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Reliability

touch

PRÜFTECHNIK

On-board help

touch

On-board help

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System packages

The touch system is available in two different features levels. The ROTALIGN touch features level uses sensALIGN 7 sensor and laser while the OPTALIGN touch features level uses sensALIGN 5 sensor and laser. Both levels are supplied in four different configurations.

ROTALIGN touch features level (using sensALIGN 7 sensor and laser)

The four configurations available for the high-end features level are as follows:

- ALI 50.000 STD — Using touch device (ALI 50.200-STD)**without** built-in camera and built-in mobile connectivity modules
- ALI 50.000 CAM — Using touch device (ALI 50.200-CAM) **with** built-in camera
- ALI 50.000 MOB — Using touch device (ALI 50.200-MOB)**with** built-in mobile connectivity (which includes WiFi, RFID and ALIGNMENT RELIABILITY CENTER 4.0 [ARC 4.0])
  WiFi is used to transfer asset measurements between the touch device and the Cloud drive via the software platform ARC 4.0.
  RFID is an identification technology used to identify assets to be aligned.
  ALIGNMENT RELIABILITY CENTER 4.0 also referred to as ARC 4.0 is a software platform that allows the management of plant assets in a structured form, displaying trends. It also allows job preparation and transfer of asset measurements to the Cloud drive.
- ALI 50.000 FULL — Using touch device (ALI 50.200-FULL); this **full** version comprises built-in camera and mobile connectivity.

OPTALIGN touch features level (using sensALIGN 5 sensor and laser)

The four configurations available for the mid-range features level are as follows:

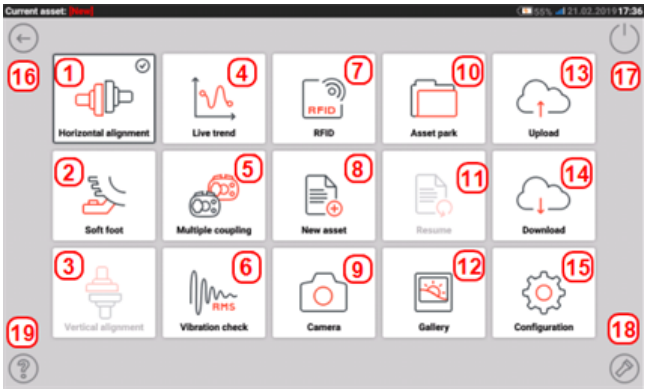
- ALI 51.000 STD — Using touch device (ALI 50.200-STD)**without** built-in camera and built-in mobile connectivity modules
- ALI 51.000 CAM — Using touch device (ALI 50.200-CAM) **with** built-in camera
- ALI 51.000 MOB — Using touch device (ALI 50.200-MOB)**with** built-in mobile connectivity (which includes WiFi, RFID and ALIGNMENT RELIABILITY CENTER 4.0 [ARC 4.0])
  WiFi is used to transfer asset measurements between the touch device and the Cloud drive via the software platform ARC 4.0.
  RFID is an identification technology used to identify assets to be aligned.
  ALIGNMENT RELIABILITY CENTER 4.0 also referred to as ARC 4.0 is a software platform that allows the management of plant assets in a structured form, displaying trends. It also allows job preparation and transfer of asset measurements to the Cloud drive.
- ALI 51.000 FULL — Using touch device (ALI 50.200-FULL); this **full** version comprises built-in camera and mobile connectivity.

Note
Check and ensure that the delivered package items conform to the purchase order and the packing list. Reference may also be made to the online product catalog.

Contact PRÜFTECHNIK Condition Monitoring or your local sales representative if any package items are damaged or missing.

Home screen

The home screen is displayed when the device 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. If this icon is inactive, tap the "New asset" icon**(8)** to activate the vertical alignment icon.
- **(4)** The "Live Trend" icon is used to access the **Live Trend** application.
- **(5)** The "**Multiple coupling/Single coupling**" icon toggles between horizontal alignment and Live Trend applications using multiple sensor-laser combinations or a single sensor-laser combination.
- **(6)** The "Vibration check" icon is used to access the vibration measurement application.

  Note
  The icons **(4)** Live Trend, **(5)** Multicoupling and **(6)** Vibration check are inactive in OPTALIGN touch features level.

- **(7)** The "RFID" icon is used to open assets assigned to respective RFID tags.
- **(8)** 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.

- **(9)** The "Camera" icon is used to access the built-in camera.
- **(10)** The "Asset park" icon is used to display all saved assets and templates.
- **(11)** The "Resume" icon is used to resume last asset opened (provided it was saved) when the system is switched on.

- **(12)** The "Gallery" icon is used to display all images taken using the system's built-in camera.
- **(13)** The "Upload" icon is used to save asset measurements in the **Cloud drive**.
- **(14)** The "Download" icon is used to open asset measurements from the **Cloud drive**.
- **(15)** The "**Configuration**" icon is used to configure the touch device settings (which include language, date, time, default settings), and access its built-in mobile connectivity. Mobile connectivity enables the device to access the Cloud functionality that allows wireless file sharing.
- **(16)** The "Back" icon is used to return to previous screen.
- **(17)** The "Power-off" icon is used to turn the touch device off.
- **(18)** The "Camera LED on/off" icon is used to turn the camera LEDs on/off.
- **(19)** The "Help" icon is used to access the on-board help file.

Home screen — Multiple coupling

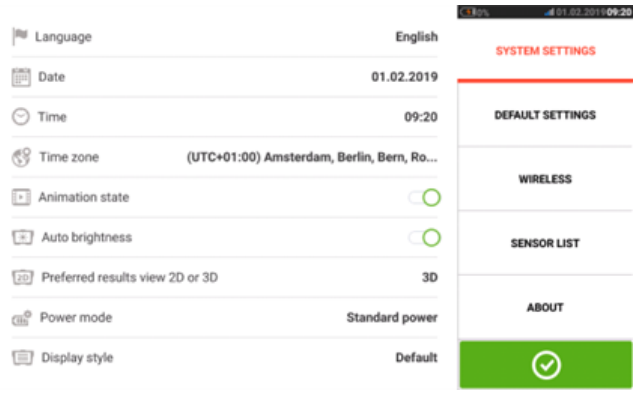
The multiple coupling functionality is accessed by tapping the "Multiple coupling/Single coupling" icon [ ] within the home screen.

- **(1)** This icon toggles between "Single coupling" and "Multiple coupling". When "Multiple coupling" [ ] is tapped, then horizontal alignment and Live Trend measurements using multiple sensor-laser combinations is enabled. Note that the icon then toggles to "Single coupling" [ ]. Tapping the "Single coupling" icon enables use of the conventional single sensor-laser combination for horizontal alignment and Live Trend applications.
- **(2)** This icon is used to access the **Multiple coupling** functionality.
- **(3)** This icon is used to access the multiple coupling Live Trend functionality.

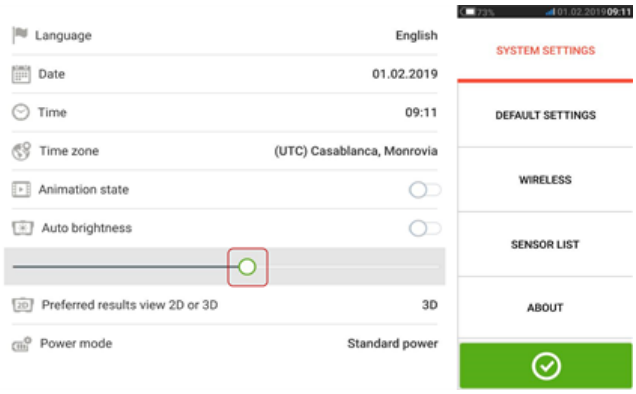
Configuration

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

- 'System settings' sets the following items:

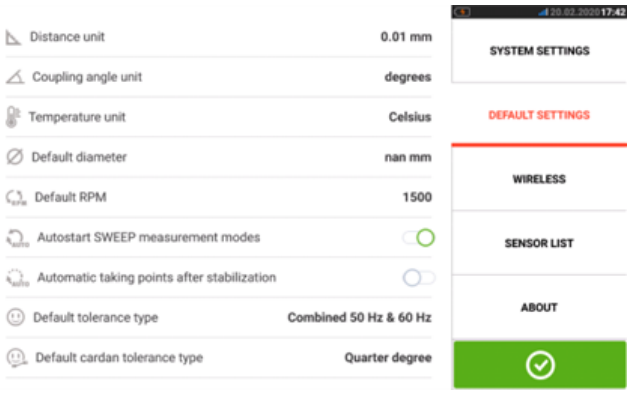


> Language (system language); > Date; > Time; > Time zone;
> Animation state — regulates the transition between the dimension, measure and results screens. Two options are available – fast and standard. If "Animation state" is on, the transition between screens is set to standard and therefore noticeable. If off, the transition is fast.
> Auto brightness – adjusts the display brightness of the touch device. If "Auto brightness is on, the display brightness adjusts automatically. If off, then the display brightness may be manually adjusted by dragging the brightness slider to the left or right.



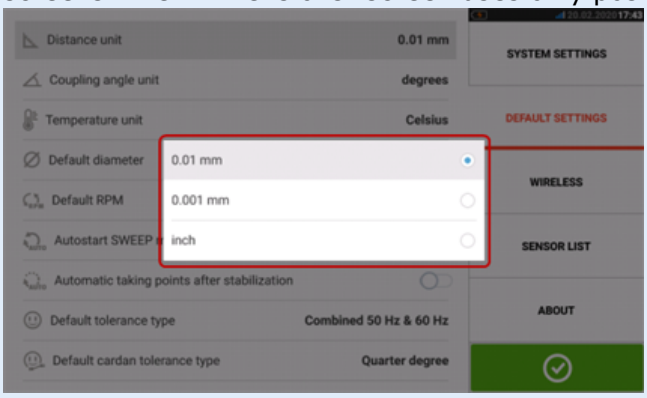
> Preferred results view 2D or 3D
> Power mode – used to manage the power usage in the touch device. Four power scheme options are available.
> Display style – used to set preferred user interface style

- 'Default settings' is used to set units of length, angle and temperature; the default diameter may be set here. It is also used to activate or deactivate the automatic start of IntelliSWEEP / Sweep 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.



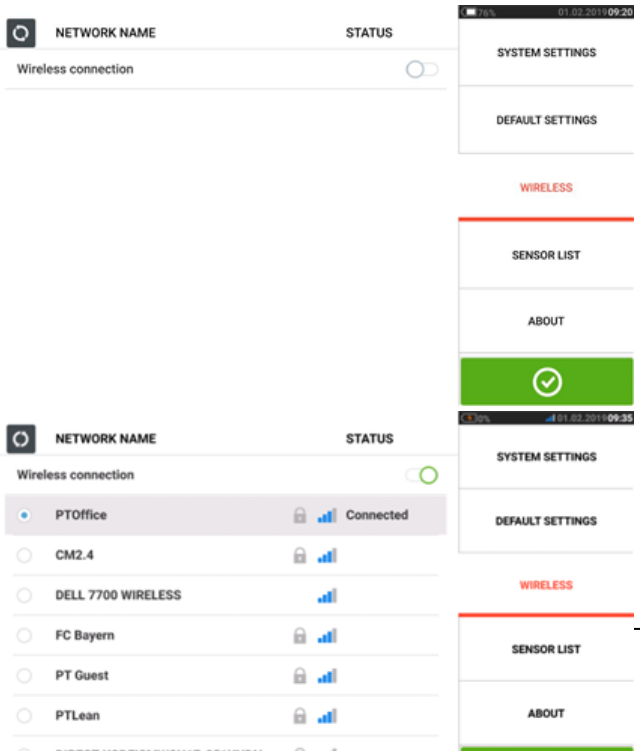
Note

When using metric units, the resolution of physical quantities used within the device may be set to two (0.01 mm) or three (0.001 mm) decimal places. This measurement precision is available in "Measurement", "Results" and "Live Move" screens. The "Dimensions" screen uses only positive integers.



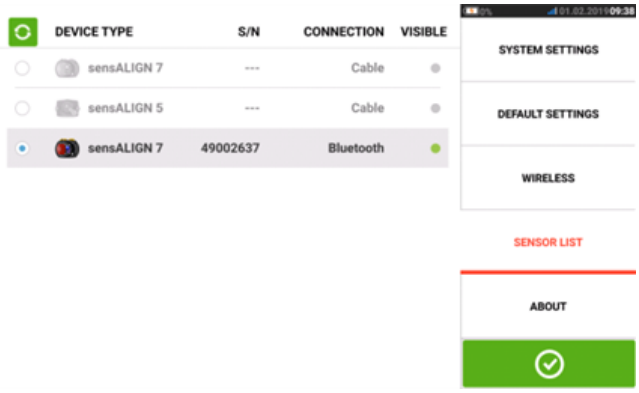
The set time zone is coupled to the default RPM unless the default RPM is edited independently. Setting the time zone to say "Central America" results in a default RPM of 1800. Setting the "London" time zone results in a default RPM of 1500.

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

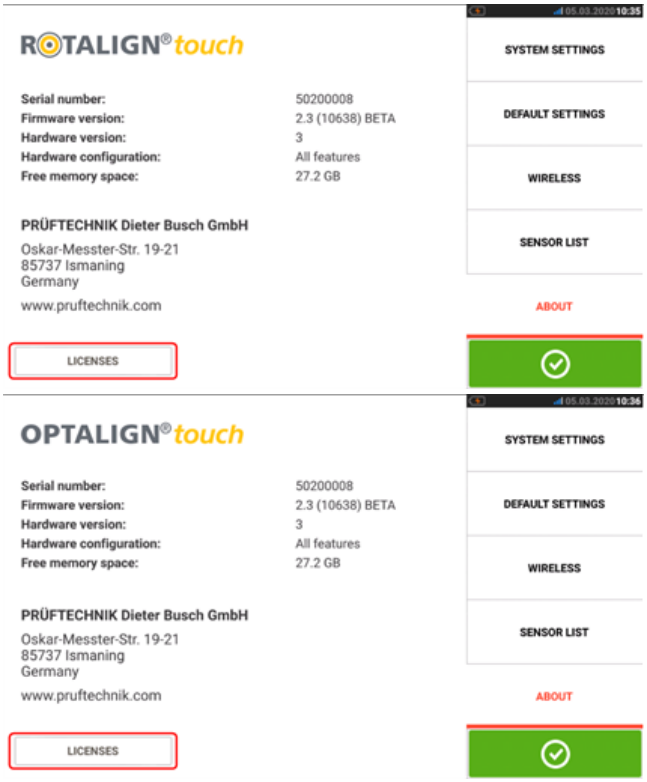


Note
The touch device may be connected only to WiFi networks that do not open separate web browsers to login.

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



- The "About" screen displays the device features level (ROTALIGN touch or OPTALIGN touch), serial number, firmware version of the application and available memory space.
  Open source licenses and other Android legal requirements may also be accessed via this screen by tapping "LICENSES".



Components

The main measuring components for shaft alignment are the touch measurement device, the sensor and the laser. The type of sensor and laser used depends on the purchased features level. The two available features levels use the touch device as a common platform.
The available features levels are are as follows:touch device may be used with either the sensALIGN 5 sensor/laser combination or with the sensALIGN 7 sensor/laser combination.

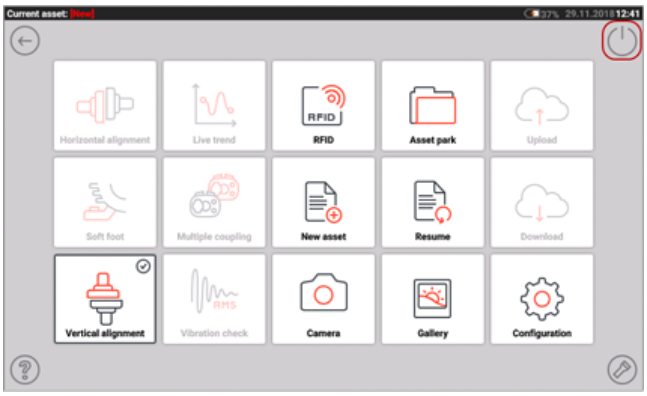
- ROTALIGN touch features level uses sensALIGN 7 sensor and laser
- OPTALIGN touch features level uses sensALIGN 5 sensor and laser

touch device

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

1: USB port, sensor and charge sockets; **2**: Ambient light sensor; **3**: Bluetooth communication LED; **4**: Power button; **5**: Battery status LEDs; **6**: Versatile stand

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



Device interfaces, built-in camera, and labelling

The touch device has three connectors housed under the sliding dust cap located at the top of the device.

1: Power connector for charger; **2**: Universal connector for sensor, PC and charger; **3**: USB host connector for USB memory device (for saving asset measurement files and carrying out firmware updates); **4**: Sliding dust cap

The touch device has an internal, rechargeable battery which is charged by connecting it 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. The device may continue to be used for measurement while charging.

Activity	Battery status LEDs
Device off and not charging	All three LEDs off
Device on with charge capacity < 10 %	Bottommost LED blinks red
Device on with charge capacity > 10% but < 40 %	Bottommost LED lights steady green
Device on with charge capacity > 40% but < 69%	Bottommost and middle LEDs light steady green
Device 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

Certain models of the touch device have a built-in camera at the back of the unit which may be used to capture machine images.

1: Label with device serial and part numbers, rechargeable battery details and disposal; **2**: Camera LED connector; **3**: Camera lens; **4**: RFID label, radio certifications and FCC notice; **5**: Versatile stand in closed position

Information on the different sensor-laser combinations may be found in the related topics below.

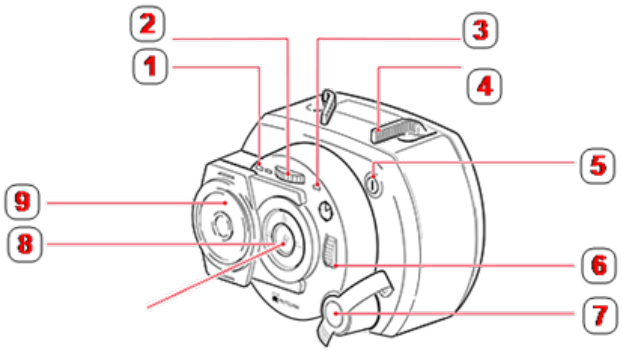
sensALIGN 7 components

sensALIGN 7 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 7 laser is turned on by pressing and holding the On/Off switch briefly. The “beam active” LED lights red.

WARNING
With sensALIGN 7 laser on, DO NOT stare into the laser beam!



1: Battery status LED; **2**: Vertical beam position thumbwheel (yellow); **3**: Beam active LED; **4**: Clamping lever (depicted here in the ‘open’ position); **5**: On/Off push button switch; **6**: Horizontal beam position thumbwheel (yellow); **7**: Charger/adapter socket (shown covered); **8**: Laser emission aperture; **9**: Sliding dust cap (yellow)

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

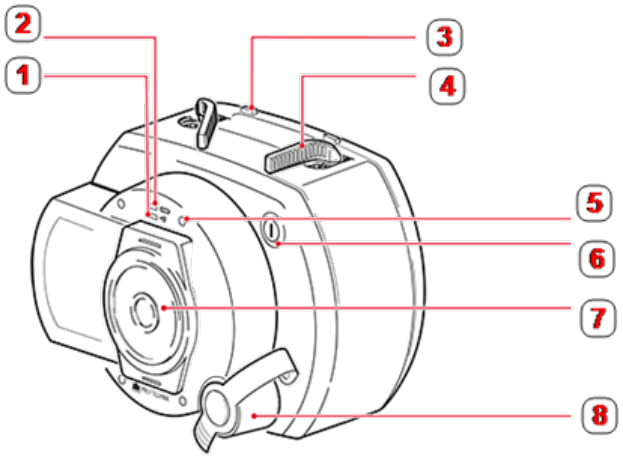
sensALIGN 7 laser is water and dust resistant (IP 65). The internal optics and electronics are internally sealed, preventing possible contamination.

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

sensALIGN 7 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 7 sensor

sensALIGN 7 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 the touch device. sensALIGN 7 sensor also transmits sensALIGN 7 laser data to the computer. The intelligent sensALIGN 7 sensor technology is used to determine shaft rotational angle and machine vibration.



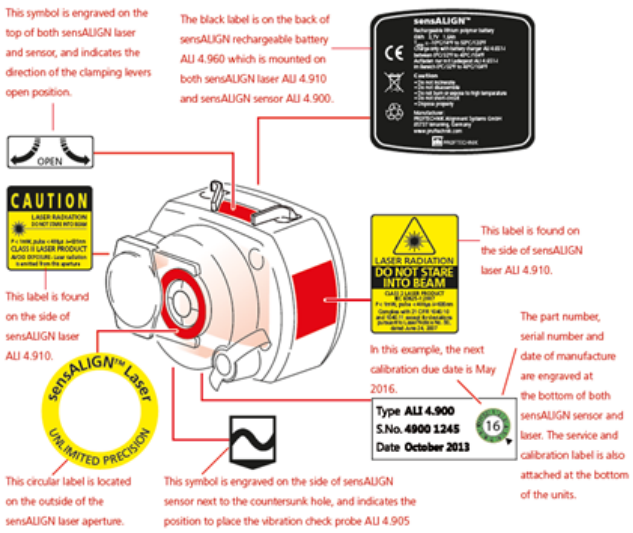
1: Bluetooth communication LED; **2**: Battery status LED; **3**: Clamping lever stopper (positioned on the rechargeable battery); **4**: Clamping lever (depicted here in the 'open' position); **5**: Laser beam adjustment LED (four in number); **6**: On/Off push button switch; **7**: Sliding dust cap (red); **8**: Charger/adapter/sensor cable socket(shown covered)

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

- Battery status LED
- Bluetooth communication LED
- Four beam adjustment LEDs

sensALIGN 7 laser and sensor labelling

The labelling diagram represents both sensALIGN 7 sensor and sensALIGN 7 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 7 laser at the positions shown in the diagram. The rechargeable battery label is located on the rear of sensALIGN rechargeable battery.



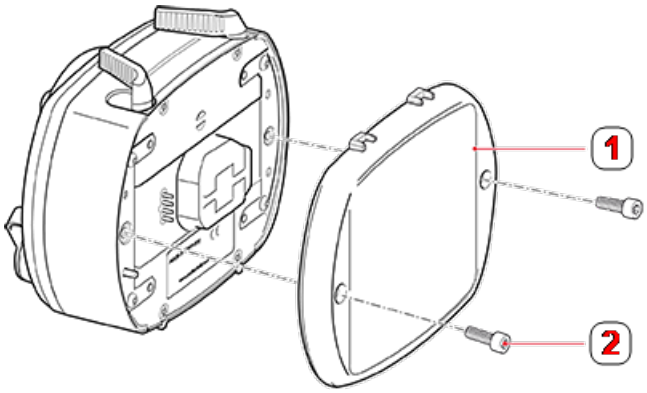
sensALIGN rechargeable battery

Both sensALIGN 7 laser and sensALIGN 7 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 meas-urements	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 bat-tery	Blinks green when char-ging	Blinks green when char-ging	LED off
	Lights steady green when fully charged	Lights steady green when fully charged	
	Lights red when a fail-ure occurs during char-ging.	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.



1: Rechargeable battery; **2**: Hex screw

The position and removal of the rechargeable battery is identical for both sensor and laser.

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

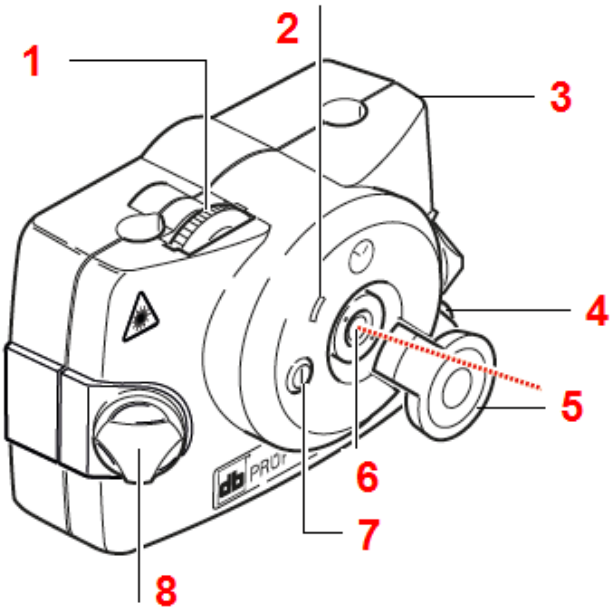
sensALIGN 5 components

sensALIGN 5 laser

The semiconductor laser diode emits a ray of red light (wavelength 630 – 680 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”).

The laser is turned on by pressing its On/Off push button switch. The “beam active” LED lights red.

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



1: Vertical beam position adjustment thumbwheel; **2**: “Beam active” indicator LED; **3**: Rubber housing; **4**: Horizontal beam position thumbwheel; **5**: Laser dust cap in “open position”; **6**: Laser emission aperture; **7**: On/Off push button switch; **8**: Locking knob

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

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

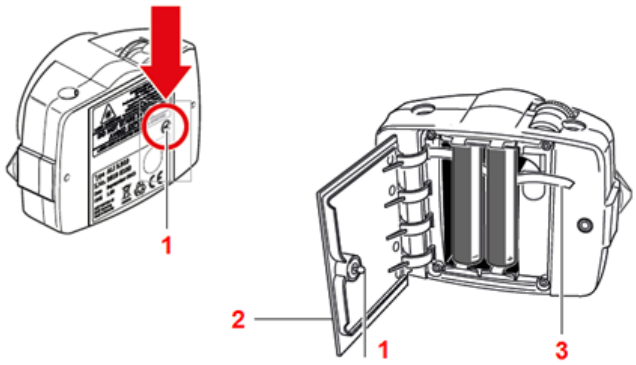
CAUTION
The battery compartment is not watertight. If water enters this compartment, open it and dry it out. The two AA size batteries should then be replaced.

Laser batteries

The laser is powered using two high energy AA size alkali-manganese 1.5 V batteries. These provide a typical operating duration of 180 hours.

CAUTION
As the battery becomes depleted, the colour of the 'laser active' indicator LED changes from green (full) to yellow (half full) to red (empty). When this occurs, the batteries should be replaced.
If the laser is not in use for extended periods of time, a month or more, the battery should be removed from the unit.

Replacing laser batteries



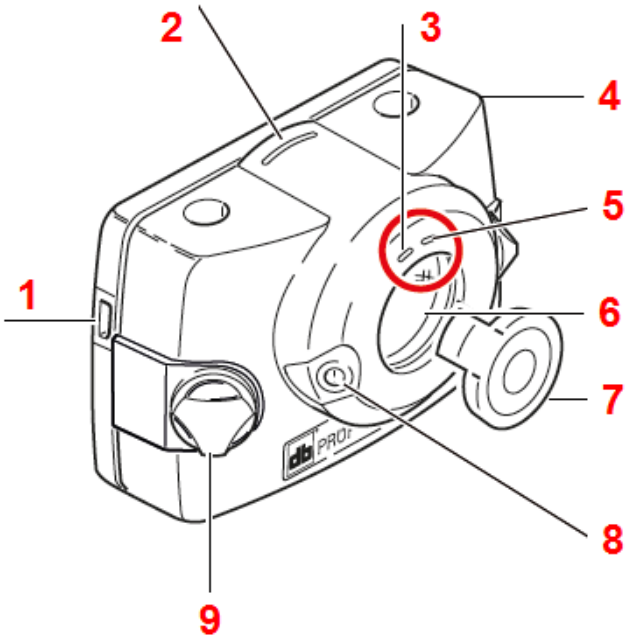
The batteries are replaced by undoing the quarter-turn screw (**1**) on the battery compartment cover (**2**) by rotating it by at least 90° (1/4 turn). With the screw loosened, lift the cover, and then use the red strap (**3**) to remove the batteries. Replace both batteries at the same time.

CAUTION
Under no circumstances may the two smaller housing hex head screws be removed, as that would void all warranty coverage.

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

sensALIGN 5 sensor

The sensor has an integrated Bluetooth, and contains two position detectors, which measure the exact position of the laser beam as the shafts are rotated. The sensor also contains an electronic inclinometer for shaft rotation measurements.
The sensor has two indicator LEDs on its front side. When facing the sensor, the left LED shows both the laser beam adjustment and charging statuses. The LED lights red, orange or green depending on current function. The LED on the right shows the Bluetooth communication status and lights blue when scanning and when communication is established.
The sensor is powered using its internal 3.7 V 5 Wh Lithium-ion rechargeable battery.



1: Micro USB port; **2**: Distance marking; **3**: Laser beam adjustment and charging LED; **4**: Rubber housing; **5**: Bluetooth communication LED; **6**: Scratch-resistant lens; **7**: Sensor dust cap in "open position"; **8**: On/Off push button switch; **9**: Locking knob

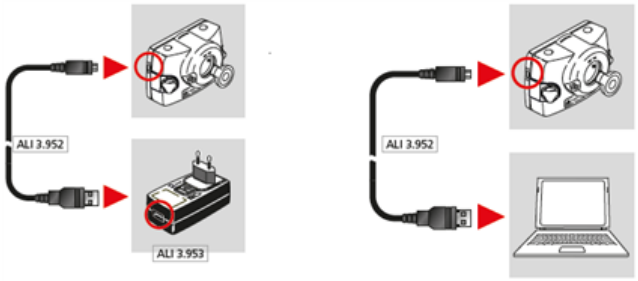
Sensor LEDs

Activity	Laser beam adjustment and charging LED	Bluetooth communication LED
Switch on	Lights up red for 1 second, then red or green (depending on the battery capacity) for another second, then continues to blink red	Lights up blue for 1 second then turns off
Laser beam adjustment	Blinks red when laser is OFF Blinks orange when laser is in END position Blinks green when laser centered or in 'laser OK' position	Blinks blue when scanning and when Bluetooth communication is established
Charging	Blinks fast green during fast charge (0% - 90%) Blinks slowly green when charge is > 90% Lights steady green when charge is 100%	

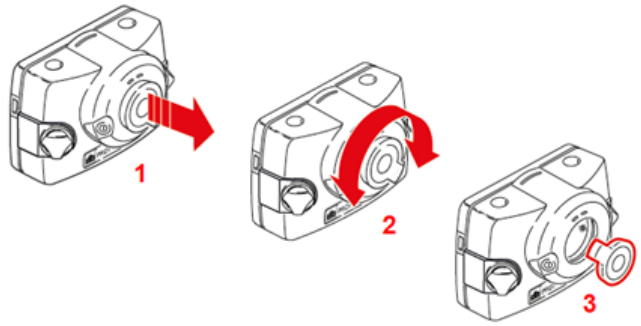
Charging the sensor

The sensor may be charged using mains supply or a PC.

Note
Charging the sensor using mains supply is faster than when charging through a PC.



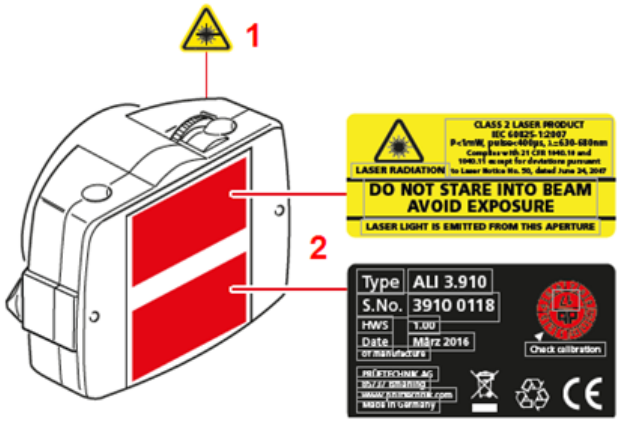
Opening the sensor/laser aperture



- **(1)** Lift the dust cap slightly in the direction shown by the bold red arrow.
- **(2)** Rotate the dust cap in either direction as shown by the bold red arrow.
- **(3)** Lock the dust cap in its "open position" highlighted in red.

Sensor and laser labelling

Labels used in communicating laser safety and other general information are to be found affixed to the housing of the system components.



- **(1)** The laser beam hazard symbol label is affixed at the front of the laser head.
- **(2)** The laser safety warning label, the laser identification label and the laser inspection label are affixed to the back of the laser.
- **(3)** The sensor identification label and the sensor inspection label are affixed to the back of the sensor.

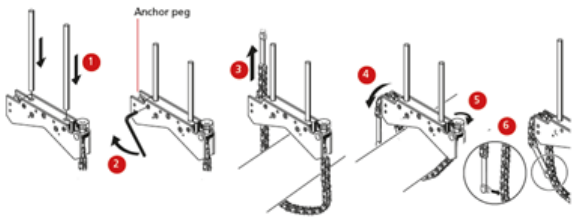
Mounting components

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.

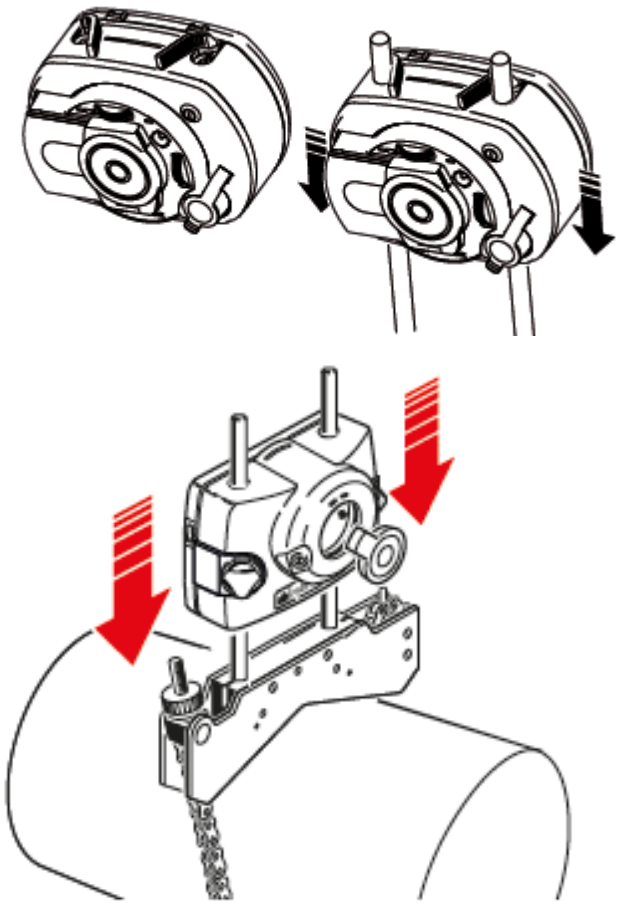
The bracket should now be tight upon the shaft. Do not push or pull on the bracket to check, since this could loosen its mounting.

