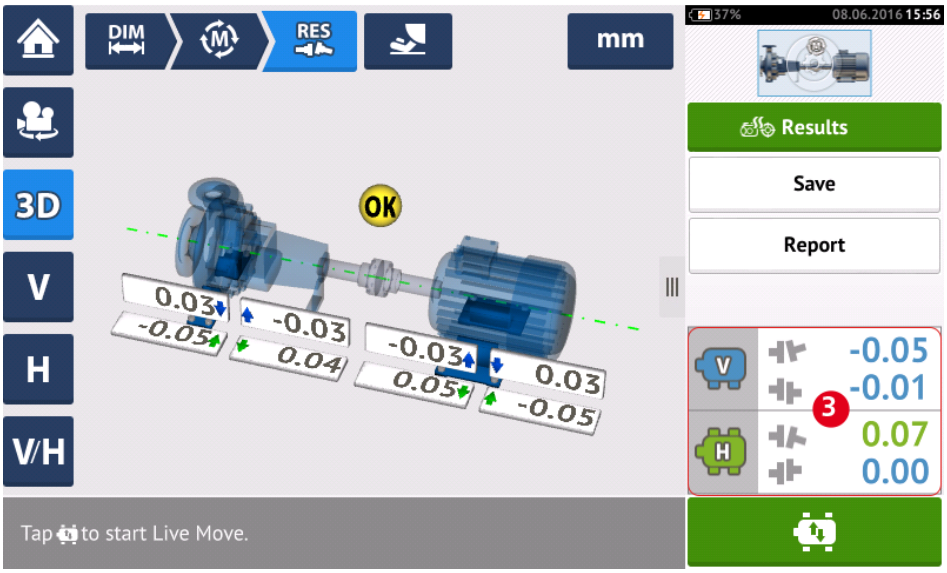
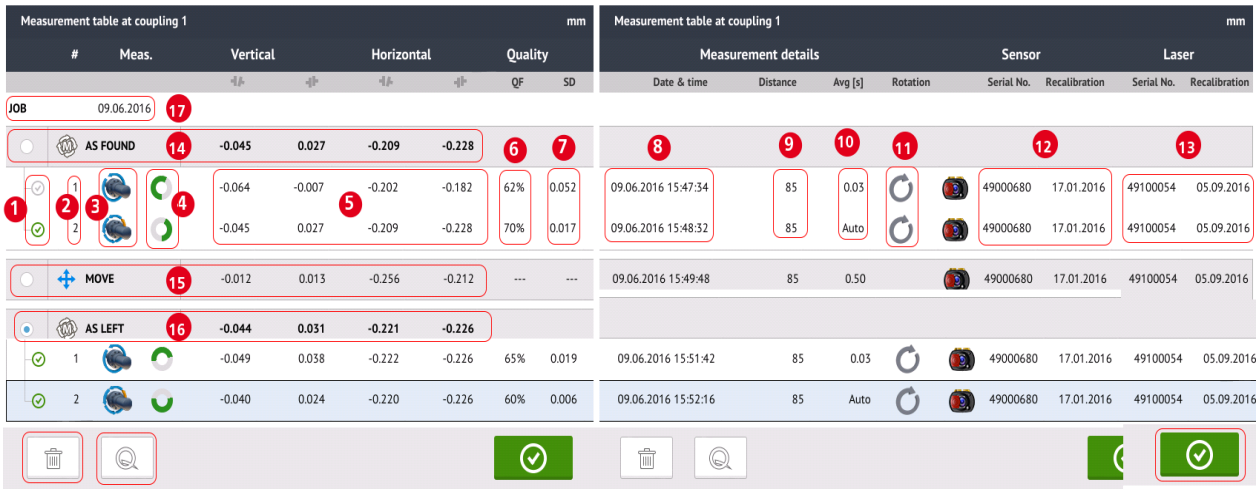
Measurement table

The measurement table is used to register and display all Shaft alignment, and any Live Move measurements taken on the current couplings. Access the measurement table by tapping either the results repeatability table **(1)** or coupling results **(2)** / **(3)**.



The following items are included in the measurement table for each measurement.



- **(1)** Tap the check box to include the measurement in calculating the averaged results that is displayed on the results screen. Included measurements have a green check mark. The check mark remains grayed out if the measurement is not selected.
- **(2)** Measurements in chronological order
- **(3)** Used measurement mode
- **(4)** The rotational angle covered during measurement
- **(5)** Vertical and horizontal gap and offset values
- **(6)** Measurement quality factor (QF)
- **(7)** Measurement standard deviation (SD)
- **(8)** Date and time when measurement was taken
- **(9)** Dimension sensor-to-coupling centre
- **(10)** **Averaging** used
- **(11)** Direction of shaft rotation during measurement
- **(12)** Serial number of sensor used and recalibration due date
- **(13)** Serial number of laser used and recalibration due date

The "AS FOUND" coupling result **(14)** shows the initial alignment condition of the machines before any Live Move is performed. The displayed result could be an average of selected measurements. In the following table, the "AS FOUND" coupling result is the selected measurement number 2 only.

The "MOVE" result **(15)** shows the alignment condition after Live Move.

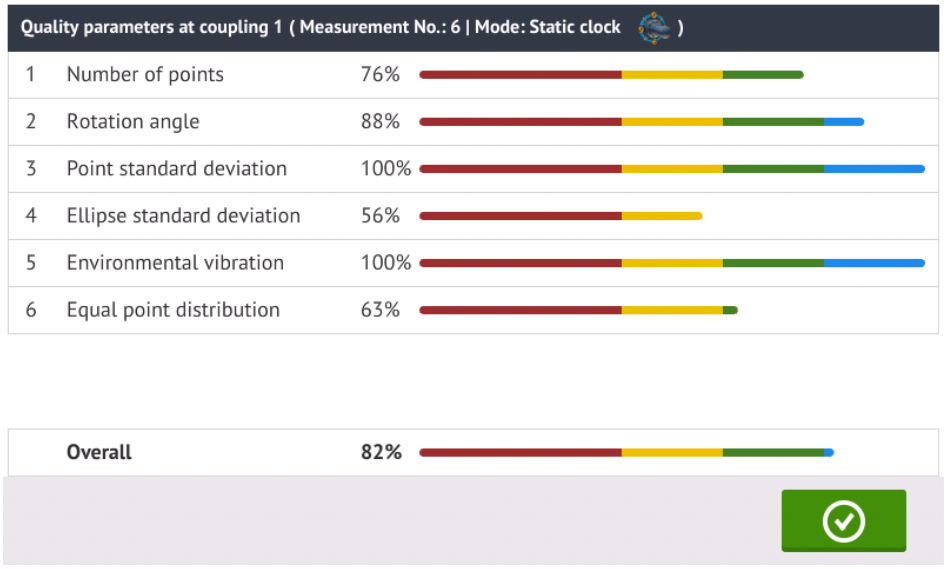
The "AS LEFT" coupling result **(16)** shows the alignment condition measured after Live Move. The displayed result could be an average of selected measurements. In the following table, the "AS LEFT" coupling result is the average of measurements numbers 1 and 2.

The "JOB" date **(17)** appears whenever a new alignment job is started.

Swipe horizontally to view all columns in the table and vertically to view all rows in the table.

Tap  to delete highlighted "AS LEFT" reading from the measurement table.

Tap  to display the parameters determining the quality factor of the measurement.



Tap  to exit the measurement table.

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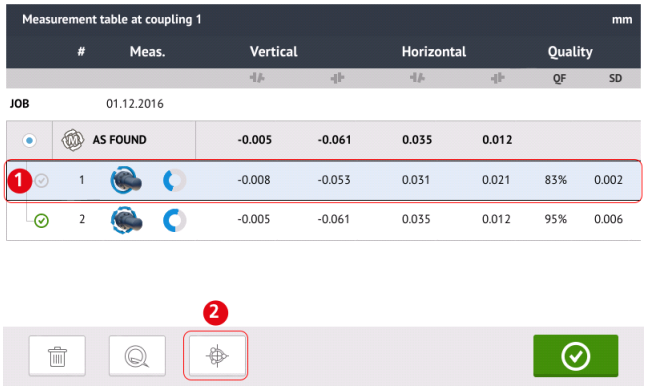
Editing measurement data

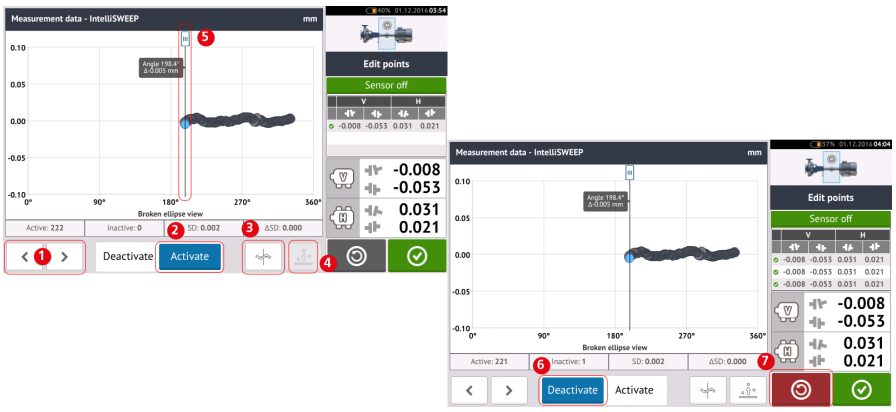
To improve the quality of the alignment results, it is possible to edit measurement data that could have been affected by external circumstances such as bracketing touching piping arrangement. The editing options are accessed via the **measurement table**.



When in the measurement table screen, tap desired measurement (**1**) then tap  (**2**) to access the measurement data screen.

Broken ellipse

The most commonly used deviation diagram is referred to as 'broken ellipse'. During measurement, the laser beam traverses an arc that is dependent on the alignment condition of the rotating shafts. Over a complete 360° rotation, the beam describes an ellipse. Cutting the ellipse and laying it out flat results in the deviation diagram 'broken ellipse'. In this diagram points out of track are clearly seen.



- **(1)** Tap  or  to cycle through the points.
- **(2)** Currently selected point is active. The point is made inactive by tapping 'Deactivate'.
- **(3)** Shows currently displayed deviation diagram or sensor plane. Tap icon to cycle through available deviation diagrams and sensor planes. These include: Broken ellipse []; Ellipse []; Polar ellipse []; Sensor plane []; Sensor plane zoomed []
- **(4)** Tap  to automatically select the point with the highest deviation within the diagram. The cursor (**5**) springs automatically to this point. Note that the icon is inactive when the currently highlighted point has the highest deviation within the group.

- **(5)** The cursor is used to highlight any point in the diagram. The selected point is highlighted blue.
- **(6)** Currently selected point is inactive. The point is made active by tapping 'Activate'.
- **(7)** The 'undo' icon  is used to reverse all changes made before saving the asset measurement.

Other deviation diagrams

All deviation diagrams show the actual number of active and inactive points, the current standard deviation (SD), and the total change in standard deviation (delta SD) when deviant points are deactivated.

What is the effect of deactivating individual points?

Individual points are deactivated in order to lower the standard deviation value. Change in standard deviation impacts the V and H results displayed in the results repeatabilty table. Results with a green check mark indicate results with better standard deviation.

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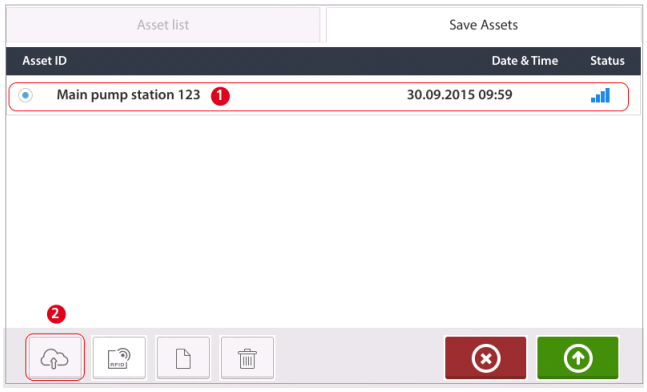
Using Cloud drive

To set up the PRÜFTECHNIK Cloud drive, an ALIGNMENT RELIABILITY CENTER 4.0[1] (ARC 4.0) licence is required. The Cloud drive allows the sharing of up-to-date measurement files (or assets) on different devices.

Note
Wireless connection between ROTALIGN touch computer and a network must be established to enable file transfer via ARC 4.0 take place.

Storing a measurement file in Cloud drive

After finalizing a measurement **save measurement file** (**1**) then upload it to Cloud drive.

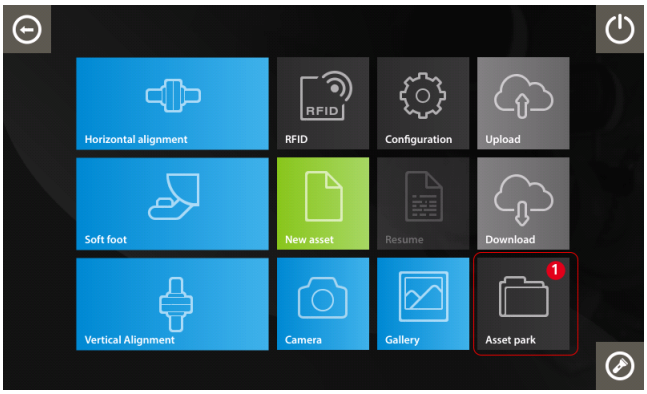


Tap the "Upload" icon (**2**) The measurement file appears in ARC 4.0 "Exchange" view with the status "complete". Drag and drop the measurement file in its appropriate location on the Cloud drive.

Downloading a measurement file from Cloud drive

From the ARC 4.0 "Exchange" view, drag and drop the desired measurement file into the Name pane. The measurement file appears with the status "ready".

From the home screen, tap  . The selected file appears in the asset park (**1**).



[1]This software platform which is also referred to as ARC 4.0 allows the management of plant assets in a structured form, displaying trends. It also allows job preparation and transfer of asset measurements in Cloud drive.

Tap  to open the measurement file in ROTALIGN touch computer.

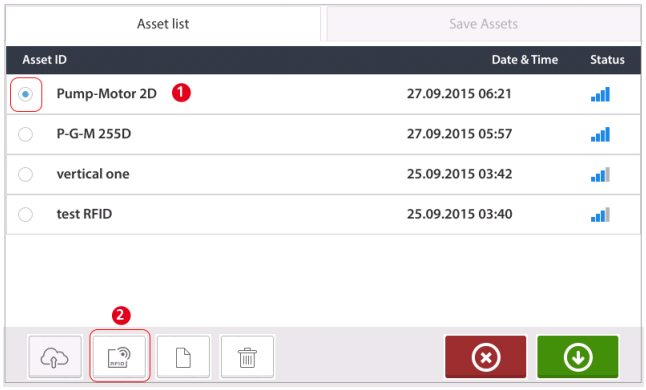
RFID

ROTALIGN touch uses this automatic identification technology to perform the following:

- Identify machine to be aligned
- Enter corresponding files directly into the device
- Store data and results under the correct file name automatically

Assigning a saved measurement file to an RFID tag

From the home screen, tap  the "Asset park" icon to display measurement files saved.



Tap the measurement file [**1**] that is to be assigned to the RFID tag, then tap the RFID icon [**2**].

Position ROTALIGN touch such that its built-in NFC module is as close to the RFID tag as possible (less than a centimeter).

As soon as data has been written on the RFID tag, the corresponding hint appears on the display.

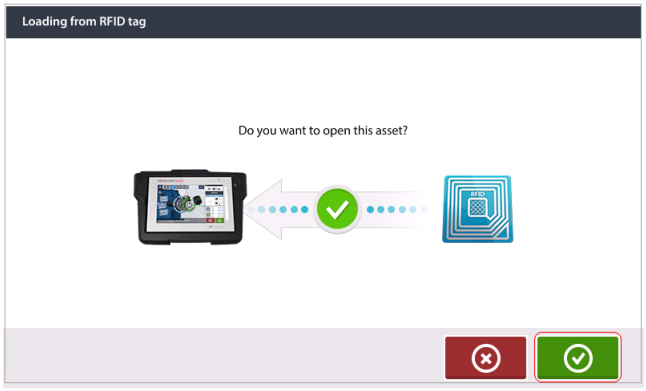
Tap  to exit the screen.

Note
If however, data had already been assigned to the RFID tag, a hint requesting overwriting of the data appears.

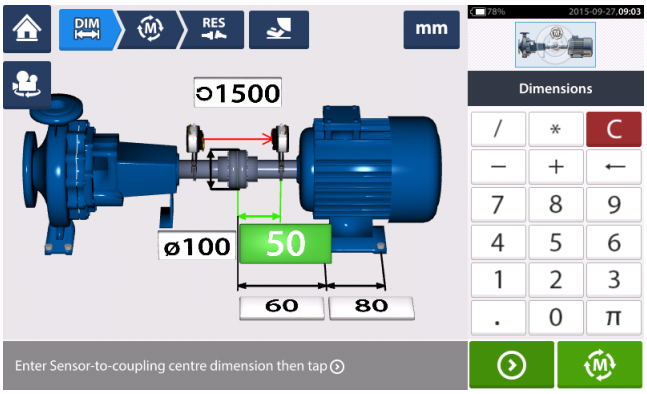
Opening a measurement file assigned to an RFID tag

From the home screen, tap  the "RFID" icon.

Position ROTALIGN touch such that its built-in NFC module is as close to the RFID tag as possible (less than a centimeter).



Tap  to open the measurement file.



Note
If however, no data had been written on the RFID tag, a hint on missing information appears.

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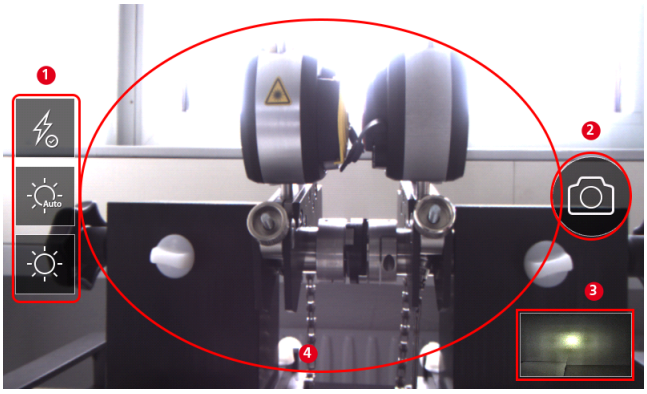
Built-in camera

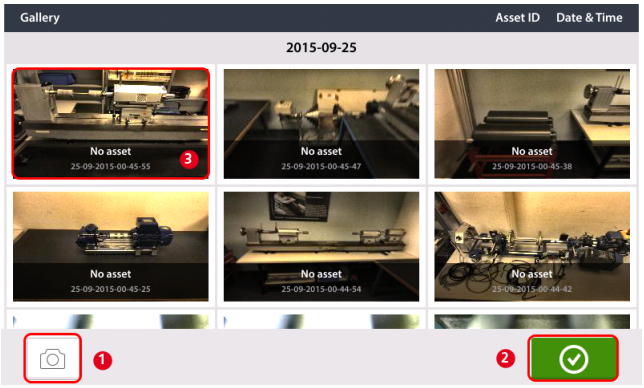
The built-in camera is accessed by tapping  the "Camera" icon.



Focus the device on the object to be photographed. The object is displayed on the screen.

- **(1)** Camera settings for indoor, outdoor and night imaging, including automatic light setting – Tap desired light setting icon (Flash may be turned on/off; Auto mode is for automatic light setting).
- **(2)** Tap  the "Take picture" icon to take a photo of the object focused on the display.
- **(3)** Tap this location to access the device gallery.
- **(4)**Object to be photographed

Gallery



To view all images saved in the gallery, touch then drag up or down. All images are displayed as miniatures.

- **(1)** Tapping  returns user to the image settings screen where objects may be photographed.
- **(2)** Tapping  opens the home screen.
- **(3)** Tap any miniature to view the image in full scale.

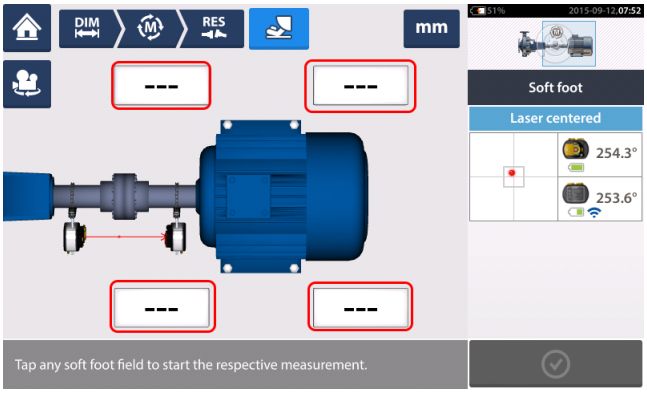
How to capture a screen shot on ROTALIGN touch

Select the desired screen then press the power button four times in quick succession. The message 'Screenshot saved' appears on the display. The captured image may now be viewed in the gallery.

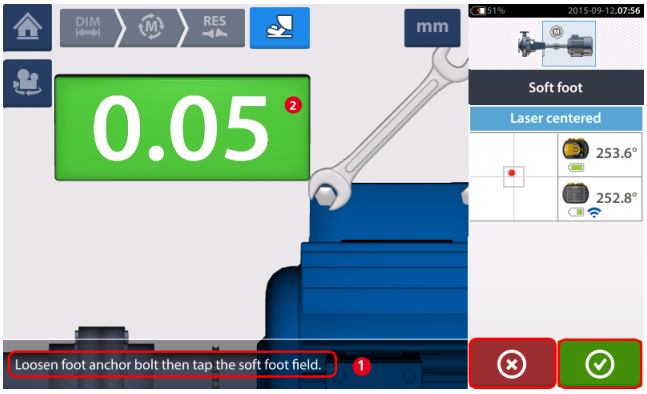
Note
Images saved to the gallery may only be transferred to a PC if assigned to an asset. Before taking the desired photo or screenshot the corresponding new or existing asset must be opened. The captured image may then be transferred to the PC software ARC 4.0.

Soft foot

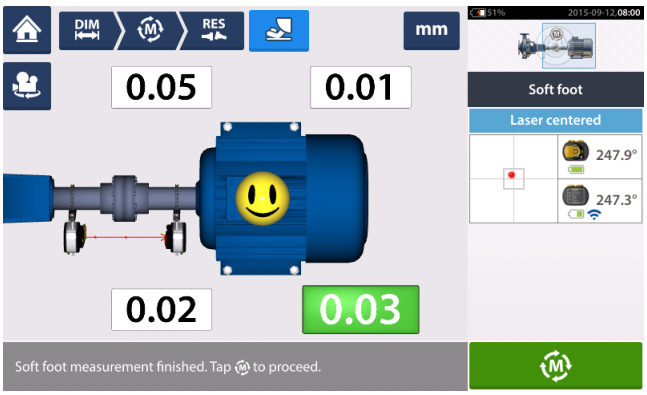
Soft foot measurement can be started from any screen where the 'Soft foot' icon [ ] is active. Tap to start soft foot measurement. The laser beam must have the status "Laser centered" or "Laser OK". Refer to **Laser beam adjustment**.



Tap any one of the four pulsating value fields to start soft foot measurement at the respective machine foot.

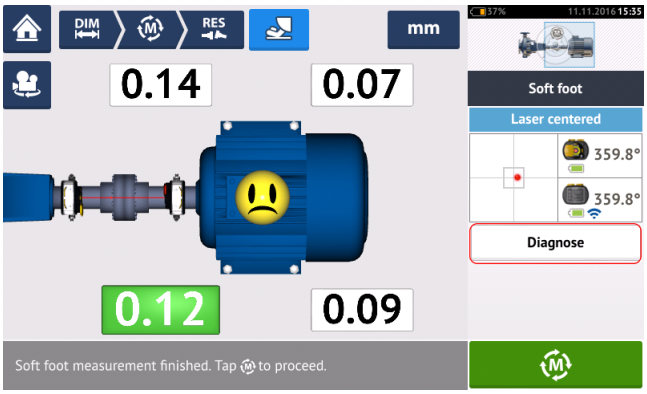


Loosen the corresponding foot bolt (see hint **1**). The recorded soft foot value is displayed [**2**]. When the soft foot value stabilizes, tap the 'Proceed' icon, then tighten the bolt (see hint **2**). If desired, the soft foot measurement at the corresponding foot is canceled by tapping the 'Cancel' icon. The above soft foot measurement procedure is repeated for all four feet positions.

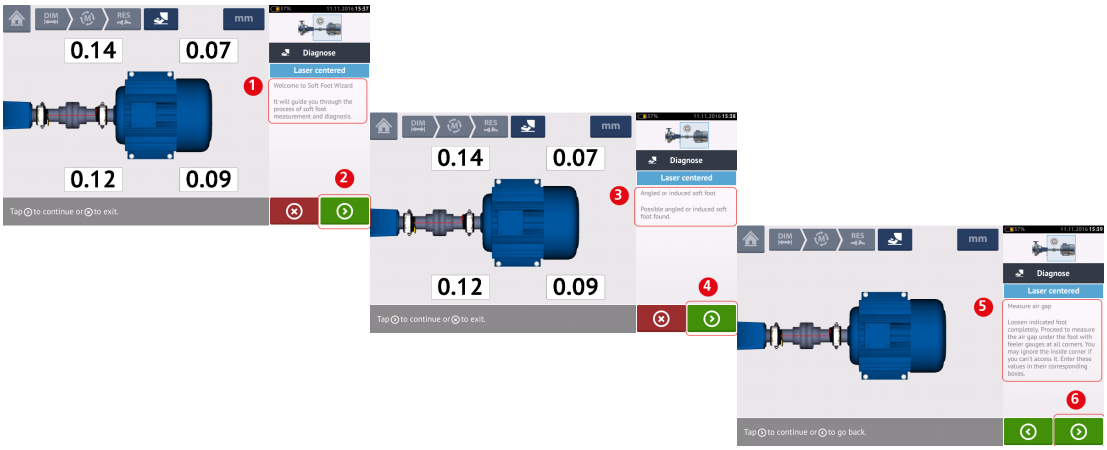


If however soft foot is detected, 'Diagnose' will appear on the screen. Tap 'Diagnose' to start the **soft foot wizard** which guides the user through diagnosis and correction of soft foot.

Soft foot wizard



Tap 'Diagnose' to start the soft foot wizard. The wizard guides the user through diagnosis and correction of soft foot.



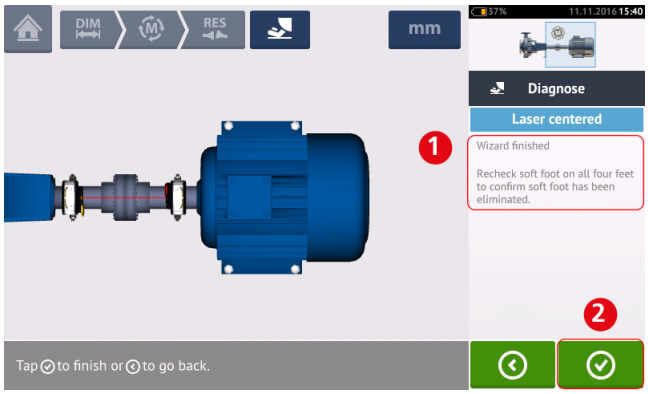
A welcome hint (**1**) appears after the wizard is started. Tap  (**2**) to proceed to the next wizard step. A hint appears (**3**) showing the type of soft foot detected. Tap  (**4**) to display the suggested action (**5**). Tap (**6**) to proceed to the next wizard step.

Note
The wizard steps are dependent on the type of soft foot detected.

Types of soft foot

These include:

- Rocking soft foot – in this case, the highest values are diagonally opposed
- Angled soft foot – mostly observed in machine with bent foot or when the base plate is bowed
- Squishy sof foot – results from dirt or too many shims
- Induced sof foot – due to external forces such as pipe strain



After cycling through all the given wizard steps, the 'Wizard finished' hint (**1**) appears.

Tap  to return to the soft foot measure screen. **Measure soft foot** again to check whether soft foot has been eliminated.

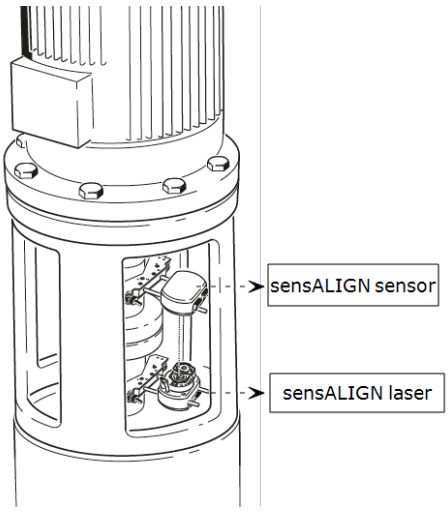
Vertical flanged machines

A typical vertical machine arrangement comprises one machine mounted on top of the other using a bolted flange.

Flange-mounted machines may have a vertical or horizontal orientation. In either case, alignment corrections are made directly at the flange.

Angularity is corrected by inserting or removing shims between the flanges. ROTALIGN touch calculates the shimming thickness for each flange bolt.

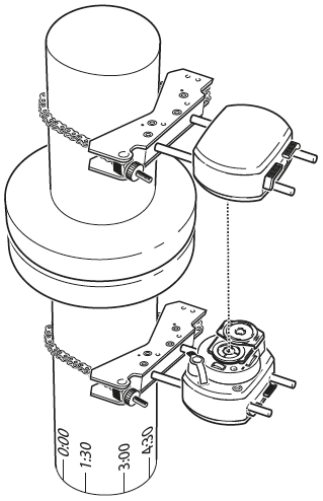
Offset is corrected by positioning the flange laterally.



sensALIGN laser and sensor are mounted on either side of the coupling as for **horizontal machines**, with sensALIGN laser on the shaft of the bottom machine. As the electronic inclinometer cannot directly determine the rotation angle of vertical shafts, the measurement mode for vertical machines is Static Clock.

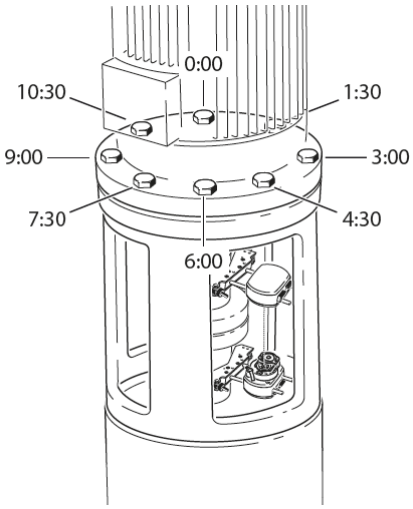
Marking measurement positions

The eight 45° measurement positions used with these procedures must be marked accordingly on the machine.



- Mark a reference position on the coupling housing close to the shaft and in line with a convenient external reference or flange bolt. Likewise, mark a reference point on the shaft.
- Measure the circumference of the shaft and divide by eight.
- Use this distance to make seven more evenly-spaced marks on the shaft beginning at your chosen start point. Number the points counterclockwise as seen from sensor to laser, beginning with 0 first, followed by 1:30, 3:00,4:30, 6:00, 7:30, 9:00 and 10:30.

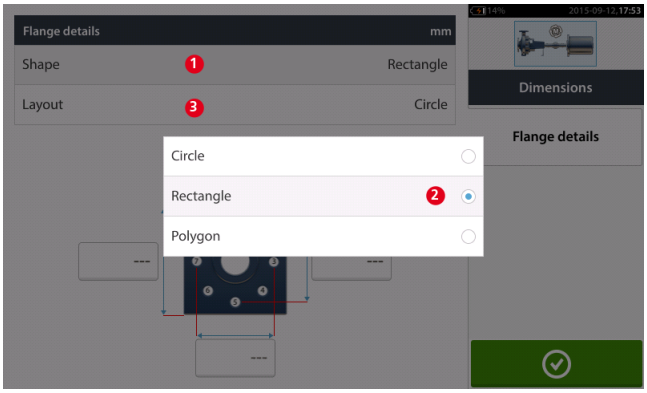
For circular housings, measure the circumference of the coupling housing and divide by eight. Use this distance to make eight evenly-spaced marks on the housing beginning at your chosen start point. Number the points clockwise looking down onto the shaft with 0 as the first, followed by 1:30, 3:00,4:30, 6:00, 7:30, 9:00 and 10:30.



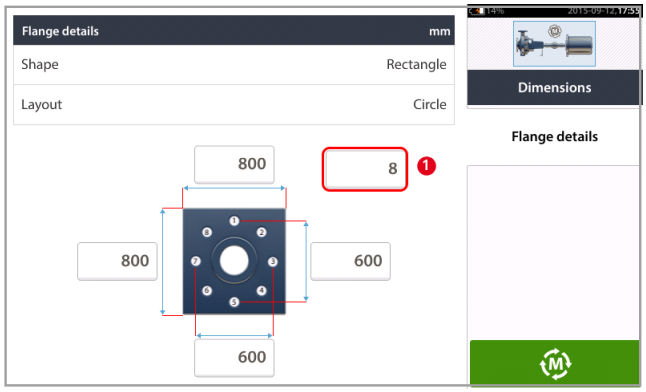
Set-up

- Mount sensALIGN laser and sensALIGN sensor on either side of the coupling, ensuring that they are aligned exactly with the 0 or reference mark.
- Switch ROTALIGN touch on, then tap  in the home screen to start the vertical alignment application.

- Enter the following required machine dimensions:
  - Sensor to coupling center
  - Coupling center to flange
  - Coupling diameter
  - RPM
- When entering machine dimensions, the flange geometry must be taken into account. Tap the flanged machine area (**5**) to configure the flange.



- Tap the "Shape" area [**1**] to select the shape of the flange from the drop down menu [**2**] that appears. In the above example, the selected shape of the flange is "Rectangle".
- Tap the "Layout" area [**3**] to select the pattern formed by the bolts from the drop down menu that appears.



- Tap the respective value boxes then use the onscreen keyboard to enter flange dimensions and bolt pattern lengths. The number of bolts is edited by tapping [**1**] then entering the value directly.
- After all the required dimensions have been entered, tap  to proceed with measuring.