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

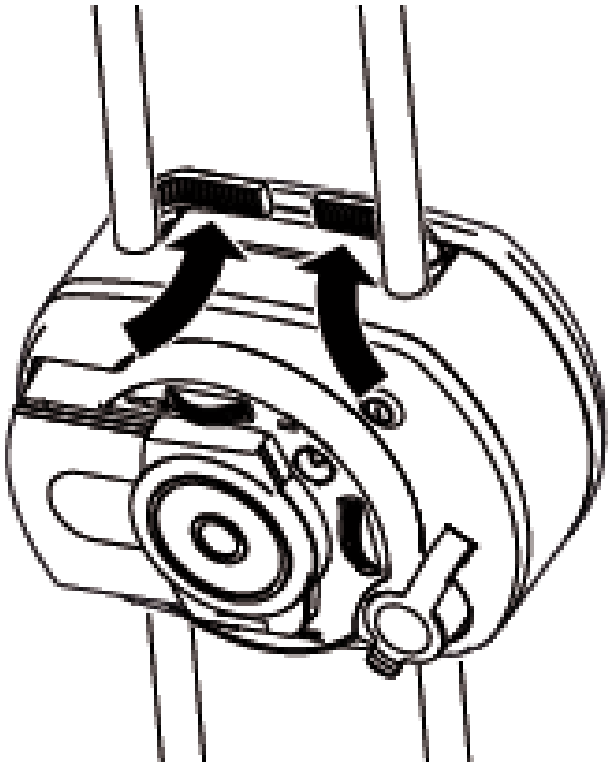
Mounting sensor and laser

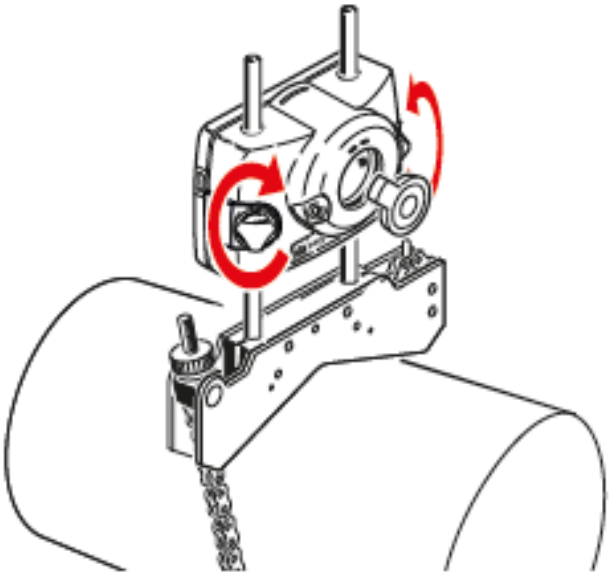
Mount the sensor on the support posts of the bracket fixed on the shaft of the right machine (usually moveable machine), and the laser on the support posts of the bracket fixed on the shaft of the left machine (usually reference machine) – as viewed from normal working position. Before mounting both sensor and laser, ensure the following:
For sensALIGN 7 sensor and laser — The yellow clamping levers must be in the open position (placed to the front). This enables components to slide onto the support posts.

For sensALIGN 5 sensor and laser — The yellow locking knobs should be loose enough to allow the sensor slide onto the support posts.



Fix both sensor and laser onto their respective support posts.
For sensALIGN 7 sensor and laser — Lock the yellow clamping levers. Lock the levers by pushing them backwards until they rest on the stoppers.
For sensALIGN 5 sensor and laser — Tighten the yellow locking knobs.



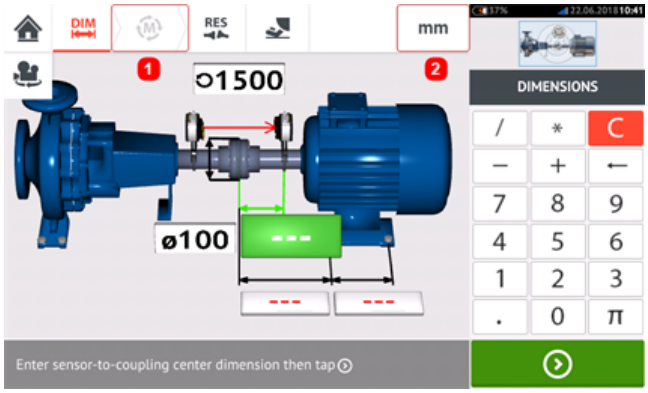


Ensure that the laser can pass over or through the coupling and is not blocked.

Both sensor and laser 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



- **(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.

Note
If units are set to Imperial system, inch fractions may be entered as follows: For $^{1}/_{8}$" enter 1/8 = 0.125"; For 10 $^{3}/_{8}$" enter 10 + 3/8 = 10.375".
The coupling diameter value may be determined by entering the measured circumference of the coupling and dividing the value by π (pi) (= 3.142). For example 33"/π = 10.5"; Or 330 mm/π = 105 mm

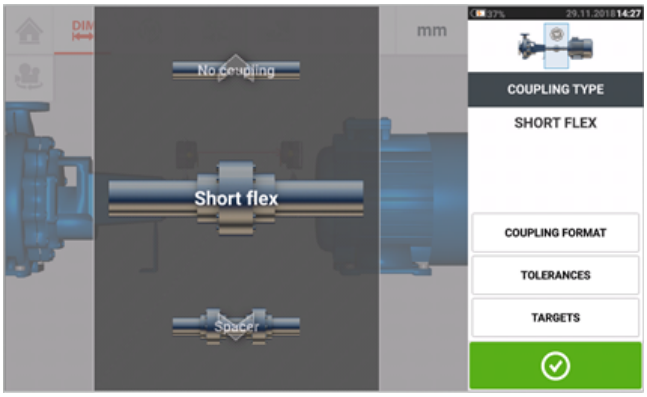
The rotate machine view icon is used to rotate the view of the machines and mounted components on the display.

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.

Coupling properties



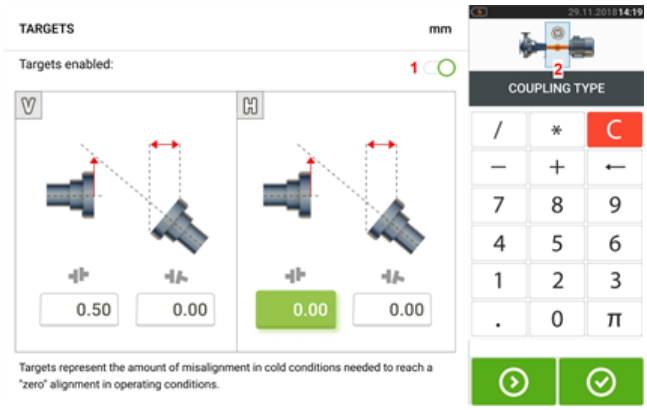
Swipe the carousel up or down and select desired coupling type.
The following coupling types are available for selection:

- Short flex — These couplings feature fitted transmission elements with play (such as teeth, claws or bolts) or elastic connecting elements like rubber 'tires' or springs.
- Spacer shaft — When the coupling halves are joined by a spacer element, its length must be entered.
- **Cardan shaft** — Just as with regular spacer shafts, the shaft length (between coupling planes) must be entered.
- Single plane — The coupling halves are bolted directly together. Loosen the bolts before taking measurements, since they would otherwise distort the true alignment condition.
- No coupling — This coupling format is intended for use with CNC machines. In this format, the length between the two shafts must be entered. The measurement mode for this coupling format is **intelliPOINT**.

Targets

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

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



The displayed coupling format depends on the type of coupling selected.

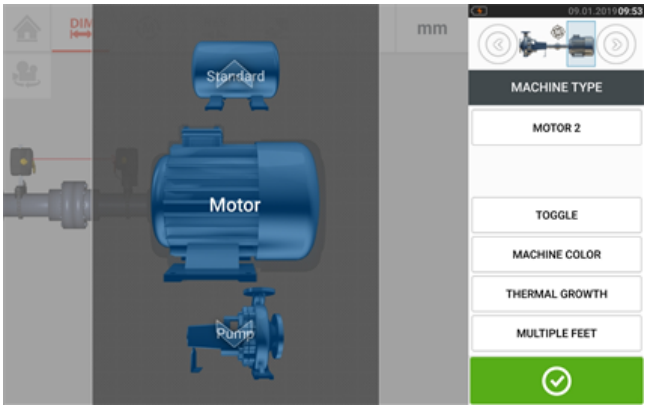
To enter any target specifications at the coupling, tap the corresponding value box then proceed to enter the target value using the onscreen keyboard. Cycle through the value boxes using . Alternatively, tap the desired value box.

Target specification values are activated by tapping the icon [**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.

Machine properties

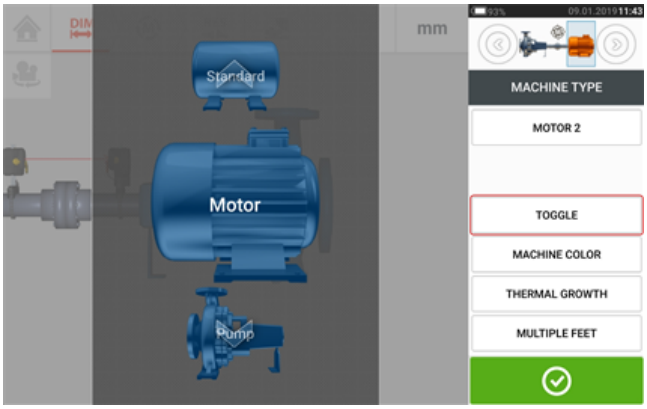
The following lifelike machine graphics are available:
1. Generic standard machine; 2. Motor; 3. Pump; 4. Split case pump; 5. Fan; 6. Center hung fan; 7. Blower; 8. Compressor; 9. Gearbox; 10. Rotor gearbox; 11. Diesel engine; 12. Generator; 13. Gas turbine; 14. Shaft with no supports; 15. Shaft with a single support; 16. Shaft with two supports



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.

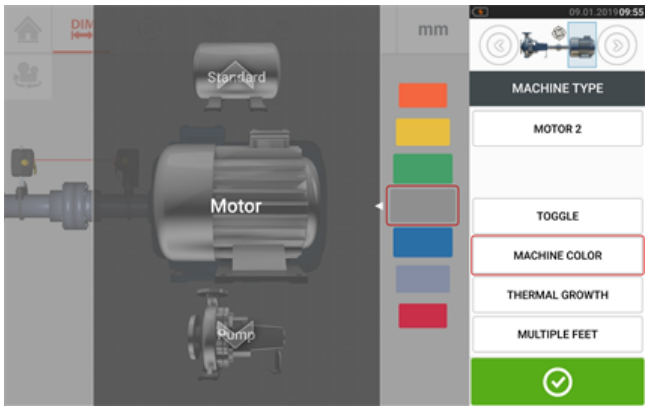
Toggle

"Toggle" is used change the orientation of the selected machine along the shaft axes. In the following example, the motor has been flipped so as to connect the non-drive side to the coupling.



Machine colour

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



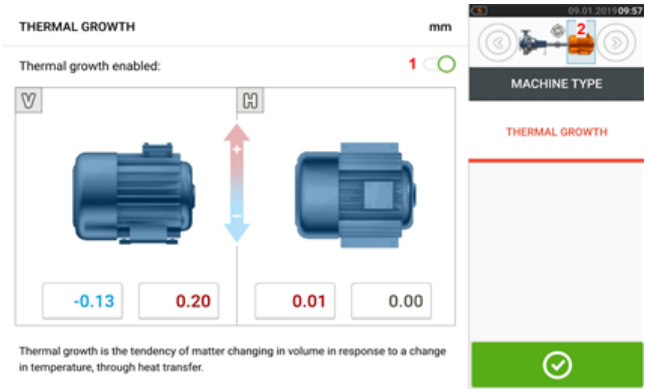
Swipe the colour palette up or down to select the desired colour then tap to confirm selection and return to the dimensions with the machines having the desired colour.

Thermal growth

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

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

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



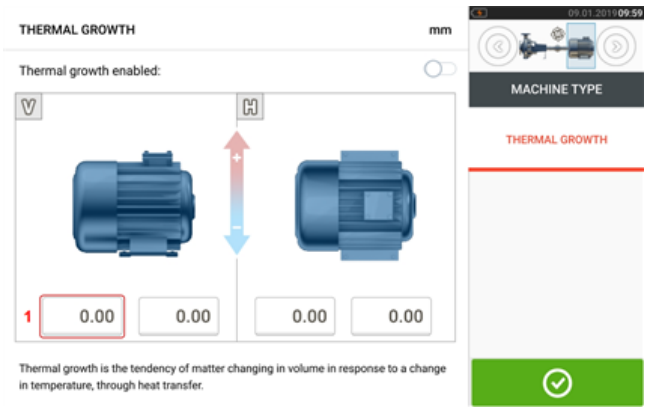
To enter any specified thermal growth value at the required foot position, tap the corresponding value box then proceed to enter the thermal growth value using the onscreen keyboard. Cycle through the value boxes using . Alternatively, tap the desired foot position.

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.

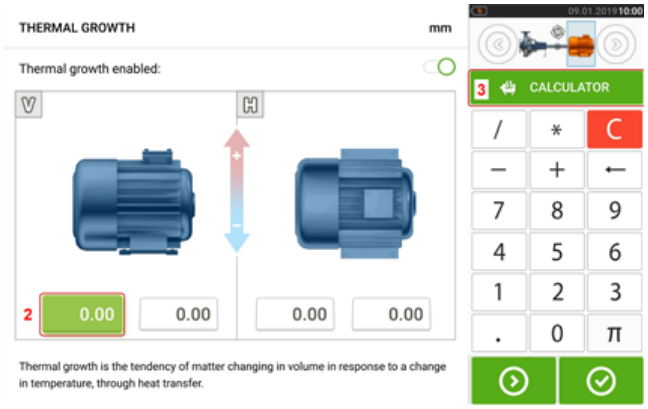
Thermal growth calculator

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.

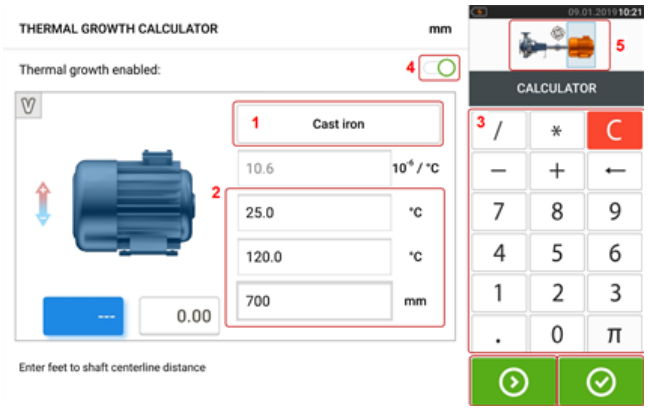
After accessing the thermal growth screen, tap value box of feet pair [**1**] where thermal growth is to be entered.



The box is highlighted green [**2**], and the 'Calculator' tab [**3**] appears.



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

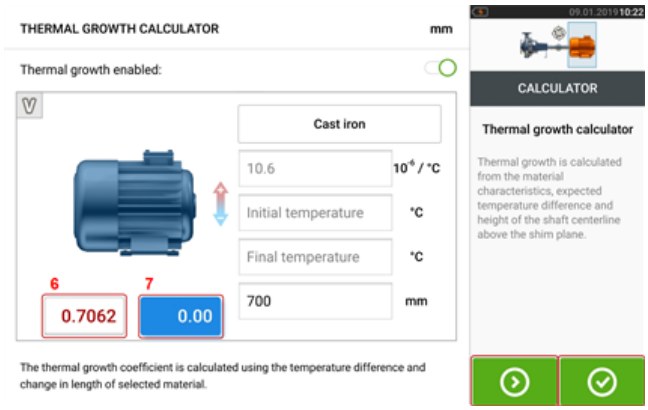


Tap (**1**) and select machine material. The corresponding linear thermal expansion appears. Enter the three values [**2**] required to calculate the thermal growth value for the selected feet pair using the onscreen keyboard [**3**]. The three values are:

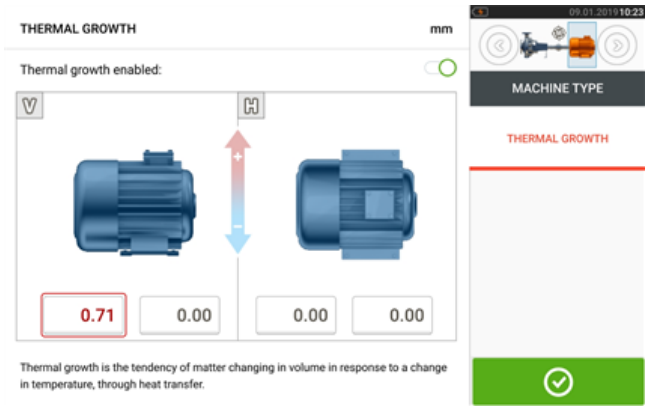
- Ambient temperature (initial temperature)
- Machine running temperature (final temperature)
- Distance from machine base (or shimming plane) to the shaft centerline (length)

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**].

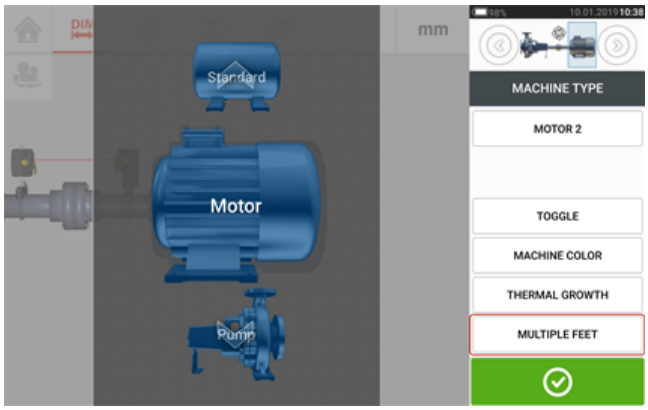


Tap to return to the thermal growth screen showing the calculated values.

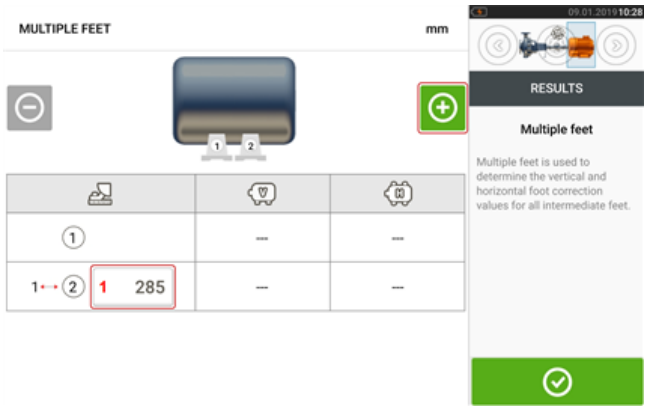


Multiple feet

The item "Multiple feet" is primarily used to determine foot corrections in a multiple feet machine, and is therefore accessible also in the result screen.
The dimension between the feet may be defined in the 'Multiple feet' screen which is accessed by tapping the item "Multiple feet".

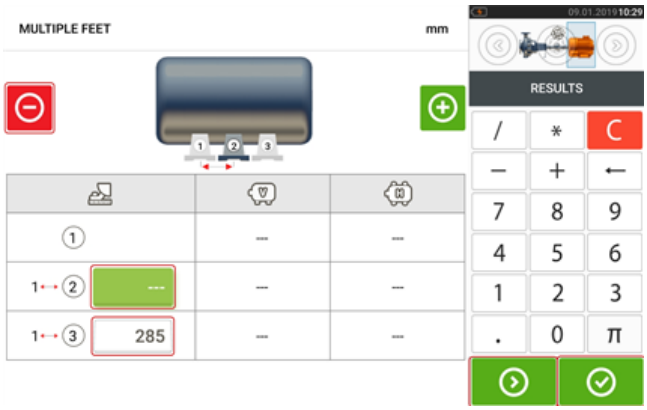


If already entered, the 'Multiple feet' screen will show the dimension between the front feet and the back feet [**1**].



Note
Machine intermediate feet cannot be displayed in the dimension screen.

Tap to add any intermediate feet.



- The intermediate feet pair is added after the front feet.
- Enter this dimension in the row that appears.
- If desired, intermediate feet may be deleted by tapping .
- Tap to exit the 'Multiple feet' screen.

Laser beam adjustment

Laser adjustment wizard

The laser adjustment wizard is the primary laser beam adjustment feature in the touch device. If the sensor is initialized, and the laser beam is not centered, use the wizard to adjust the laser beam correctly. The wizard arrows indicate the direction and amount in which movement should take place.

- The wizard arrows next to the laser position thumbwheels (e.g. **2**) indicate the direction and magnitude in which the thumbwheels are to be moved in order to adjust the laser beam correctly.
- The wizard arrows away from the thumbwheels (e.g. **1** and **3**) indicate the direction and magnitude to move the laser physically for correct adjustment.
- The attained laser beam status is shown in **4**.
- **5** shows the position of the laser beam on the position detectors.

- The wizard arrows decrease in magnitude and occurrence as the laser beam status improves, disappearing completely once the laser beam is centered.
- Measurement may commence once the laser beam is centered.

It may however be necessary to preadjust the laser beam without using the wizard. In that case, proceed as follows:

- "Laser beam adjustment (sensALIGN 7)" on page 44
- "Laser beam adjustment (sensALIGN 5) " on page 46

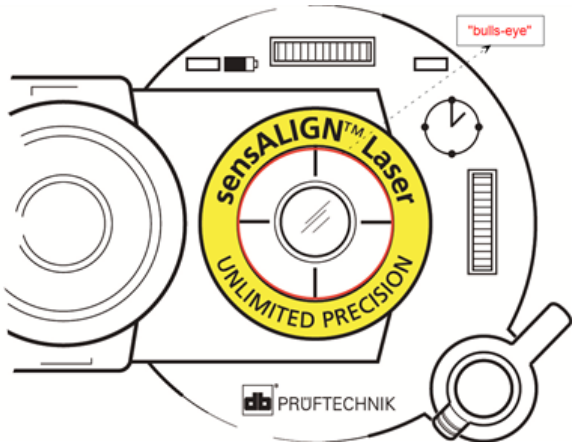
Laser beam adjustment (sensALIGN 7)

Using sensALIGN 7 laser and sensor

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

WARNING
The 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 the laser on.

WARNING
Do not stare into the laser beam!.

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

5. Slide the dust cap to open the lens. Observe the four sensALIGN 7 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 7 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 sensor dust cap to cover the lens, then loosen the chain type bracket supporting the sensor and move the sensor sideways. At the same time, release the 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 the 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

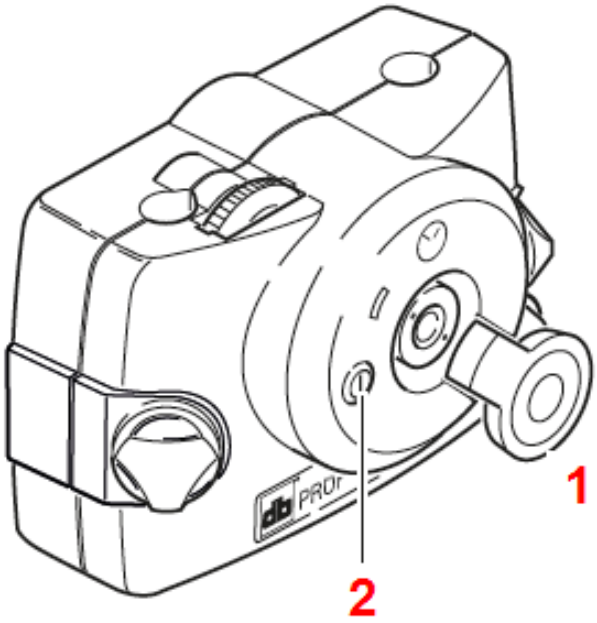
The four beam adjustment LEDs provide additional help when adjusting the laser beam position on the sensor position detectors. The LEDs indicate the angle and position at which the laser beam enters the sensor. The LEDs blink either red or green depending on the angle at which the laser beam strikes 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 7 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

Laser beam adjustment (sensALIGN 5)

Using sensALIGN 5 laser and sensor

1. Open the laser aperture by lifting and the rotating the dust cap until it rests in its “open” position (**1**). Switch the laser on by pressing its On/Off push button switch (**2**). Leave the sensor dust cap on its “close” position.

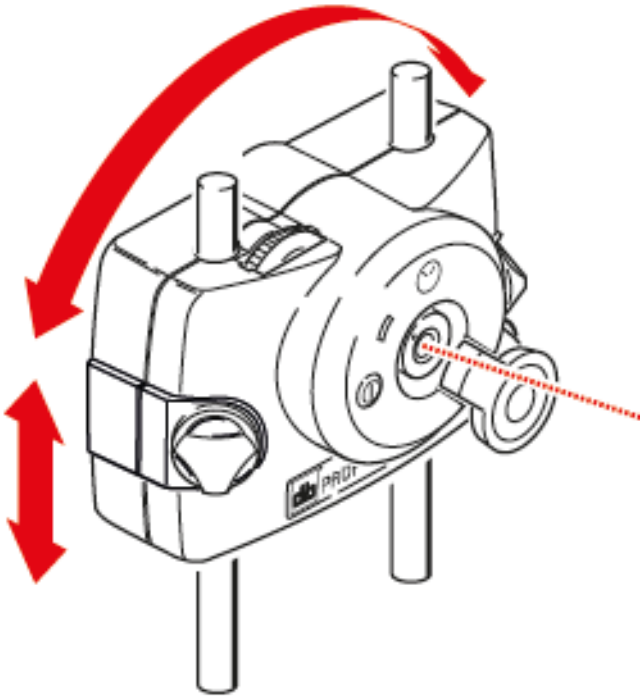


WARNING
Do not stare into the laser beam!

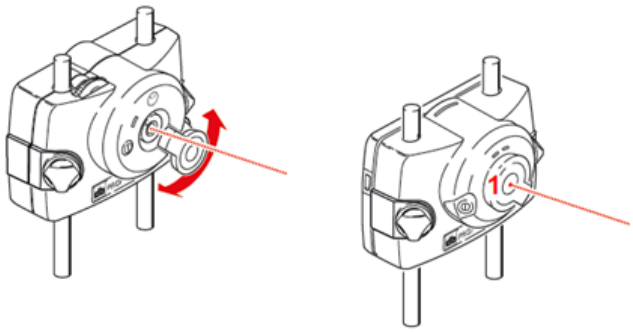
2. If the laser and sensor have been roughly positioned to each other during mounting, the laser beam should strike the sensor dust cap. If the beam be so far off target that it misses the sensor completely, hold a sheet of paper in front of the sensor to locate the beam and readjust it onto the sensor as follows:

3. Reposition the components until the laser beam strikes the sensor cap:

- vertically: loosen the locking knobs and adjust the height.
- horizontally: loosen the bracket and turn the laser and/or sensor brackets into line with one another.



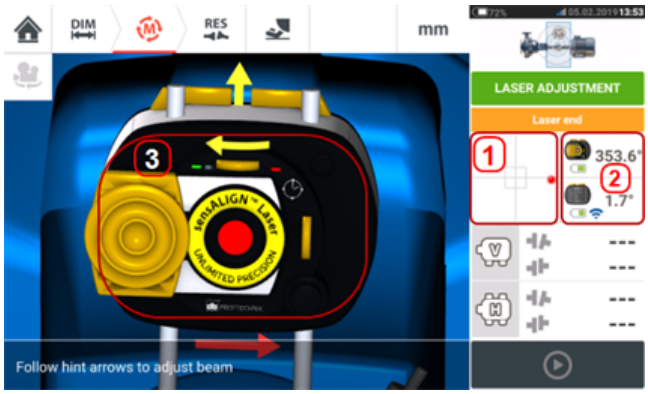
4. Use the adjustment wheels on the laser to center the laser beam on the sensor dust cap (**1**), and then open the sensor aperture by lifting and rotating its dust cap until it rests on its "open" position.



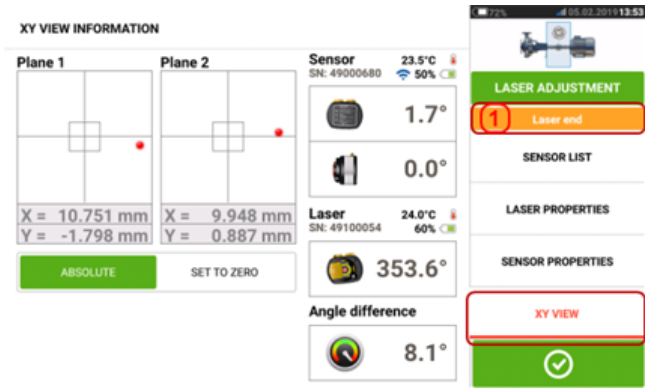
Note
It is highly recommended that before mounting the laser on its bracket, both yellow adjustment thumbwheels be brought to the approximate center of their travel range. This will ensure that the beam is emitted from the laser as straight as possible and not at an angle.
Also make sure both brackets are rotationally aligned to each other.
These precautions will greatly facilitate the beam adjustment process.

XY View

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

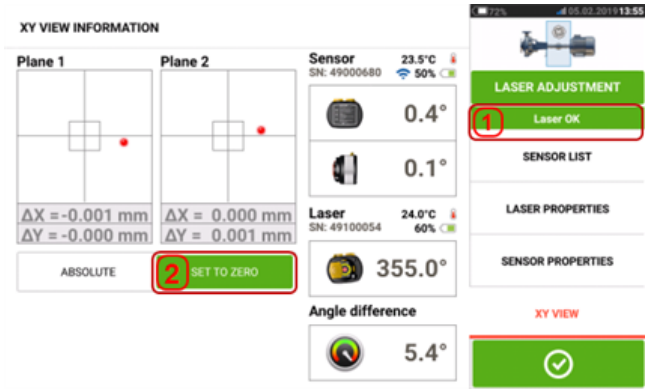


- Tap the shown detector area **(1)** to directly access the XY View screen.
- The XY View screen may be accessed using the menu item "XY View" which appears when the "sensor/laser area" **(2)** is tapped.
- The XY View screen may be accessed using the menu item "XY View" which appears when the laser **(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 the sensor along the support posts or sideways by loosening the chain type bracket and slightly rotating it.

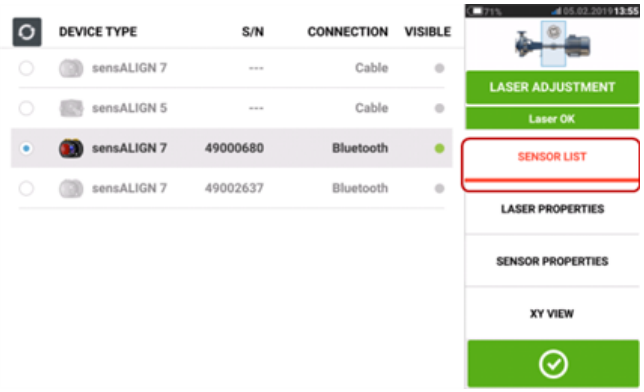
The "Set to zero" function may be used to check the effect of environmental and machinery vibration on the measurement. Note that the "Set to zero" is active only when the laser beam status [**1**] is "OK" or "Centered".



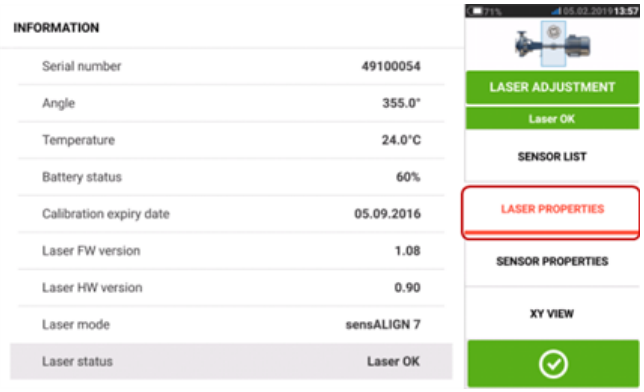
If the laser beam status is "OK" or "Centered" [**1**] tap "Set to zero" [**2**] to set the XY values of the two detector planes to 0,0. These values are then monitored to check the stability of the values. Tap "Absolute" to return to the absolute values.

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

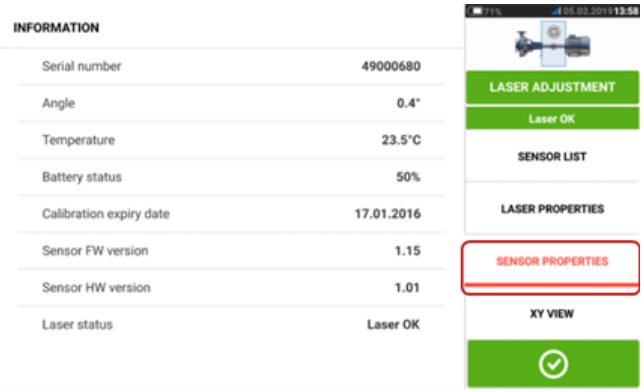
Sensor list – displays serial number of sensors detected or previously used, as well as type of connection used for communication.



Laser properties – displays detailed information of the laser unit in use



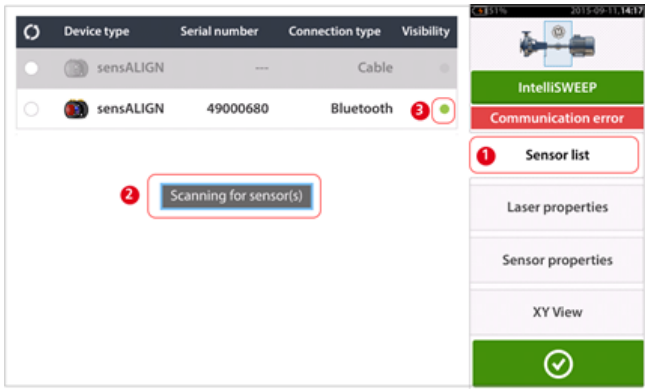
Sensor properties – displays detailed information of the sensor unit in use



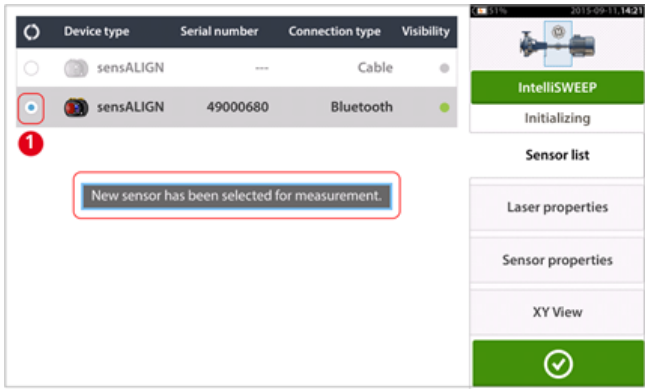
Initializing sensor

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.

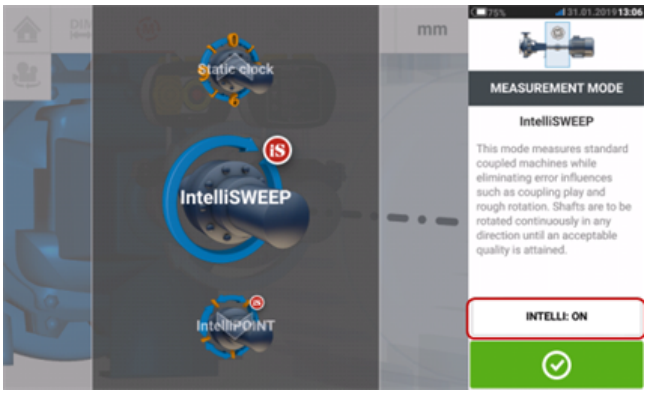


Initialize the sensor by tapping the listed sensor. A bold blue dot [1] signifies that the sensor is initialized.

Measurement

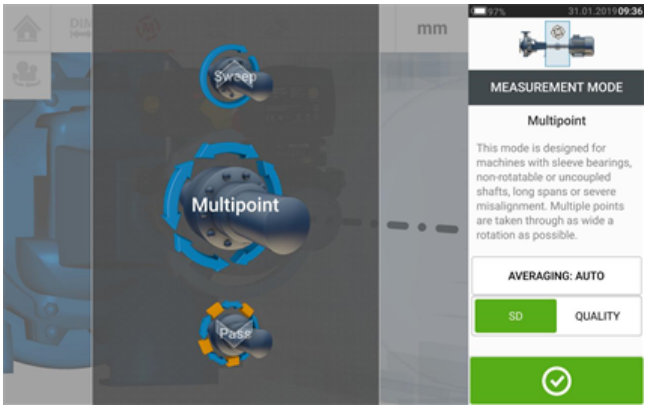
The desired measurement mode is selected while in the measurement screen.

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



Note
The selected intelligent measurement mode may be changed by tapping the "Intelli:ON/OFF" area. This procedure is used to change the measurement mode from IntelliSWEEP to Sweep, and vice versa; and from IntelliPASS to pass, and vice versa.

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.
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.
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.

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**].

Measurement modes

The following measurement modes are available for horizontal machine configurations:

- "IntelliSWEEP measurement" on page 54 – 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.
- "Continuous Sweep measurement" on page 58 –This mode is used to measure standard coupled machines. The shafts are rotated continuously in machine rotational direction until acceptable measurement quality is attained.
- "IntelliPOINT measurement" on page 62 – 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 measurement" on page 69 – This mode is used in cases where the uncoupled shafts cannot be stopped at definite positions.
- "Pass mode" on page 71 – Pass measurement mode is used for uncoupled and non-rotatable shafts (one or both). The laser is rotated past the sensor at different rotational positions.
- "Multipoint measurement" on page 65 – 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 misalignment that will readily cause the beam to fall out of range.
- "Static measurement" on page 67 – This mode is used to measure **vertical mounted machines**.

Note
The intelligent measurement modes IntelliSWEEP, IntelliPOINT and IntelliPASS are only available when using the intelligent sensALIGN 7 sensor.
When using sensALIGN 7 sensor, the intelligent modes may be switched off and standard modes used. These modes are set using the "Intelli:ON/OFF" menu item in the measurement mode carousel.

IntelliSWEEP measurement

This is the default measurement mode (when using sensALIGN 7 sensor) 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.

- **(1)** Returns user to "Home" screen
- **(2)** Returns user to "Dimensions" screen
- **(3)** Current "Measurement" screen
- **(4)** "Results" screen icon
- **(5)** Takes user to soft foot measurement screen
- **(6)** Rotates the view of both machines and mounted components
- **(7)** Laser
- **(8)** Sensor
- **(9)** "Intelli" hint (text)
- **(10)** Tap to start rotating the shafts

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).

- **(1)** Rotational angle covered by the shafts
- **(2)** Measurement positions taken

- **(3)** Measurement quality
- **(4)** Rotational arc
- **(5)** Coupling results displayed as soon as the measurement quality reaches 40% (rotational arc is orange)
- **(6)** "Intelli" hint (text)
- **(7)** "Intelli" hint (icon)
- **(8)** 'Cancel' icon
- **(9)** 'Proceed' icon (has same colour code as the corresponding measurement quality)

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

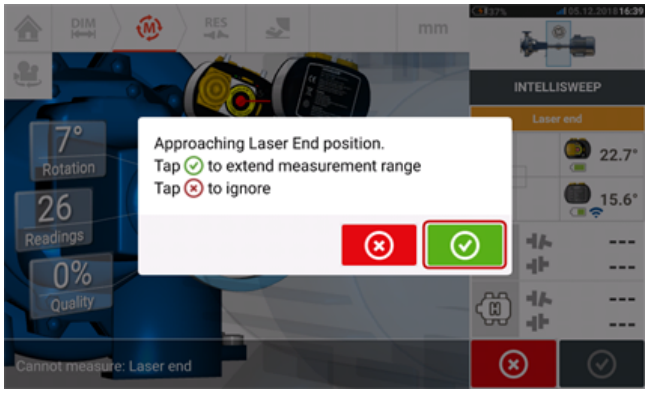
Note that the colour of the 'Proceed' icon corresponds to the colour of the rotational arc which denotes the attained measurement quality.

- **(1)** Tap to re-measure machines.
- **(2)** Tap RES 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 use the two yellow beam position thumbwheels to readjust 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.

Continuous Sweep measurement

This is the default measurement mode (when using sensALIGN 5 sensor) and is used to measure standard horizontal coupled machines.

Once the laser beam has been centered, measurement may be started automatically when the shafts are rotated or by tapping or '**M**' (**1**). 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).

- **(1)** Rotational angle covered by the shafts
- **(2)** Measurement positions taken
- **(3)** Measurement quality
- **(4)** Rotational arc
- **(5)** Hint
- **(6)** Coupling results displayed as soon as the measurement quality reaches 40% (rotational arc is orange)
- **(7)** 'Cancel' icon
- **(8)** 'Proceed' icon

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

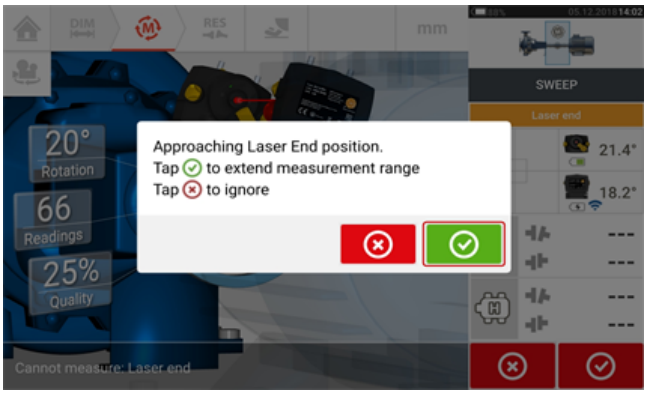
Note that the color of the 'Proceed' icon corresponds to the color of the rotational arc which denotes the attained measurement quality.

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

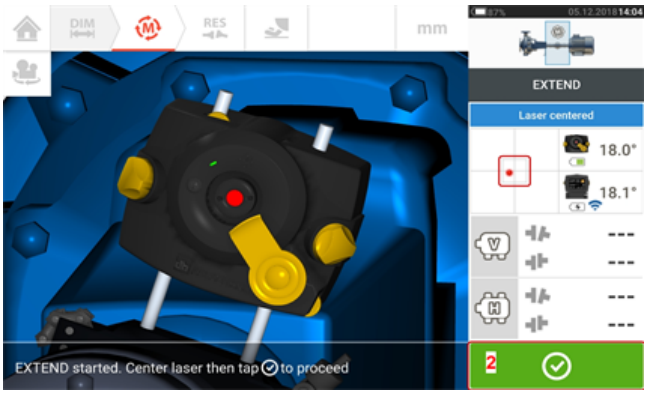
Extending measurement range when using Continuous Sweep

This feature automatically activates the extension of the measurement range while in Continuous Sweep 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 **Continuous Sweep**, 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. The program interrupts measurement and switches to the laser beam adjustment screen. The current beam position is automatically recorded and taken as the starting point for range extension. Follow the hints on the display and use the two yellow beam position thumbwheels to readjust the laser beam dot into the detector area target square (**1**).



- With the laser beam centered, tap

(**2**) then continue with measurement by rotating the shafts further.

- After rotating the shafts through as wide an angle as possible, tap (**3**) to proceed to results, then (**4**) to view results.

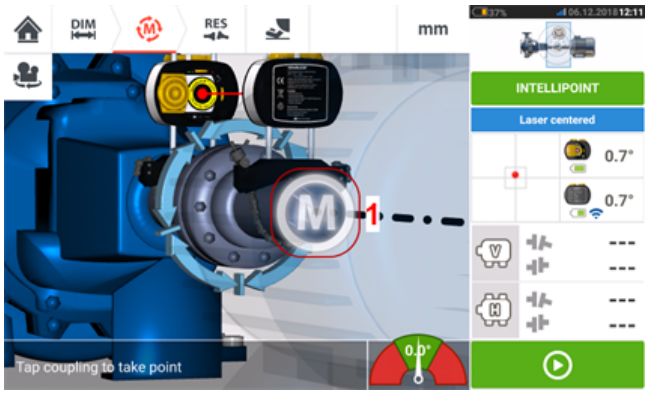
IntelliPOINT measurement

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.

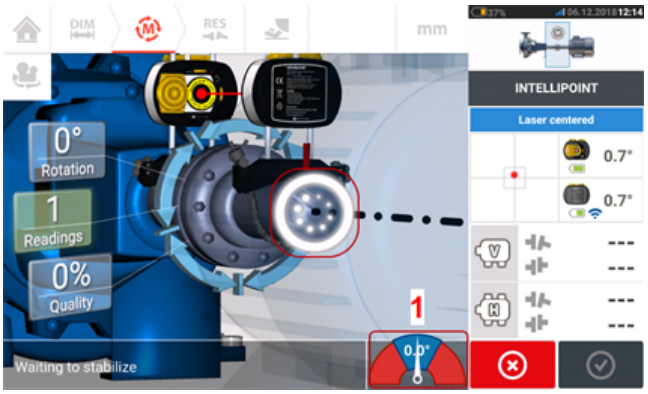
The letter '**M**' appears below **1** as shown in the screen below.



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 onscreen 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 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 the pulsating **M** or to take the first measurement point.

- **(1)** Number of points already taken (in this example initial point)
- **(2)** Tap pulsating **M** 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 sensor and laser then take next measurement point by tapping the pulsating **M** [**2**].

Note
After taking a measurement point, the displayed 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 >.

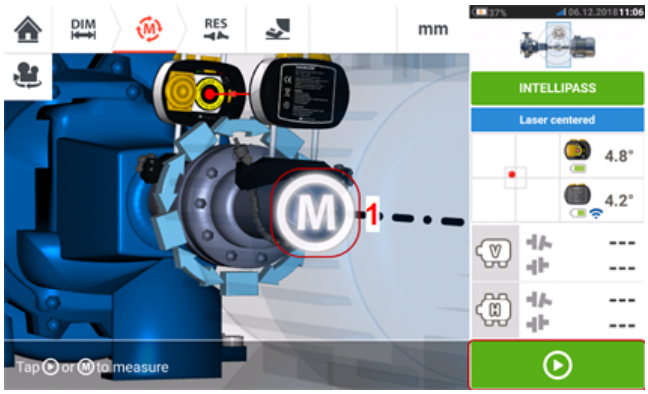
Measurements must be taken in at least three positions over 90°, but more measurements over a wider angle is recommended.

- **(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

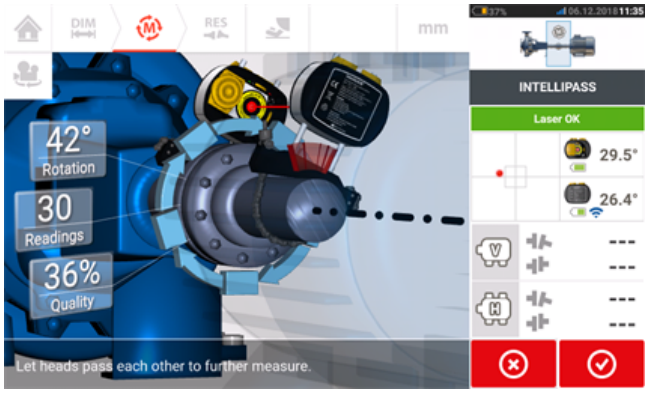
In this mode, the shaft supporting the laser is rotated so that the laser beam strikes the sensor lens as it passes it. Measurements are taken when the laser beam passes through the middle sector of the detector.

- 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 7 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.

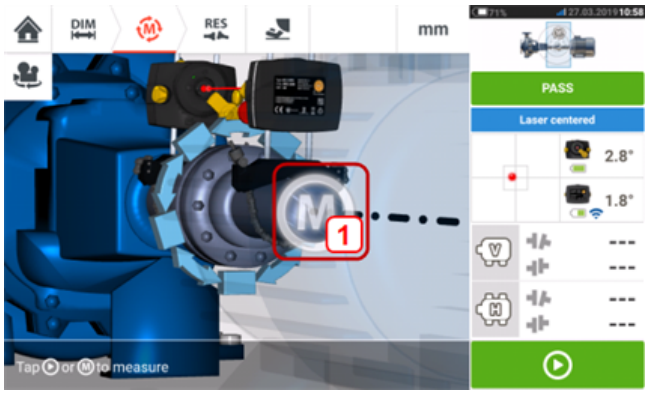
- Tap to view results.

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.

Pass mode

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 sensALIGN 5 sensor laser beam adjustment LED on the front of its housing blinks green.

- Repeat step 3 taking measurements in as many positions and over as wide an angle as possible. Coupling results (**1**) will be displayed if measurements have been taken in at least three positions over at least 60° rotation.

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

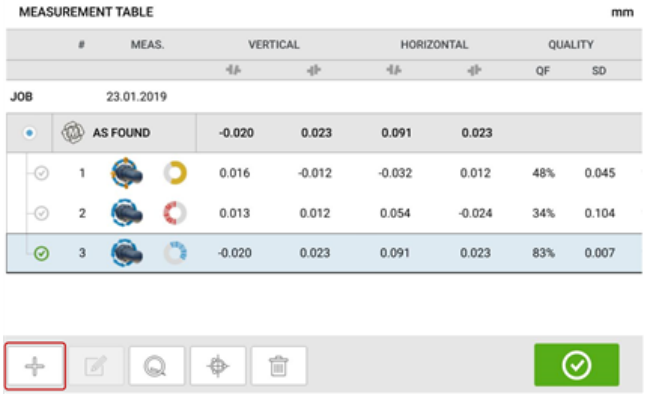
- Tap to view results.

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 the 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.

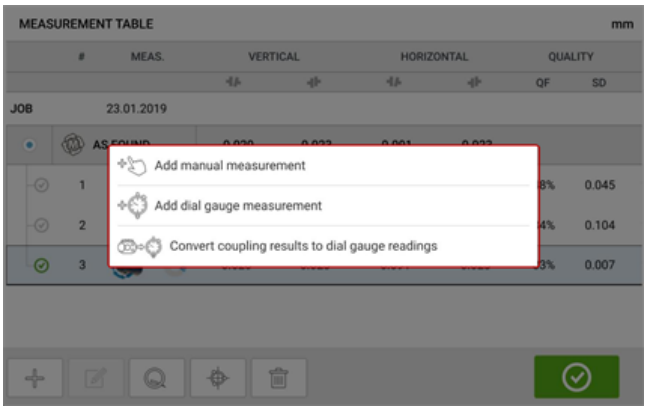
Manual and dial gauge entries

The **measurement table** may also be used for the following functionalities:

- Entering manual readings (**Note**: available only with ROTALIGN touch features)
- Addition of a dial gauge measurement and displaying coupling results
- Converting alignment results obtained using sensor-laser measurement into the comparable dial gauge readings



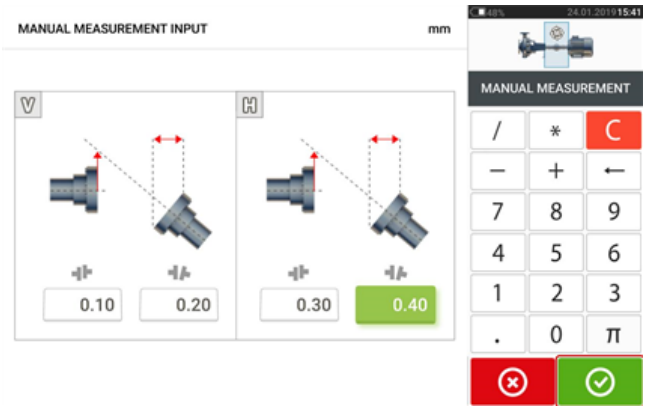
When in the measurement table screen, tap . The manual entry and dial gauge functionalities are displayed.



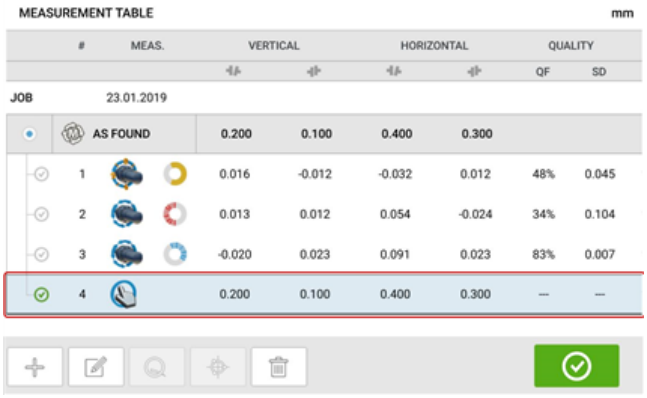
Note
1. If the measurement table is accessed for a new asset without any measurements, the two options available are "Add manual measurement" and "Add dial gauge measurement".
2. For a new asset, the measurement table may be accessed via the measurement screen **coupling results area** by entering the sensor-to-coupling center dimension.
3. For a new asset without sensor-to-coupling center dimension, the measurement table is accessed by tapping the **coupling results area** in the results screen.

Entering manual measurement values

With the three items displayed, tap the option "Add manual measurement", then proceed to enter the coupling values manually.



After entering all values, tap to return to the measurement table. The added manual value appears in the measurement table. The hand symbol next to the entry signifies that it is a manual entry.

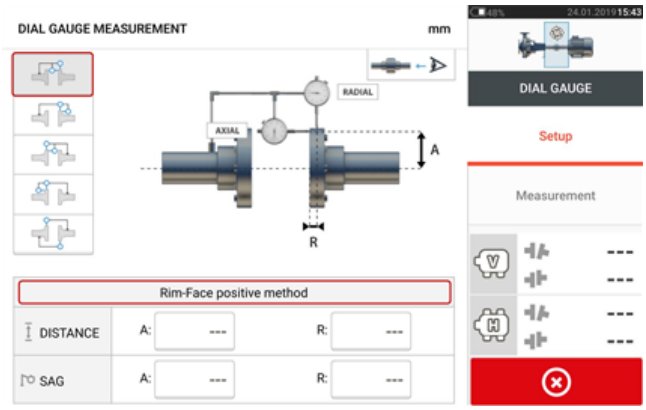


Addition of a dial gauge measurement

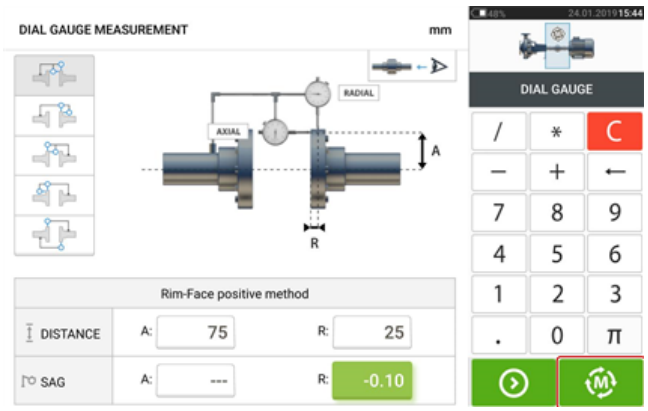
With the three items displayed, tap the option "Add dial gauge measurement", then select desired dial gauge set-up. Five set-up methods are available:

- Rim and face (positive)
- Rim and face (negative)
- Rim and face (reversed)
- Rim and face (negative reversed)
- Reverse indicator

In the following example the rim and face (positive) method has been selected.



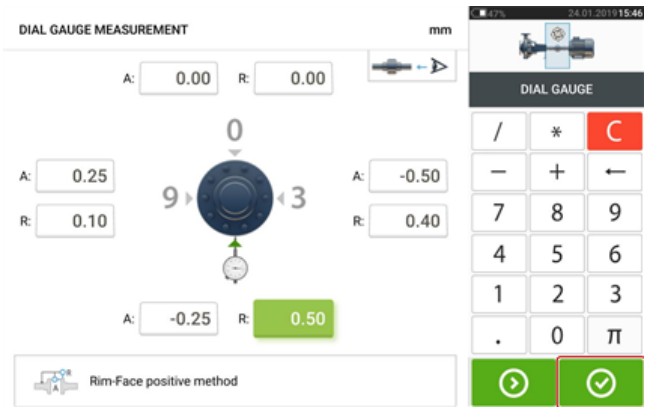
Enter the required dimensions and the amount of bracket sag. In this example, the axial distance A is 75 mm, the radial distance R is 25 mm and the indicator bracket sag R is -0.10 mm.



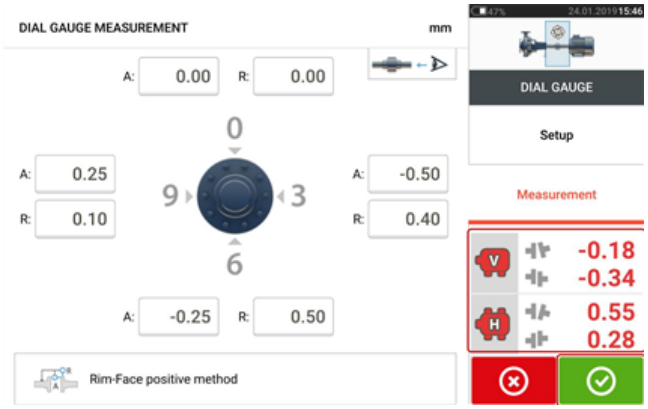
Note

The "Measure" icon appears as soon as both axial and radial distances have been entered. It is therefore possible to proceed to measurement without entering the sag value.

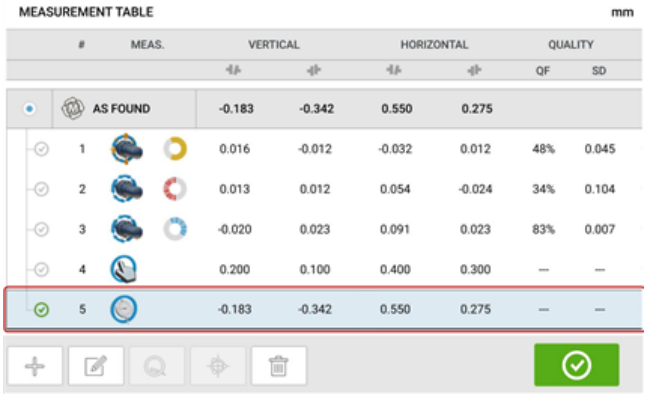
Enter the measured dial gauge readings then tap to display coupling results.



Dial gauge readings are now displayed as coupling results in terms of gap and offset.

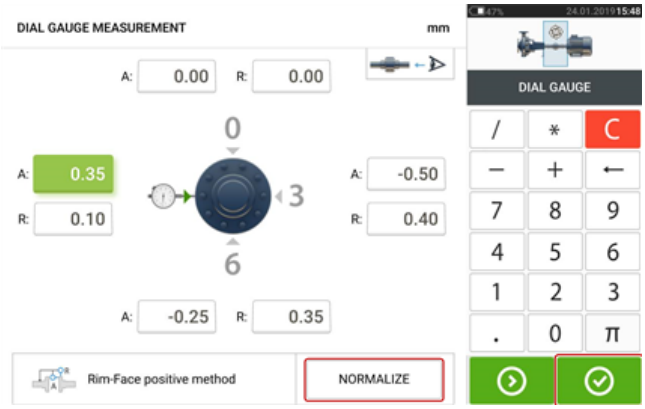


The dial gauge measurement is now listed on the measurement table which is accessed by tapping . The dial gauge measurement is identifiable by dial indicator symbol next to the entry.

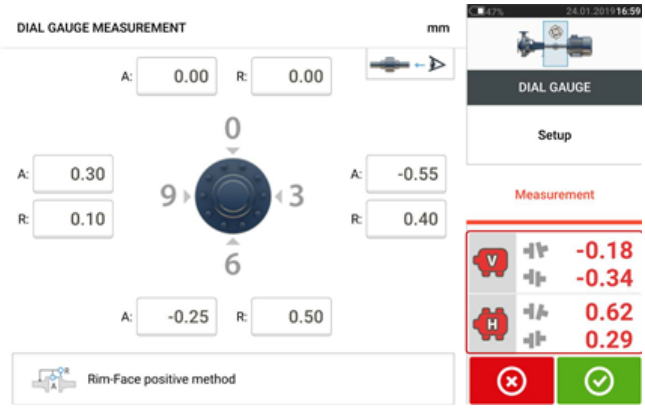


Validity rule

Dial indicator readings are taken at the 12, 3, 6 and 9 o'clock positions. The validity rule states that when shafts are rotated, the sum of the dial indicator readings at the 12 and 6 o'clock a positions must equal that of the 3 and 9 o'clock positions.
TOP + BOTTOM = SIDE + SIDE
The validity rule works because readings are taken around the circumference of a circular object.
If the above is not true, then the measurement should be repeated. The touch device incorporates a functionality used to check the validity rule. If the entered dial gauge measurement values do not conform to the validity rule, the hint "Normalize" appears on the screen.



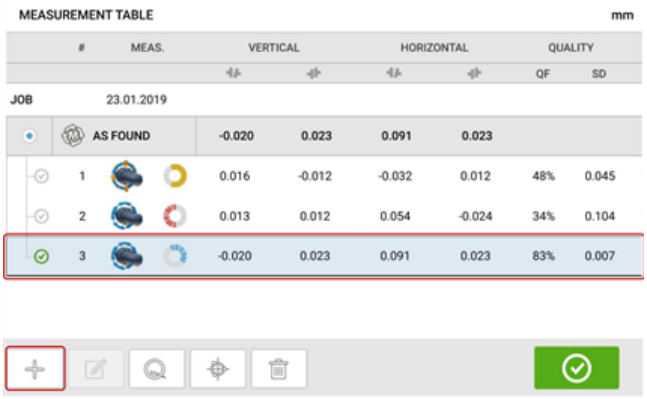
Tap "Normalize" to view the adjusted dial gauge values. The coupling results may also be viewed directly by tapping .



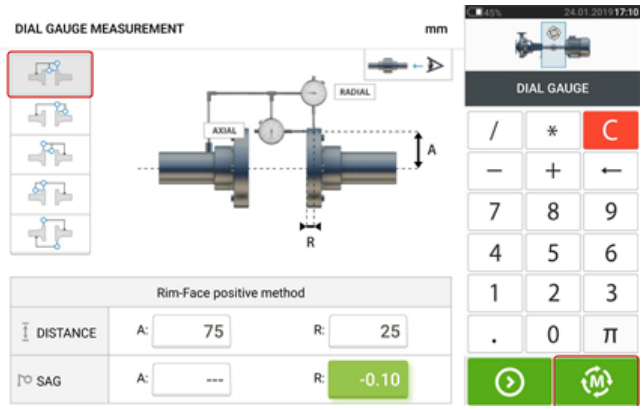
Note
The adjusted dial gauge values conform to the validity rule. The displayed coupling results are not affected by the validation process.

Convert coupling results to dial gauge readings

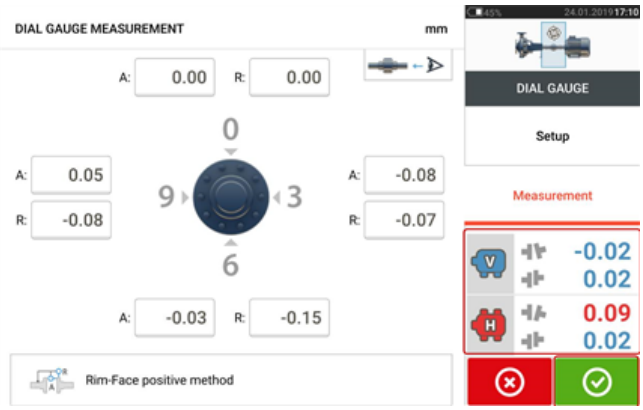
From the measurement table, select measurement whose coupling results are to be converted to dial gauge values.



Tap then tap the option "Convert measurement to dial gauge".
Select the desired dial gauge set-up, then enter the axial (A) and radial (R) dimensions, and the amount of bracket sag.

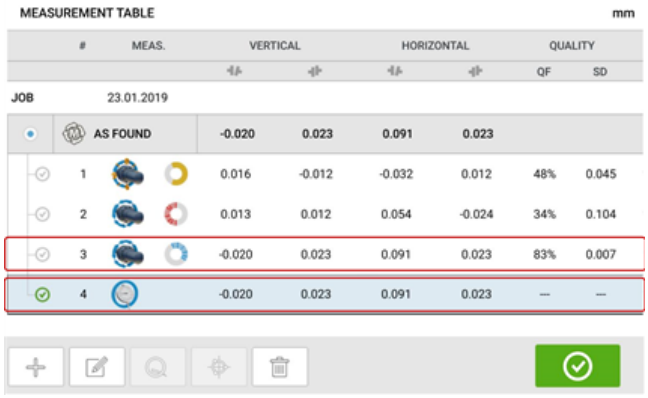


Tap to view the fitting dial gauge values and the corresponding coupling results.



Note
The calculated dial gauge values conform to the validity rule.

This conversion is now listed on the measurement table which is accessed by tapping .



The converted coupling results correspond to those obtained directly using the touch device. The dial gauge measurement entry is identified by the dial indicator symbol next to the entry.

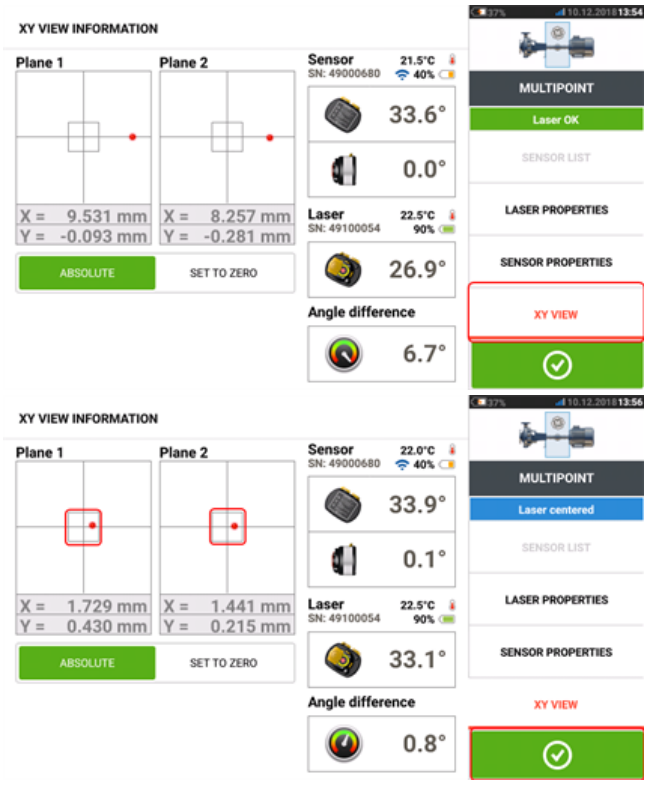
Extend measurement range manually

Measurement range may be extended manually in Multipoint, intelliPOINT and Static measurement modes. 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. During measurement, manual extension is prompted by accessing the XY view before 'Laser End' is displayed.

- If the laser dot (**1**)on the display continues to move further away from the center of the detector screen while rotating shafts to take measurements using either Multipoint or intelliPOINT measurement mode, tap the detector area (**2**) to access the "XY view" screen.

- After accessing the "XY view", use the two yellow laser horizontal and vertical position thumbwheels and adjust the laser dots such that they are positioned inside or very close to the square targets.

> **Note**
> During the laser adjustment procedure, avoid readjusting the sensor.



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

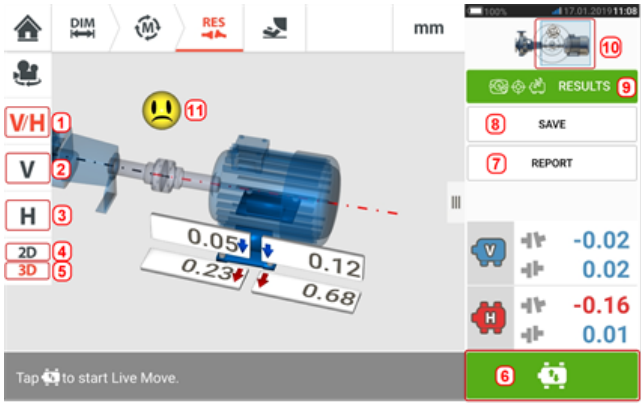
- After rotating the shafts through as wide an angle as possible, tap (**1**) to proceed to results, then

(**2**) to view results.

Note

The colour of the proceed icon [ ] depends on the attained measurement quality.

Results



- **(1)** Displays both horizontal and vertical foot results in 2-D simultaneously
- **(2)** Used to display vertical foot results only
- **(3)** Used to display horizontal foot results only
- **(4)** Used to display foot results in 2-D
- **(5)** Used to display foot results in 3-D
- **(6)** Starts Live Move
- **(7)** Used to generate asset measurement report
- **(8)** Used to save asset measurements in asset park
- **(9)** Used to select results mode
- **(10)** Tapping the slider on the machines icon opens the triple "Train Manager" / "Train Setup" / "Train Fixation" screen
- **(11)** Alignment condition tolerance symbol

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

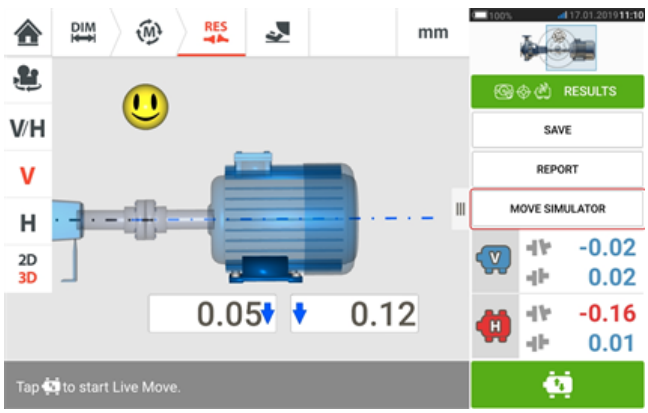
The 2D V and H foot results screens show the vertical (V) and horizontal (H) foot positions respectively.

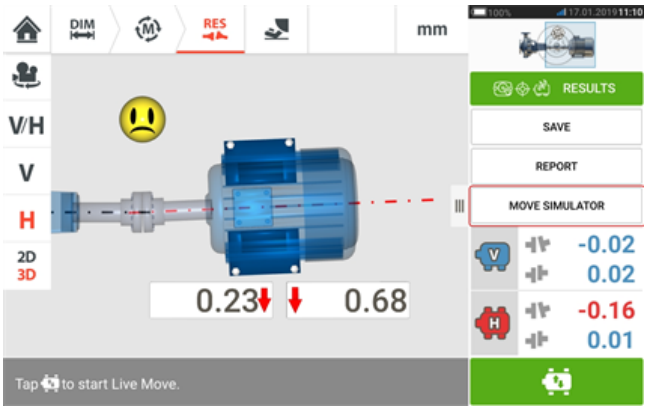
The colors of the bold arrows next to the feet correction values are directly related to the coupling alignment condition as follows:

Blue – excellent [foot should not be moved]

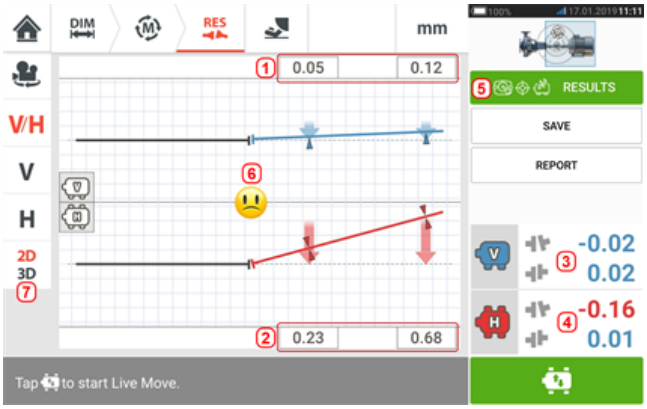
Green – good [if possible foot should remain unaltered]

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





Note
"Move Simulator" is available only with ROTALIGN touch features.