The following measurement procedures are available for vertical flanged machines:

vertiSWEEP (default measure mode)

Static clock

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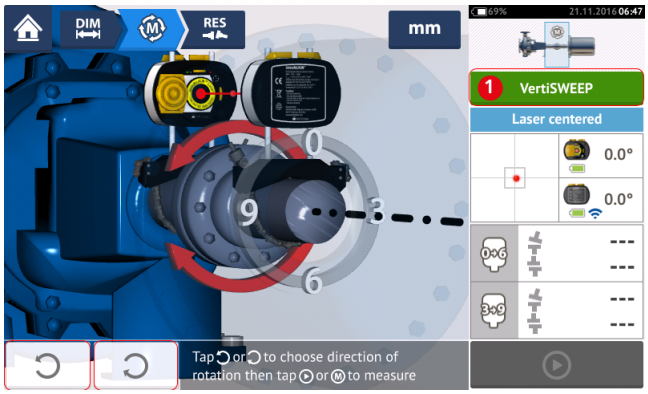
Vertical flanged machines – vertiSWEEP

Measure using vertiSWEEP

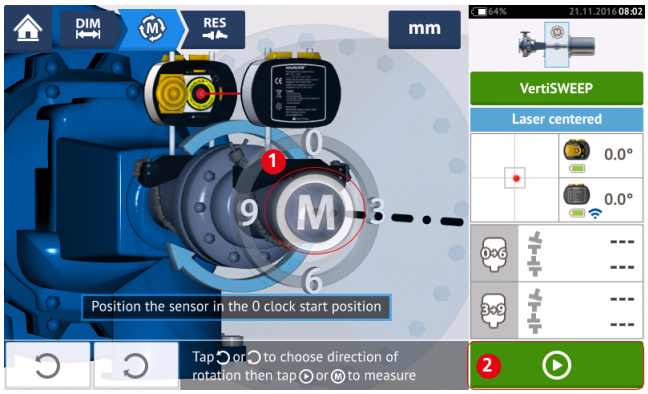
- Center the laser beam.

> **Note**
> vertiSWEEP is the default measurement mode for vertically mounted machines. The alternative Static clock measurement mode may be accessed by tapping (**1**) in screen below.

- Position the shafts such that sensALIGN sensor and laser are both at the '0' reference mark position.



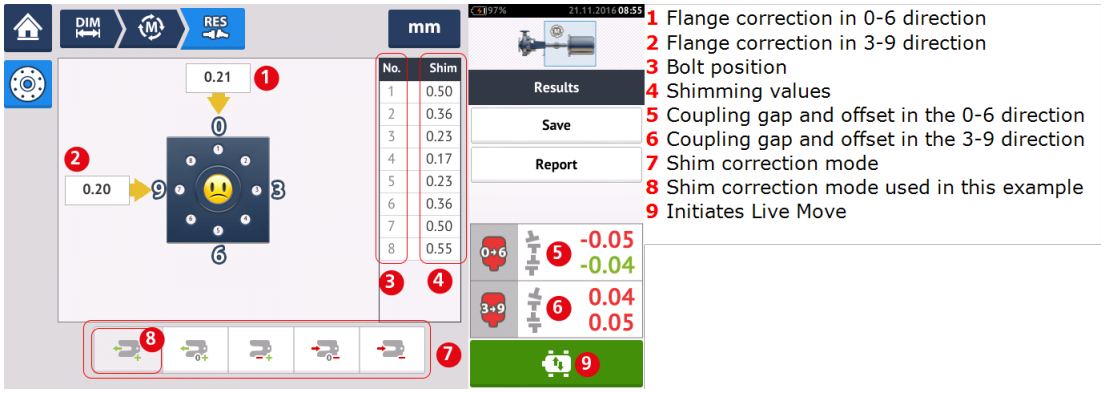
- Use or and select the direction in which the shafts will be rotated. Once the direction to rotate the shafts is selected, measurement is activated and the letter '**M**' (**1**) appears and also (**2**) becomes active.



- Tap either '**M**' or  then rotate the shafts through an angle greater than 360°.

- After rotating the shafts through the required angle, tap  (**1**) to display coupling results. Tap  (**2**)to display shimming corrections.

> **Note**
> If the measurements have a high standard deviation [>0.05 mm (>2 thou)] resulting from say bearing play, stiff coupling or radial play in coupling, a hint suggesting the use of Static measurement mode appears on the screen. In this case, the measurement mode should be changed to Static measurement.



Shimming modes

Shimming modes are defined as follows:

- **(1)** mode indicates all positive shimming
- **(2)** mode indicates "zero/plus" shimming. In this mode, one bolt position is forced to zero and the rest are positive

- **(3)** mode indicates optimized shimming. In this mode, half of the corrections will positive, and the other half negative.
- **(4)**mode indicates "zero/minus" shimming. In this mode, one bolt position is forced to zero and the rest are negative.
- **(5)** mode indicates all negative shimming

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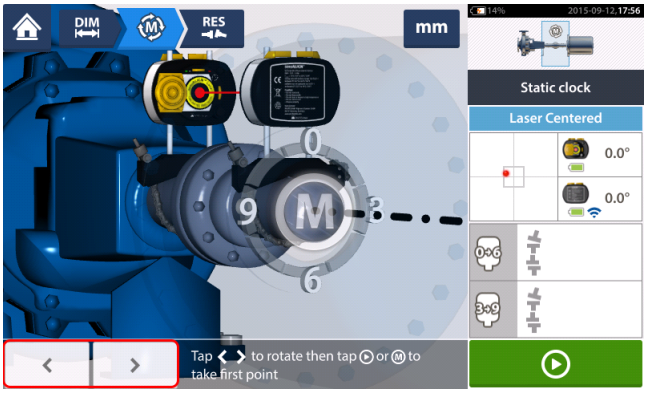
Vertical flanged machines – Static clock

Measure using Static measurement mode

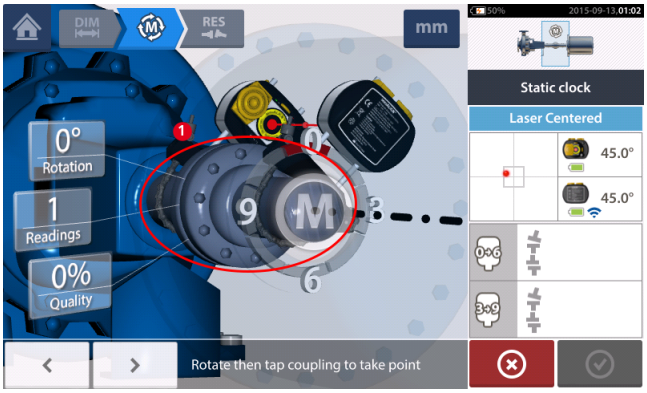
- Center the laser beam.

  Note
  Static measurement mode is used for vertically mounted machines.

- Rotate the shafts to the first measurement position. If using the coupling housing numbering convention, the reference mark and the measurement position 0 should be aligned or matched to each other.



- Use < or > to position the displayed sensALIGN laser and sensor at the angular rotation corresponding to the actual position of the components mounted on the shafts, then tap to take the first measurement point.
- Rotate shaft to the second measurement position (e.g. 1:30). If the chosen measurement position does not correspond to the angle selected automatically on the display, use the navigation keys to manually position sensALIGN sensor and laser at desired angle on the display. Take the measurement point by tapping the coupling area [1].



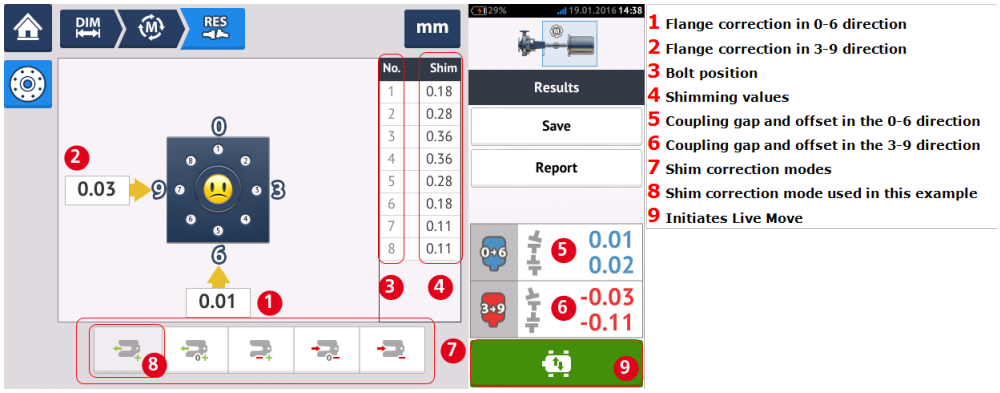
- Take the maximum number of measurement points to maximize the quality of results.

- Tap  to proceed to view measurement results.

Note

The colour of the "Proceed" icon [] denotes the attained measurement quality.

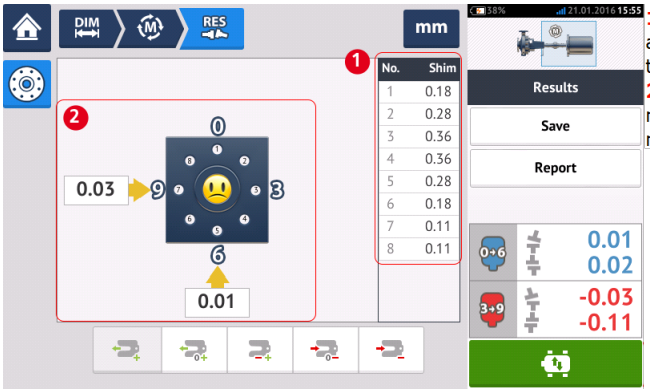
- Tap  to view measurement results.



The **shimming mode** used in the above example is "all positive" shimming.

Live Move – Vertical machines

Alignment is carried out by correcting angularity and offset.



1 Angularity corrections are made by shimming at the given bolt locations.
2 Offset corrections are made by moving the machine laterally.

Correcting angularity

It is recommended (but not necessary) to correct angularity first:

1. Loosen the flange bolts then lift the movable machine.

> **WARNING**
> The machine bolts must be undamaged and removable.

2. Angularity corrections are made by shimming. The shimming values at the respective bolt positions are shown on the screen. Insert (or remove) shims with the correct thickness under the selected bolt. Loosen the flange bolts then lift the movable machine.

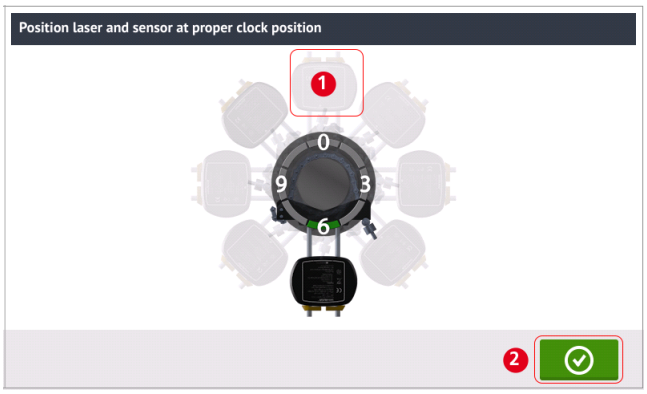
3. Tighten the bolts back down, then take another set of readings to confirm shimming corrections; repeat shimming if necessary.

4. Once satisfied that overall angular misalignment is in tolerance, and no more shimming is required, proceed to correct offset.

Correcting offset

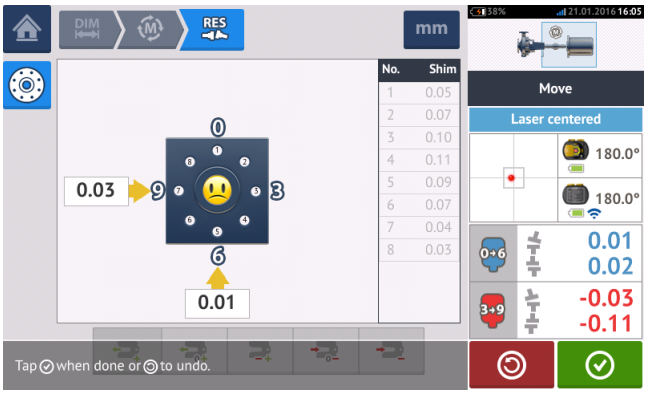
1. Offset corrections are carried out using the Live Move function.

2. Tap  to start Live Move. A hint screen requesting the angular position of both sensor and laser appears.



In the above example, the desired angular position of both sensor and laser is the 12:00 o'clock position **(1)**.

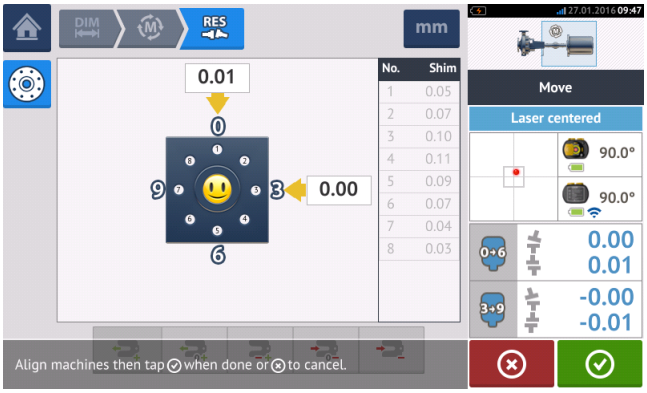
3. Tap **(1)** to position the screen sensor at this position then tap  to proceed.



4. Loosen the flange bolts. Once Live Move has been detected, the 'Cancel' icon  replaces the 'Undo' icon  . The 'Cancel' icon  prompts the 'Cancel Live Move' hint.

5. Move the machine laterally in the direction of the bold yellow arrows to perform offset corrections. Monitor the arrows on the Live Move screen.

- Corrections should be brought as close as possible to zero.
- Use appropriate tools (e.g. jackscrews) to position the machine.
- Take care not to let the shims slip out of place during lateral positioning.



6. When offset is in tolerance, tighten the flange bolts. Remeasure to check if the new alignment condition is in tolerance.

7. If not, repeat the above steps until alignment is in tolerance.

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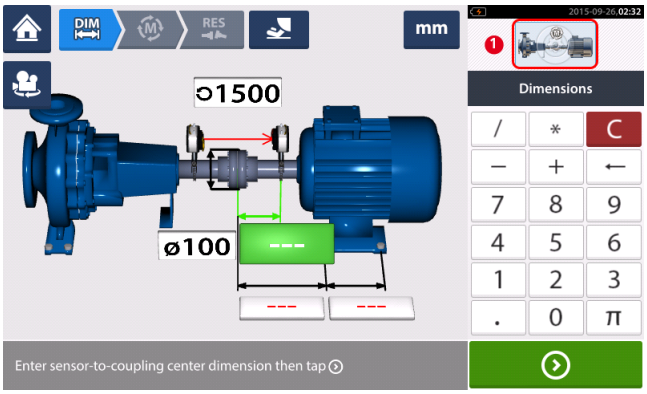
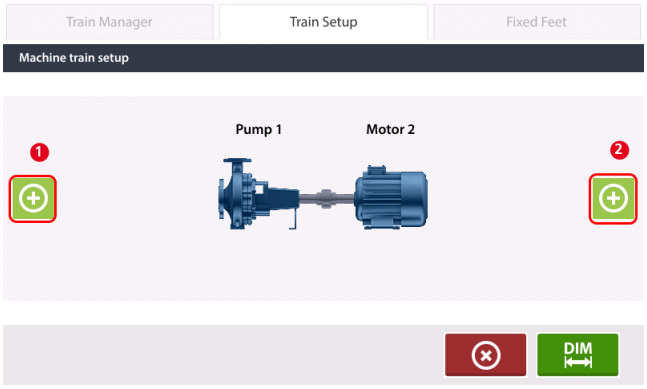
Machine train alignment

The following is a step-by-step approach for measuring the alignment condition of a three-machine train. The components should be **mounted** and **laser beam adjusted** as required.

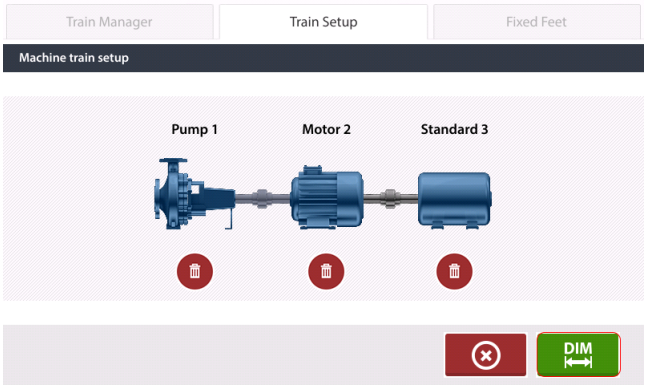
From the home screen, tap  the "New asset" icon to open a new measurement file.



Tap the mini train inset at the top-right corner (**1**) to access the "Train set-up" screen.

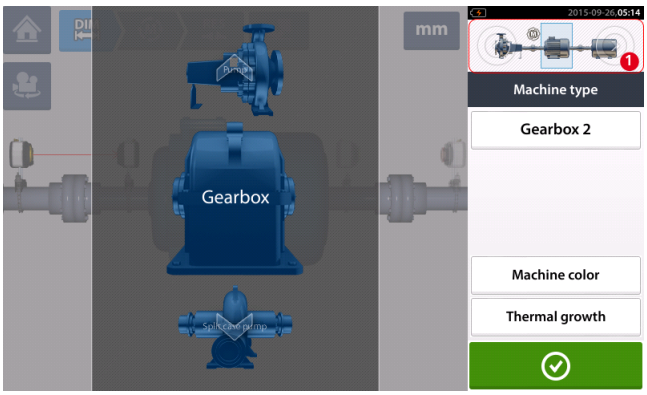


Tap either of the two "Add machine" icons [**1**/**2**] to add the third machine to the left (**1**) or right (**2**) of the train.