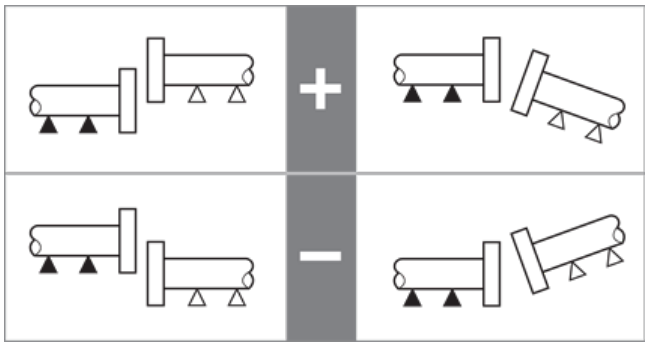
- **(1)** Vertical foot position results
- **(2)** Horizontal foot position results
- **(3)** Vertical coupling results
- **(4)** Horizontal coupling results
- **(5)** Selected results mode
- **(6)** Alignment condition tolerance symbol
- **(7)** Horizontal and Vertical foot results in 2D

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.

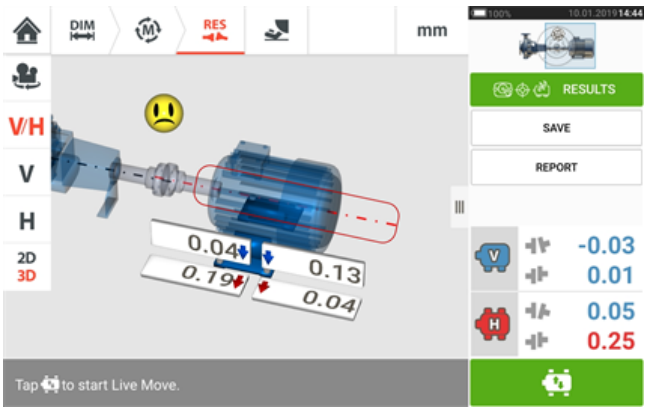
Both vertical and horizontal results show the foot position relative to the centerline of machine designated stationary. Positive values indicate that machine is upwards or away from viewer. Negative values indicate that machine is downwards or towards the viewer.



Multiple feet results

Foot corrections

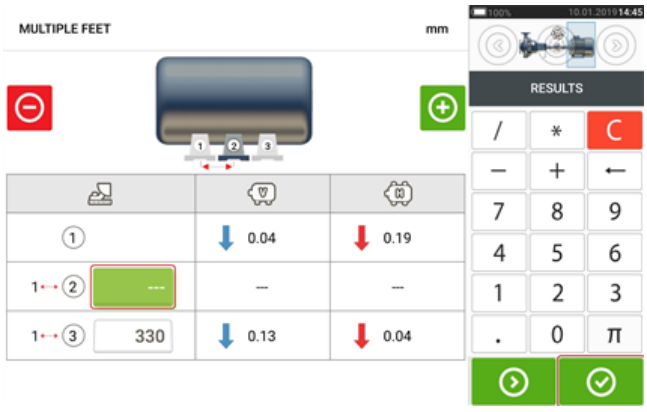
Foot corrections in a multiple feet machine are viewed from the result screen.



Tap the machine centerline to access the results multiple feet screen.

Note
If the machine intermediate feet were already defined within machine properties, then the foot corrections for the intermediate feet will be displayed. In the following example, the intermediate feet has not been defined.

Tap to add any intermediate feet.



Enter the diemnsion between the front feet and the intermediate feet in the row that appears then tap .

The foot correction values for the intermediate feet appear in the corresponding row.

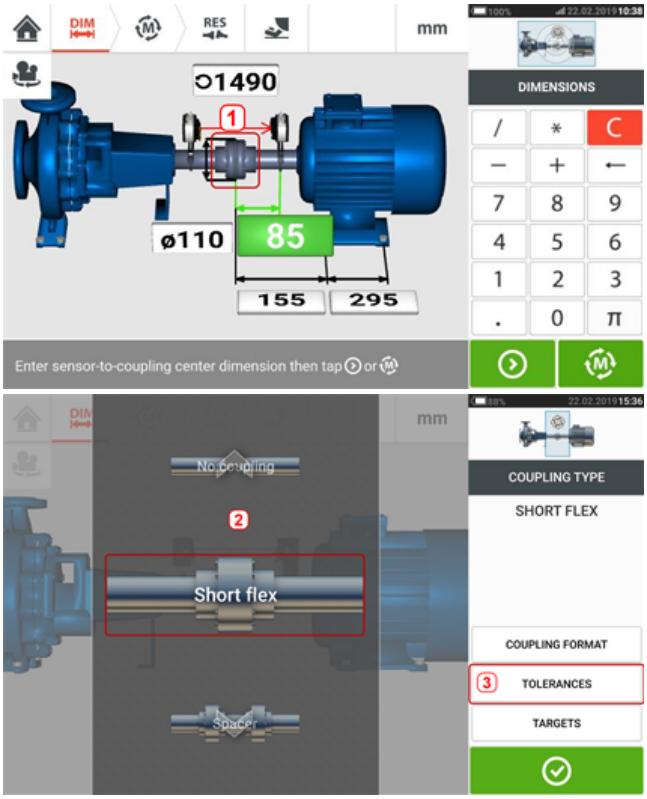
Tolerances

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.

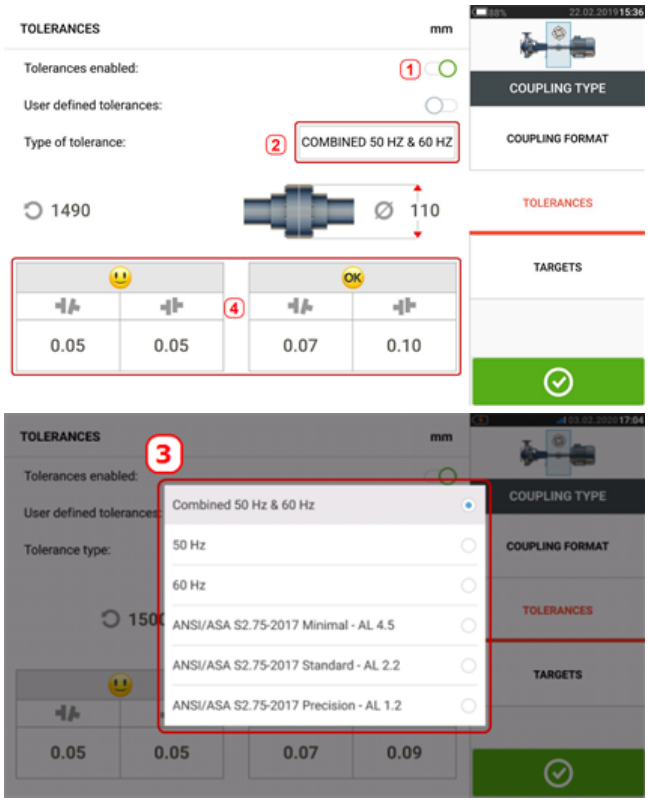
Tolerances are accessed via the dimensions screen.



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.

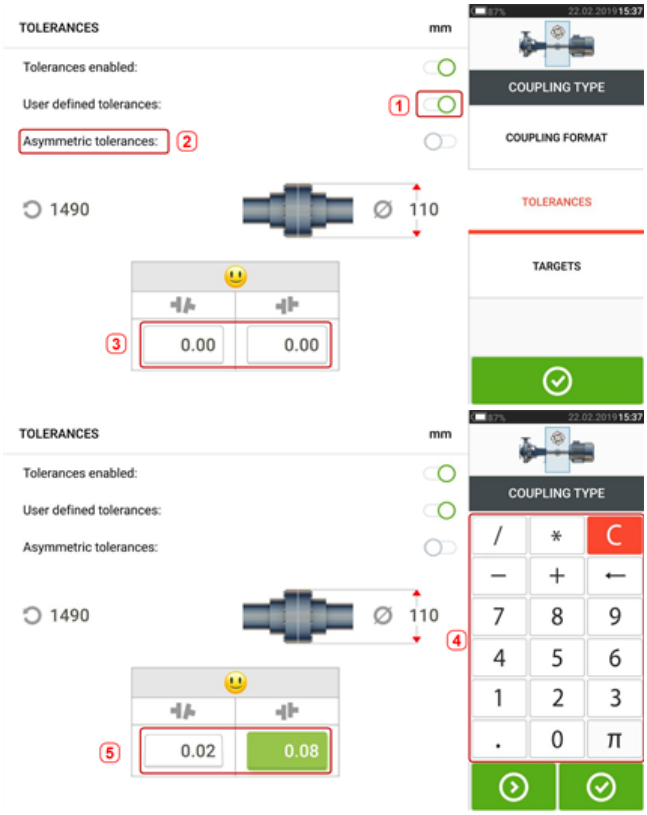


Swipe the icon (**1**) to the right to enable tolerances. Tap (**2**) to select desired type of tolerance. A pop-up menu (**3**) appears showing available tolerances. Tap desired type to display the corresponding tolerance table (**4**).

ANSI standard specification tolerances

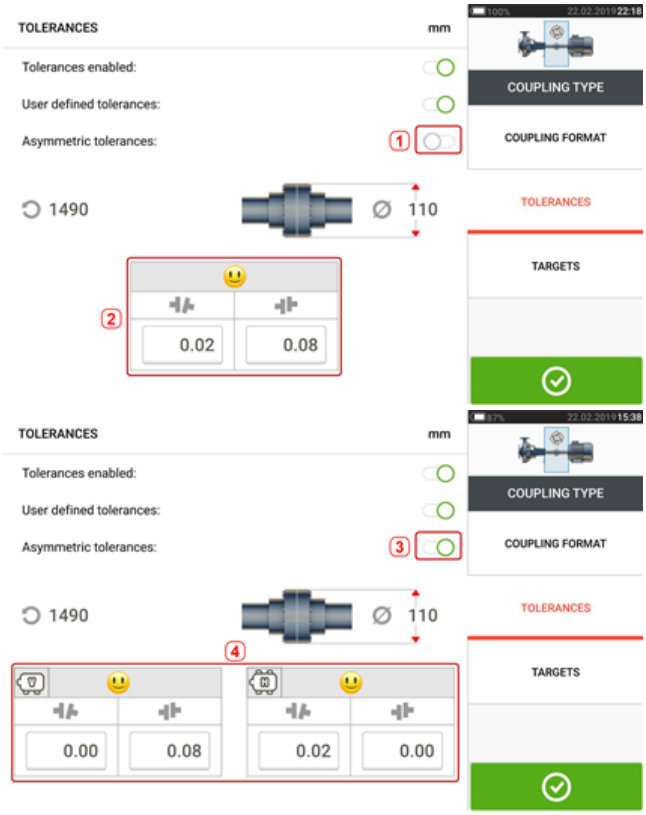
The Acoustical Society of America (ASA) developed shaft alignment tolerances for both short flex and spacer couplings on standard rotating machinery. These tolerances are an approved American National Standards Institute (ANSI) specification, and are grouped into three tiers (minimal, standard and precision).

User defined tolerances



Swipe the icon (**1**) to the right to enable user defined tolerances. Asymmetric tolerances (**2**) can be activated only when user defined tolerances are enabled. In asymmetric tolerances, the tolerance values for the two coupling planes are not the same. Tap (**3**) to edit user defined tolerances using the onscreen keyboard (**4**). The edited values are then displayed (**5**).

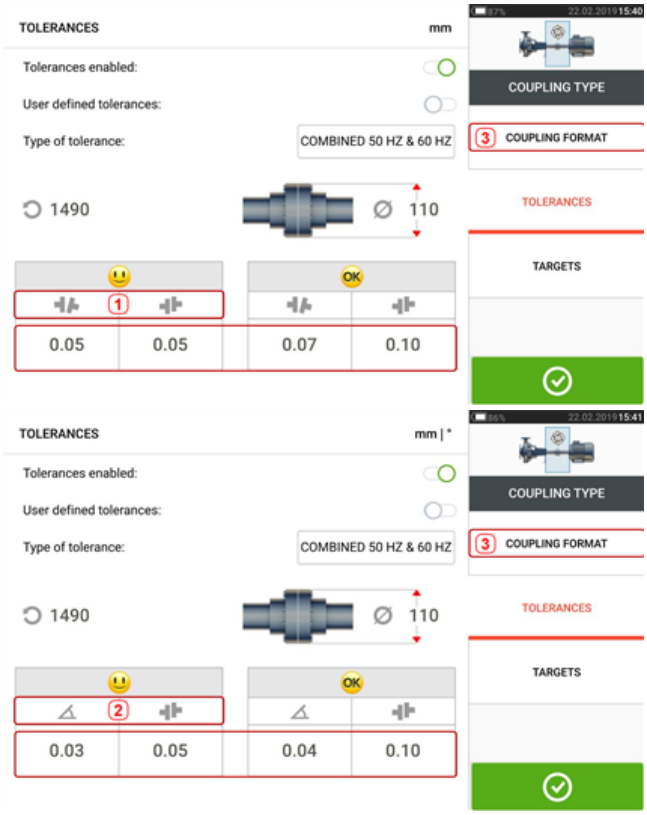
Asymmetric and symmetric tolerances



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

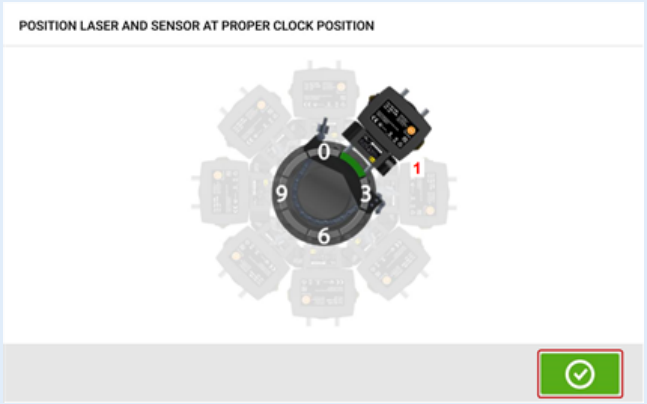


For the same type of tolerance, RPM, and coupling diameter, the tolerances value differ according to the coupling format selected. Coupling format (**1**) is gap/offset for short flex coupling, and (**2**) is angle/offset for short flex coupling. Change coupling format by tapping **3**.

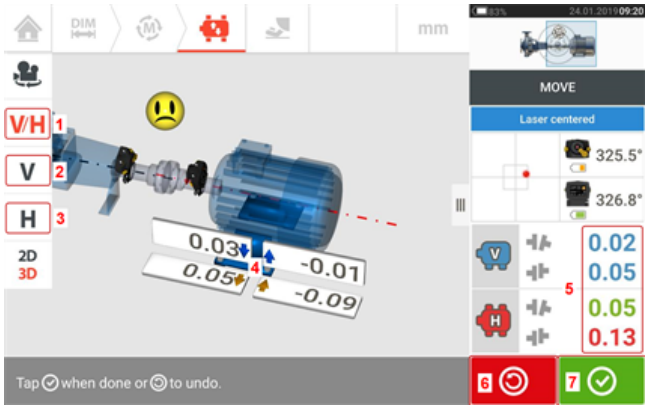
Note
There are no tolerance tables for consolidated spacer shaft coupling formats. Consolidated formats consider the spoolpiece or jackshaft as an extension of either the right or left shaft.

Live Move screen

Note
If Static measurement mode is selected, the Live Move screen is accessed only after the desired 45° clock position **(1)** of the sensor and laser has been selected and confirmed by tapping in the position selection screen that appears.

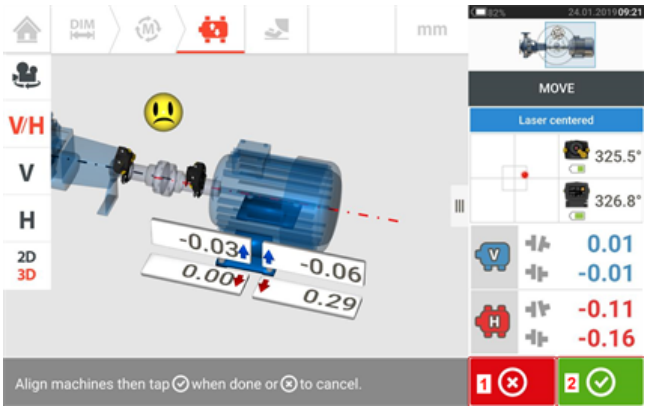


Live Move is monitored in both horizontal (H) and vertical (V) planes simultaneously.



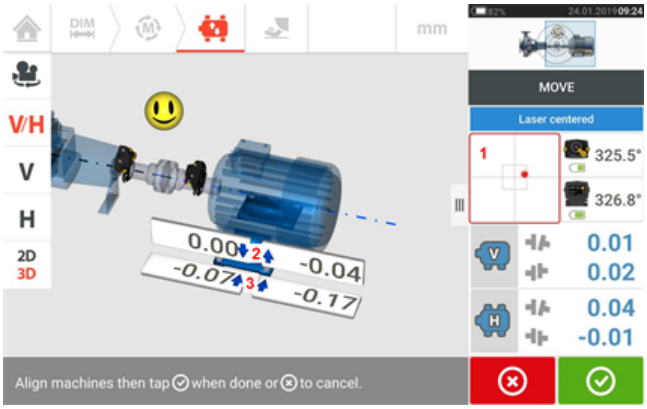
- **(1)** Tap the 'V/H' icon to follow both vertical and horizontal foot corrections simultaneously
- **(2)** Tap the 'V' icon to follow the vertical foot corrections
- **(3)** Tap the 'H' icon to follow the horizontal foot corrections
- **(4)** Arrows indicate direction and magnitude to move machine feet
- **(5)** Tolerance coded gap and offset coupling values
- **(6)** Tapping the 'Undo' icon allows user to re-measure or start Live Move afresh
- **(7)** Tapping the 'Proceed' icon allows user to re-measure or start Live Move afresh

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**.

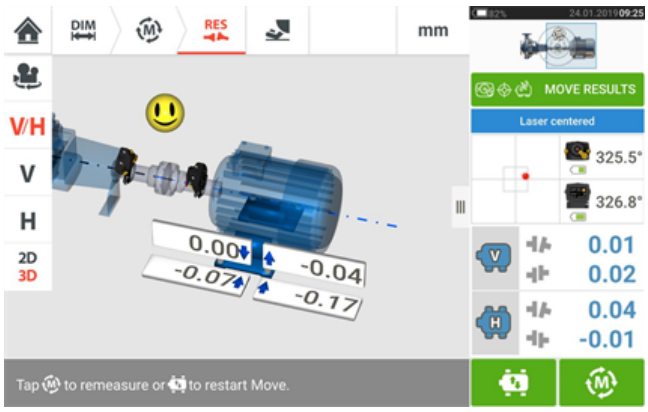
CAUTION
Do NOT attempt to move the machine using heavy sledgehammer blows. This can cause bearing damage, and also produce inaccurate Live Move results. Jack bolts on the feet or other mechanical or hydraulic devices are recommended for moving machines.

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.

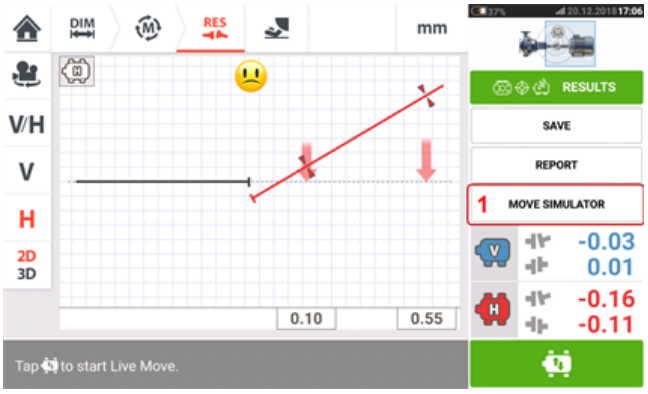
Move simulator

Note
This functionality is available only with ROTALIGN touch features.

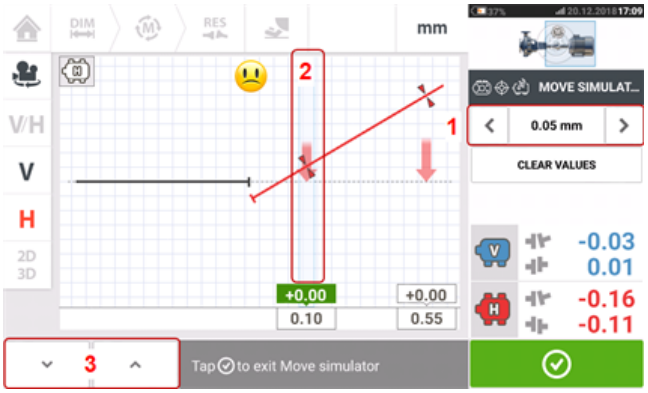
As the name suggests, the Move simulator is used to simulate shim values and horizontal movement corrections that are required to correct the alignment condition. The simulator takes into account the shim thickness available and the amount by which the machines can be physically moved.

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) [**3**] by the movement step value factor. 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 (**1**) above the measured feet values.

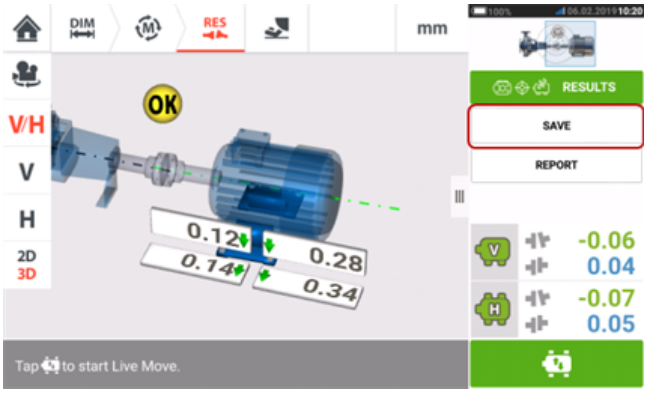
To remove the simulation values, tap 'Clear values' (**2**).

Tap (**3**) to exit the Move simulator.

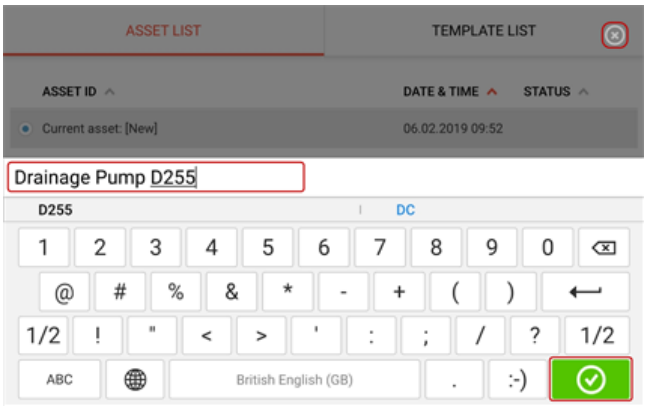
Saving asset measurements

Saving an asset

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 transferred via Cloud or USB to ARC 4.0 the PC software. Asset measurements are saved from the results screen.



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

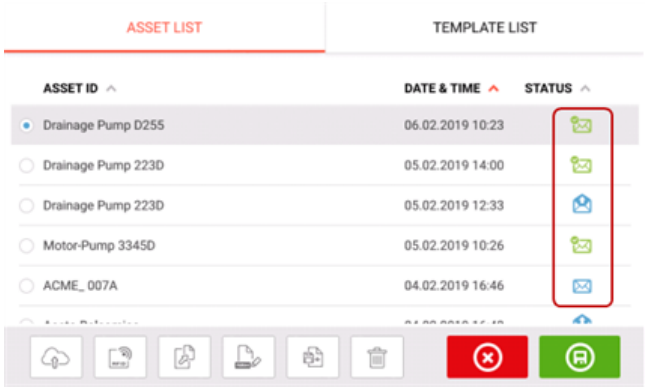


Once asset name has been entered, tap to save the asset under "Asset park". This is the location where asset measurements are saved.

Note

If for any given reason, the asset is not to be saved, tap the cancel icon [ ] to cancel saving.

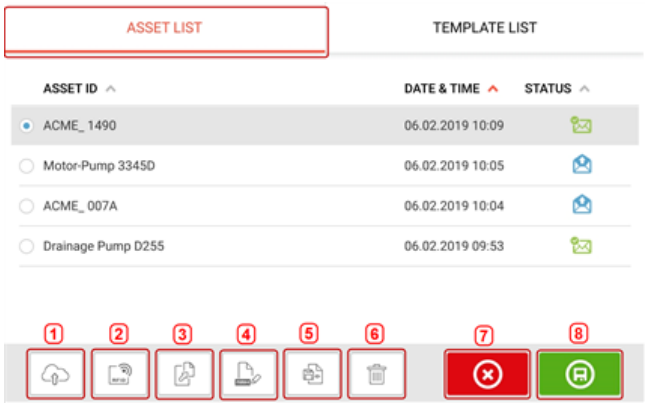
Asset refers to machinery and equipment within a plant. The asset is listed as an Asset ID. Access "Asset park" via the home screen.



The status envelopes indicate whether an asset has been measured or not.

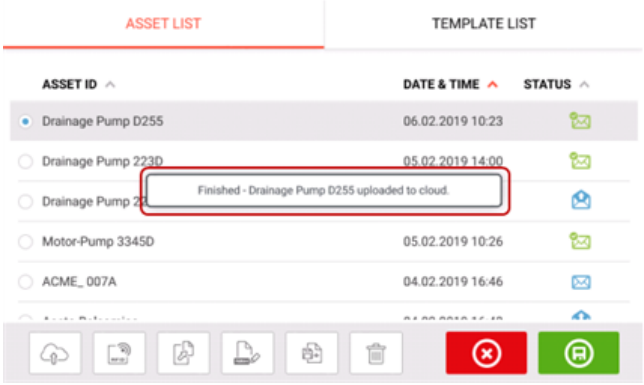
- This icon shows that the asset has been imported from ARC 4.0 but is yet to be opened.
- This icon shows that the asset has been opened but the alignment measurement has not been completed.
- This icon shows that the alignment measurement has been completed.

Asset list options



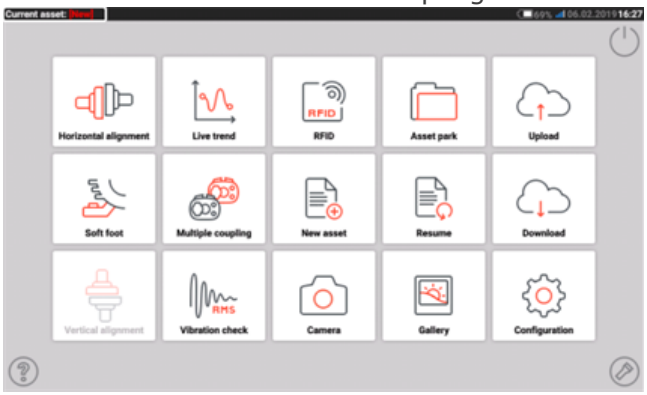
By tapping the respective icon, the following actions may be taken on any selected asset.

- **(1)** Uploads the selected asset to the cloud. Note: The action is completed only if wireless connection is enabled.



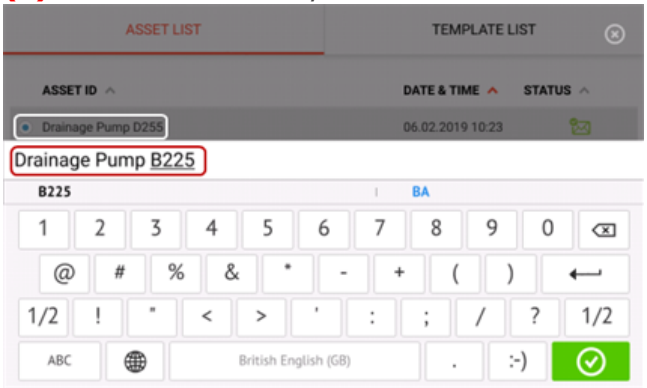
- **(2)** Assigns selected asset to an RFID tag.

- **(3)** Opens the selected asset a new asset. The new asset will be a copy of the selected asset without the sensor-to-coupling center dimension and any asset measurements.



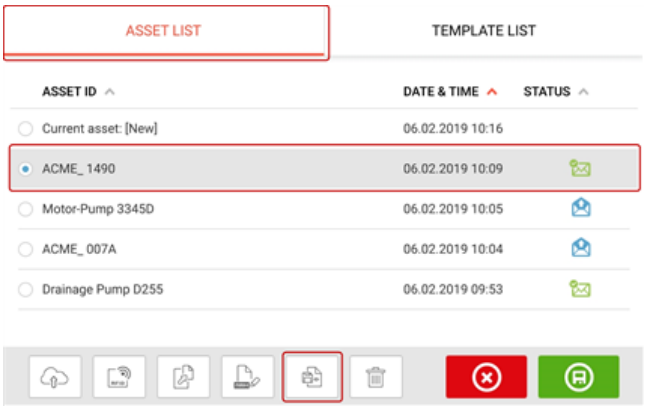
Start desired application by tapping the appropriate icon on the home screen. The new asset opens and may be edited as required.
Assets opened in this manner are used as templates.
This asset is then saved with a new asset name.

- **(4)** Used to edit directly the name of the selected asset.

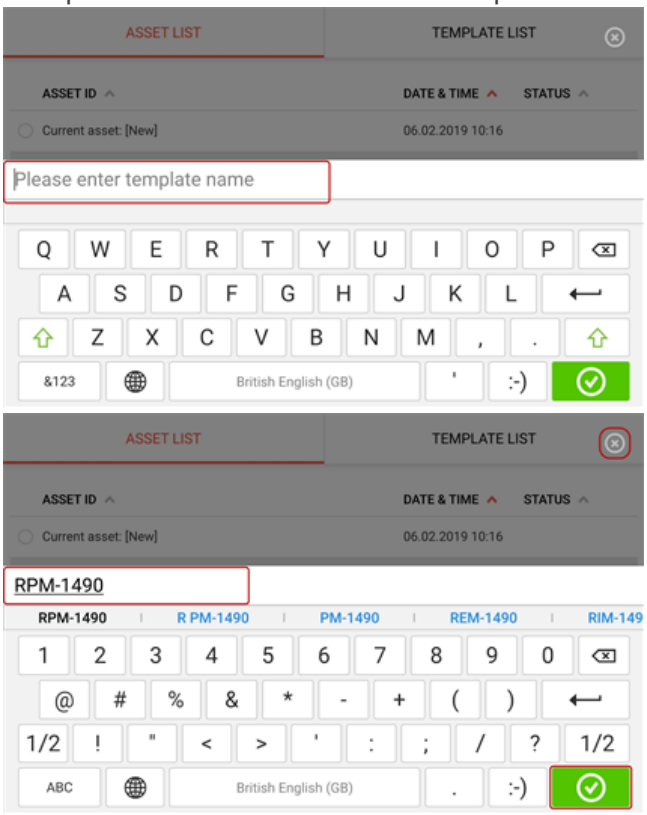


Once completed, tap . The asset will now appear in the asset list with the new name.

- **(5)** Used to create a template.
A template is a file that serves as a pattern for alignment set-ups that are repeated frequently. Their main purpose is to save time by not having to reconfigure the same set-up many times. It can contain all known dimensions (except sensor-to-coupling center), target specifications, thermal growth values, tolerances, preferred measure mode, preferred machine icons and coupling types.
> After an asset has been created and saved, it appears on the asset list.



> Tap to save the asset as a template.

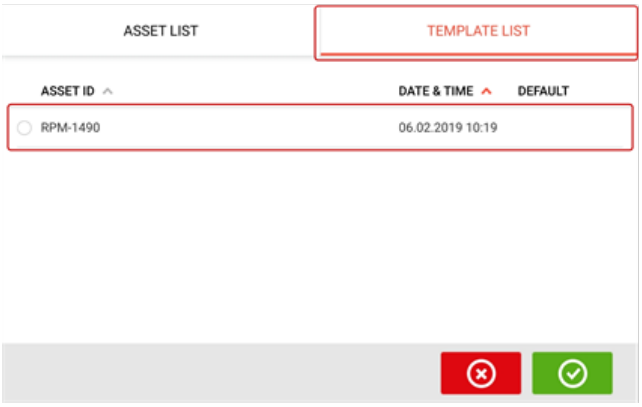


> Enter name of template then tap .

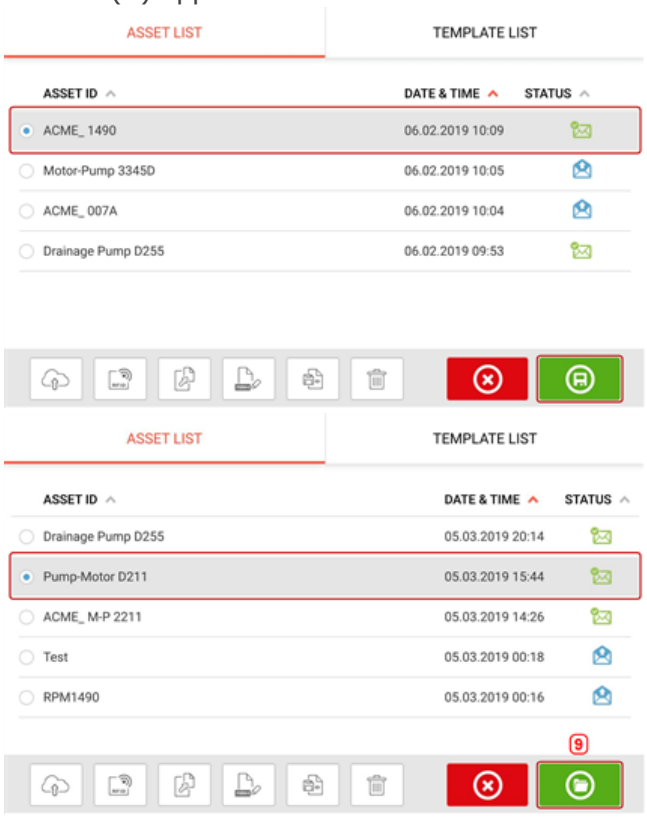
Note

If for any given reason, the template is not to be saved, tap the cancel icon [ ] to cancel saving.