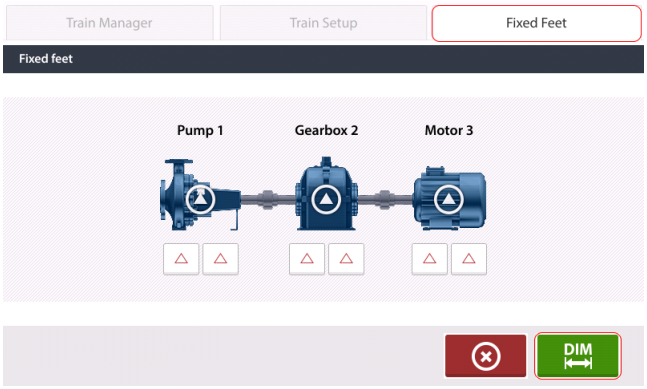


After adding third machine to the train, tap  to return to the dimensions screen then use the **carousel** to configure the three machines as desired. To access the different elements within the three machine train, tap the corresponding element within the train inset [**1**] at the

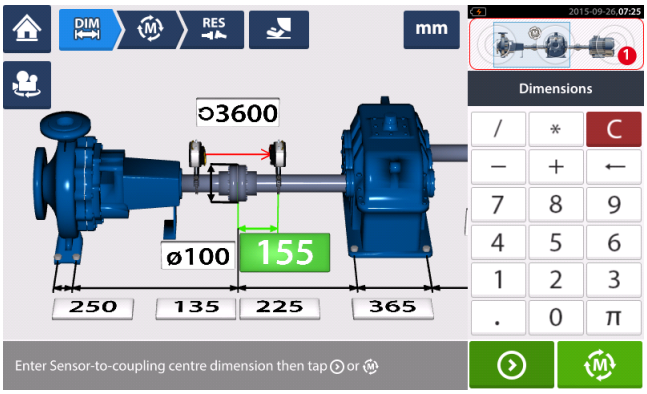
top right corner of the screen. In the following example, the machine train configuration comprises pump, gearbox and motor.



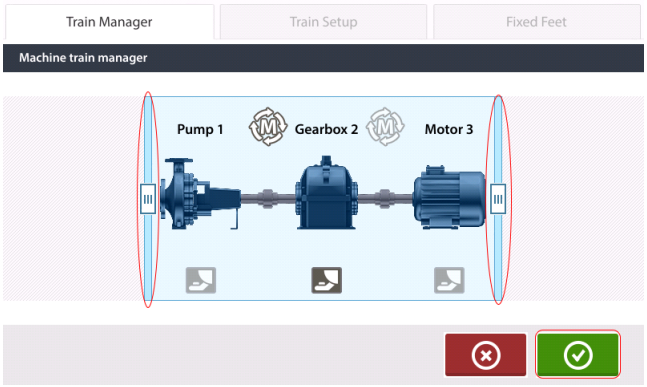
The "Fixed feet" screen is accessed by tapping the center of the mini train inset [**1**].



Tap  then proceed to entire the dimensions.



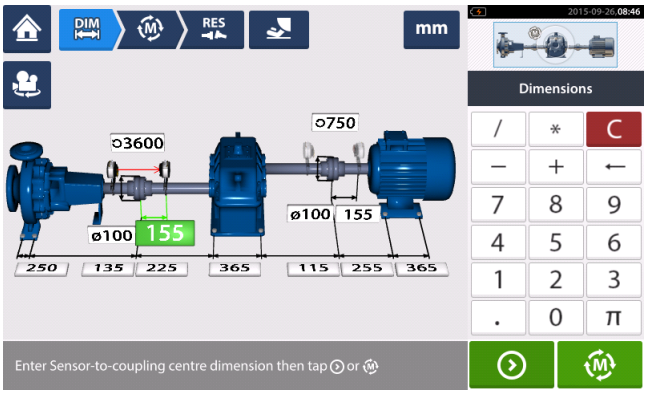
To view the entire three-machine train and its related dimensions, tap the centre of the mini train inset [**1**] to access the "Machine train manager" screen.



Use the sliding bars to display the entire machine train.

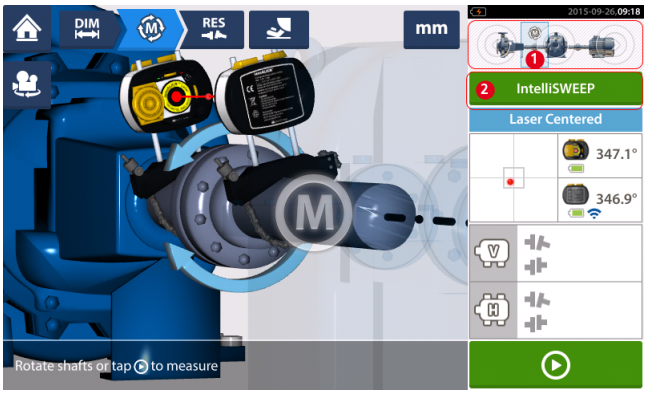
Note that the number of machines displayed within the train manager screen are the same ones displayed in the results screen.

Tap  to return to the dimensions screen displaying the entire machine train with all dimensions.

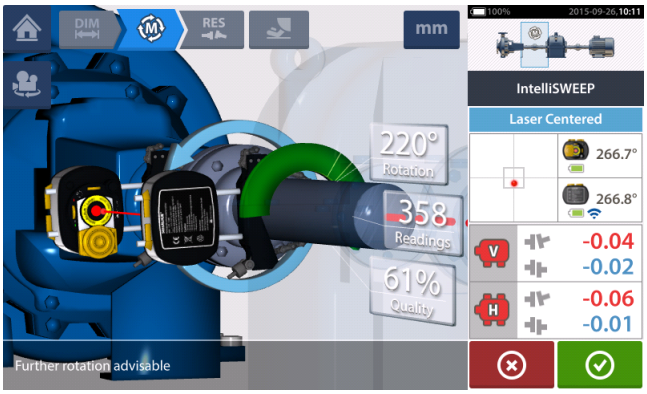


Measurement

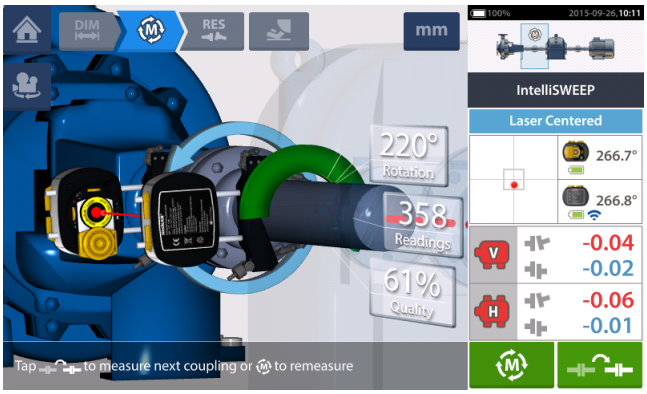
Tap  from the dimensions screen then proceed to **initilize sensALIGN sensor** mounted across the coupling as displayed on the machine train inset [**1**].



The **measurement mode** used in measuring the coupling in this example is **IntelliSWEEP**.



After rotating the shafts through as wide an angle as possible, then tap  to finish measure on the specified coupling.



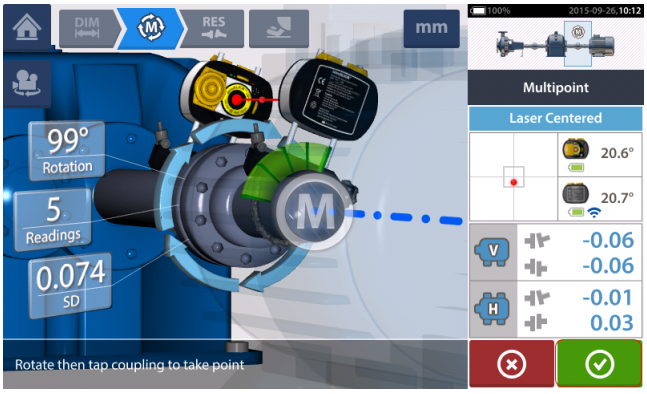
Tap  to switch measurement to the next coupling.

Switch both sensALIGN laser and sensor off then dismount them from the presently measured coupling and mount them across the next coupling. When ready, switch both sensALIGN laser and sensor on.

Note
Please make sure when moving the laser and sensor to each coupling that the

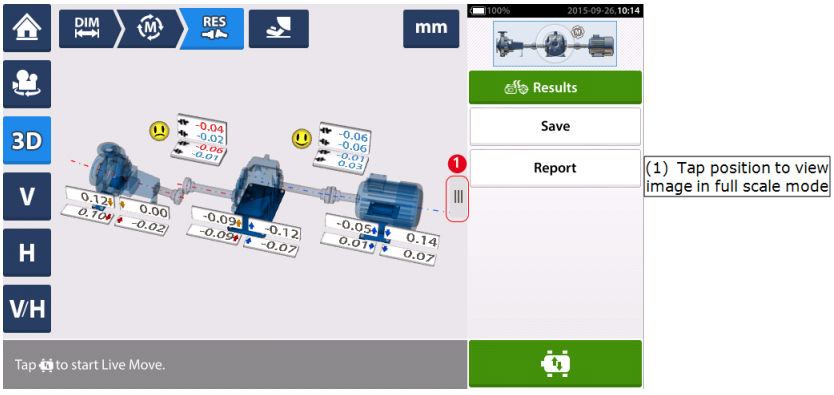
dimension from sensor to coupling center is entered correctly in the dimensions screen. Always make sure the coupling you are measuring is the one actually highlighted in the mini train inset (**1**)!

The measurement mode (**2**) used in measuring the next coupling in this example is **Multipoint**.



When measurement across both couplings is completed, tap  to proceed to view results.

Tap  to display and evaluate both feet and coupling results.



Tap  , the "Move" icon, to perform alignment corrections involving shimming and lateral positioning of the three-machine train.

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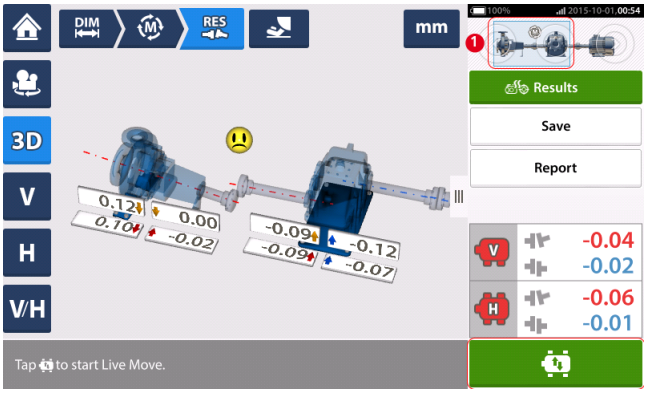
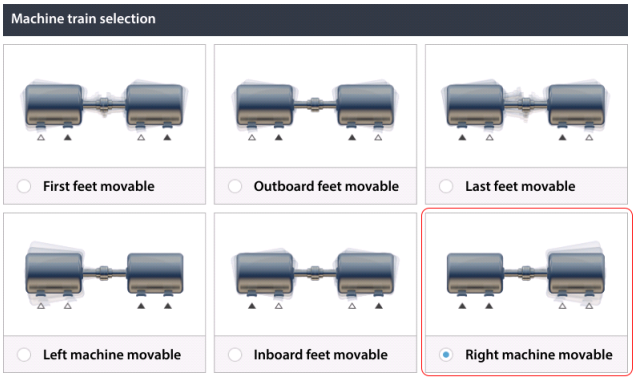
Live Move – 3-machine train

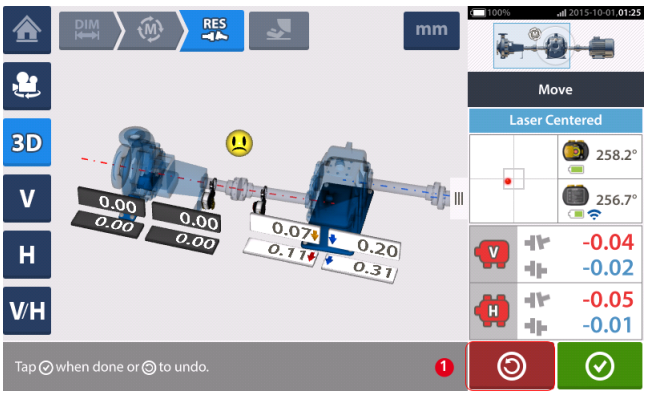
Decide which pair of machines to move in a train, one may need to re-install and re-adjust sensALIGN laser and sensor across the chosen coupling. Be sure to install the sensor at exactly the same location on the shaft or coupling as previously, or re-enter the new correct distance from the sensor to the coupling. In the following example, the chosen machine pair is pump (left machine) and gearbox (right machine) as shown by the highlighting window on the mini train inset (**1**).



Tap  to start Live Move. If all machines are designated movable, then the machine fixed feet configuration appears.

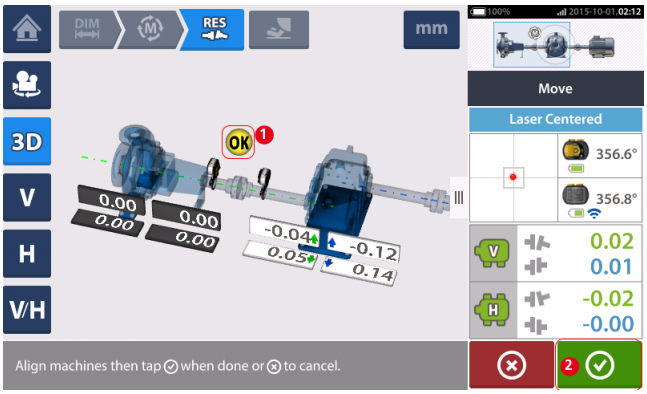


Tap the desired machine feet correction configuration. In the above example, pump (left machine) will be designated stationary while gearbox (right machine) will be designated movable.



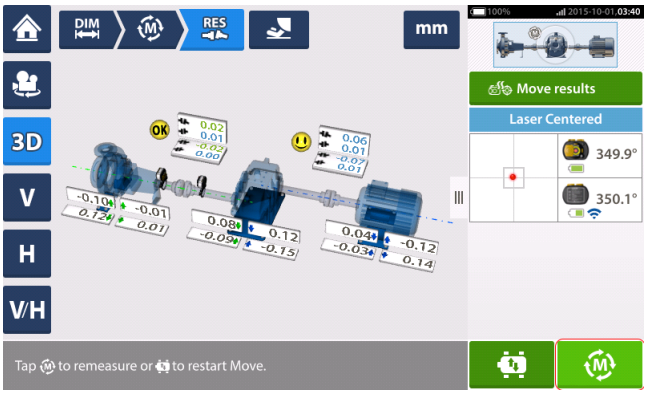
Start machine corrections. As soon as machine movement is detected, the "Undo" icon  is replaced by the "Cancel" icon  .

CAUTION
Do NOT attempt to move the machine using heavy sledgehammer blows. This can cause bearing damage, and also produce inaccurate Live Move results. Jack bolts on the feet or other mechanical or hydraulic devices are recommended for moving machines.



Move the machines until the alignment condition is within the specified tolerance which is indicated by the smiley (**1**) then tap  to finish Live Move.

Access the "Train manager" by tapping the mini train inset, to view the alignment condition of the entire machine train.

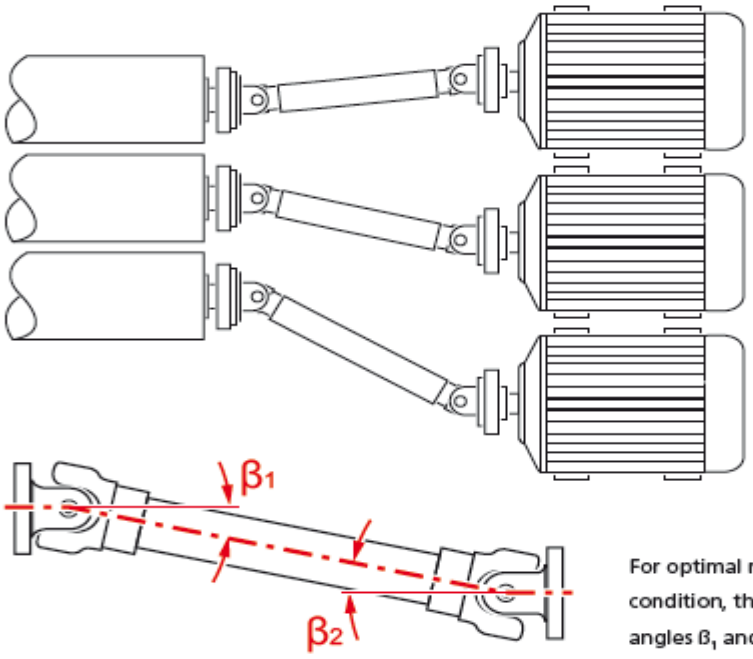


Tap  and remeasure to confirm the alignment condition. If the smiley icons return a happy face or an OK, then the alignment condition is within tolerance. If not, repeat the Live Move procedure.

Introducing cardan drives

Cardan drives are installed and operated with a large offset between the driver and the driven shaft. Depending on the type of cardan shaft in place, a minimum deflection angle of the universal joints may be necessary in order to ensure sufficient lubricant circulation, which in turn prevents the universal joints from seizing. A large difference in the deflection angles ß1 and ß2 (refer to image below) leads to rapid fluctuation of the driven shaft RPM during operation, which can lead to grave consequences for electronically-controlled synchronous and asynchronous AC drive motors.

For smooth operation the machines should be aligned such that the driving and driven machine shaft centerlines are parallel. Precise alignment reduces the rotational irregularities of the cardan shaft to a minimum, so that the uneven bearing loading during cardan shaft rotation is also minimized, the service life of the components is extended and the chance of unexpected machine failure is reduced.



Positioning of machines in an area with limited space.

For optimal running condition, the deflection angles $ß_1$ and $ß_2$ should be equal

Measurement procedures in the cardan application

For cardan applications, select the **coupling type** 'Cardan' when **configuring** the machines.

The following measurement procedures are available for cardan applications:

- Cardan rotating plane[1] – This is the default measurement procedure for cardan applications. This procedure allows precise measurement of machines joined by cardan shafts without having to remove the cardan shaft. This procedure is used in conjunction with **cardan rotating arm bracket**.
- IntelliPOINT– In this procedure, the cardan must be dismantled. Measurement is carried out using intelliPOINT measurement mode in conjunction with the **cardan offset bracket**.
- Static clock – In this procedure, the cardan must be dismantled. Measurement is carried out using static measurement mode in conjunction with the **cardan offset bracket**.

[1]This is the default measurement procedure for cardan applications. This procedure allows precise measurement of machines joined by cardan shafts without having to remove the cardan shaft.

Cardan shaft alignment - Using rotating arm bracket

Measurement using the rotating arm bracket allows precise measurement of machines joined by cardan shafts without having to remove the cardan shaft, which must be rotated to take measurements.

Note
Based upon experience, it is suggested that both sensALIGN laser and sensor should first be mounted on their respective brackets together with the anti-torsion bridges, then the bracket assemblies with the components mounted on the respective machine shafts.
It must be ensured that the surface where the cardan rotating arm bracket is to be mounted is clean, smooth, cylindrical, even and provides the necessary surface contact. Should the surface be painted, ensure that paint is stripped off the four areas with contact to the bracket 'V' frame.

Cardan rotating arm bracket for mounting sensor

Large chain type bracket for mounting laser

Mounting sensALIGN laser and sensor

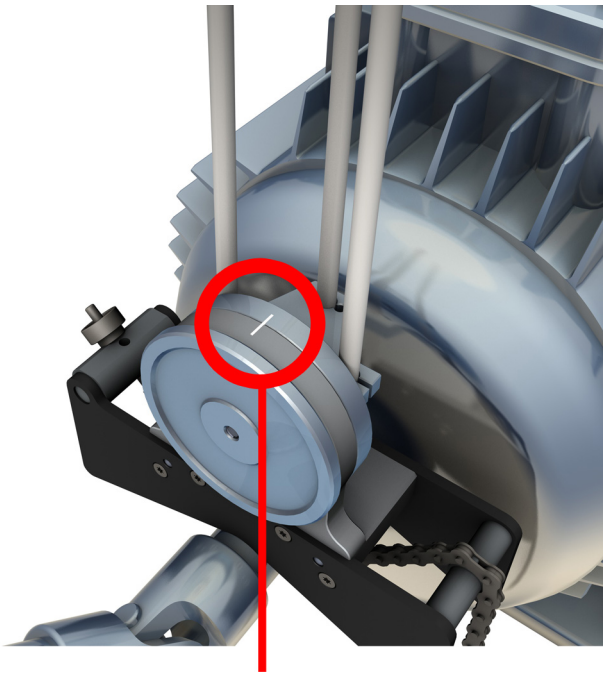
1. With the laser OFF, carry out a pre-adjustment to ensure that the laser beam will be emitted perpendicular to the laser housing. Use the two yellow beam position thumbwheels to center the **'bulls-eye'** as accurately as possible, then mount it on the support posts of the large chain type bracket.

2. Mount an anti-torsion bridge on the laser support posts to provide the necessary rigidity to the long support posts.

3. Mount the sensor on the support posts of the cardan rotating arm bracket then mount an anti-torsion bridge on the sensor support posts to provide the necessary rigidity to the long support posts.

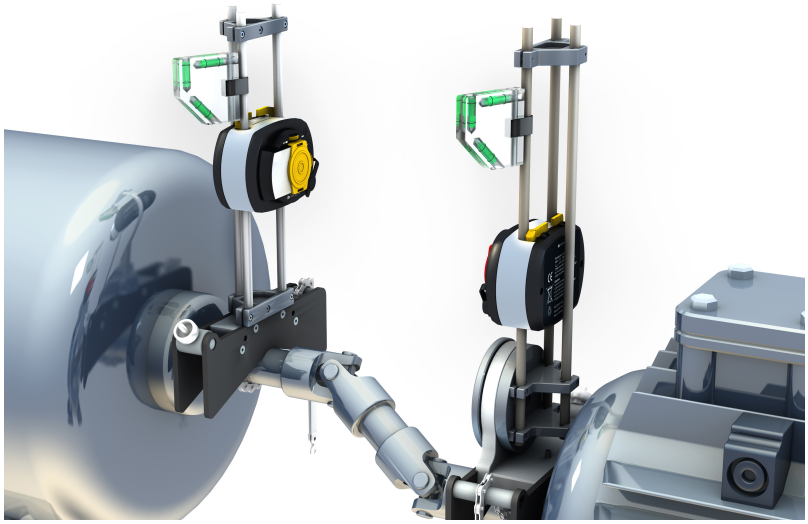
Mounting the brackets on the shafts

Mount the large chain type bracket holding the laser on the shaft of the left machine (usually reference machine), and the cardan rotating arm bracket holding the sensor on the shaft of the right machine (usually moveable machine) – as viewed from normal working position. Ensure that both markings on the rotating arm are in line.



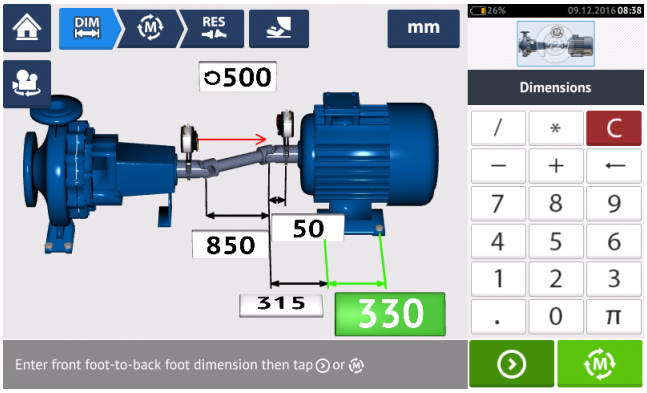
Use the external inclinometers to position both brackets at the same rotational angle. (You may refer to the **bracket mounting** procedure.) Remove the external inclinometers, then switch the laser on.

WARNING
Do not stare into the laser beam!.

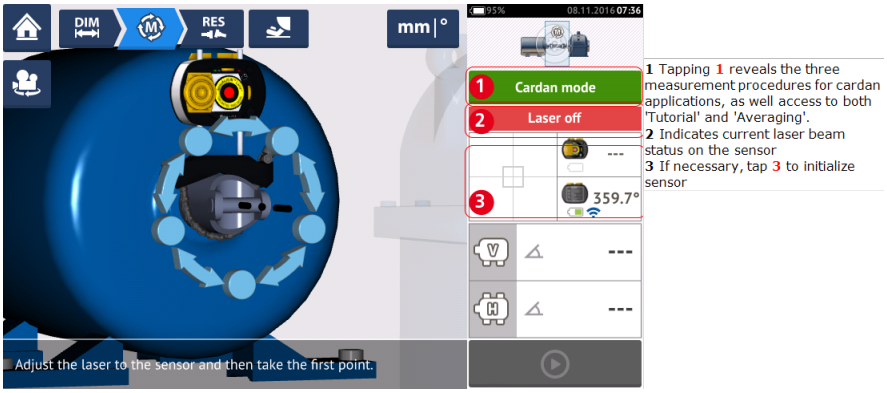


Cardan shaft alignment - Rotating plane measurement procedure

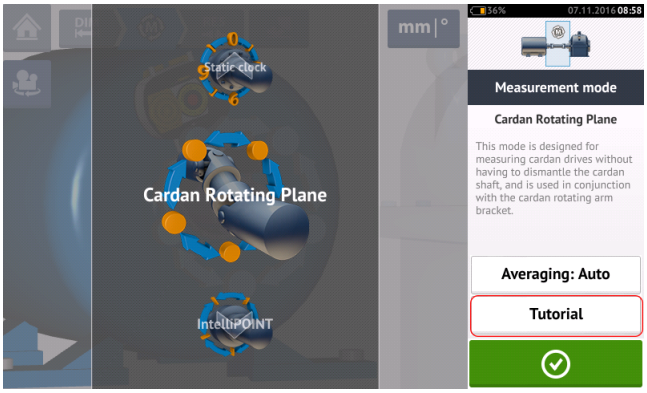
1. Switch sensALIGN sensor, sensALIGN laser and ROTALIGN touch computer on, then proceed to set up the machines. (You may refer to **dimensions screen**.)



2. After setting up the machines and entering all required machine dimensions, tap  to proceed with measurement.



Note
It is recommended that users familiarize themselves with the steps required for the rotating arm procedure. Access the available tutorial by tapping **1** (as shown on the next screen).



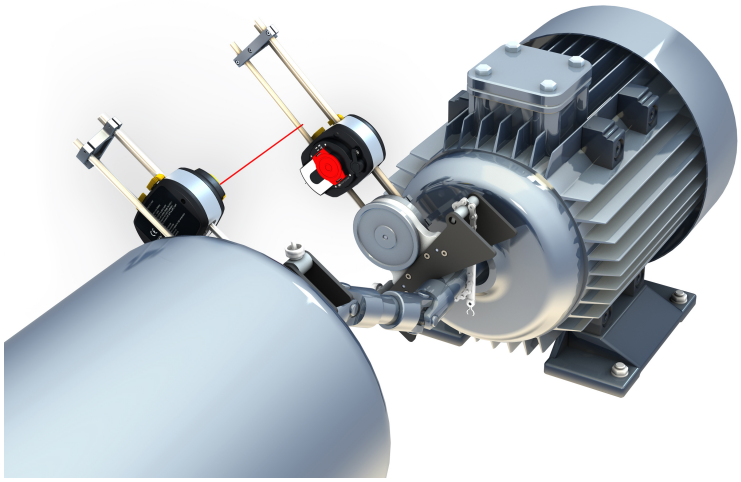
Taking measurements

In a crowded plant, it is necessary to determine the optimal position to start measurement. The objective is to ensure that the line of sight between sensALIGN sensor and laser is maintained through as wide a rotational angle as possible when the cardan shaft is rotated in its normal direction of machine rotation.

1. Rotate the cardan shaft in the normal direction of machine rotation to the first measurement position.

2. Loosen the rotating arm wheel, then rotate the frame with the support posts until the laser beam strikes the middle sensor support post.

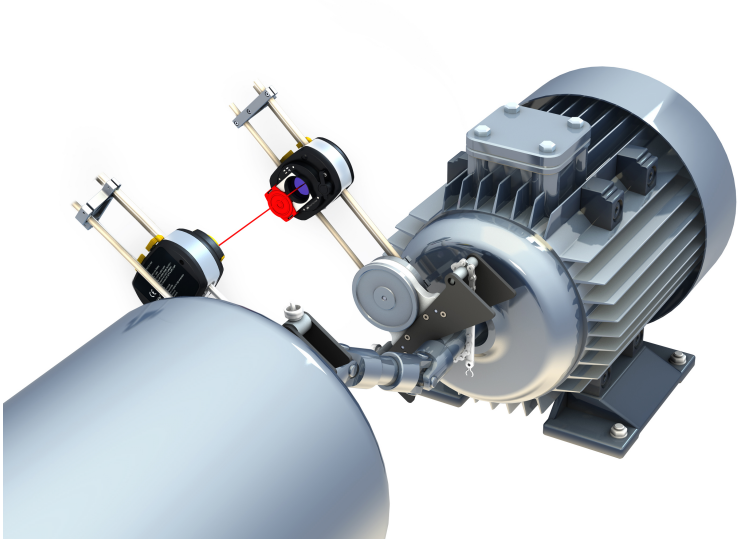
3. When the laser beam strikes this support post, retighten the rotating arm wheel.



4. Loosen the sensor by pushing the yellow sensor clamping levers to the open position, then slide the sensor up and down the support posts to ensure that the laser beam strikes the center of the red sliding dust cap.

5. Fasten the sensor at this position by locking the yellow clamping levers, then slide the dust cap so that the laser beam strikes the sensor aperture.

Note
DO NOT touch the two yellow beam position thumbwheels.



6. The laser beam should now be apparent in the laser adjustment screen.

7. Once measuring has stabilized, the letter '**M**' appears below **1** as shown in the above screen.

Note
For this measurement procedure automatic measurement after stabilization must be disabled in **default settings**.

8. Tap '**M**' to take the measurement point.

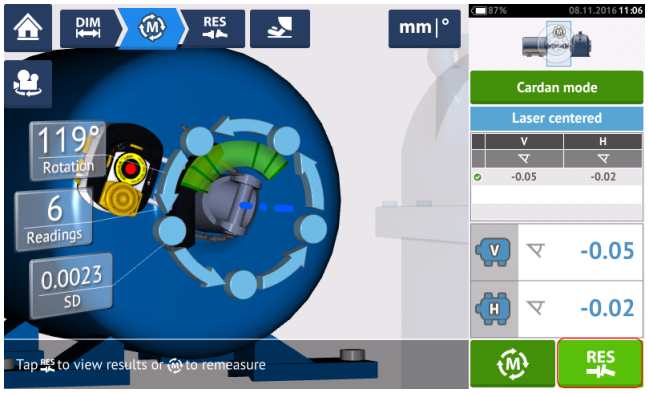
9. Slide the red sensor dust cap to cover the sensor aperture, then rotate the cardan shaft approximately 10° - 20° to the next measurement point.

Note
Determine this position depending on the accessible angle of rotation, and the minimum requirement of five measurement points through a rotational angle greater than 60°.

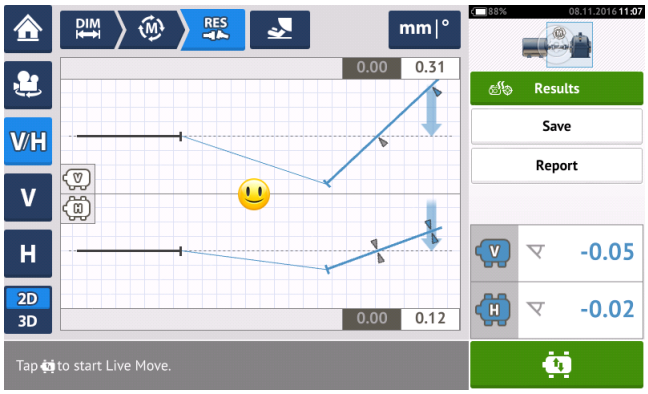
10. Repeat steps 2 to 8 for all necessary measurement points.

Note

Taking measurements at points evenly distributed along the rotational arc has a positive influence in the quality of the measurement attained.



11. Tap RES to view cardan alignment results.



Cardan shaft alignment – Using cardan offset bracket

Cardan offset brackets

Two types of cardan offset brackets are available.

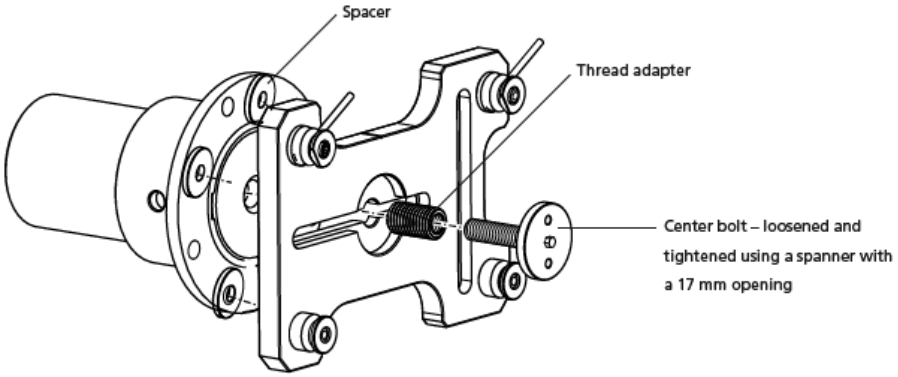
- The large type allows precise measurement of machines joined by cardan shafts over distances of up to 10 m (33 ft) and shaft offsets of up to 1000 mm (39 3/8 in.).
- The smaller type also referred to as Lite, allows precise measurement of machines joined by cardan shafts over distances of up to 3 m (10 ft) and shaft offsets of up to 400 mm (15 3/4 in.).

Mounting the large cardan offset bracket and adjusting sensALIGN laser

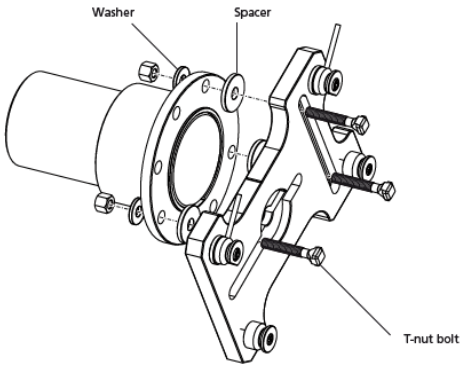
Mounting bracket

1. Mount the faceplate on the face of the coupling using the bolts supplied. The bracket is usually mounted on the coupling face of the non-rotatable shaft, for example, the roll in a paper mill. Two different mounting arrangements are available:

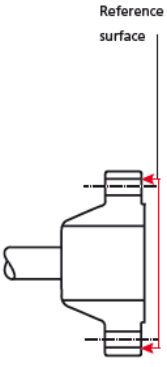
- If the shaft end or coupling face has a threaded hole in its center, the easiest and most rigid mounting method is to use the large center bolt as shown below. A thread adapter may be used as shown to fit the center bolt to larger bores.



- The faceplate may also be attached to the coupling face using the three T-nut bolts, forming a three-point mounting.