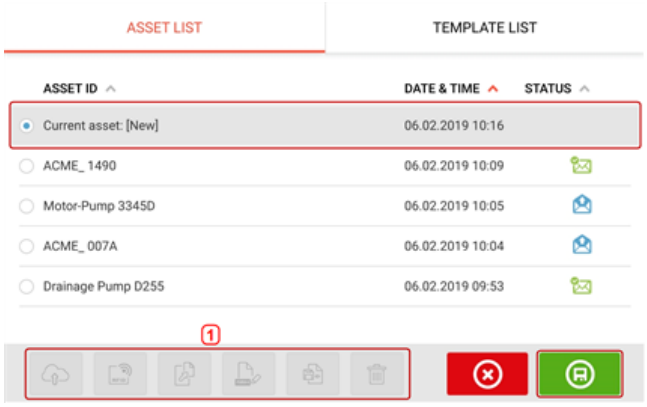
> The created template now appears on the template list.



- **(6)** Used to delete selected asset.
- **(7)** Used to exit the asset list/template list screen and return to the home screen.
- **(8)** This symbol ( ) signifies that the selected asset is open and running in the background. The symbol serves the dual purpose of either opening the selected asset or saving any changes that may have been applied to the asset but not yet saved. If an asset that was previously saved but currently not open is selected, then the symbol (**9**) appears.

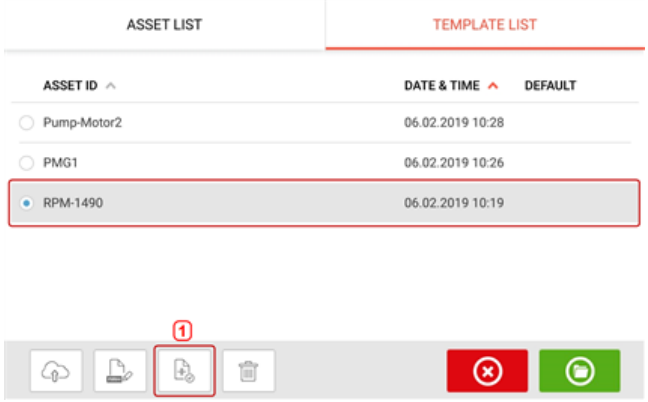


Note
If the selected asset has not been previously saved then all the asset list options (**1**) are inactive.

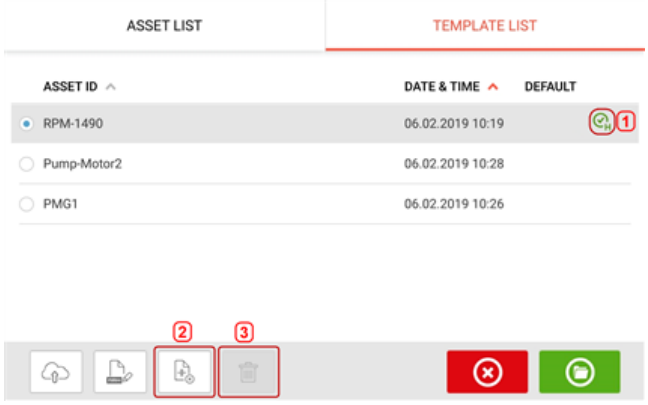


Default template

It may be necessary to define any one template as the default template. The default template will be used whenever a new asset is opened within the home screen.
> All available templates are listed on the template list.



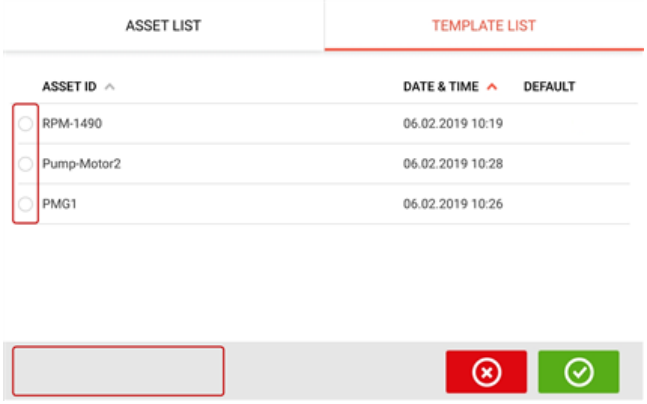
> Select template to be designated as default, then tap (**1**).



> The default template now appears on the template list with a check mark (**1**).

> To revert the default template to a normal template, tap (**2**).
> **Note:** The designated default template cannot be deleted (**3**). To delete it, it must first be reverted to a normal template.

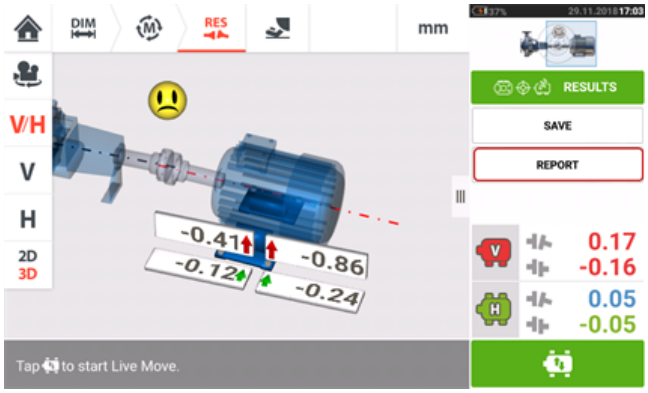
Note: If no template is selected, all template list options are unavailable.



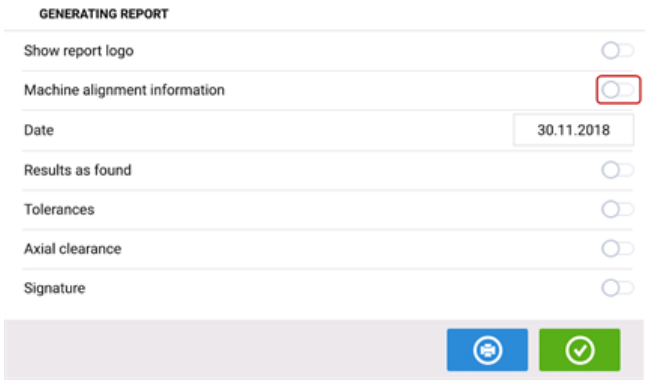
Generating reports

Generating measurement reports

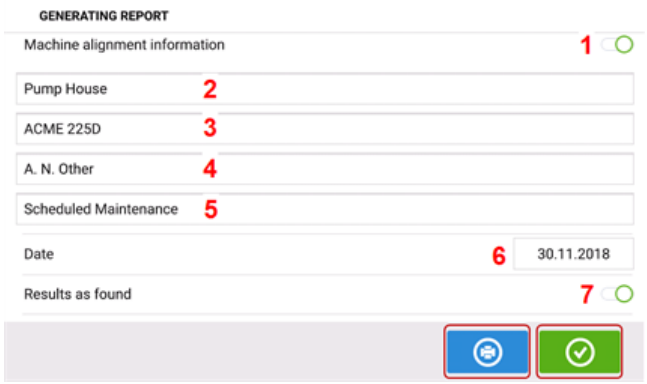
Asset measurement reports may be saved directly from the system as a PDF to a USB storage device. The USB storage device is connected to the touch device via the USB port. Measurement reports are generated from the results screen.



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



If not yet done, tap the icon to activate "Machine alignment information". Once activated, enter the necessary information using the onscreen keyboard. If desired, the items "Show report logo", "Results as found", "Tolerances", "Axial clearance" and "Signature" is activated by tapping their respective icon .



- **(1)** "Machine alignment information" activated
- **(2)** Location where asset is positioned

- **(3)** Asset (Machine) ID
- **(4)** Name of operator
- **(5)** Any other machine relevant notes
- **(6)** Date is set automatically
- **(7)** In this case, "Results as found" has been activated

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

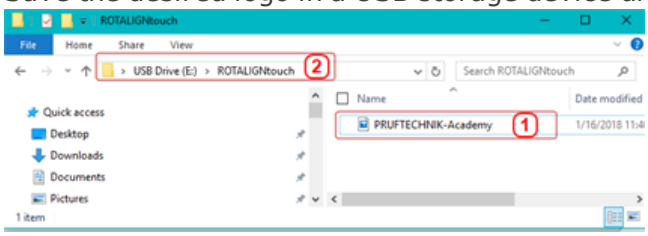
Note
If a USB storage device is not connected to the touch device, the generated PDF report is saved together with the asset and may be accessed via the software platform ARC 4.0 in "Asset Attachments".

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

Report logo

The desired report logo must initially be saved within the touch device before it can be added to the measurement report.
Note: Adding a new logo to the report logo gallery is only possible if the item "Show report logo" is activated.

- Save the desired logo in a USB storage device under the folder "ROTALIGNtouch".

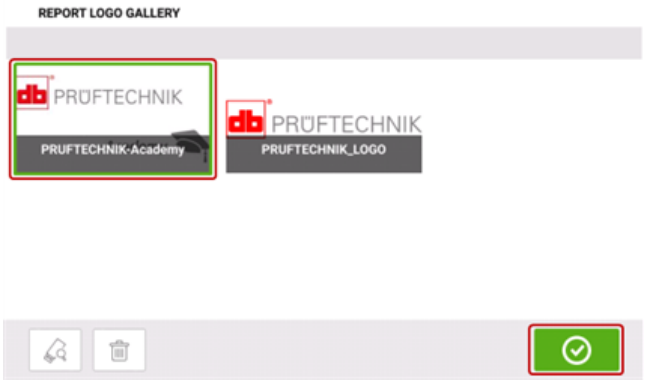


- Connect the USB storage device to the touch device USB port and then tap the "Add report logo" icon . The report logo gallery opens.

- Tap to browse the connected USB storage device.
Note: The delete icon remains inactive as the default logo (PRUFTECHNIK_LOGO) cannot

be deleted from the gallery.

- With the USB storage device displayed, tap the desired logo and then tap .

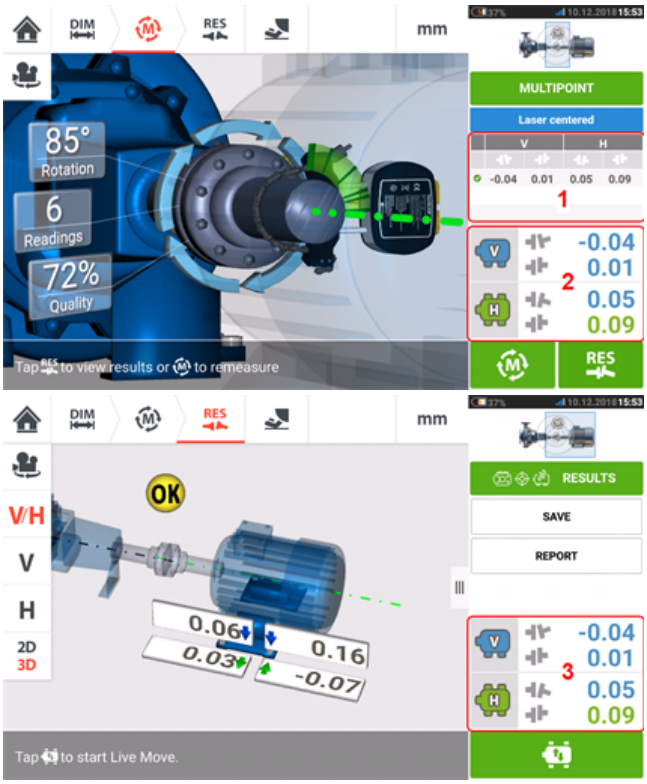


Note: The delete icon is active. In this case, the added logo can be deleted from the gallery.

- From the report logo gallery, tap the desired logo and then tap . The selected logo will now appear on the PDF measurement report when "Show report logo" is activated.

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.

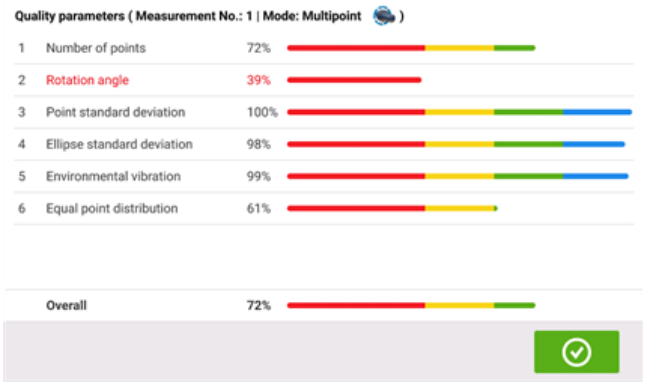
The "AS LEFT" coupling result **(16)** shows the alignment condition measured after Live Move. The displayed result could be an average of selected measurements. In the following table, the "AS LEFT" coupling result is the average of measurements numbers 1 and 2.

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.

Measurement quality

Measurement quality is depicted using the following colour codes:
Blue – excellent; Green – acceptable; Yellow – not acceptable; Red – poor

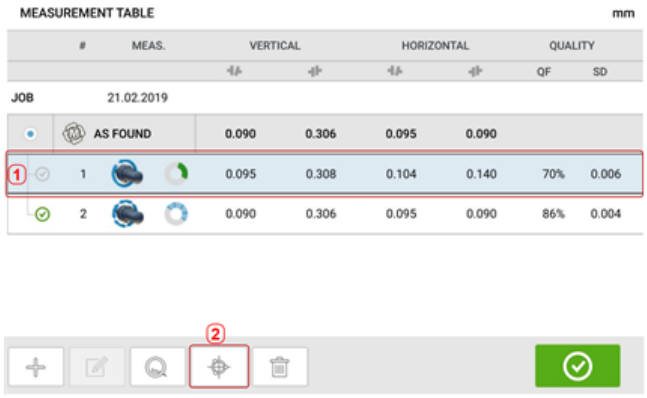
Measurement quality is based on the following measurement and environmental criteria:

- Rotation angle – the angle through which the sensor and/or shaft is rotated during measurement
- Ellipse standard deviation – the root mean square deviation of the measurement points on the calculated ellipse
- Environmental vibration – the level of external vibration e.g. from neighbouring running machine(s)
- Rotation evenness – the smoothness of the measurement rotation e.g. if there is any friction during the rotation that 'jerks' the shaft
- Angle rotation inertia – abrupt changes in the measurement rotation speed e.g. releasing and re-applying a break during the rotation
- Rotation direction – change in the measurement rotational direction
- Rotational speed – how fast the sensor and/or shaft is rotated during measurement
- Filter output – the amount of measurement data filtered out

Editing measurement data

Note
This functionality is available only with ROTALIGN touch features.

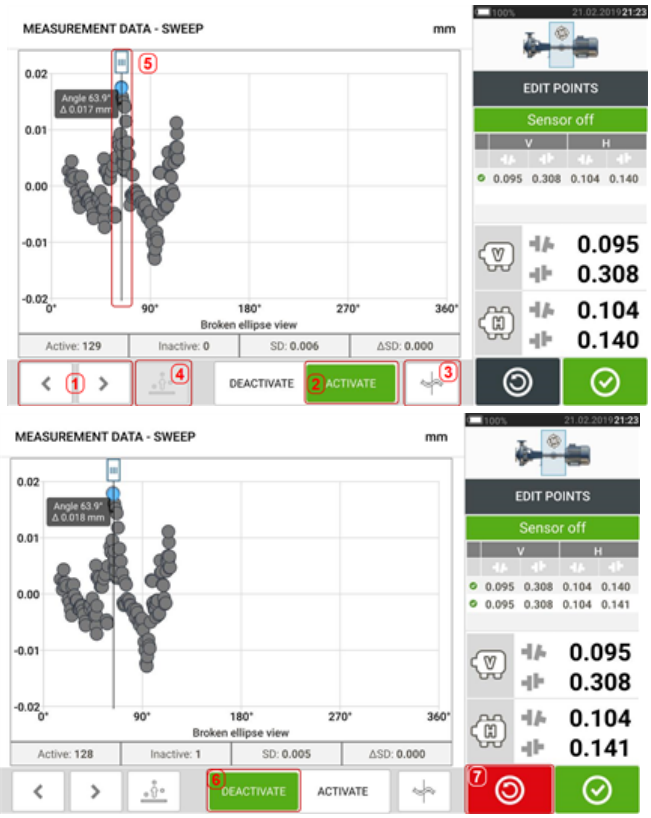
To improve the quality of the alignment results, it is possible to edit measurement data that could have been affected by external circumstances such as bracketing touching piping arrangement. The editing options are accessed via the **measurement table**.



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

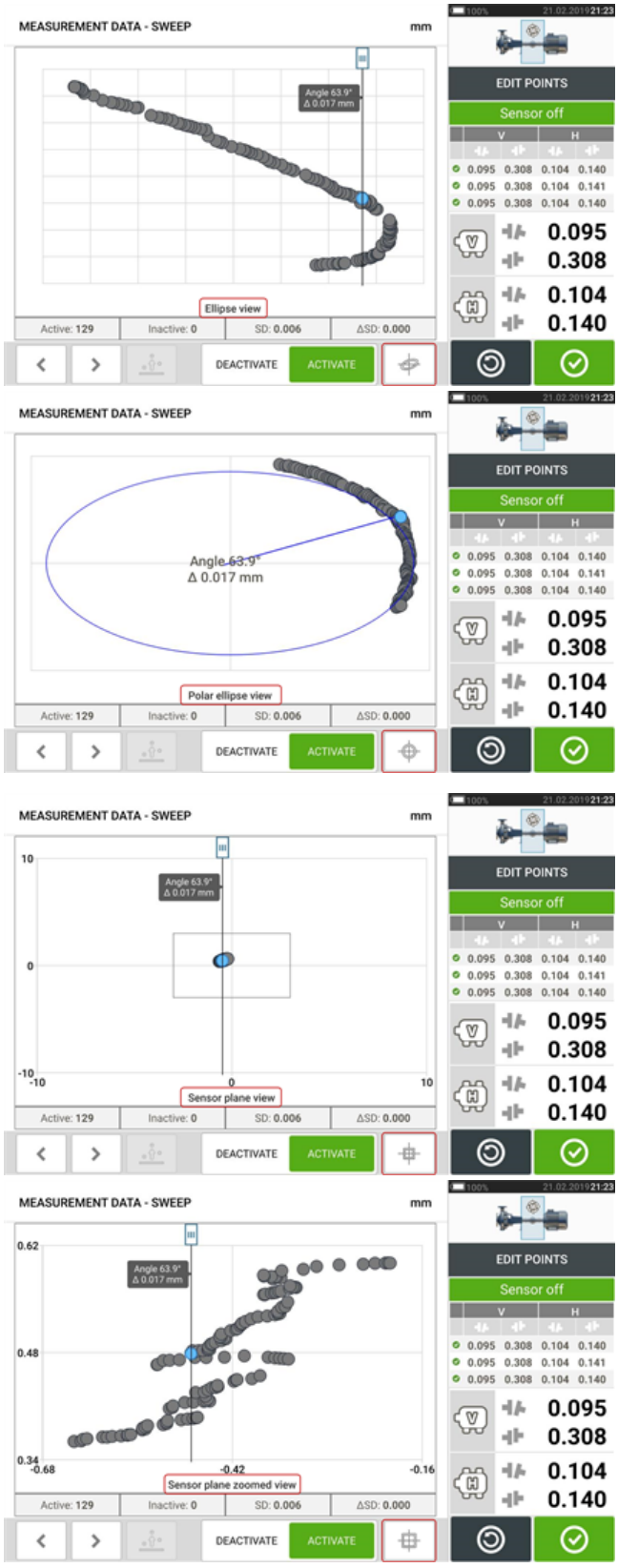
Broken ellipse

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.

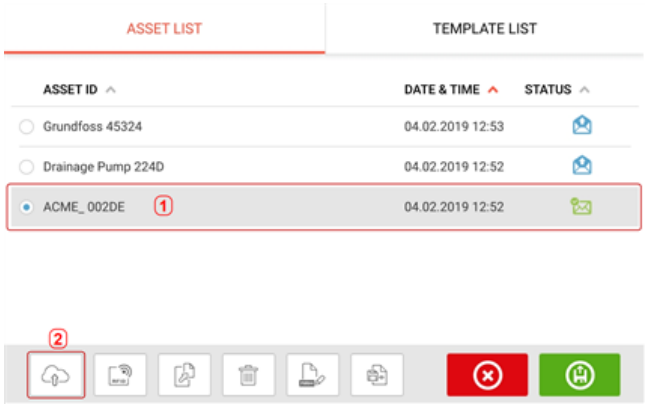
Using Cloud drive

To set up the PRÜFTECHNIK Cloud drive, an ALIGNMENT RELIABILITY CENTER 4.0 (ARC 4.0) licence is required. The Cloud drive allows the sharing of up-to-date asset measurements from different devices via the PC software ARC 4.0.

Note
Wireless connection between the ruggedized tablet touch device and a network must be established to enable assets to be transferred via ARC 4.0.

Transferring an asset to the Cloud drive

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

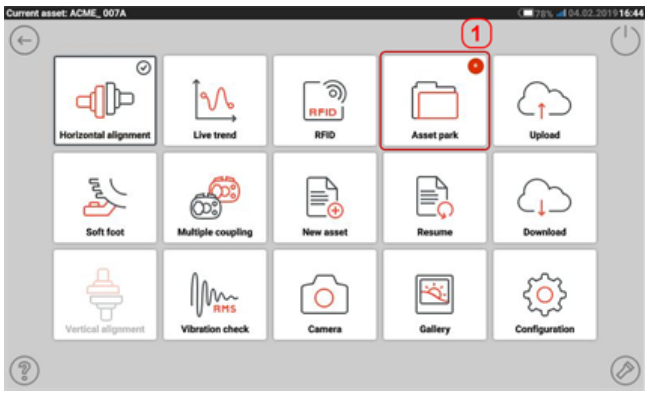


Tap the "Upload" icon (**2**) The asset appears in ARC 4.0 "Exchange" view with the status "complete". Drag and drop the asset in its appropriate location on the Cloud drive.

Downloading an asset from Cloud drive

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

From the touch device home screen, tap the "Download" icon . The selected asset appears in the asset park (**1**).



Tap the "Asset park" icon to open the asset in the ruggedized tablet touch device.

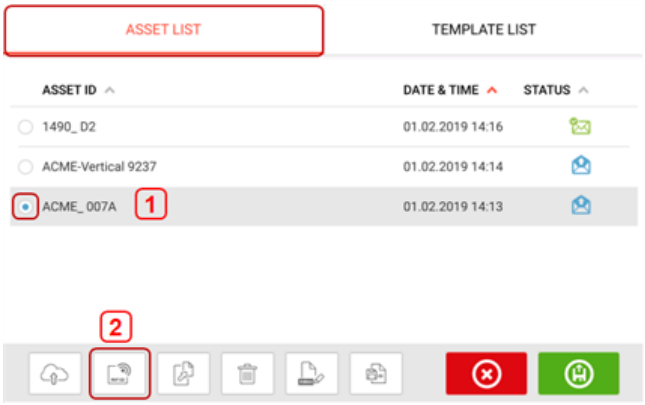
RFID

The touch device uses this automatic identification technology to perform the following:

- Identify assets to be aligned
- Enter corresponding assets directly into the device
- Store data and results under the correct asset automatically

Assigning a saved asset to an RFID tag

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



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

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

- **(1)** Near Field Communication (NFC) module marked with RFID symbol

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

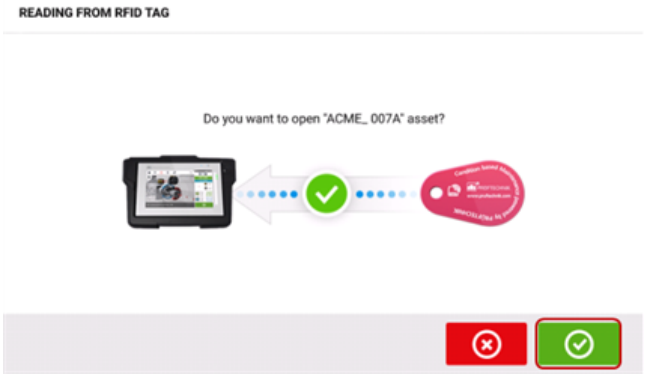
Tap to exit the screen.

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

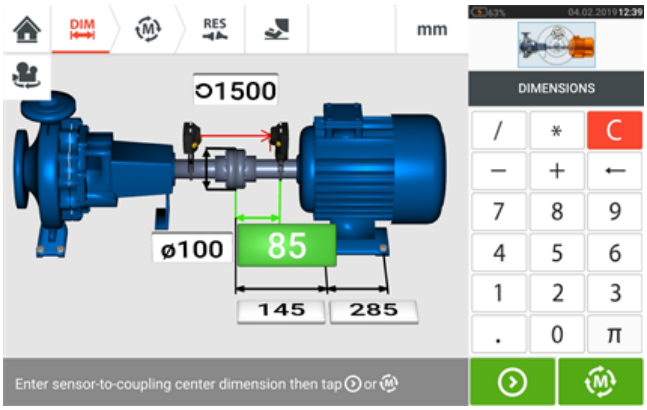
Opening an asset measurement assigned to an RFID tag

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

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



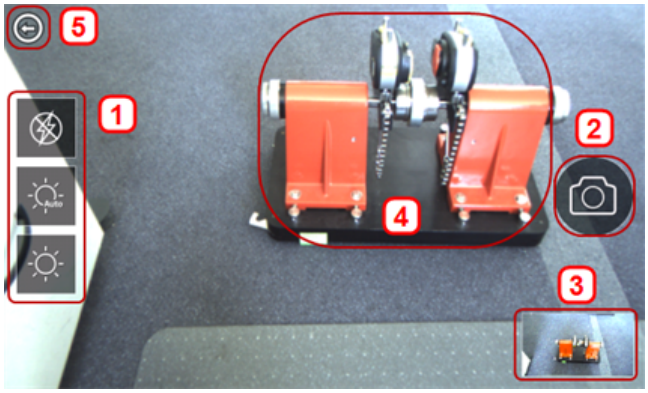
Tap to open the asset measurement.



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

Built-in camera

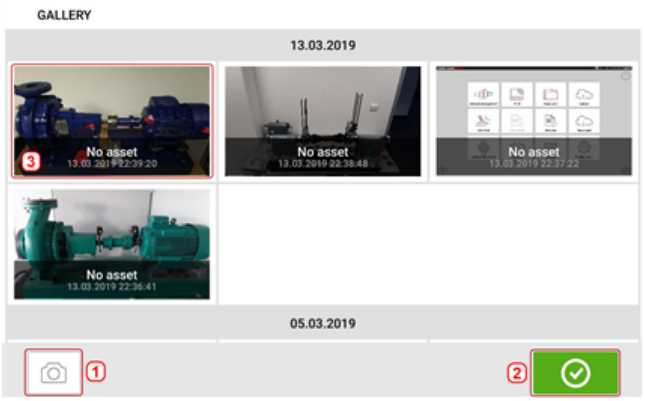
The built-in camera is an optional functionality. Tap the 'Camera' icon to access the function.



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. All images taken using the touch device are saved at this location.
- **(4)**Object to be photographed
- **(5)**Tap to return to home screen.

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 the touch device

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 be viewed in the gallery.

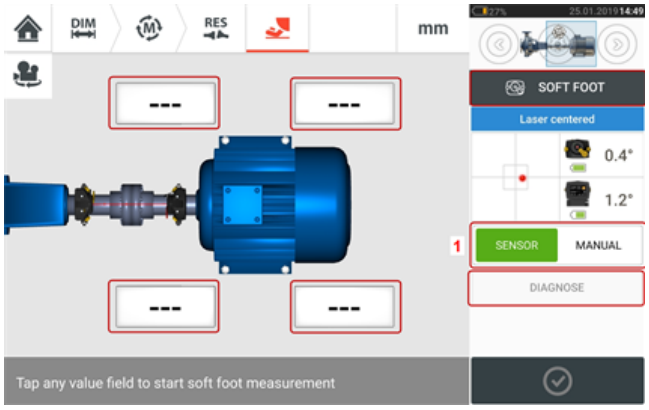
Note
Images saved to the gallery may only be transferred to a PC if assigned to an asset. Before taking the desired photo or screenshot the corresponding new or existing asset must be opened. The captured image may then be transferred to the PC software ARC 4.0.

Soft foot

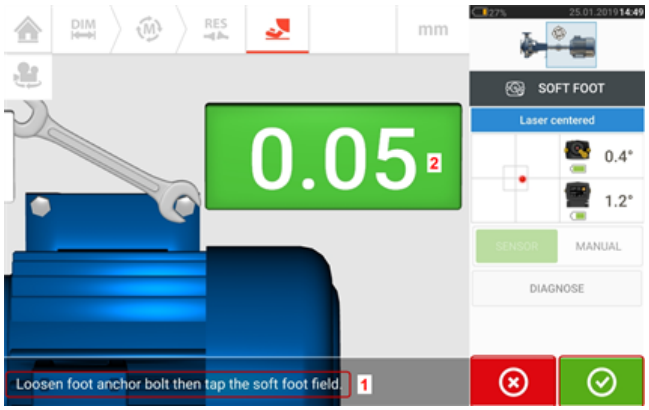
Soft foot measurement can be started from any screen where the 'Soft foot' icon [ ] is active. Tap to start soft foot measurement. The values may be determined by sensor measurement or entered manually from values established using manual methods such as feeler gauges and shims.

Sensor measurement

Activate sensor measurement by swiping the green button **(1)** to "Sensor". The laser beam must have the status "Laser centered" or "Laser OK". Refer to laser beam adjustment.

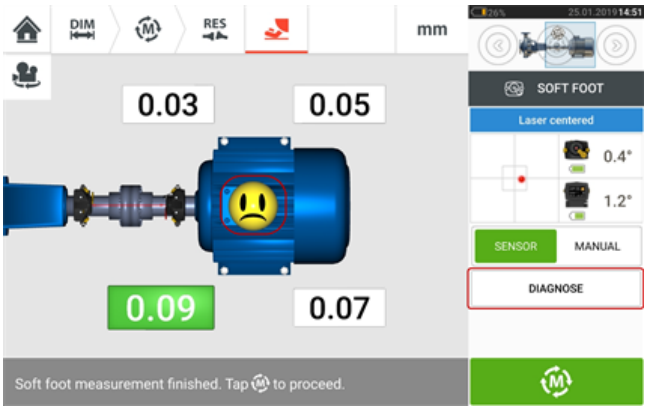


Tap any one of the four pulsating value fields to start soft foot measurement at the respective machine foot.



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 or recorded value **(2)**, then tighten the bolt (see hint **1**). 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, the item 'Diagnose' is active. Tap 'Diagnose' to start the soft foot wizard which guides the user through diagnosis and correction of soft foot.

Note
The set soft foot tolerance may be displayed by tapping the smiley within the machine.

Manual entry

Manual entries are made by first swiping the green button to "Manual". Manual entries are signified by the finger icon on the display.

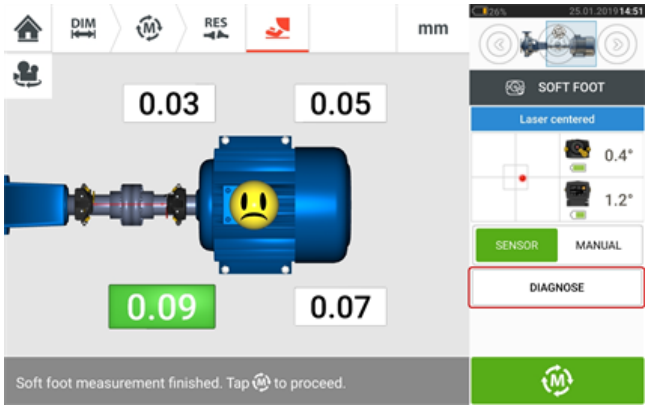
Tap any one of the four pulsating value fields then proceed to enter the soft foot value at the respective machine foot using the onscreen keyboard.

Repeat the procedure for all four feet positions.

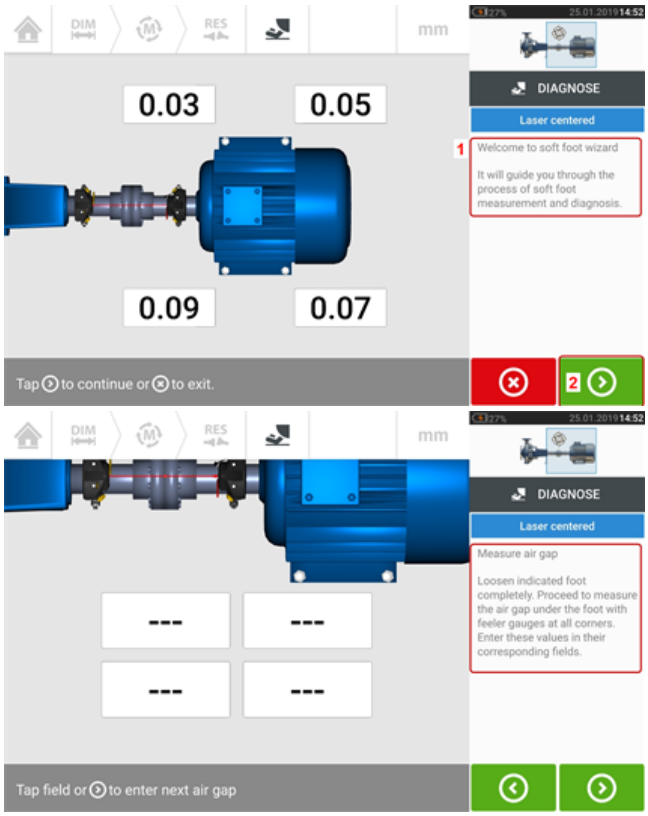
If necessary, diagnosis may be carried out using the soft foot wizard.

Soft foot wizard

Note
This functionality is available only with ROTALIGN touch features.



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. Follow the wizard instructions carefully. Hints on the type of soft foot detected and the suggested action will be displayed.

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.

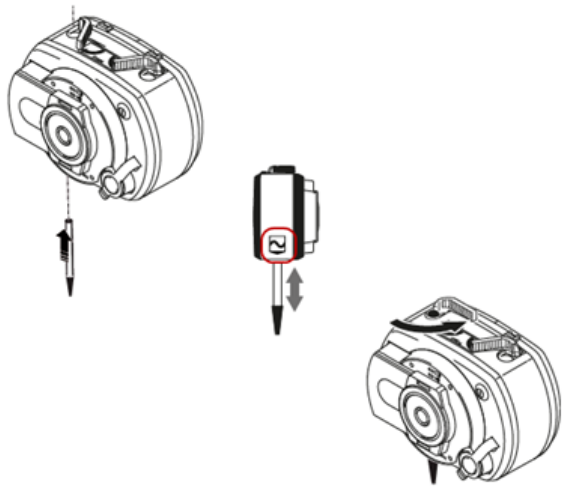
Tap to return to the soft foot measure screen. Measure soft foot again to check whether soft foot has been eliminated.

Simple vibration check

If desired, the vibration velocity of any asset may be measured. Note that the measured value is not based on any known or standard vibration norms but is a simple indication of any vibration that may be prevalent while the asset is in operation.
This simple measurement is carried out using the touch device, sensALIGN 7 sensor and the vibration check probe.

Note
Vibration check is possible only when using the intelligent sensALIGN 7 sensor.

Applying the vibration check probe



Insert the probe in the sensALIGN 7 sensor hole with a countersink such that the black base of the probe tip rests firmly on the sensor housing. Use the clamping lever to lock in the probe. Switch the sensor on by pressing its On/Off push button switch.