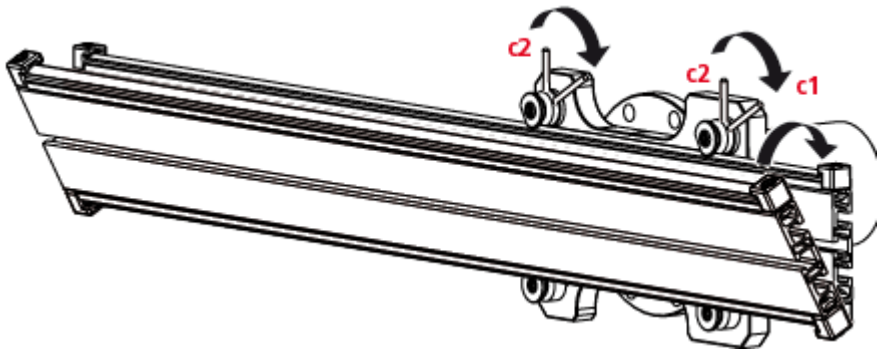
This coupling example has a raised face flange. The provided spacers are used to create a three-point plane to ensure that the faceplate and the coupling surface are joined together.



Note
Do not bolt down the faceplate as the laser is still to be adjusted.

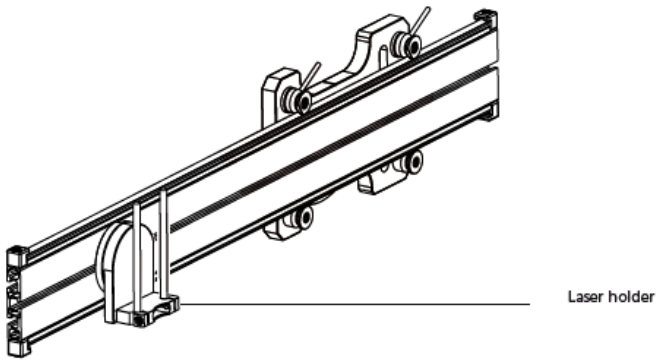
If the coupling has a raised face, the precision machined spacers are used as shown in order to separate the faceplate from the raised inner section of the coupling face while connecting the faceplate to the coupling face which is the reference surface.

2. Place the rail in the faceplate as shown below (**c1**), then use the two top levers (**c2**) to tighten the slide into place. Ensure that the center groove on the rail faces outwards.



Mounting the laser holder assembly on the rail

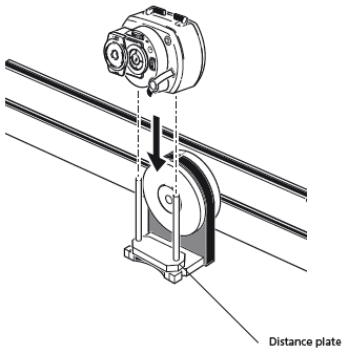
1. Loosen the handwheel slightly, then slide the laser holder assembly down the center groove of the rail.



Mounting and adjusting the laser

1. Slide the distance plate down the support posts.

2. Slide sensALIGN laser onto the posts until it rests on the distance plate.



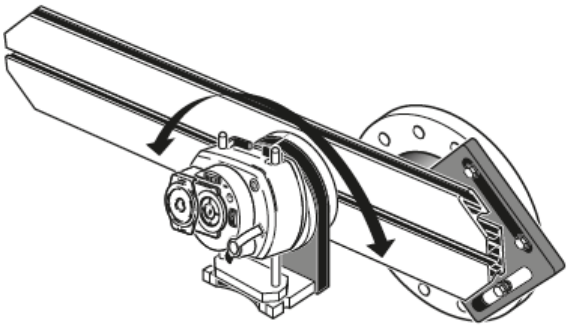
3. Mark a set of target crosshairs on the shaft rotation centerline of the other machine coupling (if the flange has a center hole, a temporary target surface such as a dust cap may be affixed to the hole).

4. Switch on sensALIGN laser and adjust the beam to strike the center of the target on the opposite coupling.

- The objective is to adjust the laser beam such that it is colinear to the rotational axis of the laser holder assembly; making it possible to shift the laser assembly holder rotational axis.

Note
The distance plate influences the offset by positioning the laser beam on the same axis as the rotational axis of the laser holder assembly.

- The two yellow beam position thumbwheels are used to adjust the angular position of the laser beam. By rotating the laser assembly holder, the laser beam traces an 'approximate' circle. If the 'approximate' circle is a single dot at the center of the target, then the laser beam has been adjusted correctly. If that is not the case, repeat the laser beam adjustment process until the 'approximate' circle corresponds to a 'single dot' position.



Note
As soon as a single dot position has been achieved, do not touch the laser thumbwheels.

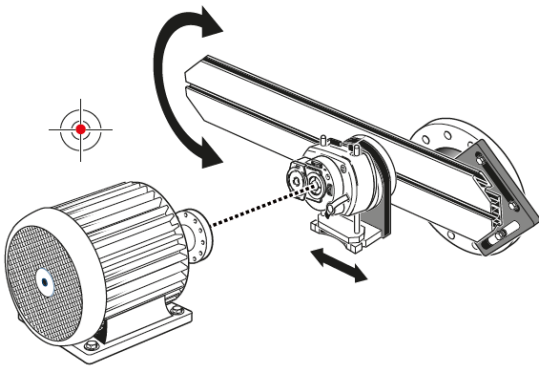
Adjusting the laser beam to the machine rotational axis

In this step, the laser holder assembly is adjusted on the bracket such that the laser holder rotational axis is roughly colinear with the rotational axis of machine to be aligned (which could be a motor or a gearbox).

Note
During this procedure, DO NOT touch the yellow laser beam position thumbwheels.

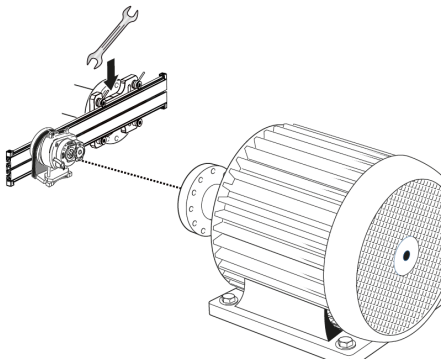
1. Carry out the vertical and horizontal adjustment of the laser holder assembly by sliding it horizontally through the center groove on the rail and positioning it vertically by rotating the rail.

2. Repeat the above procedure until the laser beam strikes the center of the target placed on the rotational axis of machine to be aligned.



Once the laser beam has been centered on the target, tighten the faceplate on the coupling face.

- If using the center bolt, tighten this using the provided 17 mm open end spanner (wrench).



- If using the T-nut bolt, tighten them as appropriate.

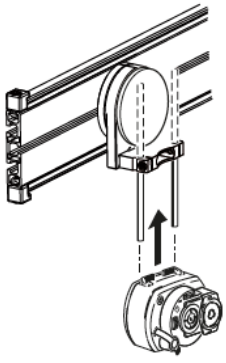
Positioning laser and mounting sensor for measurement

In this step, the laser is remounted on the underside of the laser holder while the sensor is mounted on the shaft of the machine to be aligned.

1. Switch off the laser and remove it from its holder.

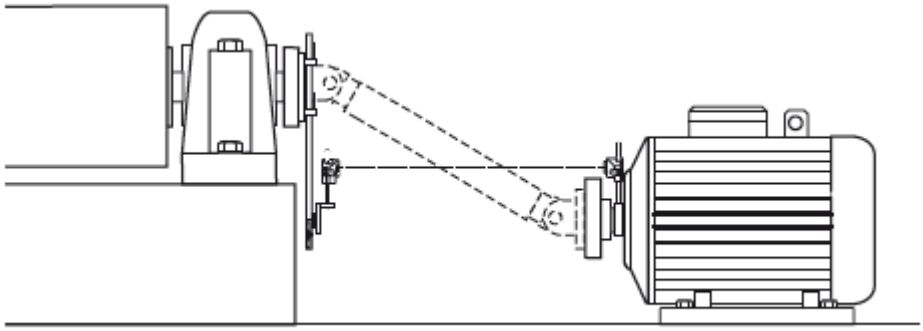
2. Using the provided M4 Allen key, loosen the support posts then slide them through the laser holder base so that they protrude from the other side.

3. Retighten the M4 Allen screws to secure the support posts, then remount the laser onto the support posts.



4. Use the chain-type bracket or appropriate magnetic brackets to mount the sensor on the shaft of the machine to be moved (such as the motor or gearbox). The sensor is aligned to the laser by pushing or sliding the bracket supporting the sensor.

Note
DO NOT touch the laser or its laser position thumbwheels.



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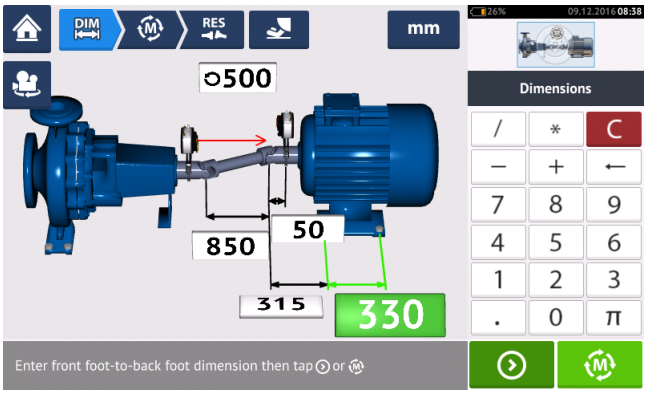
Cardan shaft alignment – IntelliPOINT measurement procedure

This measurement procedure is used in conjunction with the cardan offset bracket, and the cardan shaft joining the machines must be dismantled during measurement.

1. Switch sensALIGN sensor, sensALIGN laser and ROTALIGN touch computer on, then proceed to set up the machines. (You may refer to **dimensions screen**.)



2. After setting up the machines and entering all required machine dimensions, tap  to proceed with measurement.

3. Tap **1** to access the 'Measurement mode' screen.

4. Swipe the carousel (**2**) and select 'IntelliPOINT' (**3**) the required measurement mode.

5. Tap  (**4**) to proceed with measurement.

Taking measurements

1. With the laser beam centered, and the needle exactly at the center of the green sector (**1**), wait for measuring to stabilize.

Note
To center the needle, both laser and sensor must be at the same rotational angle.

2. Once measuring has stabilized, the letter '**M**' appears (**2**).

Note
For this measurement procedure automatic measurement after stabilization has to be disabled in **default settings**.

3. Tap '**M**' to take the measurement point.

4. Rotate sensALIGN sensor to the next measurement position.

5. Turn the laser-side shaft and observe the on-screen needle indicator (**1**). Measuring only stabilizes when the needle is in the blue sector.

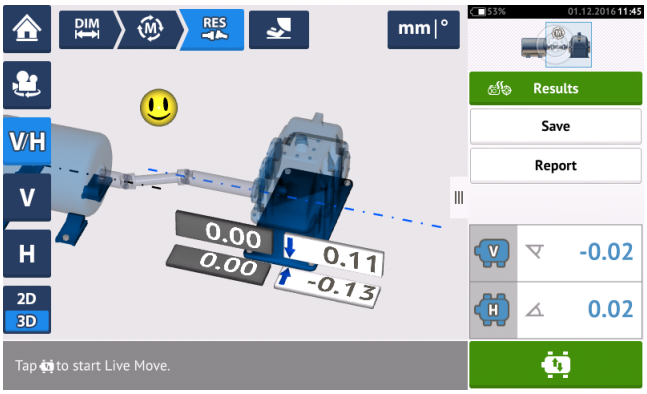
6. Once measuring has stabilized, tap '**M**' (**2**) to take the measurement.

7. Repeat steps 4 – 6 and take measurements in as many positions over as wide an angle as possible, ensuring that the measurement quality is acceptable.

8. When a good enough measurement quality (**1**) has been attained, tap  (**2**) to stop measurement. Tap  (**3**) to view cardan alignment results.

Evaluation and alignment

Offset has no real influence in the alignment condition but any angularity at the rotational axes must be corrected.



As only angularity must be corrected in cardan shaft alignment, results displayed show only foot values for one pair of feet. Angularity may be presented in mrad or degrees. Cardan shaft units are set under **default settings** in 'Configuration'.

Note
A PRÜFTECHNIK cardan shaft tolerance table is available for 1/2° and 1/4° limits. The required tolerance type may be set under **default settings** in 'Configuration'.

Out of tolerance machines may be repositioned with the help of the **Live Move** function.

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Introducing Live Trend

What is Live Trend?

Live Trend is an application used for live monitoring of machine movements arising from thermal growth, machine foundation movement and changes in operating load. The application is also used to check pipe strain. Live Trend can additionally be used to track machine drift as raw sensor data in the X,Y coordinates.

Live Trend packages

To be able to mount both sensALIGN sensor and laser on the machines to be monitored, two bracket packages are available.

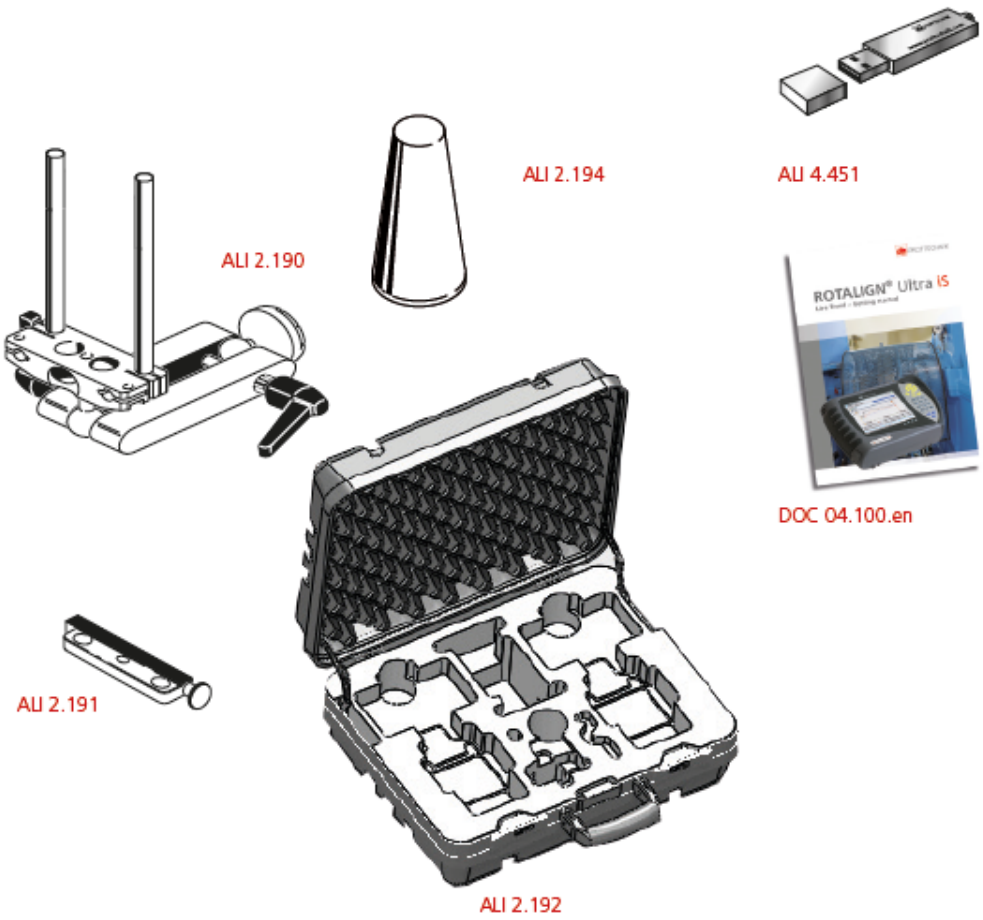
- ALI 4.005/2-10 — Live Trend add-on module with magnetic brackets
- ALI 4.005/2-20 — Live Trend add-on module with PERMAFIX brackets

ALI 4.005/2-10 Live Trend add-on module with magnetic brackets	
Part number	**Component**
ALI 14.310	Live Trend magnetic bracket for mounting laser and sensor including 115 mm support posts (Note that this package contains 2 no. ALI 14.310)
ALI 14.320	Magnetic bracket for Bluetooth module (for ROTALIGN sensor)
ALI 2.191	Anti-torsion bridge (Note that this package contains 2 no. ALI 2.191)
ALI 2.193	Live Trend case for magnetic brackets
ALI 4.743	ROTALIGN Ultra Shaft Expert firmware voucher
ALI 4.451	USB memory stick
DOC 04.100.en	Live Trend Getting started
0 0739 1055	2.5 mm allen key

See package components in following images.

ALI 4.005/2-20 Live Trend add-on module with PERMAFIX brackets	
Part number	**Component**
ALI 2.190	PERMAFIX mounting bracket for laser and sensor (Note that this package contains 2 no. ALI 2.190)
ALI 2.191	Anti-torsion bridge (Note that this package contains 2 no. ALI 2.191)
ALI 2.192	Live Trend case for PERMAFIX brackets
ALI 2.194	Striking cone
ALI 4.743	ROTALIGN Ultra Shaft Expert firmware voucher
ALI 4.451	USB memory stick
DOC 04.100.en	Live Trend Getting started

See package components in following images.


ALI 2.190
ALI 2.194
ALI 4.451
ROTALIGN® Ultra IS
DOC 04.100.en
ALI 2.191
ALI 2.192

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Mounting Live Trend brackets

Mount the necessary Live Trend measurement brackets as described in "ROTALIGN Ultra iS Live Trend getting started" DOC 04.100.en which is included in the Live Trend packages.