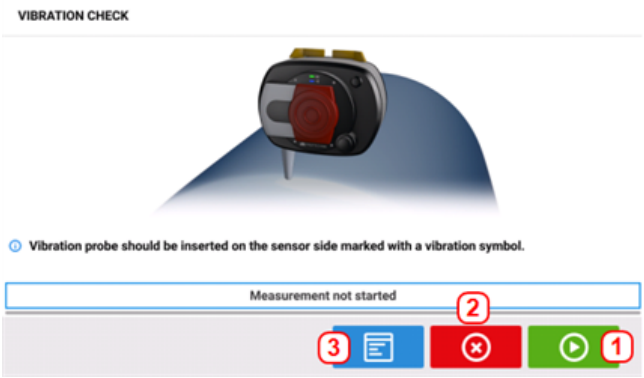
Open or create a new asset then tap the "Home screen" icon.

Tap the "Vibration check" icon to access the vibration measurement screen.

Taking measurement

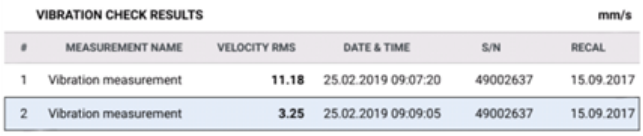
With the probe securely locked in, place it on the appropriate measurement location while holding the sensor firmly.

WARNING
Exercise CAUTION when carrying out vibration measurement using the vibration check probe.



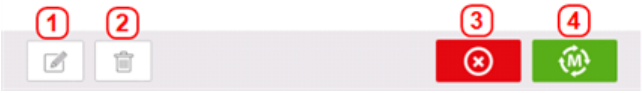
- **(1)** Used to start measurement
- **(2)** Used to exit the vibration check application
- **(3)** Used to open the "Vibration check results" screen

Tap to start measurement. Hold the sensor firmly until measurement is completed. The time taken depends on the severity of the vibration, and can take up to 15 seconds. Once a measurement is completed, the "Vibration check results" screen opens displaying the measured velocity rms value.



VIBRATION CHECK RESULTS mm/s

#	MEASUREMENT NAME	VELOCITY RMS	DATE & TIME	S/N	RECAL
1	Vibration measurement	**11.18**	25.02.2019 09:07:20	49002637	15.09.2017
2	Vibration measurement	**3.25**	25.02.2019 09:09:05	49002637	15.09.2017



- **(1)** Used to edit the name of the measurement if desired
- **(2)** Used to delete undesired measurement values
- **(3)** Used to exit the vibration check application
- **(4)** Used to remeasure

Note
Measurement name may also be edited as required by tapping the name then using the onscreen keyboard.

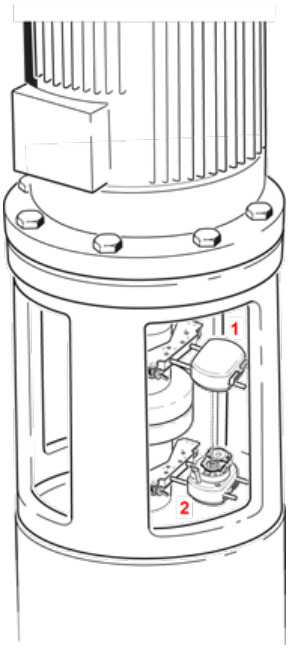
Vertical flanged machines

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. The touch device calculates the shimming thickness for each flange bolt.

Offset is corrected by positioning the flange laterally.

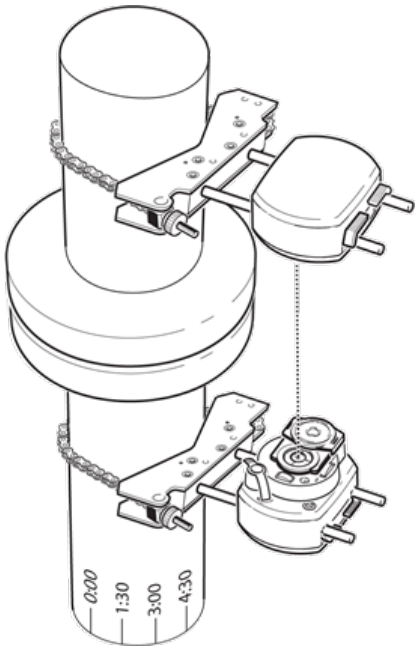


- **(1)** Sensor
- **(2)** Laser

The laser and sensor are mounted on either side of the coupling as for horizontal machines, with the 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 and vertiSWEEP.

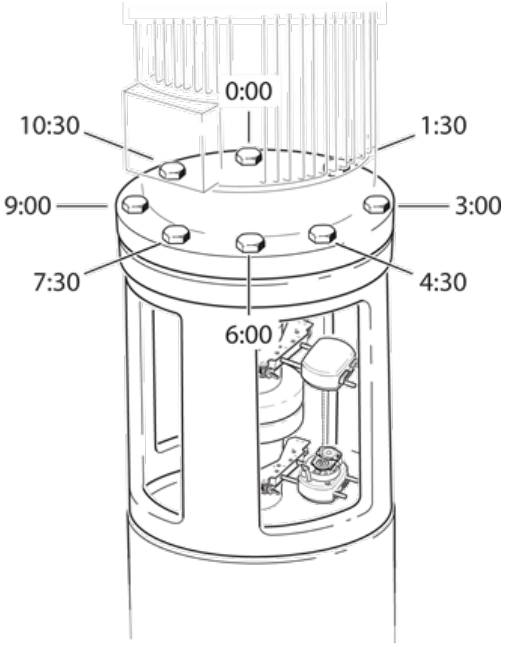
Marking measurement positions

For Static Clock measurement mode, the eight 45° measurement positions used with these procedures must be marked accordingly on the machine.



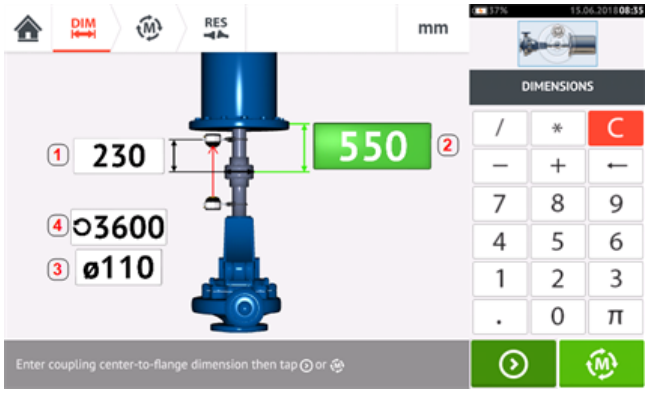
- Mark a reference position on the coupling housing close to the shaft and in line with a convenient external reference or flange bolt. Likewise, mark a reference point on the shaft.
- Measure the circumference of the shaft and divide by eight.
- Use this distance to make seven more evenly-spaced marks 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.

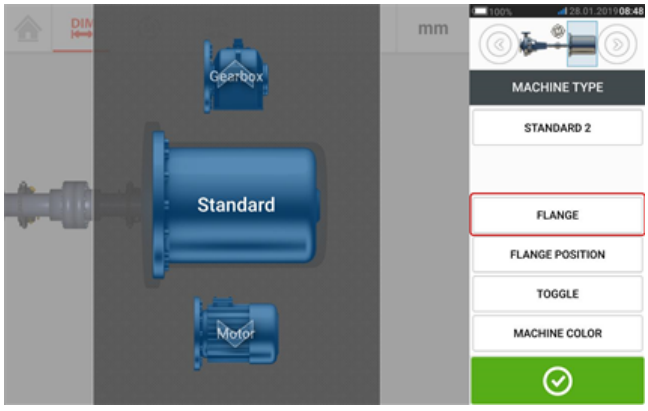


Set-up

- Mount the laser and the sensor on either side of the coupling, ensuring that they are aligned exactly with the 0 or reference mark.
- Switch the touch device on, then tap in the home screen to start the vertical alignment application.
- Configure the machines as appropriate by tapping the machines and coupling to select the desired machine type or coupling from the respective carousel.
- Enter the following required machine dimensions:

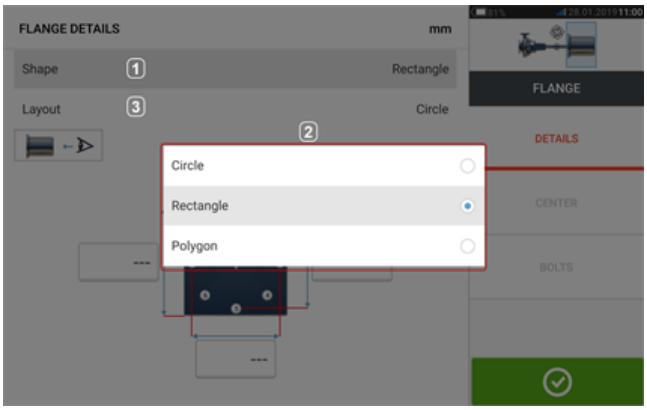


  - **(1)** Sensor to coupling center
  - **(2)** Coupling center to flange
  - **(3)** Coupling diameter
  - **(4)** RPM
- When entering machine dimensions, the flange geometry must be taken into account. Tap the flange-mounted machine.

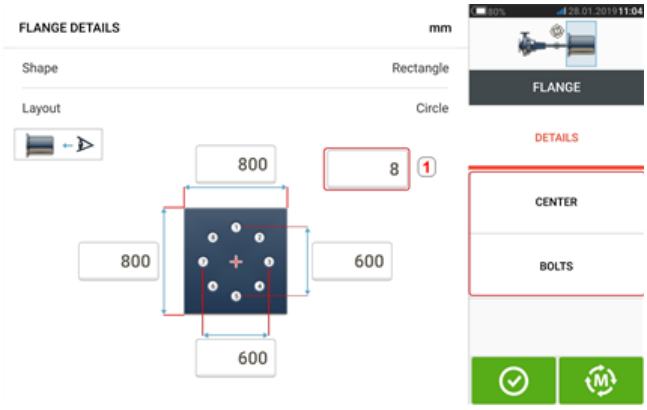


The menu items on the screen may be used to edit machine name, access the "Flange details" screen, change the flange position with respect to the shaft, flip the machine along the shaft axis (toggle) and edit machine color.

- Tap 'Flange' to access the "Flange details" screen where the flange may be edited.



- Tap the 'Shape' area [**1**] to select the shape of the flange from the pop-up 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 pop-up 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 entering the dimensions, tap the displayed flange area to close the onscreen keyboard.



Note: The menu items 'Center' and 'Bolts' are active in only ROTALIGN touch features level.

'Center' is used to define the exact location of the center of the shafts and is expressed in X,Y coordinates.
'Bolts' is used to define the exact position of the bolts on the flange, which are also expressed in X,Y coordinates.

- After all the required dimensions have been entered, tap to proceed with measuring.

The following measurement procedures are available for vertical flanged machines:

"Vertical flanged machines – vertiSWEEP" on page 131 (default measure mode for ROTALIGN touch features level)

"Vertical flanged machines – Static clock" on page 134 (available measure mode for OPTALIGN touch features level)

Vertical flanged machines – vertiSWEEP

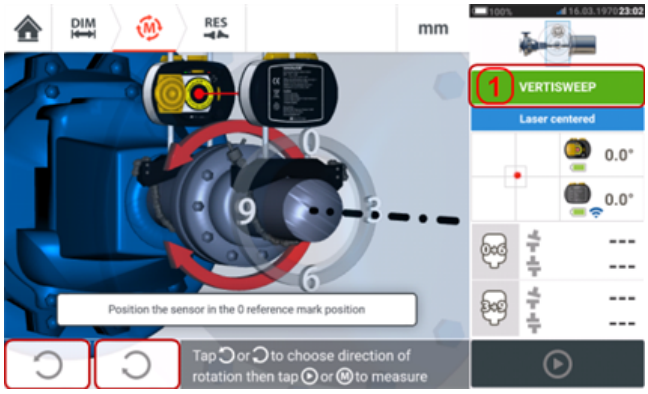
Note
This functionality is available only with ROTALIGN touch features.

Measure using vertiSWEEP

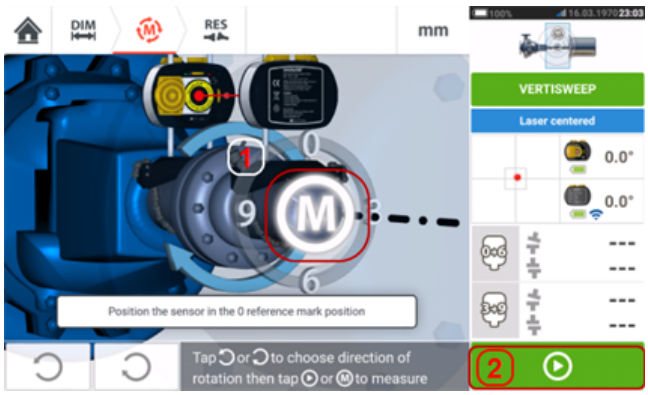
- Center the laser beam.

  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 sensor and laser are both at the '0' reference mark position.

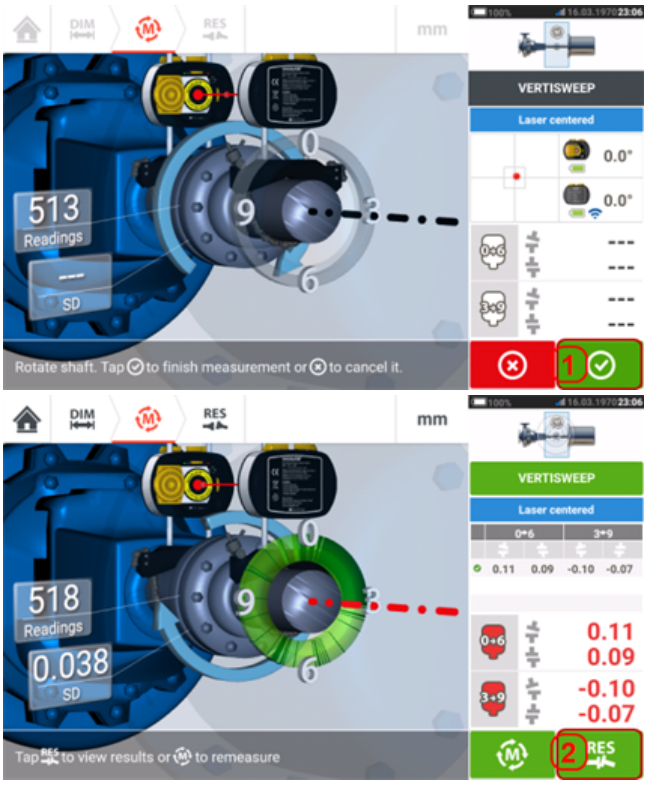


- Use or and select the direction in which the shafts will be rotated. Once the direction to rotate the shafts is selected, measurement is activated and the letter '**M**' (**1**) appears and also (**2**) becomes active.

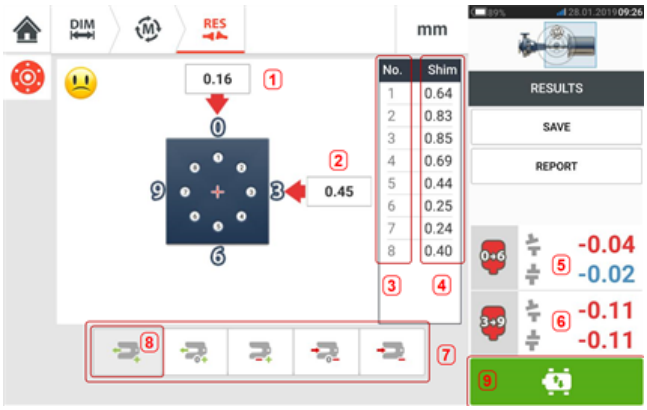


- Tap either '**M**' or then rotate the shafts through an angle greater than 360°.
- After rotating the shafts through the required angle, tap (**1**) to display coupling

results. Tap RES (**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.



- **(1)** Flange correction in 0-6 direction
- **(2)** Flange correction in 3-9 direction
- **(3)** Bolt position
- **(4)** Shimming values

- **(5)** Coupling gap and offset in the 0-6 direction
- **(6)** Coupling gap and offset in the 3-9 direction
- **(7)** Shim correction modes
- **(8)** Shim correction mode used in this example
- **(9)** Initiates Live Move

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

Vertical flanged machines – Static clock

Measure using Static measurement mode

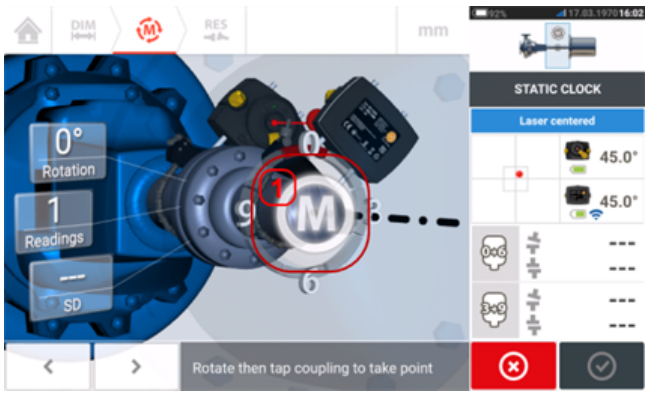
This is the measurement mode for vertical flanged machines when using sensALIGN 5 sensor and laser.

- 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 sensor and laser at the angular rotation corresponding to the actual position of the components mounted on the shafts, then tap **M** (**1**) or 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 the sensor and laser at desired angle on the display. Take the measurement point by tapping **M** (**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.

Note

If flange dimensions have not been defined, the flange icon appears. Tap to enter missing flange dimensions.

- Tap to view measurement results.

- **(1)** Flange correction in 0-6 direction
- **(2)** Flange correction in 3-9 direction
- **(3)** Bolt position
- **(4)** Shimming values
- **(5)** Coupling gap and offset in the 0-6 direction
- **(6)** Coupling gap and offset in the 3-9 direction
- **(7)** Shim correction modes
- **(8)** Shim correction mode used in this example
- **(9)** Initiates Live Move

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 obligatory) 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.

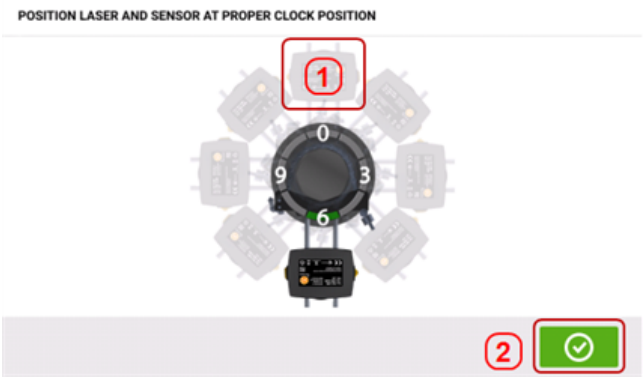
3. Tighten the bolts back down, then take another set of readings to confirm shimming corrections; repeat shimming if necessary.

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.



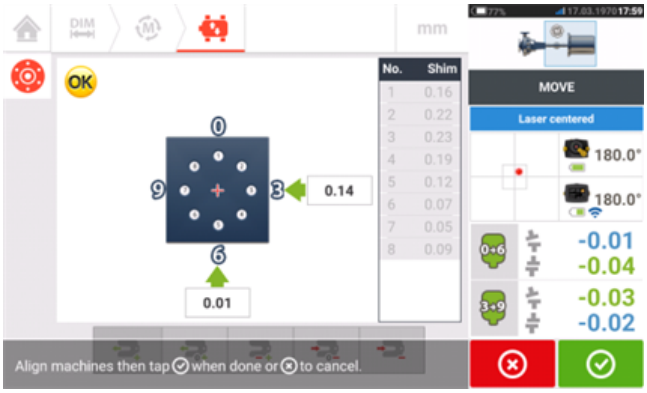
In the above example, the desired angular position of both sensor and laser is the 12:00 o'clock position **(1)**.

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.



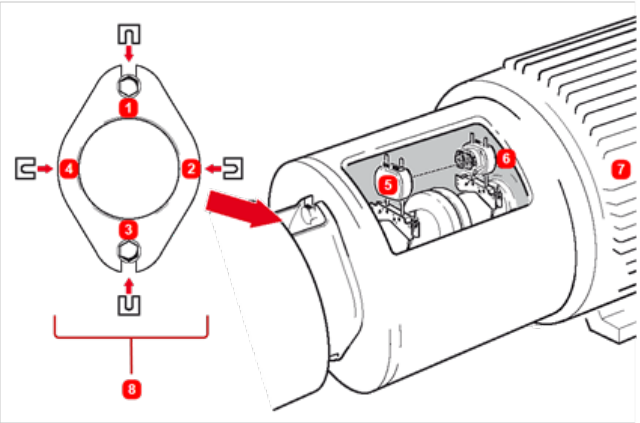
6. When offset is in tolerance, tighten the flange bolts. Remeasure to check if the new alignment condition is in tolerance.

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

Horizontal flanged machines

Flange-mounted horizontal machines

When machines are joined by means of flange, their alignment is determined by inserting the proper combination of shims at the flange bolts and, depending on the flange type, between the faces of the flanges. The requirements are similar to those for aligning vertical machines. When the shaft rotates around a horizontal axis, the electronic inclinometer detects the rotational position during measurement, which may be taken in any desired measurement mode. Based on the measurements taken, the touch device determines the thicknesses of shims to be fitted between the flanges required to align the shafts.

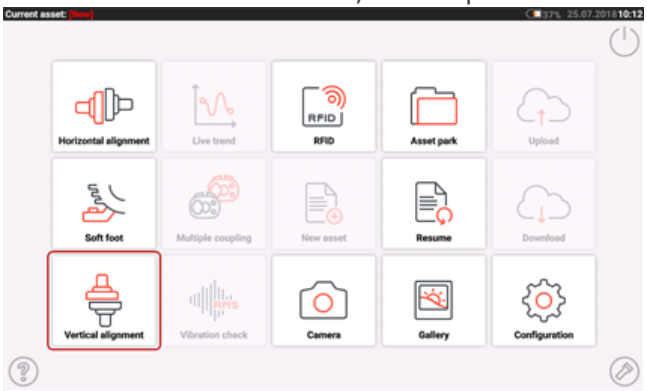


- **(1)** – **(4)** Flange shimming positions
- **(5)** Laser
- **(6)** Sensor
- **(7)** Machine to be aligned
- **(8)** End view of flange (as seen from left)

Shown here are the shimming locations for a two-bolt flange, a special case of the normal circular flange shape.

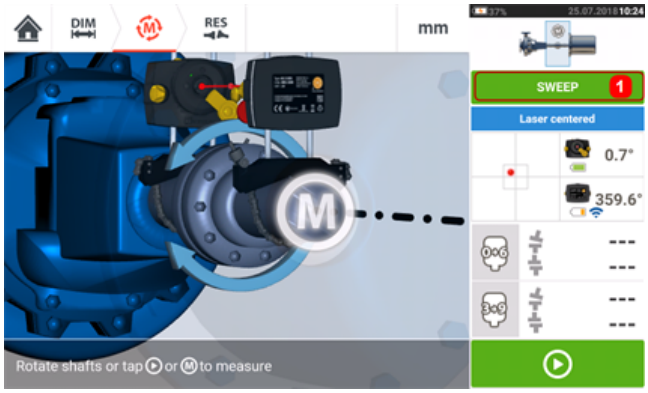
Set-up

- Mount the laser and the sensor as required (horizontally).
- Switch the touch device on, then tap the 'Vertical alignment' icon in the home screen.

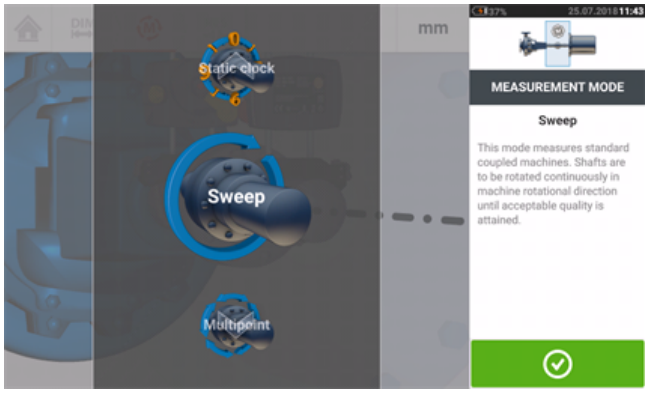


- Proceed to configure the machines as described in "Vertical flanged machines" on page 127.

- Due to the horizontal mounting of both sensor and laser, all corresponding horizontal shaft alignment measurement modes are available once the sensor has been initialized.



- Tap **(1)** and select the desired measurement mode then proceed to carry out measurement. (See "Measurement modes" on page 53).

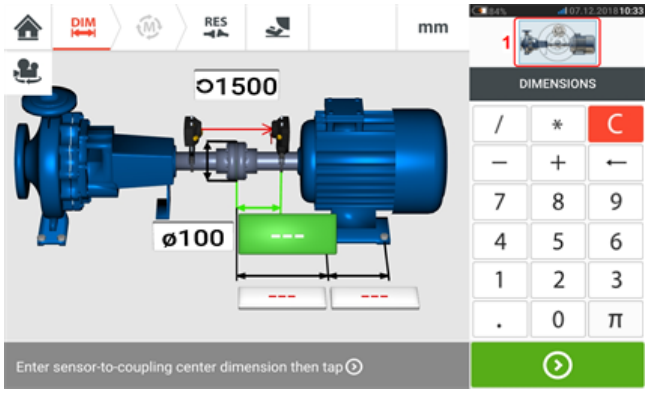


The coupling results icons for the horizontal flange application show 0-6 (for **V**ertical) and 3-9 (for **H**orizontal).

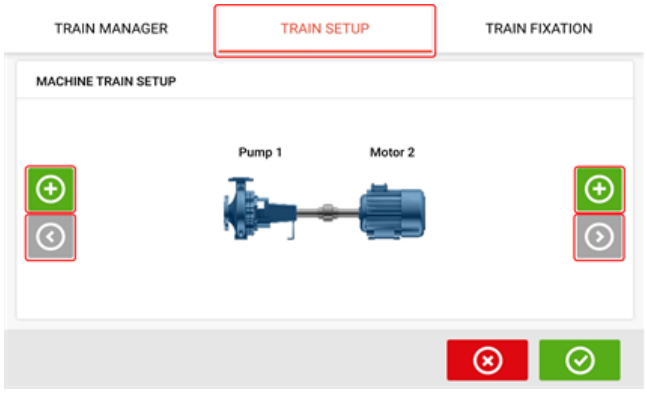
Machine train alignment

The following is a step-by-step approach for measuring the alignment condition of a three-machine train (when using OPTALIGN touch features level).
When using ROTALIGN touch features level, groups of up to 14 machines coupled together may be measured.
The components should be mounted and laser beam adjusted as required.

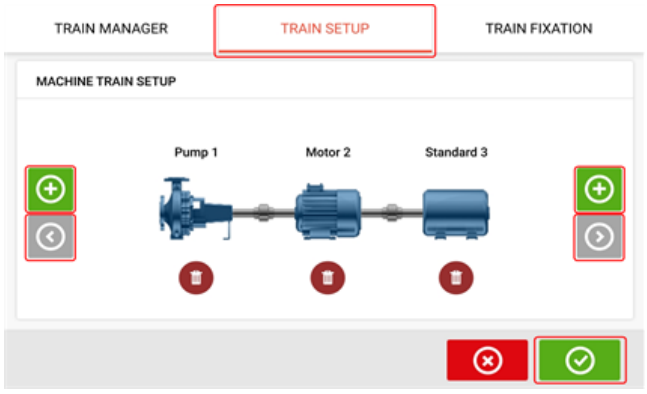
From the home screen, tap the "New asset" icon to open a new measurement file.



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 [] to add a machine to the respective side of the train.

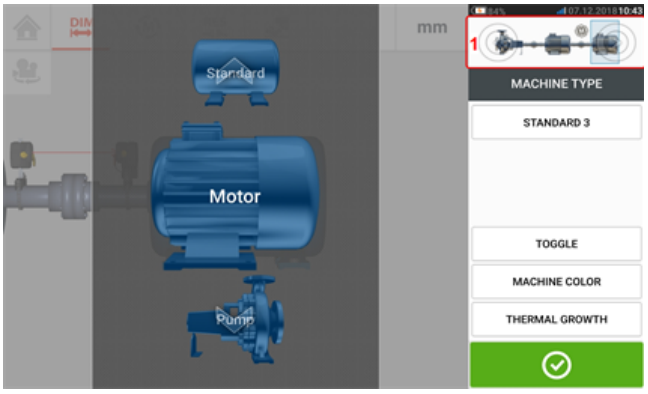


The 'Add machine' and 'Scroll machine train arrow' icons are grayed out when inactive.

When active, the 'Scroll machine train arrow' icon [] is blue and signifies there are

machines in the respective directions that are currently not on display. The active arrows are used to scroll these machines into view.

After adding the required number of machines to the train, tap to return to the dimensions screen then use the carousel to configure the machines as desired.

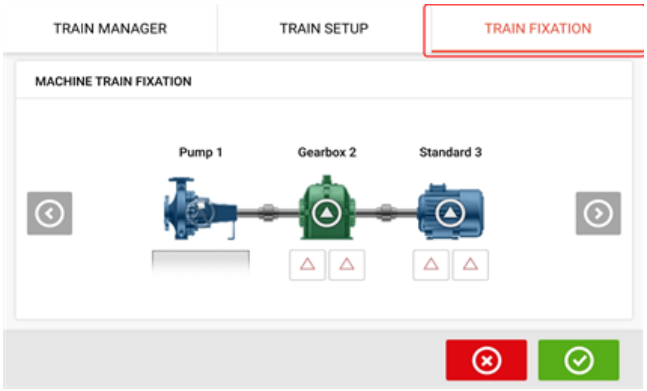


To access the different elements within the machine train, tap the corresponding element within the mini train inset [**1**] at the top right corner of the screen.

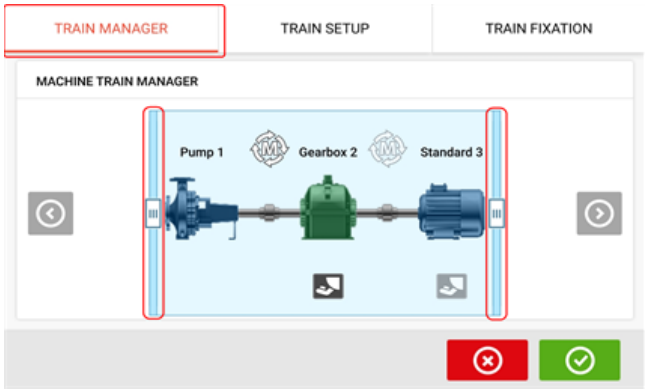
Alternatively, the desired machine and coupling types including the machinery color may be specified within the "Train set-up" screen. Tap the element to be specified then use the respective carousel to select desired machine or coupling type. The machine carousel appears together with the color carousel. After specifying desired element, tap to proceed.

When all machine train elements have been specified, tap to return to the dimensions screen to enter the required machine train dimensions.

The "Train fixation" screen which is also accessed by tapping the mini train inset is used to fix and unfix machine feet pairs or entire machine.



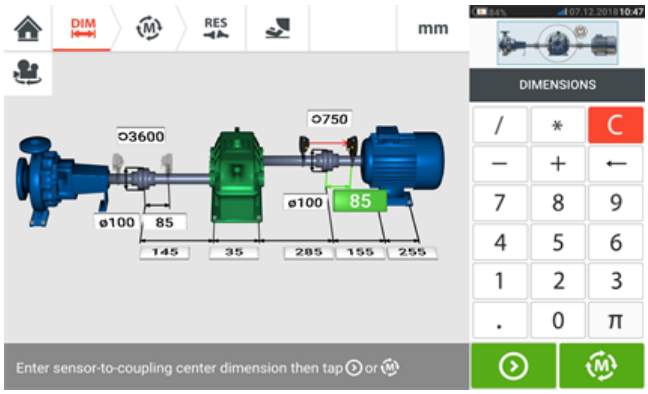
The "Train manager" screen which is also accessed by tapping the mini train inset is used to select a maximum of three machines that may be displayed in completeness including the related dimensions.



Use the sliding bars and select machines to be displayed in completeness.

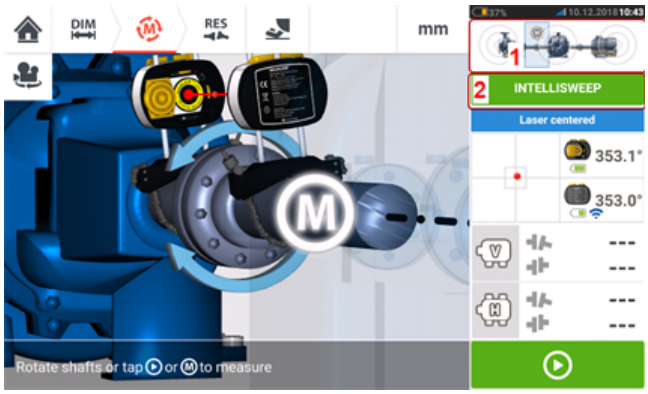
Note that the machines selected within the train manager screen are the same ones displayed in both the dimensions and results screens.

Tap to return to the dimensions screen displaying the selected section of the machine train with the respective dimensions.

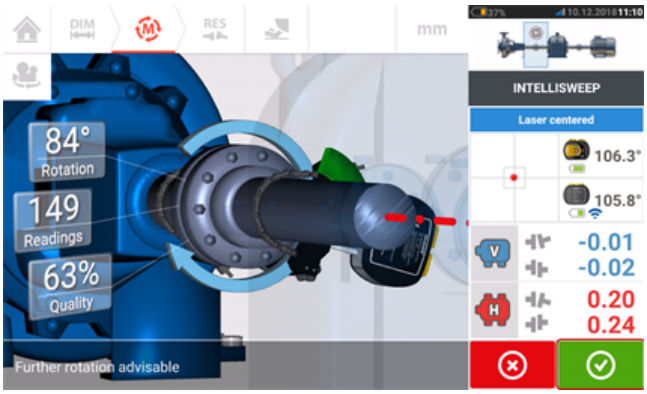


Measurement

Tap from the dimensions screen then proceed to initilize 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 laser and sensor off then dismount them from the presently measured coupling and mount them across the next coupling. When ready, switch both laser and sensor on.

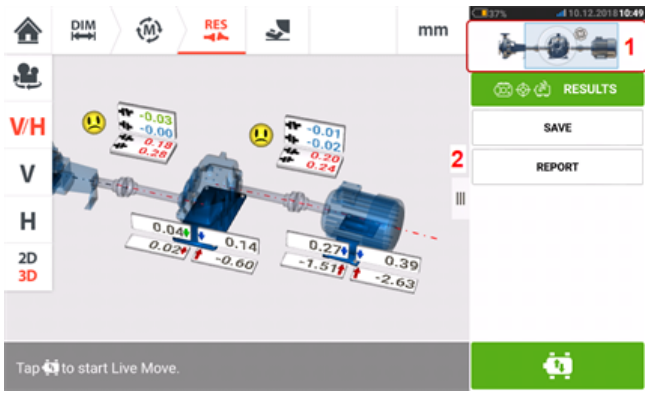
Note
Please make sure when moving the laser and sensor to each coupling that the dimension from sensor to coupling center is entered correctly in the dimensions screen.
Always make sure the coupling you are measuring is the one actually highlighted in the mini train inset (**1**)!

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.