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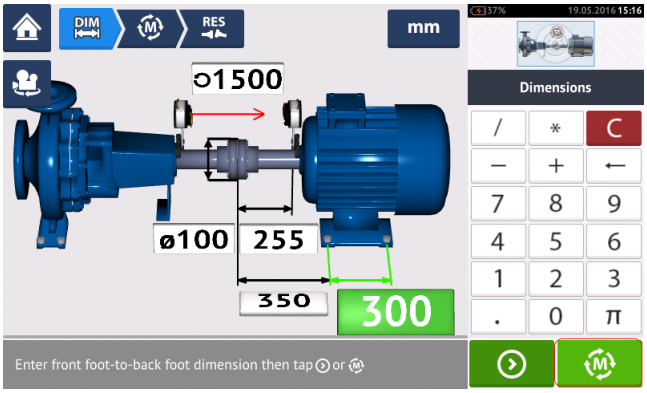
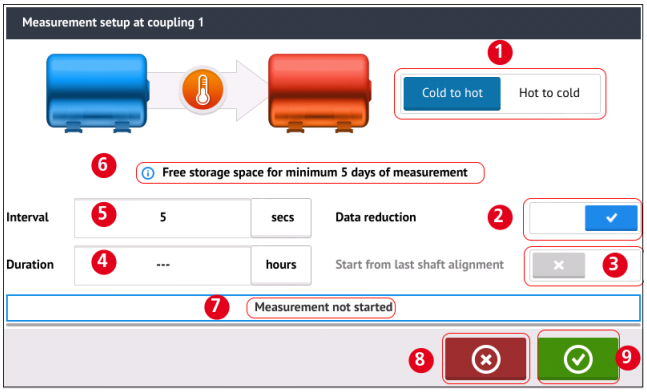
Live Trend setup

Use the **dimensions screen** to define the machines to be monitored.

Note
Live Trend brackets are mounted on the machines and NOT on shafts.



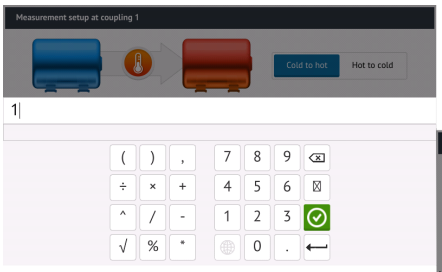
After entering all necessary dimensions, tap  then proceed to set sampling interval and measurement duration in the setup screen that appears.

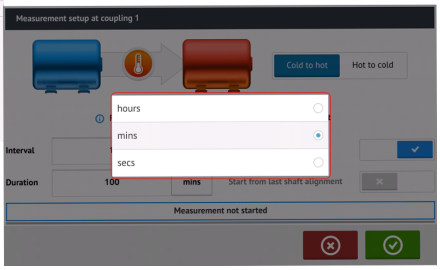


In the setup screen, the following measurement parameters and machine running condition are defined:

- **(1)** The machine running condition is set by swiping the blue button to either "Cold to hot" or "Hot to cold".
- **(2)** "Data reduction" is a process whereby readings are only taken when significant events take place. This helps reduce the volume of unnecessary data. Data reduction is set as default. A check mark appears within the blue button. Swipe the button to the left to deactivate "Data reduction". When deactivated, an "X" appears within the gray button.
- **(3)** "Start from last shaft alignment" sets the last shaft "As left" alignment condition as the starting point of the Live Trend measurement. This option is only active if a shaft alignment measurement had been carried out on the particular asset.
- **(4)** "Duration" is set in either hours, minutes or seconds. It is the time set for the entire measurement.

- **(5)** "Interval" is set in either hours, minutes or seconds. It is the time that elapses between taking readings.





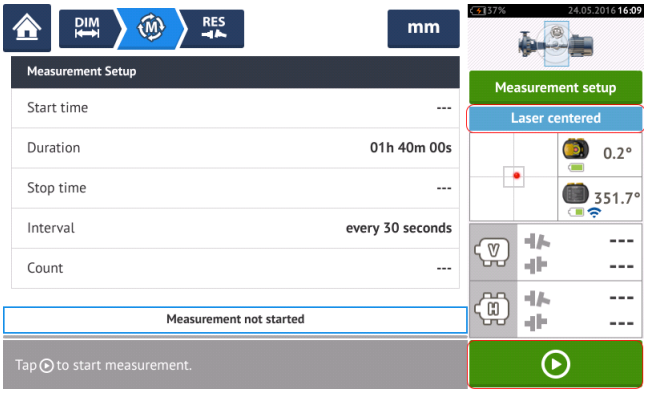
Tap the respective value box then enter the duration or measurement interval using the on-screen keyboard. Tap  or  to exit the on-screen keyboard and return to the setup screen.

Tap the respective unit of time box then select desired unit from the units window that pops up.

- **(6)** The indicated free storage capacity is based on the sampling interval.
- **(7)** The bar shows the current status of the measurement.
- **(8)** Tap  to cancel the setup
- **(9)** Tap  to proceed with Live Trend measurement

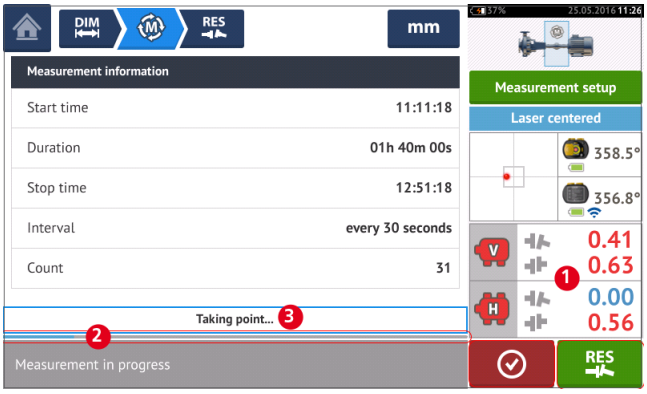
Live Trend – Measurement

If the sensor has been initialized, and laser beam centered, tap  to start Live Trend measurement. If not, see "**Initializing sensor**" and "**Laser beam adjustment**" respectively.



Note
DO NOT touch sensALIGN laser or adjust the laser beam once measurement has started.

Once measurement is started, the "Measurement screen" displays the current coupling gap and offset values (**1**). The blue measurement progress bar (**2**) shows the approximate percentage of completed measurement. The time measurement commenced, the scheduled duration, time when measurement will end, the sampling interval and number of measurements taken are also displayed.



The measurement status bar (**3**) will indicate when measurement is completed. Tap  to stop current measurement before set duration elapses. Tap  to **evaluate results**.

Note

Results may be viewed with measurement in progress. Tap  to view feet results and measurement plots.

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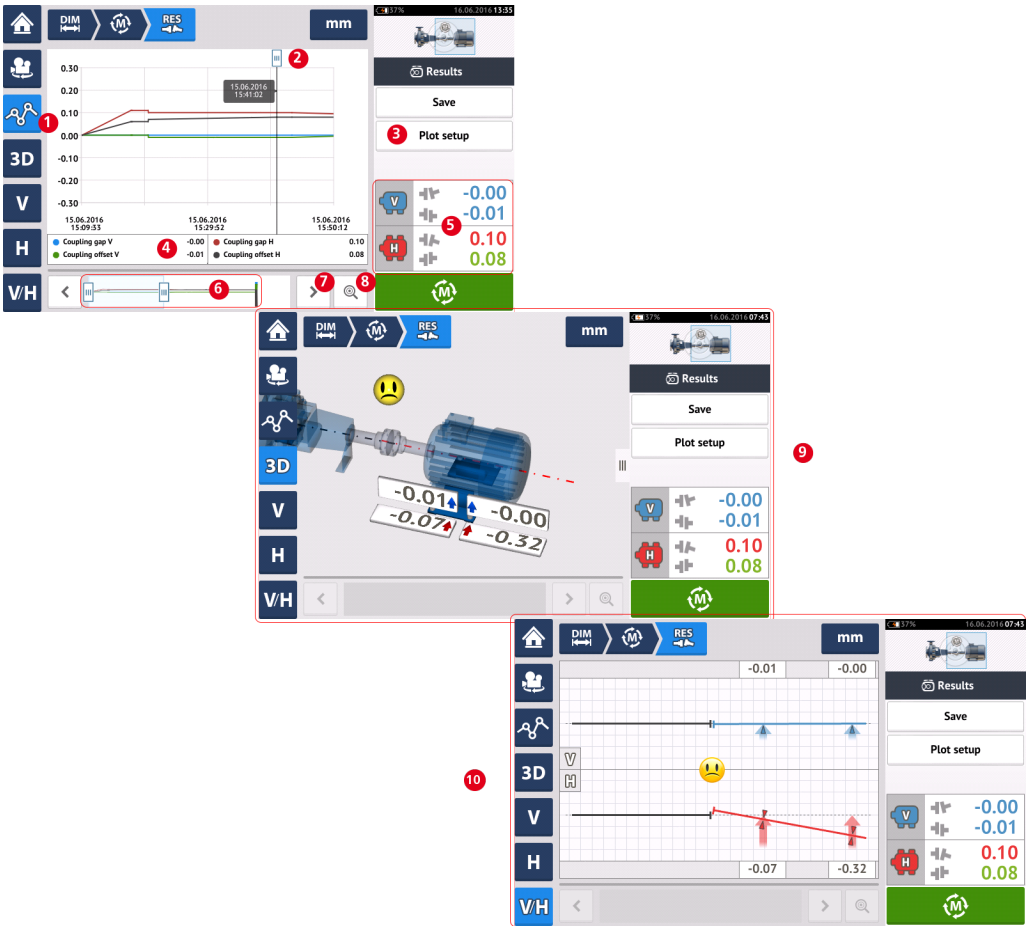
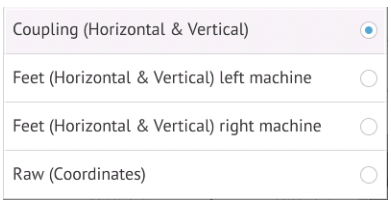
Live Trend – Evaluating results

Results screen overview



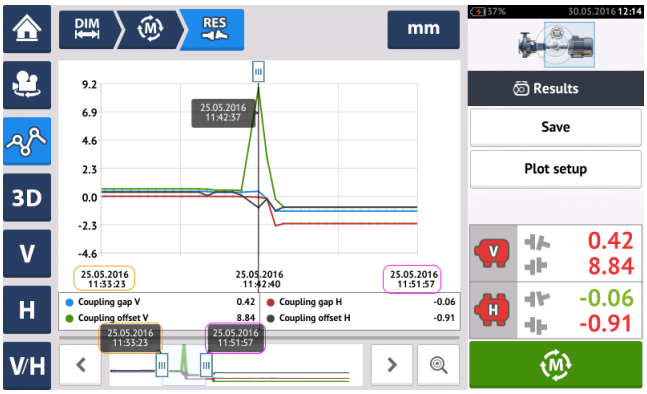
Interpreting the results screen

- **(1)** The "Plots" icon is used to display the results in form of plots. The type of data displayed on the plot is selected via the menu item "Plot setup" (**3**).
- **(2)** The cursor[1] which is freely movable possesses a data tip that shows the date and time of the position on the graph. The displayed coupling and feet results correspond to the current cursor position.
- **(3)** The menu item "Plot setup" is used to select type of data to be displayed on the plots. The following options are available:



[1]This is a position indicator on the Live Trend plots. It is freely movable. Displayed plot results correspond to the cursor position.

- Tap "Coupling (Horizontal & Vertical)" to display coupling gap and offset value plots
- Tap "Feet (Horizontal & Vertical) left machine" to display left machine feet value plots
- Tap "Feet (Horizontal & Vertical) right machine" to display right machine feet value plots
- Tap "Raw (Coordinates)" to display plots of raw XY values on both position detectors
- **(4)** Displayed results correspond to current cursor position and selected plot setup.
- **(5)** The displayed coupling results correspond to the current cursor position. Tap coupling results **(5)** to access the Live Trend log.
- **(6)** This area is used to control the timeline of the Live Trend application.



The two sliding bars are used to adjust the time scale of the plots on display. The left sliding bar marks the beginning of the timeline. The right sliding bar marks the end of the timeline. The cursor will always remain on the display and is repositioned by sliding it across the display or using [›] or [‹] **(7)**.

- **(7)** Tap [›] or [‹] to position cursor at desired position.
- **(8)** Tap [🔍+] or [🔍−] to toggle cursor between final measurement position and previously selected measurement position respectively.
- **(9)** The 3-D results shows the coupling and feet results for the reading at current cursor position **(2)**.
- **(10)** The 2-D (V/H) results shows the coupling and feet results for the reading at current cursor position **(2)**

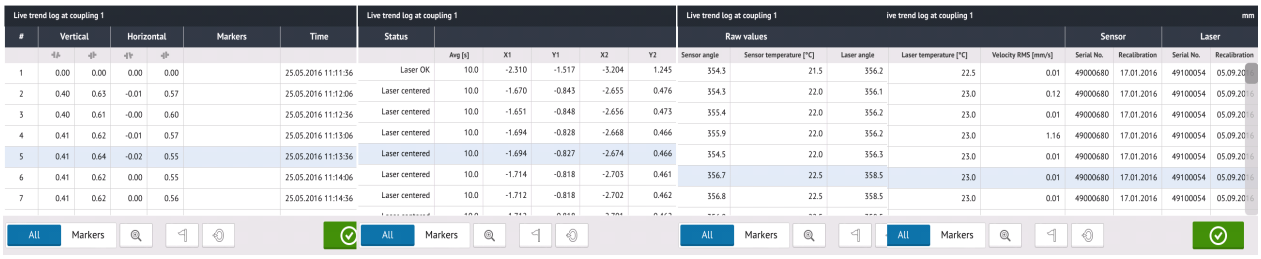
Live Trend – Log

What is a Live Trend log?

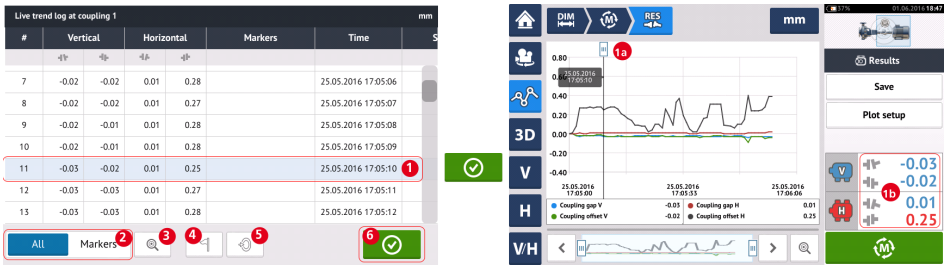
A Live Trend measurement log is a table that records the results of all measurements taken during the live monitoring of the machine. The following items are also included in the log.

- Vertical and Horizontal coupling results for every recorded measurement
- **Markers**
- Date and time when each measurement was taken
- Laser status at time of measurement (this could be 'Laser centered' or 'OK' or 'Laser end' or 'Laser weak')
- The averaging time for each measurement
- The sensor raw values that include X,Y coordinates on both position detectors, the rotational angle and the temperature
- The laser raw values that include the rotational angle and the temperature
- Velocity RMS
- Both sensor and laser serial numbers and their respective recalibration dates

Swipe horizontally to view all columns in the log and vertically to view all rows in the log.



The reading presently highlighted on the log corresponds to the cursor reading on the plot.



- **(1)** Reading currently highlighted on the log. Tap  to view results. The cursor position **(1a)** corresponds to reading highlighted on the log. The displayed coupling results **(1b)** correspond to those highlighted on the log.
- **(2)** Slide the blue button to select either 'All' or 'Markers'. When 'All' is selected, the log displays all readings taken. When 'Markers' is selected, only readings with **markers** are displayed.
- **(3)** Tap  or  to toggle cursor between currently highlighted reading and the last recorded reading respectively.

- **(4)** Tap  to assign marker to highlighted log reading.
- **(5)** Tap  to set highlighted log reading to zero.
- **(6)** Tap  to view results.

Live Trend – Markers

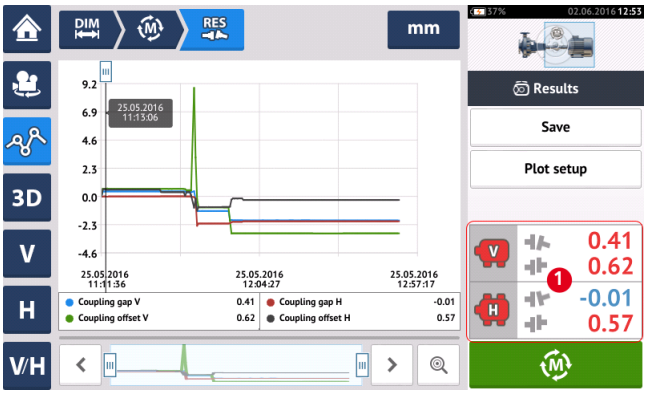
What are markers?

In the Live Trend application, markers are points on the graph that highlight significant events during a measurement. These may include machine startup or machine shutdown. Following markers are available.