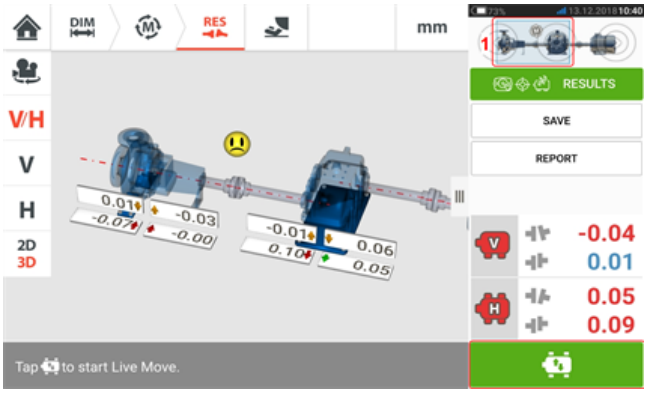
Note
The results displayed are for the coupling(s) selected in the mini train inset (**1**)
To view the results display in full scale mode, tap (**2**).



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

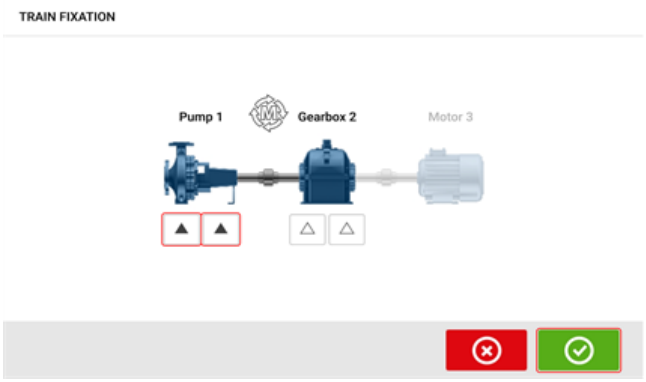
Live Move – machine train alignment

Decide which pair of machines to move in a train, one may need to re-install and re-adjust the 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**).

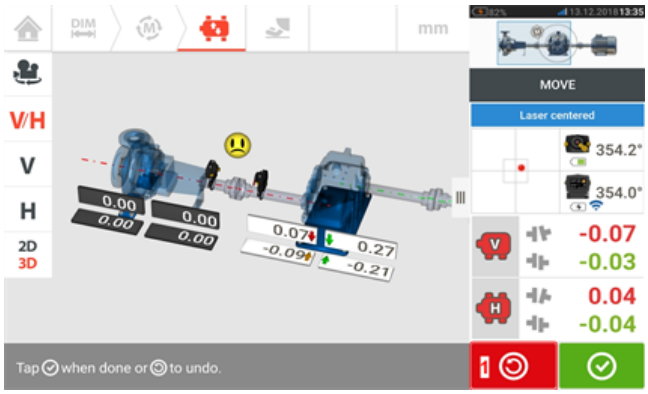


Tap to start Live Move. If all machines are designated movable, then the "Fixed feet" screen for the selected coupling position appears.

Note
The grayed out machine indicates that the measurement focus (see mini train inset [**1**] is NOT on the coupling next to this particular machine but to the coupling connecting the other two machines.



Tap feet on the machine train to be designated stationary then tap to proceed with Live Move.

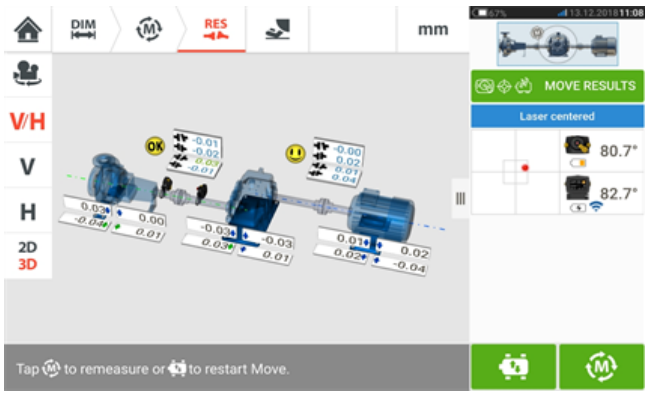


Start machine corrections. As soon as machine movement is detected, the "Undo" icon is replaced by the "Cancel" icon .

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.

Multiple coupling

Note
This functionality is available only with ROTALIGN touch features.

What is multiple coupling?

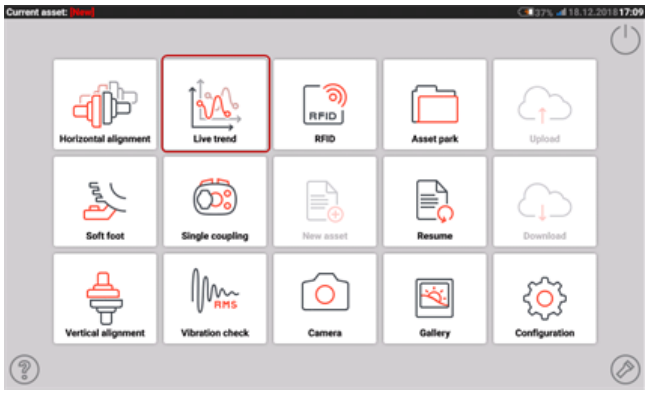
Multiple coupling is used to determine the alignment condition of multiple-element drives with three or more machines without the need to mount or dismount components as in conventional alignment methods. The functionality may be used to measure up to six couplings simultaneously.
The measurement screen can display up to three coupling positions simultaneously.

Prerequisite for performing multiple coupling

To be able to use this functionality, the user must be in possession of multiple sensor-laser head combinations as well as the corresponding fastening brackets.

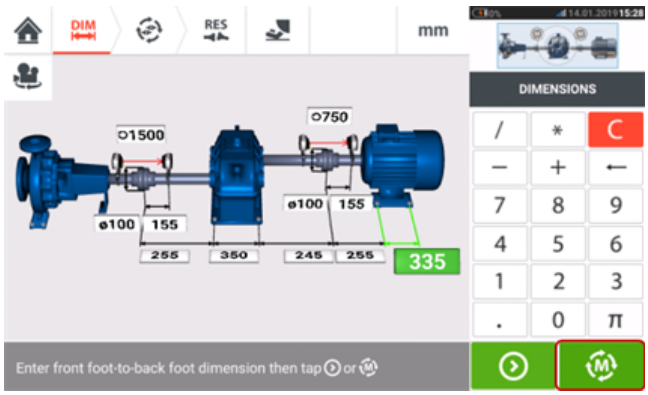
Accessing the multiple coupling functionality

The multiple coupling functionality is accessed by tapping the "Multiple coupling/Single coupling" icon [ ] within the home screen. With "Multiple coupling" selected, the only icons active are multiple coupling for horizontal shaft alignment and Live Trend for multiple coupling.

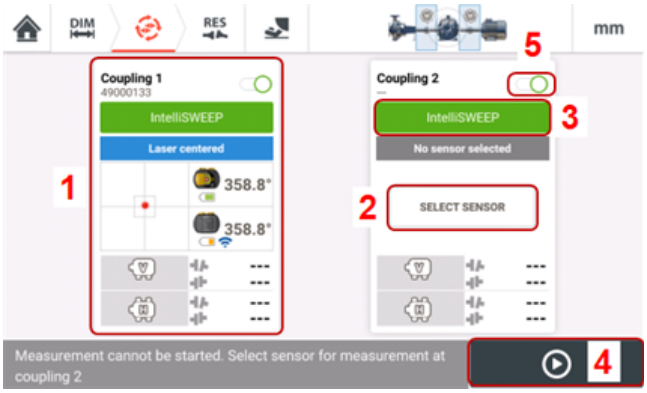


Tap to start the horizontal shaft alignment multiple coupling functionality. The application starts with a default pump-gearbox-motor template.

- After starting the application configure the machines as appropriate.



- Ensure that the measurement components have been mounted as required.
- Tap to start multiple coupling measurement.

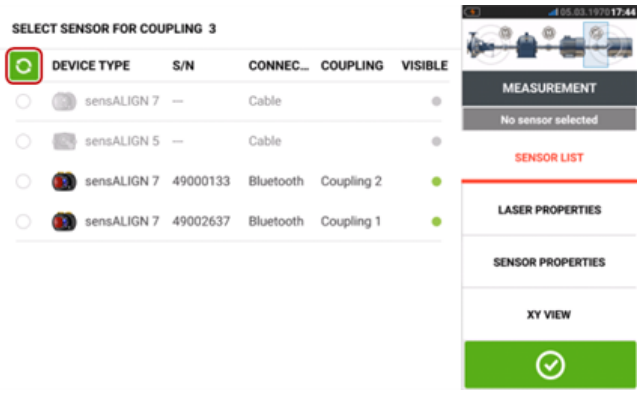


- **(1)** In this example, the sensor at coupling position one has been initialized and ready for measurement.
- **(2)** At coupling position two, the sensor to be used has not been assigned. Tap "Select sensor" to select and initialize the available sensor.
- **(3)** The measurement mode to be used at any coupling position is set by tapping the measurement mode header. The measurement modes carousel opens and the desired measurement mode is selected.
- **(4)** Measurement cannot be started until all sensors at their respective designated coupling positions have been initialized.
- **(5)** A coupling position may be disenabled by swiping the slider [ ] to the left. This may be necessary if a coupling position needs to be ignored during alignment. The position may be enabled when required by swiping the slider [ ] to the right.

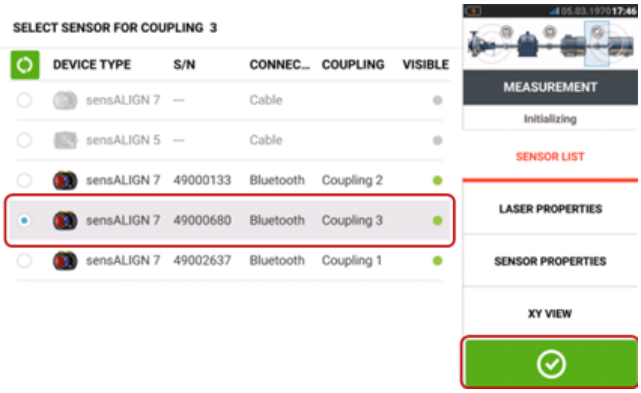
Selecting and initializing sensors in multiple coupling

If at any coupling position, the sensor has neither been selected nor initialized, the hint "Select sensor" will appear in the measurement screen.

Tap "Select sensor" and proceed with sensor initialization.



Tap to scan for available sensors. As soon as the sensor is detected, it is listed down and a green bold dot appears next to the detected sensor.



After selecting sensor for required coupling position, tap to proceed with measurement.

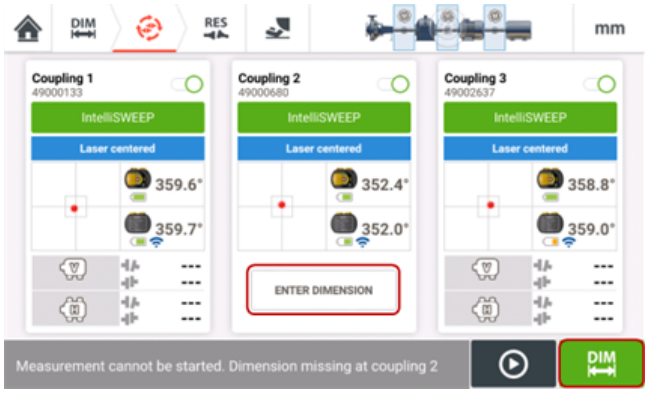
Tap to start multiple coupling measurement.

Missing dimensions in multiple coupling

If any dimension is missing in multiple coupling measurements, a hint will appear in the measurement screen.

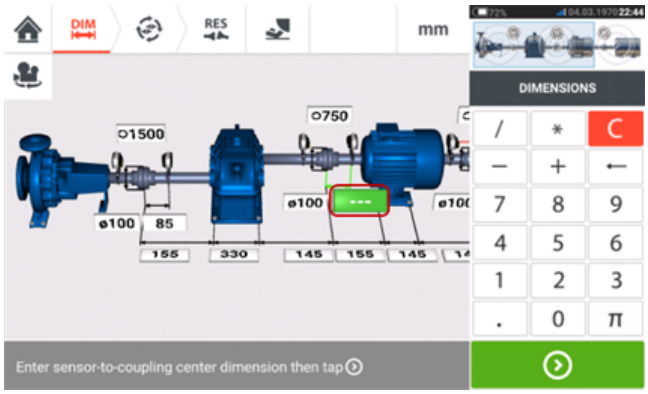
- The hint "Enter dimension" only appears when any coupling center-to-sensor dimension is missing.
- The dimension icon

appears whenever any dimension is missing.

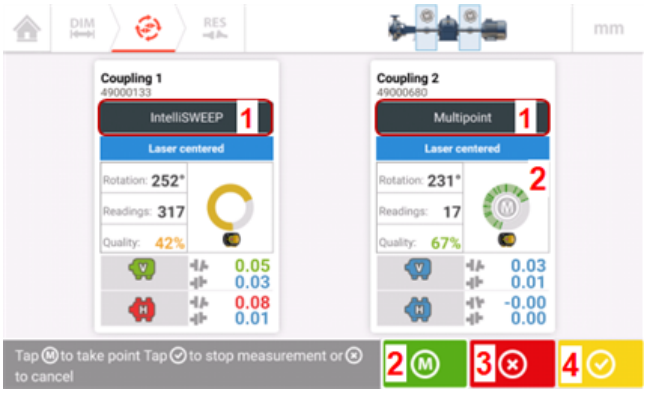


Tap either "Enter dimension" or

to access the dimensions screen and enter the required dimension. In this example, the missing dimension is the coupling center-to-sensor dimension on the first coupling.

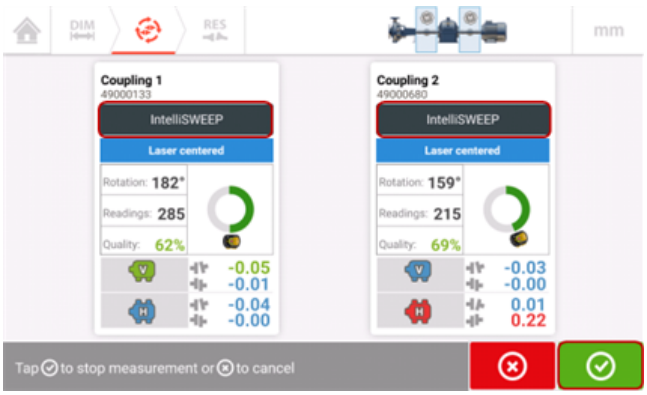


Taking multiple couple measurements



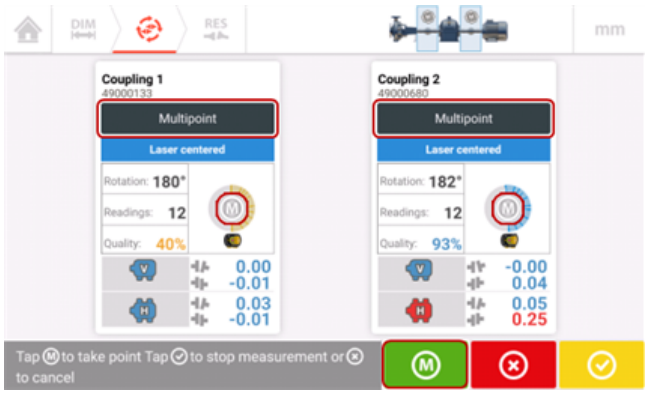
- **(1)** In this example, both intelliSWEEP and Multipoint measurements are used. In intelliSWEEP, measurement points are taken continuously as the shafts are rotated.
- **(2)** With Multipoint or intelliPOINT measurements, readings are taken at the selected measurement points by tapping or the **M** present within the rotational arc.
- **(3)** Tap to cancel entire measurement if required.
- **(4)** Tap to finish measurement.

Note
If using intelliSWEEP measurement for all designated coupling positions, measurement is taken automatically and continuously as the shafts are rotated. The color code of the "Finish" symbol [ ] is dependent on the **measurement quality**. Red denotes (overall quality factor < 40%); Amber denotes (overall quality factor >40%<60%); Green denotes (overall quality factor >60%<80%); Blue denotes (overall quality factor >80%).



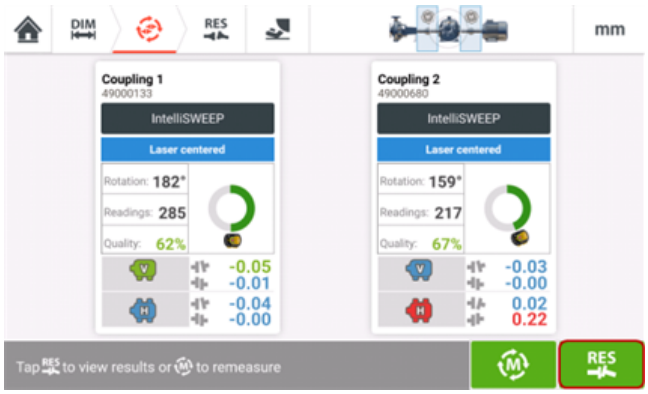
Taking measurements (Multipoint / intelliPOINT)

If using only Multipoint/ intelliPOINT measurements at all designated coupling positions, tapping or any **M** present in the rotational arc at any coupling, takes readings at the selected measurement points for all active couplings simultaneously.

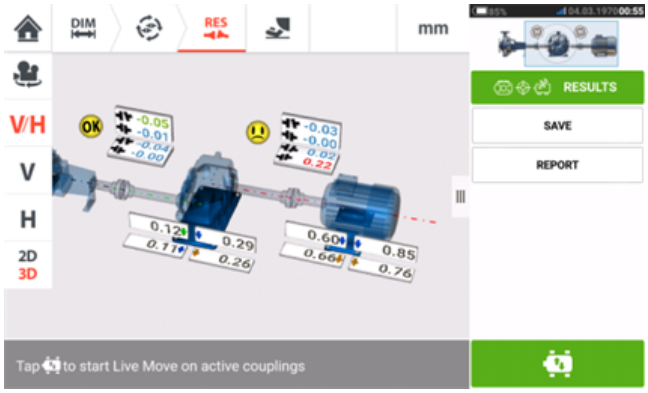


Evaluating multiple coupling results

Once measurement is finished by tapping the status changes.



Tap to view machine foot results.



Refer to "Results" on page 82.

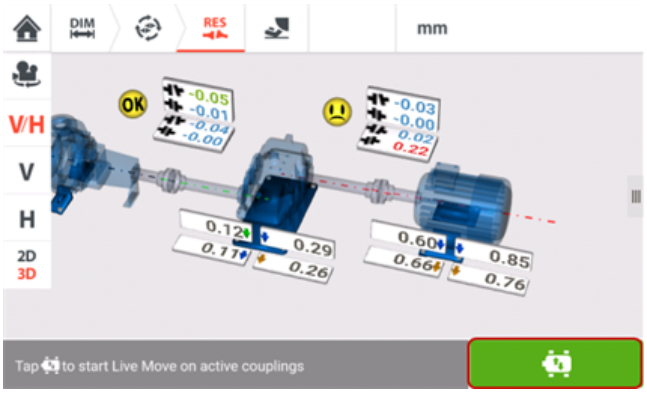
Aligning multiple element drive trains

Note
It is highly recommended that such demanding alignment tasks be carried out by experienced alignment personnel. Use all information available with regard to the drive train to be aligned.

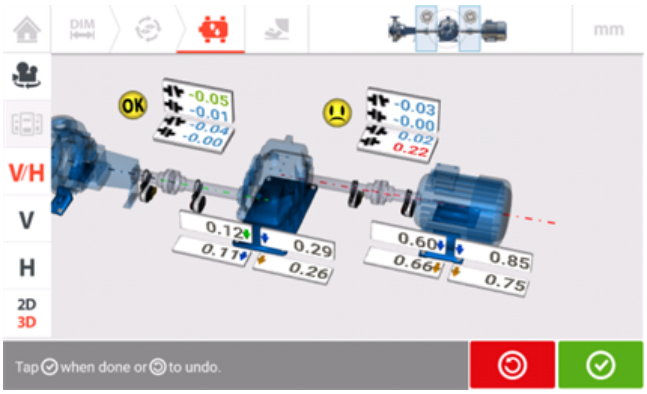
After measuring all couplings on the multiple element drive train simultaneously, display the train results and optimize corrections. Before carrying out any real machine corrections you may use the Move simulator function to determine the foot correction values required to reposition the machines to achieve a collinear shaft operation.

Multiple coupling simultaneous Live Move

The alignment corrections involving shimming and the lateral positioning of the entire multiple element drive train can be followed in a real-time interactive display.

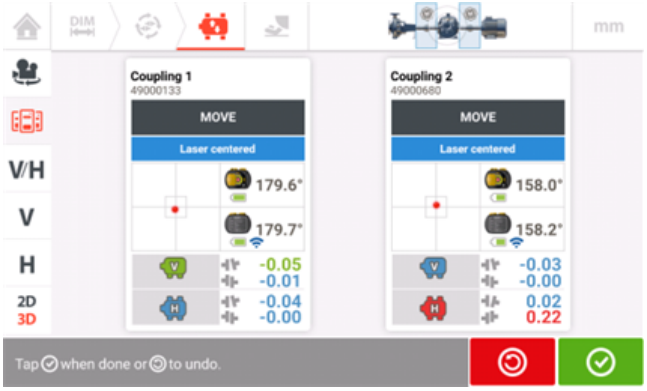


Tap to start Live Move.

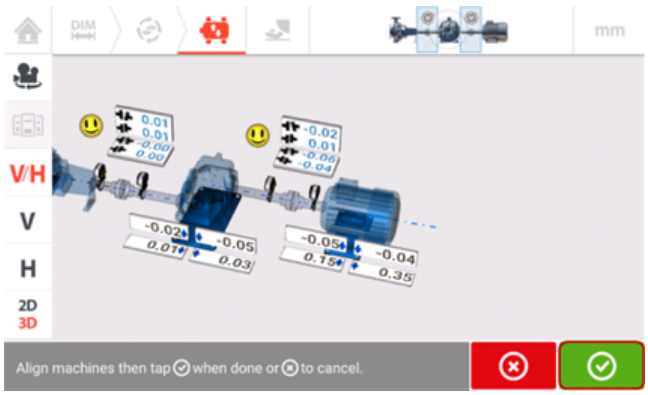


Note

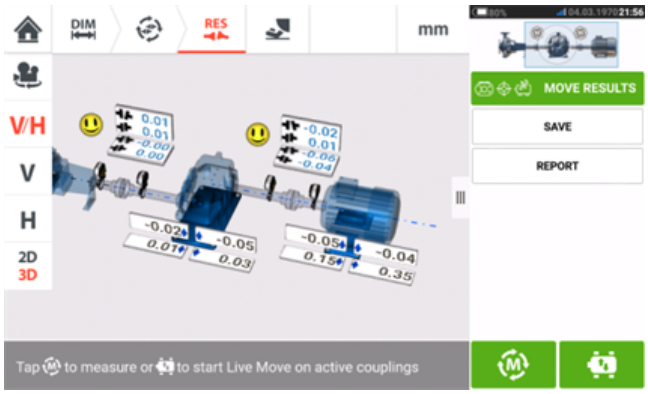
Tapping the "coupling results" icon [ ] allows the user to view the coupling results at the active coupling positions during Live Move.



While observing all plant and machinery maintenance requirements, the corrections are carried out as appropriate.



When a good alignment condition is attained, tap to finish Live Move.

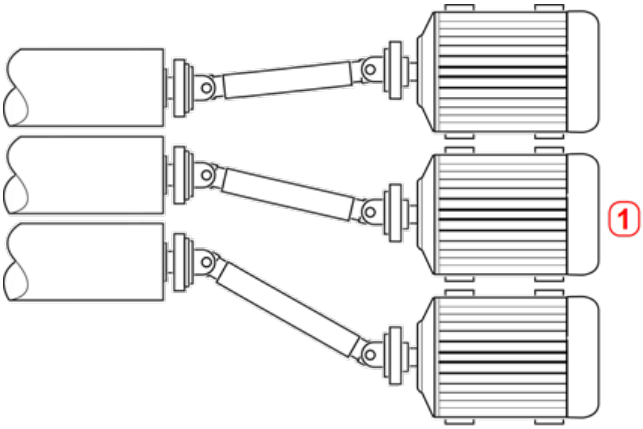


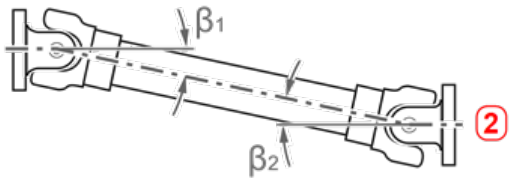
The alignment is considered successful after rechecking alignment by taking another set of measurements, and the displayed results are within tolerances.

Cardan shaft alignment

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.





- **(1)** Positioning of machines in an area with limited space
- **(2)** For optimal running condition, the deflection angle $ß_1$ 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 – This is the default measurement procedure for cardan applications when using ROTALIGN touch features level. 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. (For OPTALIGN touch features level, use Multipoint measurement).
- 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.

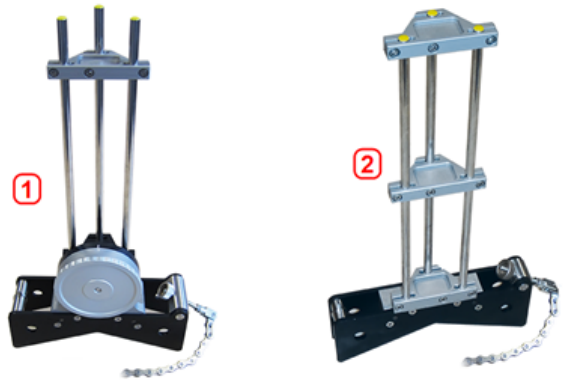
- Multipoint – In this procedure, the cardan must be dismantled. Measurement is carried out using Multipoint measurement mode in conjunction with the cardan offset bracket.

Cardan shaft alignment - Using rotating arm bracket

Note
This functionality is available only with ROTALIGN touch features.

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.



- **(1)** Cardan rotating arm bracket for mounting sensor
- **(2)** Large chain type bracket for mounting laser

Mounting laser and sensor

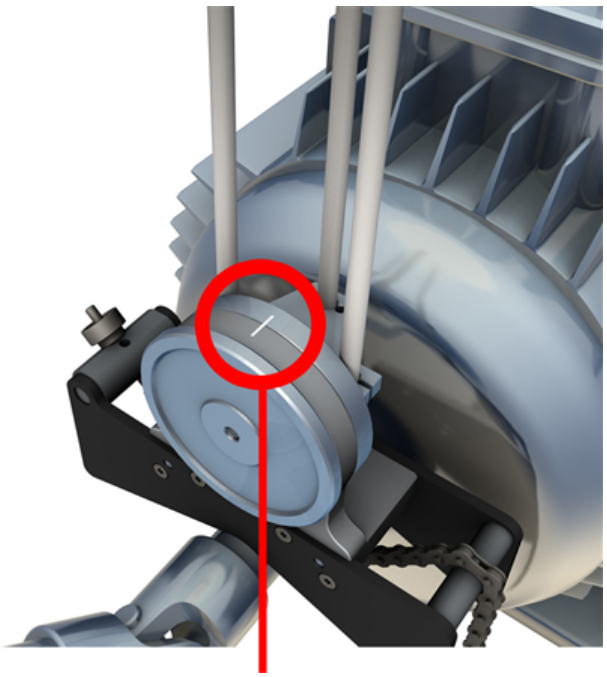
1. With the laser OFF, carry out a pre-adjustment to ensure that the laser beam will be emitted perpendicular to the laser housing. Use the two yellow beam position thumbwheels to center the **'bulls-eye'** as accurately as possible, then mount it on the support posts of the large chain type bracket.

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.

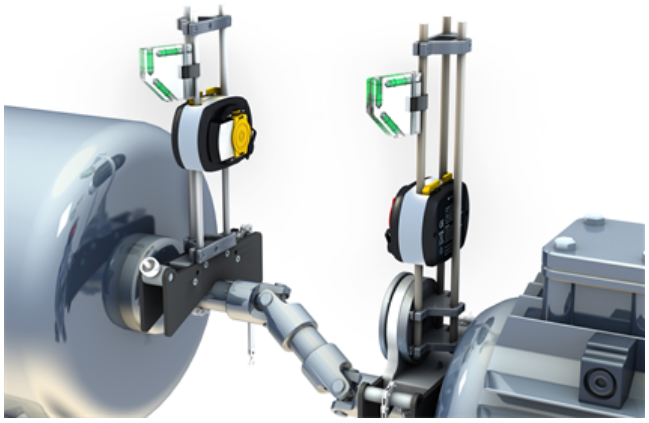
Mounting the brackets on the shafts

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.



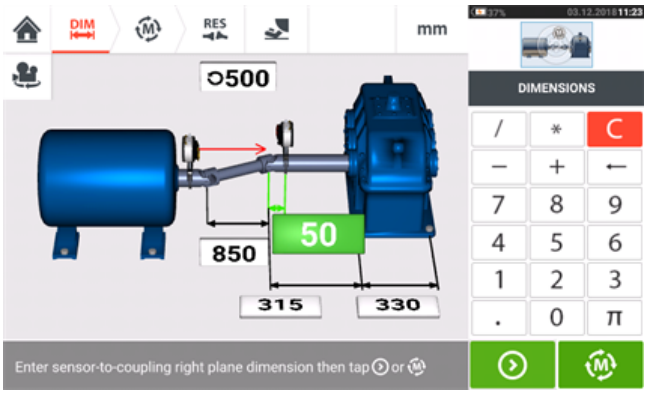
Use the external inclinometers to position both brackets at the same rotational angle. Remove the external inclinometers, then switch the laser on.

WARNING
Do not stare into the laser beam!.



Cardan shaft alignment - Rotating plane measurement procedure

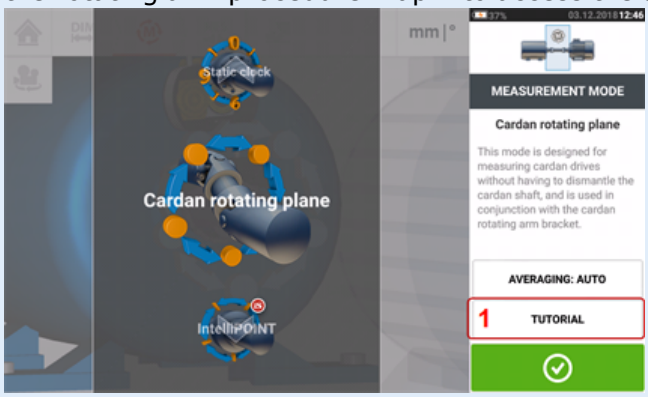
1. Switch sensor, laser and the touch device on, then proceed to set up the machines.



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

Note

'Cardan mode' (cardan rotating plane) is the default measurement mode for cardan shafts. It is recommended that users familiarize themselves with the steps required for the rotating arm procedure. Tap **1** to access the available tutorial.



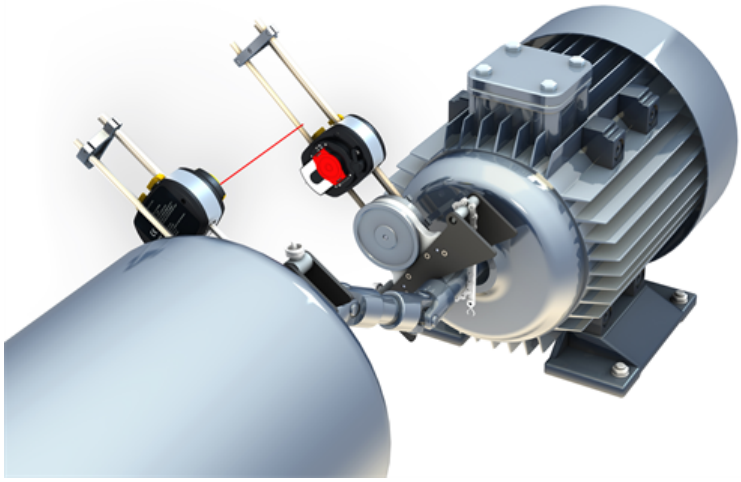
Taking measurements

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.

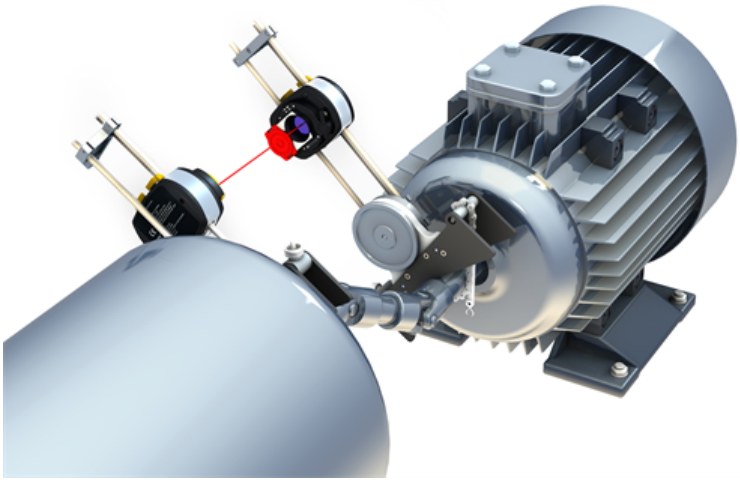
3. When the laser beam strikes this support post, retighten the rotating arm wheel.



4. Loosen the sensor by pushing the yellow sensor clamping levers to the open position, and 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, and 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.

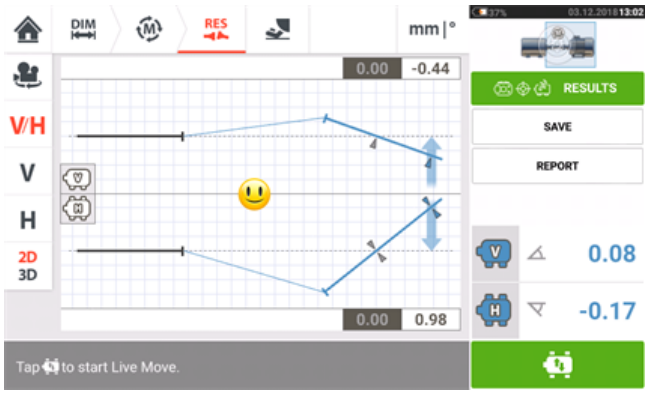
Note
Determine this position depending on the accessible angle of rotation, and the minimum requirement of five measurement points through a rotational angle greater than 60°.

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 large cardan offset bracket (sensALIGN 7 laser)" on page 168
- "Mounting cardan offset bracket lite (sensALIGN 5 laser)" on page 175

Note
Both sets of cardan offset brackets (large and lite) may be used with either sensALIGN 7 sensor /laser combination or sensALIGN 5 sensor/laser combination.