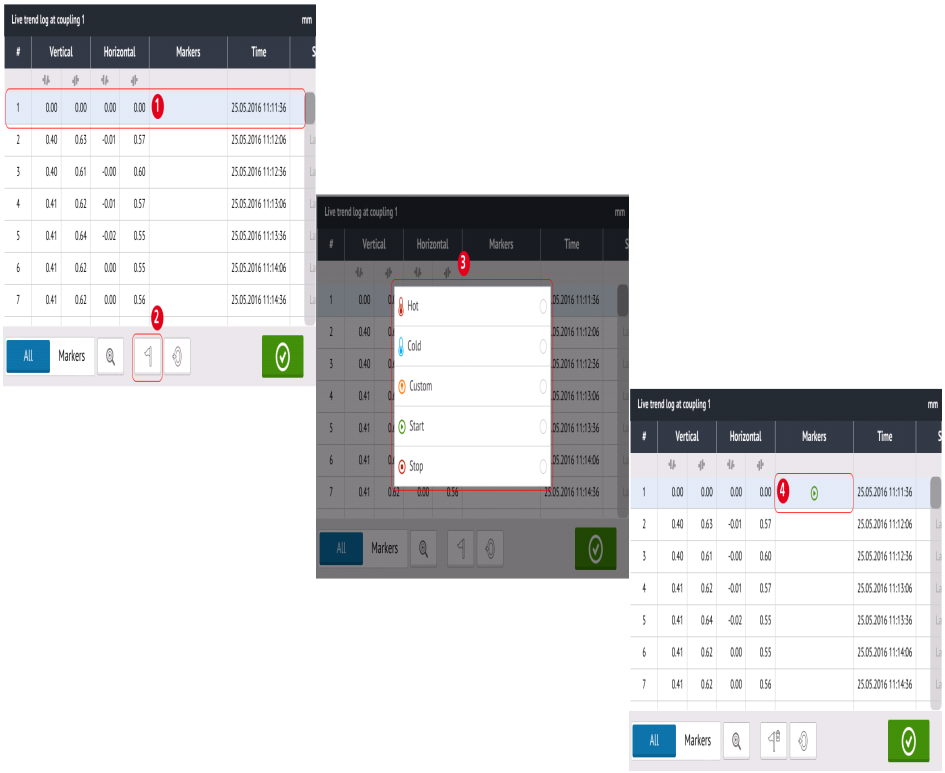
- 'Hot' – used to indicate the running condition or when machinery has warmed up
- 'Cold' – used to indicate the initial running phase from being stationary
- 'Custom' – a customer-specified marker
- 'Start' – used to indicate point where the machines are started
- 'Stop' – used to indicate the point where machines are shut off

Applying markers

Markers are applied within the log. The log is accessed from the "Measurement" or "Results" screen.



Tap the area where the coupling results are displayed **(1)**. This opens the Live Trend log.



Tap measurement where a marker is desired **(1)** then tap  **(2)**. Tap desired marker from available list **(3)**. The log table then shows selected measurement with desired marker (4).

User-specified markers

User-specified markers are set using the marker 'Custom'. Tap the desired measurement from the log then tap  . Tap 'Custom' from the displayed markers list. Use the keyboard that appears to customize the marker data tip[1].

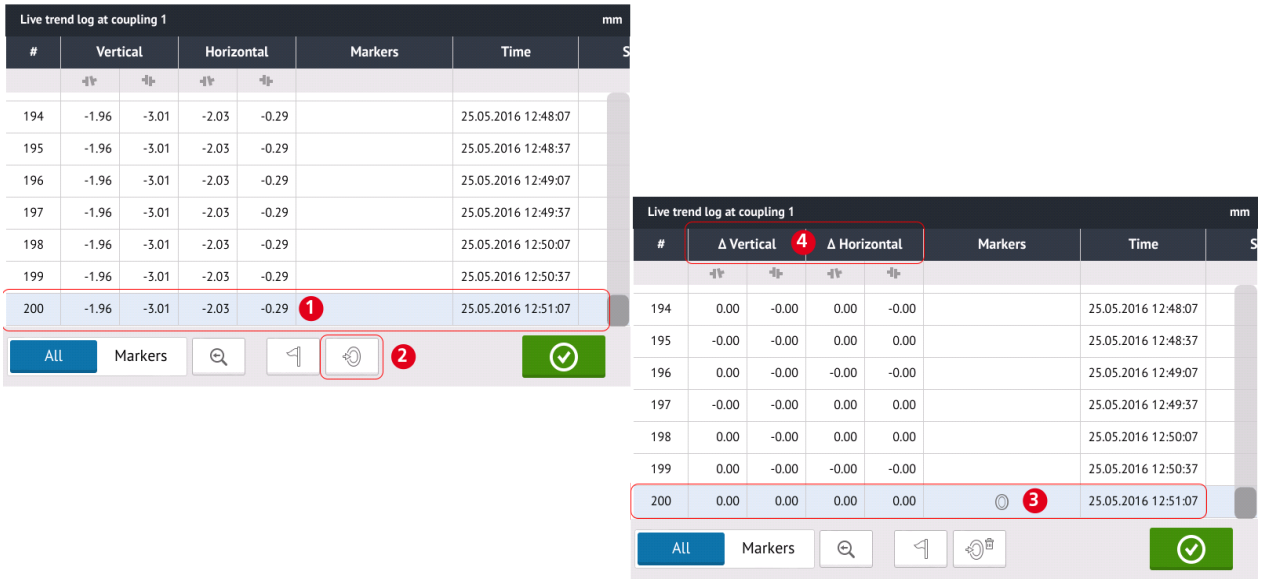
Set measurement point to zero

If desired, any measurement point may be set to zero using the "set to zero" marker  .

Note
Only one measurement point may be set to zero using the "set to zero" marker.

From the log, tap the measurement where the "set to zero" marker is to be applied **(1)**. Tap  **(2)** to set the point to zero. The "set to zero" marker appears on the measurement **(3)** with the vertical and horizontal coupling values set to zero. Coupling values **(4)** are then displayed relative to the point set to zero.

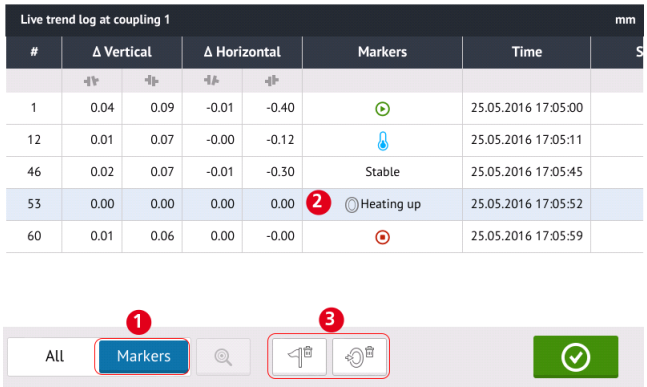
[1]Data tip is a small display that appears on the cursor. It shows the date, time and customized marker information at the current cursor position.



Note
Only one marker may be applied to any specific measurement. The special "set to zero" marker is the only one that may be combined with another marker.

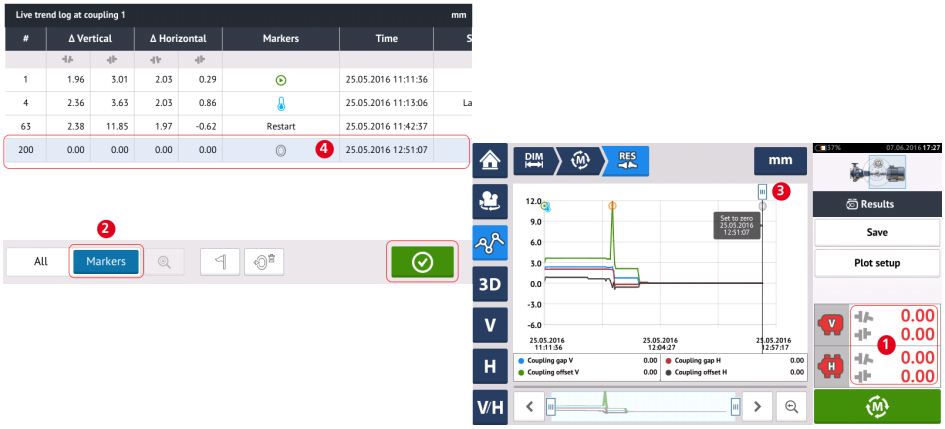
Deleting markers

From the log, slide the blue button to the right **(1)** to display markers only. Tap the measurement with marker to be deleted **(2)**. A bin icon appears next to the marker icon **(3)**. Tap either  or  depending on the type of marker being deleted.



Identifying markers

The markers on the plots may be identified using the log. Access the log by tapping the coupling results **(1)**. Slide the blue button **(2)** to the right. Only measurements with markers will be displayed. The cursor on the plots **(3)** corresponds to the highlighted measurement on the log **(4)**. Tap  to view the plots.



In this example, the highlighted measurement is measurement number 200 and happens to be the last taken measurement point. The "set to zero" marker has been applied to that measurement. The "Start" and "Cold" markers have also been set and measurement numbers 1 and 4 respectively.

Best practice

Mounting sensor and laser

›› The 'Dimensions' screen shows the sides where the sensor and laser are to be mounted. If necessary, use  , the “Camera” icon to rotate the view on the screen to allow machines be viewed as they physically appear.

›› Mount the brackets directly on the shafts or couplings.

›› Mount sensor and laser as low as possible on the supplied support posts. The couplings must not block the path of the laser beam.

›› Mount laser on the machine designated stationary and sensor on the machine designated moveable.

›› Both sensor and laser must not touch one another or the machine casings during shaft rotation.

Entering dimensions

›› Dimensions taken to within ± 2 mm [± 1/16 in.) are acceptable.

›› When entering the dimension between the front and back feet, use the distance between the center of the two foot bolts.

Initializing sensor

›› Should “communication error” occur, tap detector area below the hint “**Communication error**” then tap “Sensor list” to check whether the sensor has been detected.

Causes that may influence measurement

›› Incorrect or loose mounting of bracket frame, support posts

›› Incorrect or loose mounting of sensor and laser on the support posts

›› Loose machine anchor bolts

›› Unstable or damaged machine foundation

›› Mounted components strike machine foundation or machine casings or frame during shaft rotation

›› Mounted components moved during shaft rotation

›› Uneven shaft rotation

›› Change in temperature within machines

›› External vibration from other rotating machines

Results and Live Move

›› V is the vertical orientation of the machines viewed from the side.

›› H is the horizontal orientation of the machines viewed from the top.

›› The foot results which are used in correcting misalignment are position values with respect to the reference machine.

›› The bold colored foot tolerance arrows show the direction and magnitude in which to move the machine. The color code also shows the attained alignment tolerance.

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Technical data – computer

ROTALIGN touch computer	
CPU	Processor: 1.0 GHz quad core ARM®Cortex-A9 Memory: 2 GB RAM, 1 GB Internal Flash, 32 GB SD-Card Memory
Display	Technology: Projective capacitive multi-touch screen Type: Transmissive (sunlight-readable) backlit TFT color graphic display Optically bonded, protective industrial display, integrated light sensor for automated adjustment of the brightness to the display Resolution: 800 x 480 Pixel Dimensions: 178 mm (7") diagonal
LED indicators	3 LEDs for battery status 1 LED for WiFi communication
Power supply	Operating time: 12 hours typical use (based upon an operating cycle of 25% measurement, 25% computation, 50% 'sleep' mode) Battery: Lithium-ion rechargeable battery 3.6 V / 80 Wh AC adapter/charger: 12 V / 36 W; standard barrel connector (5.5 x 2.1 x 11 mm)
External interface	USB host for memory stick USB slave for PC communication, charging (5 V DC / 1.5 A) RS-232 (serial) for sensor RS-485 (serial) for sensor I-Data for sensor Integrated Bluetooth® wireless communication (covers direct line of sight distances of up to 30 m / 100 ft depending on the prevailing environmental conditions) Integrated Wireless LAN IEEE 802.11 b/g/n up to 72.2 Mbps (depending on configuration) Integrated RFID with read and write capabilities (depending on configuration)
Environmental protection	IP 65 (dustproof and water jets resistant) – as defined in regulation DIN EN 60529 (VDE 0470-1), shockproof Relative humidity: 10% to 90%
Drop test	1 m (3 1/4 ft)
Temperature range	Operation: 0°C to 40°C (32°F to 104°F) Charging: 0°C to 40°C (32°F to 104°F) Storage: -10°C to 50°C (14°F to 122°F)
Dimensions	Approx. 273 x 181 x 56 mm (10 3/4" x 7 1/8" x 2 3/16")
Weight	Approx. 1.88 kg (4.1 lbs)
Camera	5 MP built-in (depending on configuration) LEDs: Risk Group 1 according to IEC 62471:2006
CE conformity	Refer to the CE compliance certificate in www.pruftechnik.com

ROTALIGN touch computer	
Carrying case	Standard: ABS, drop tested (2 m / 6 1/2 ft.) Dimensions: Approx. 470 x 388 x 195 mm (18 1/2” x 15 9/32” x 7 11/16”) Weight: Including all standard parts – Approx. 8.5 kg [18.7 lb]
FCC compliance	Requirements fulfilled (refer to the provided document 'Safety and general information')

Technical data – sensALIGN sensor

sensALIGN sensor	
CPU	Type: ARM Cortex™ M3 Memory: 2 GB Flash Memory
LED indicators	4 LEDs for laser adjustment 1 LED for Bluetooth® communication 1 LED for battery status
Power supply	Operating time: 12 hours continuous use Battery: Lithium Polymer rechargeable battery 3.7 V / 1.6 Ah 6 Wh
Environmental protection	IP 65 (dustproof and water jets resistant) – as defined in regulation DIN EN 60529 (VDE 0470-1), shockproof Relative humidity: 10% to 90%
Ambient light protection	Optical and active electronic digital compensation
Temperature range	Operation: -10°C to 50°C (14°F to 122°F) Charging: 0°C to 40°C (32°F to 104°F) Storage: -20°C to 60°C (-4°F to 140°F)
Dimensions	Approx. 103 x 84 x 60 mm (4 1/16" x 3 5/16" x 2 3/8")
Weight	Approx. 310 g (10.9 oz)
Measurement range	Unlimited, dynamically extendible (US. Patent 6,040,903)
Measurement resolution	1 µm
Measurement error	< 1.0%
Inclinometer resolution	0.1°
Inclinometer error	± 0.25% full scale
Vibration measurement	mm/s, RMS, 10Hz to 1kHz, 0 mm/s – 5000/f • mm/s² (f in Hertz [1/s])
External interface	Integrated Bluetooth®Class 1 wireless communication, RS232, RS485, I-Data
CE conformity	Refer to the CE compliance certificate in www.pruftechnik.com

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Technical data – sensALIGN laser

sensALIGN laser	
Type	Semiconductor laser
LED indicators	1 LED for laser transmission 1 LED for battery status
Power supply	Operating time: 70 hours continuous use (Li-polymer battery) Battery: Lithium Polymer rechargeable battery 3.7 V / 1.6 Ah 6 Wh AC adapter/charger: 5 V / 3 A
Environmental protection	IP 65 (dustproof and water jets resistant) – as defined in regulation DIN EN 60529 (VDE 0470-1), shockproof Relative humidity: 10% to 90%
Temperature range	Operation: -10°C to 50°C (14°F to 122°F) Charging: 0°C to 40°C (32°F to 104°F) Storage: -20°C to 60°C (-4°F to 140°F)
Dimensions	Approx. 103 x 84 x 60 mm (4 1/16" x 3 5/16" x 2 3/8")
Weight	Approx. 330 g [11.6 oz]
Beam power	< 1mW
Wavelength	630 – 680 nm (red, visible)
Safety class	Class 2 according to IEC 60825-1:2007 The laser complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.
Beam divergence	0.3 mrad
Inclinometer resolution	0.1°
Inclinometer error	± 0.25% full scale
CE conformity	Refer to the CE compliance certificate in www.pruftechnik.com

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Glossary

A

ALIGNMENT RELIABILITY CENTER 4.0

This software platform which is also referred to as ARC 4.0 allows the management of plant assets in a structured form, displaying trends. It also allows job preparation and transfer of asset measurements in Cloud drive.

ARC 4.0

This software platform which is also referred to as ARC 4.0 allows the management of plant assets in a structured form, displaying trends. It also allows job preparation and transfer of asset measurements in Cloud drive.

Asset

Asset refers to machinery and equipment within a plant.

Asset park

Asset park is the location where asset measurements are saved.

Assets

Assets are machinery within a plant.

Asymmetric tolerances

In asymmetric tolerances, the tolerance values for the two coupling planes are not the same.

C

Cardan rotating plane

This is the default measurement procedure for cardan applications. This procedure allows precise measurement of machines joined by cardan shafts without having to remove the cardan shaft.

Cursor

This is a position indicator on the Live Trend plots. It is freely movable. Displayed plot results correspond to the cursor position.

D

Data tip

Data tip is a small display that appears on the cursor. It shows the date, time and customized marker information at the current cursor position.

G

Gallery

This is the location within the device where all images taken using ROTALIGN touch are saved.

I

IntelliPASS

In this mode, the sahft supporting the laser is rotated such that the laser beam passes through the middle sector of the detector.

IntelliPOINT

This mode is used in cases where the uncoupled shafts can be stopped at definite positions. It is also used in cases where the shafts are coupled but torsional play exists.

IntelliSWEEP

A high definition measurement mode that actively assists the user by automatically detecting and eliminating error influences such as coupling backlash, rotational angle and vibration.

M

Measurement quality

Measurement quality is a factor defined by the following measurement and environmental criteria: angular rotation, standard deviation of the measurement ellipse, vibration, rotation evenness, angular rotation inertia, direction of rotation, speed and filter output. The higher the factor, the better the quality of measurement.

Mobile connectivity

ROTALIGN touch mobile connectivity enables the device to access the Cloud functionality that allows wireless file sharing.

Multipoint

This is a measurement mode for horizontal machines where measurement points are taken at any desired angular rotational position.

R

RFID

This identification technology is used to identify assets to be aligned.

S

Standard Deviation

Standard Deviation (SD) is the root mean square deviation (mean of the means) of the measurement points. It describes how closely a group of data points are clustered around the average of those data points. It is a measure of the measurement calibre. The smaller the SD, the better the quality of the data collected.

Static

Static Clock measurement mode is used for both vertical and horizontal machines. Measurements are taken with shafts positioned at any of the eight defined clock positions. In this measurement mode, the electronic inclinometer is inactive.

T

Targets

Misalignment values specified as an offset and an angle in two perpendicular planes (horizontal and vertical) and used to compensate for dynamic loads.

Thermal growth

Movement of shaft centerlines associated with or due to a change in machinery temperature between the idle and operating conditions.

W

WiFi

WiFi is used to transfer asset measurements between ROTALIGN touch and Cloud drive via the software platform ARC 4.0

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