Mounting large cardan offset bracket (sensALIGN 7 laser)

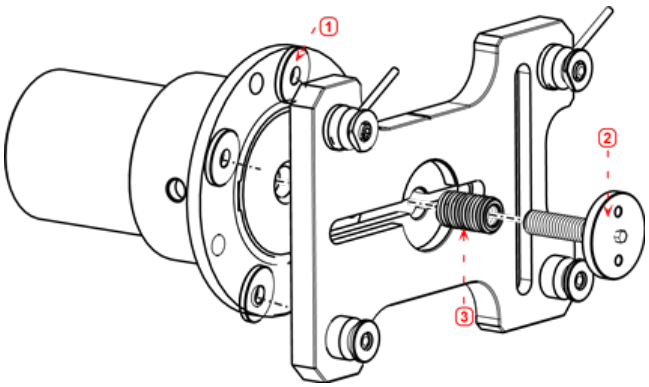
Note
sensALIGN 5 laser may also be used with the large cardan offset bracket.
When mounting and adjusting the sensALIGN 5 laser, please refer to "Mounting and adjusting the sensALIGN 5 laser" on page 177

Mounting the large cardan offset bracket and adjusting sensALIGN 7 laser

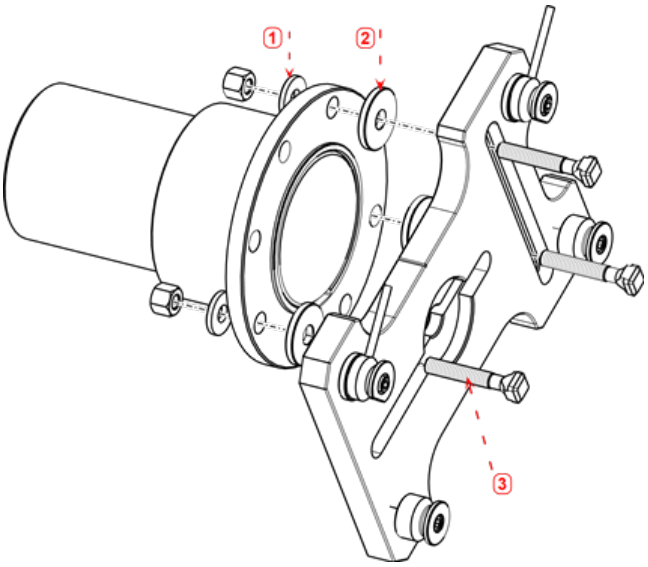
Mounting bracket

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:

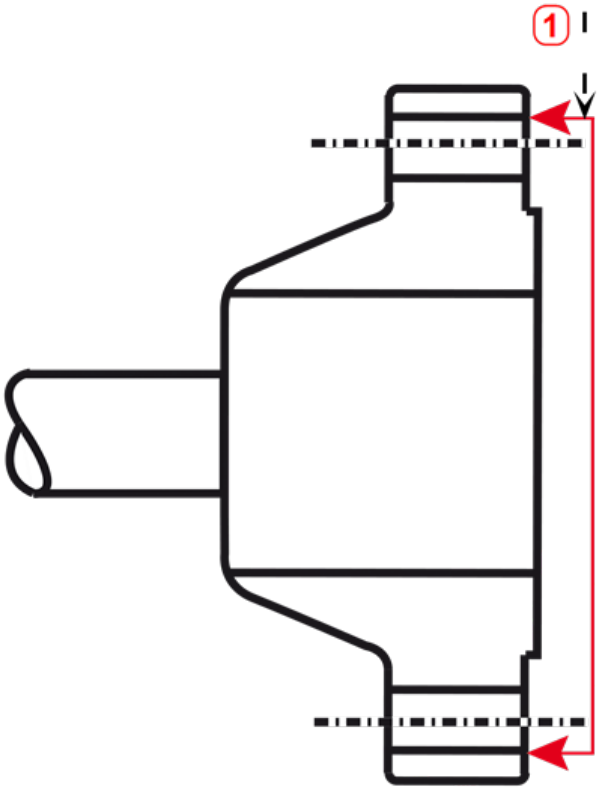
- If the shaft end or coupling face has a threaded hole in its center, the easiest and most rigid mounting method is to use the large center bolt as shown below. A thread adapter may be used as shown to fit the center bolt to larger bores.



- **(1)** Spacer
- **(2)** Center bolt – loosened and tightened using a spanner with a 17 mm (43/64") opening
- **(3)** Thread adapter
- The faceplate may also be attached to the coupling face using the three T-nut bolts, forming a three-point mounting.



- **(1)** Washer
- **(2)** Spacer
- **(3)** T-nut bolt



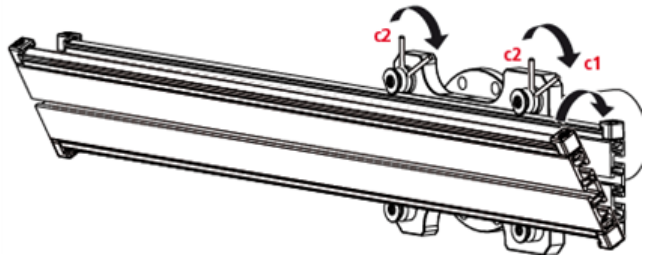
- **(1)** Reference surface

This coupling example has a raised face flange. The provide 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.

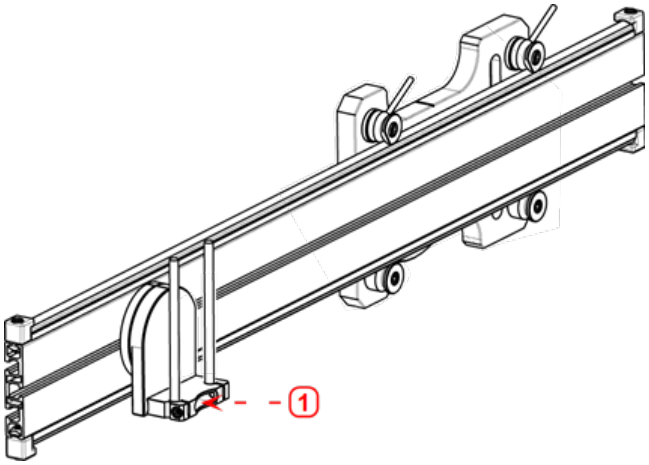
If the coupling has a raised face, the precision machined spacers are used as shown in order to separate the faceplate from the raised inner section of the coupling face while connecting the faceplate to the coupling face which is the reference surface.

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.

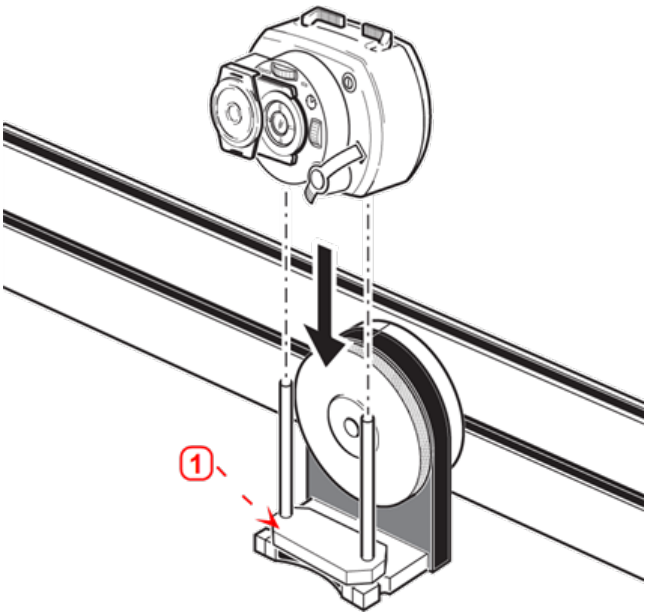


- **(1)** Laser holder

Mounting and adjusting laser

For mounting and adjusting the sensALIGN 5 laser, please refer to "Mounting and adjusting the sensALIGN 5 laser" on page 177

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



- **(1)** Distance plate

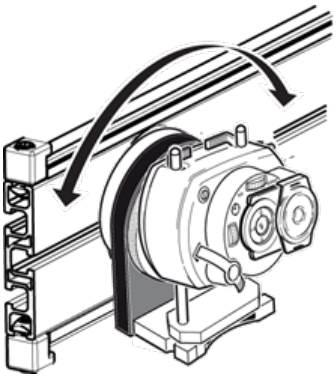
3. Mark a set of target crosshairs on the shaft rotation centerline of the other machine coupling (if the flange has a center hole, a temporary target surface such as a dust cap may be affixed to the hole).

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

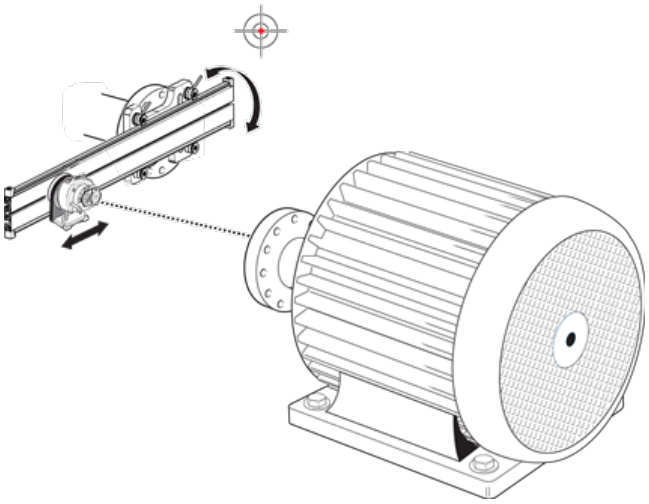
For adjusting the sensALIGN 5 laser beam to the machine rotational axis, please refer to "Adjusting the sensALIGN 5 laser beam to machine's rotational axis" on page 178

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.

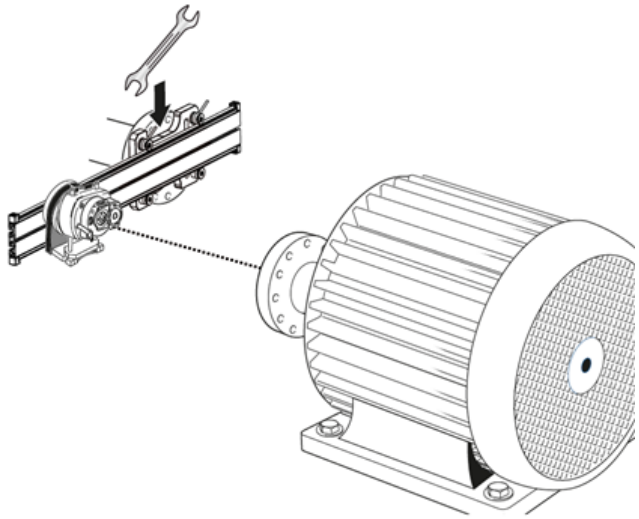
1. Carry out the vertical and horizontal adjustment of the laser holder assembly by sliding it horizontally through the center groove on the rail and positioning it vertically by rotating the rail.

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 (43/64")open end spanner (wrench).



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

Positioning laser and mounting sensor for measurement

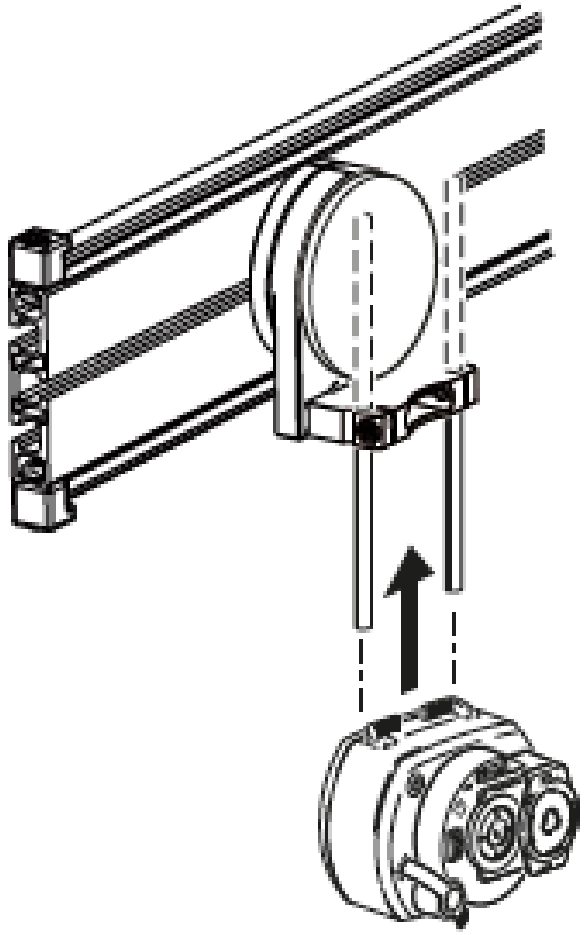
For positioning sensALIGN 5 laser and sensor for measurement, please refer to "Positioning sensALIGN 5 laser and mounting sensALIGN 5 sensor for measurement" on page 179

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.

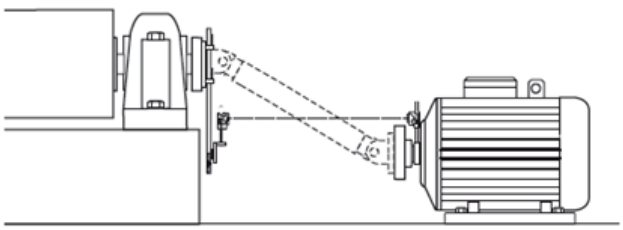
2. Using the provided M4 Allen key, loosen the support posts then slide them through the laser holder base so that they protrude from the other side.

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.



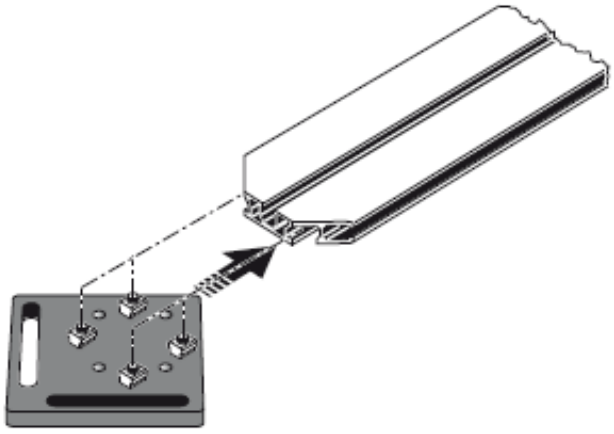
Mounting cardan offset bracket lite (sensALIGN 5 laser)

Note
sensALIGN 7 laser may also be used with the cardan offset bracket lite.

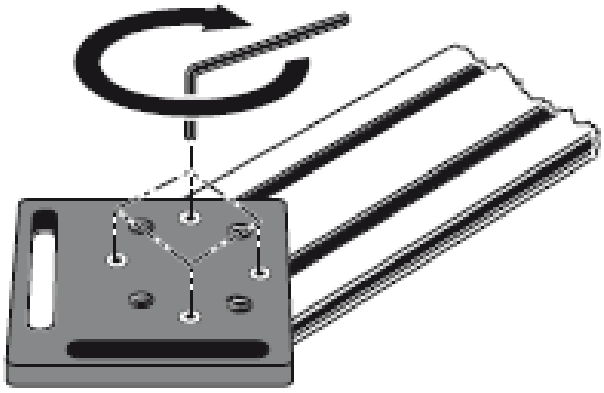
Mounting the cardan offset bracket lite and adjusting sensALIGN 5 laser

Mounting the faceplate to the rail

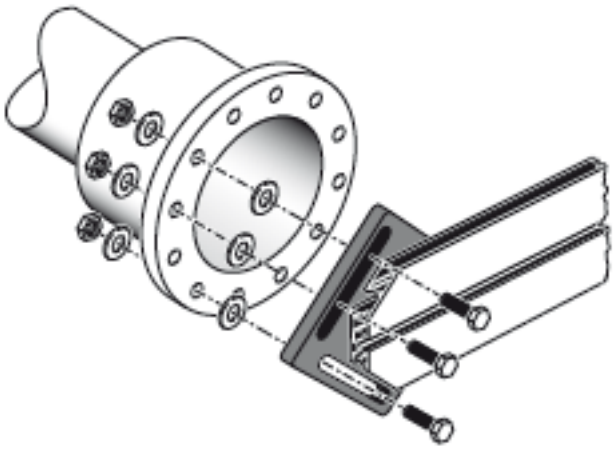
1. Slide the the faceplate down the rail as shown below. The four T-nuts should sit in the grooves.



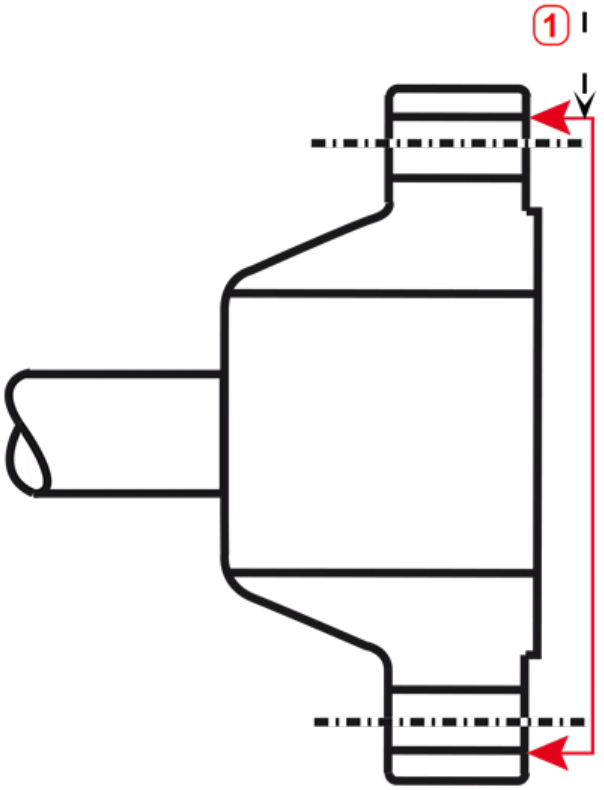
2. After positioning the faceplate on the rail, tighten the four socket head screws using the provided M5 allen key.



3. Mount the bracket assembly to the coupling face of the non-rotatable shaft. If the coupling face has a raised rim, the precision machined spacers are used as shown below in order to separate the bracket faceplate from the coupling face.



- (Without the spacers, there would be no direct contact between the faceplate and the coupling surface surrounding the bolt holes – exactly the location where the faceplate and coupling are being joined.)

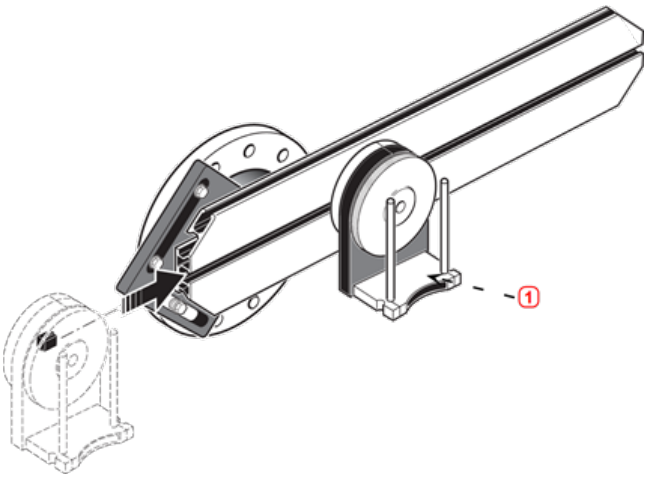


- **(1)** Reference surface
- The coupling shown above has a raised face flange. The provided spacers are used to create a three-point plane to ensure that the faceplate and the coupling face, which is the reference surface are joined together.

Note
The center part of the coupling face must not be used as a reference surface.

Mounting the laser holder assembly on to the rail

1. Loosen the handwheel slightly, then slide the laser holder assembly down the center groove of the rail, with the T-nut acting as a guide.



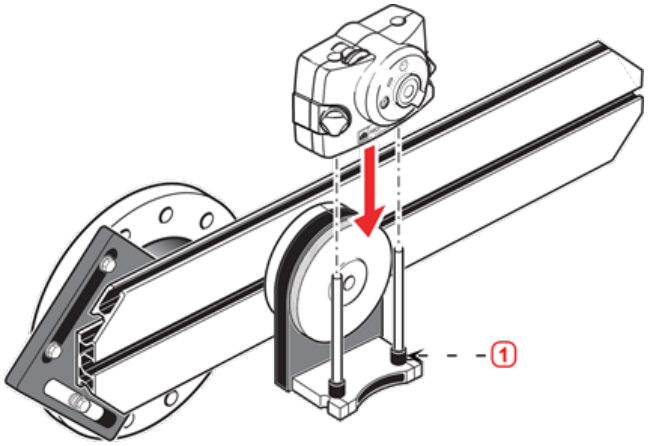
- **(1)** Laser holder

Mounting and adjusting the sensALIGN 5 laser

In this step, the laser beam is adjusted such that it is roughly colinear to the rotational axis of the laser holder assembly.

1. Slide the two black distance sleeves down the support posts.

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



- **(1)** Distance sleeve (black)

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 may be affixed to the hole).

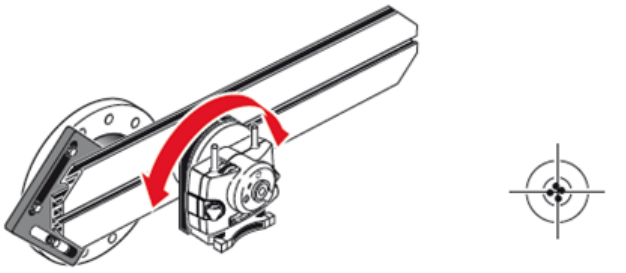
4. Switch on the laser and adjust the beam to strike the center of the target on the opposite coupling:

- The objective is to adjust the laser beam such that it is roughly colinear to the rotational axis of the laser holder assembly; this will make it possible to make fine adjustments to the laser holder assembly's position afterwards, without having to realign the laser beam itself.

Note
The distance sleeves (black) influence 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
sensALIGN 5 laser adjustment tip:
If the beam describes a circle rather than a dot at the target when rotating the laser holder assembly, then note how big the circle is and use the yellow adjustment thumbwheels to move the laser beam back by half the distance it has moved when rotating the laser holder assembly 180° from its start position. Do this both vertically and horizontally. When correctly adjusted, you should be able to rotate the laser holder assembly a full 360° without the laser dot moving from the target center.



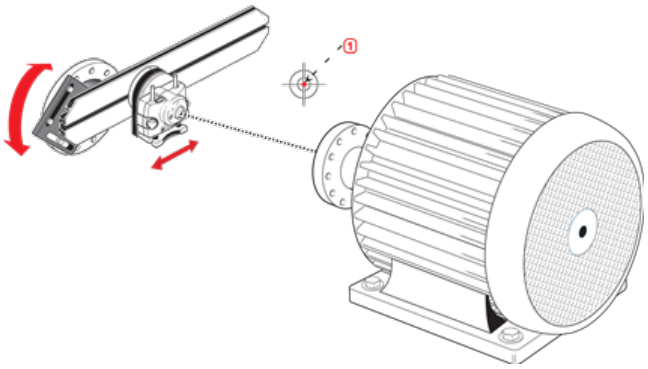
Note
As soon as a single dot position has been achieved, do not touch the laser thumbwheels.

Adjusting the sensALIGN 5 laser beam to machine's rotational axis

In this step, the laser holder assembly is adjusted on the bracket such that the laser holder rotational axis is 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 bracket rails and positioning it vertically by rotating the bracket.



- **(1)** Laser dot

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.

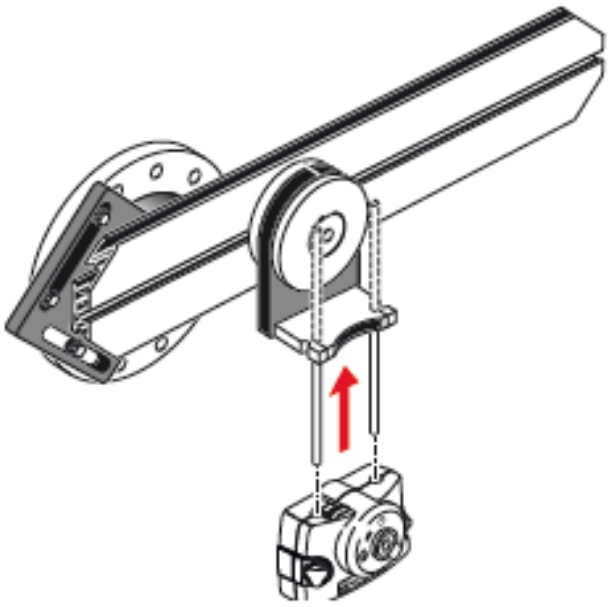
3. Once the laser beam has been centered on the target, tighten the faceplate on the coupling face using the provided hexagon socket head screws.

Positioning sensALIGN 5 laser and mounting sensALIGN 5 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.

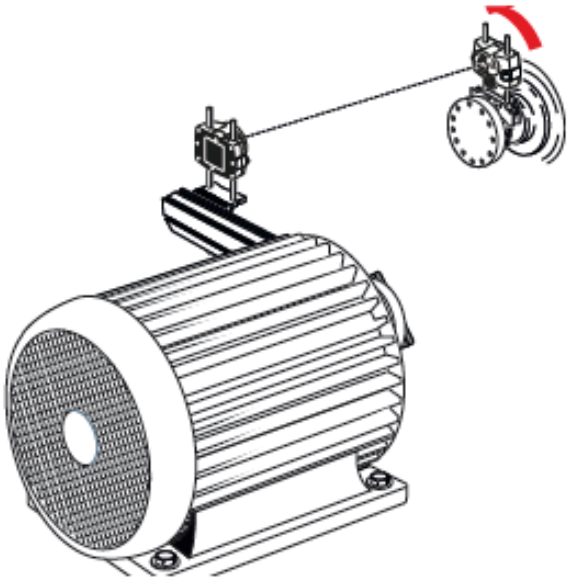
1. Switch off the laser and remove it from its holder.

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.

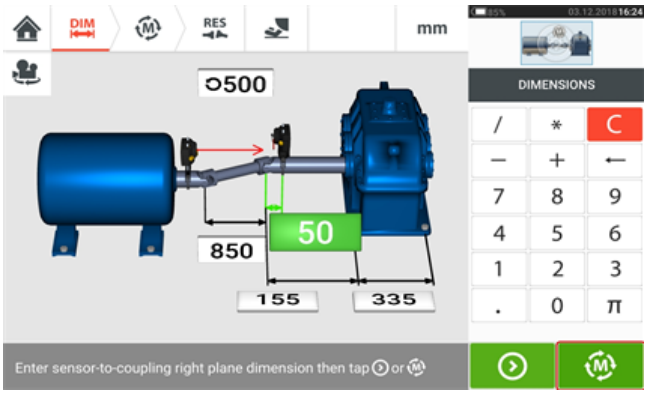


Note
DO NOT touch the laser or its laser position thumbwheels.

Cardan shaft alignment using sensALIGN 5 sensor and laser

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

1. After mounting the cardan offset bracket and the measuring components, and then adjusting the laser, switch the touch device on, then proceed to set up the machines.

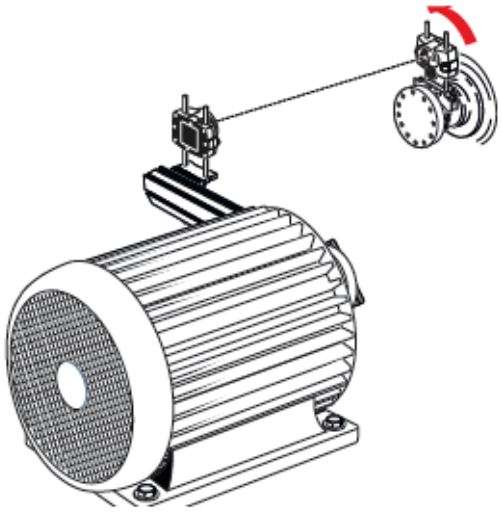


2. After setting up the machines and entering all required machine dimensions, tap to proceed with measurement.

Note
The default measurement mode for cardan shafts when using sensALIGN 5 sensor and laser is static measurement (**1**) where measurements are taken at 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 positions viewed from coupling towards laser emitter).
Multipoint measurement may also be used.

3. Tap either the pulsating **M** (**2**) or (**3**) to take initial measurement point.

4. Rotate the sensor and the laser to the next measurement position.



5. Use < or > to position the displayed laser at the desired measurement position, then tap the pulsating **M** to take measurement at the selected clock position.

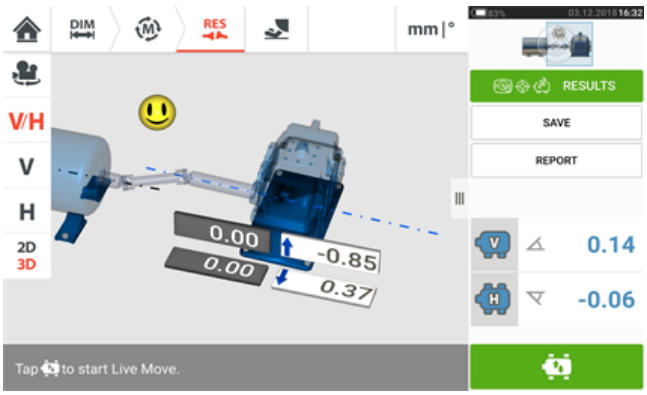
6. Repeat steps 4 and 5 to take measurements in at least three clock positions over at least 70° of rotation. (Taking more position measurements improves the reliability of results.)

7. When enough measurement points over at least 70° rotation have been taken, tap ✓ to stop measurement.

8. Tap RES 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.

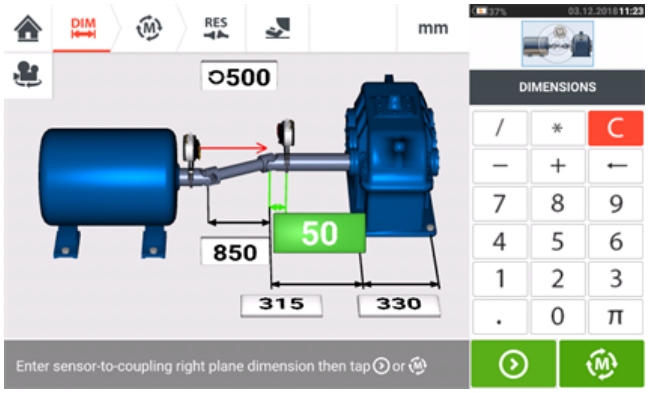
Note
A PRÜFTECHNIK cardan shaft tolerance table is available for 1/2° and 1/4° limits. The required tolerance type may be set under default settings in 'Configuration'.

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

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 sensor, laser and the touch device on, then proceed to set up the machines.



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 the sensor to the next measurement position.

5. Turn the laser-side shaft and observe the onscreen 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.

Live Trend

Note
This functionality is available only with ROTALIGN touch features.

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

Note
As stated in the copyright, package contents may also vary from those listed here. Check and ensure that the delivered package items conform to the purchase order and the packing list. Reference may also be made to the online product catalog.
Contact PRÜFTECHNIK Condition Monitoring or your local sales representative if any package items are damaged or missing.

See package components in following images.

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

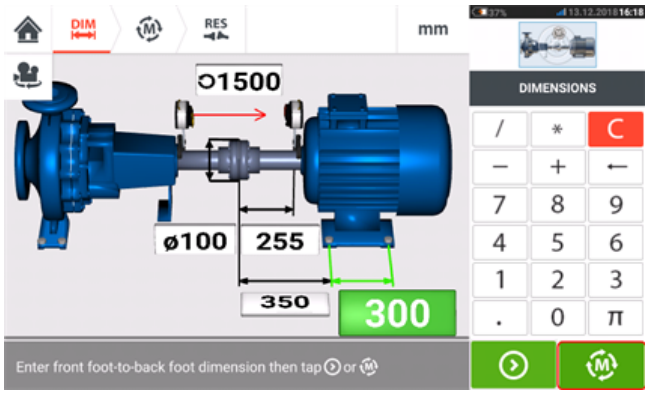
Mounting Live Trend brackets

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.

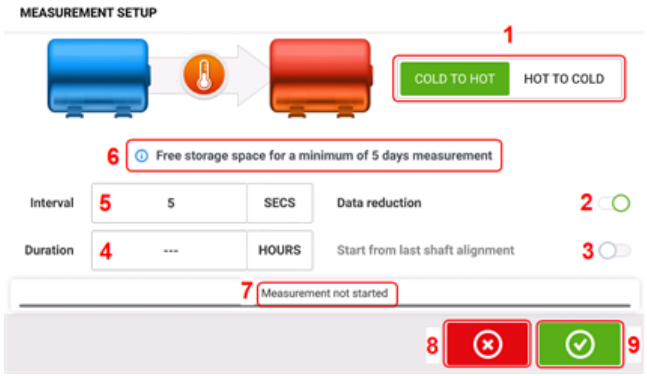
Live Trend setup

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

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

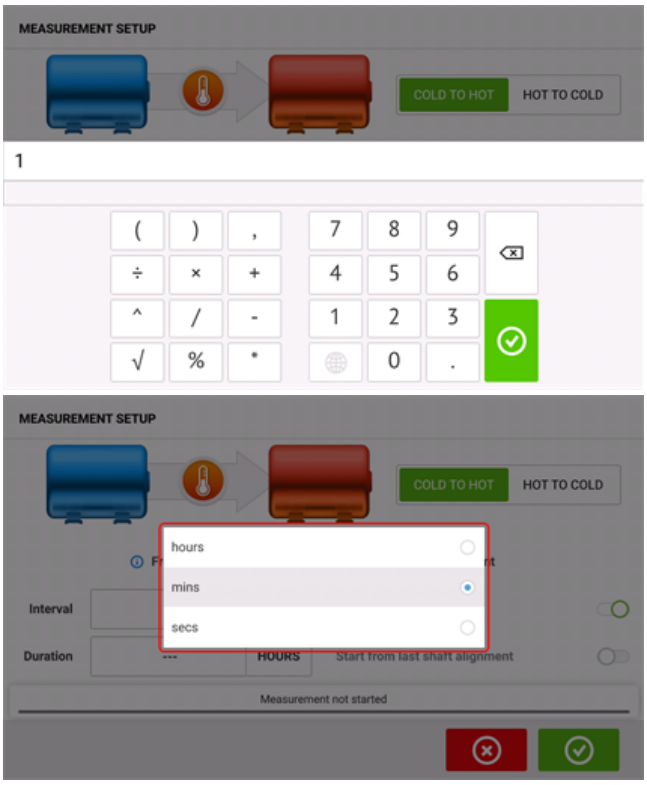


After entering all necessary dimensions, tap then proceed to set sampling interval and measurement duration in the setup screen that appears.



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.



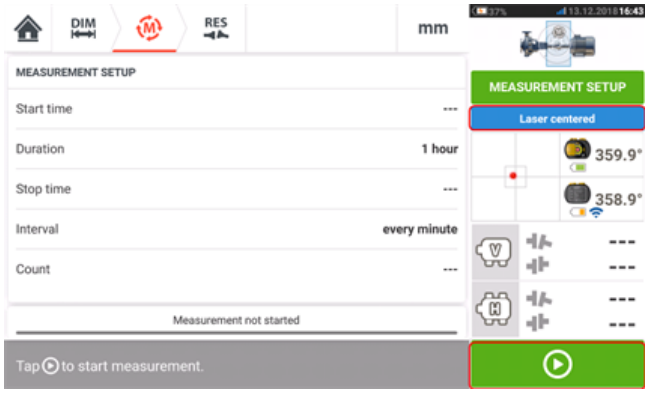
Tap the respective value box then enter the duration or measurement interval using the onscreen keyboard. Tap or to exit the onscreen keyboard and return to the setup screen.

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

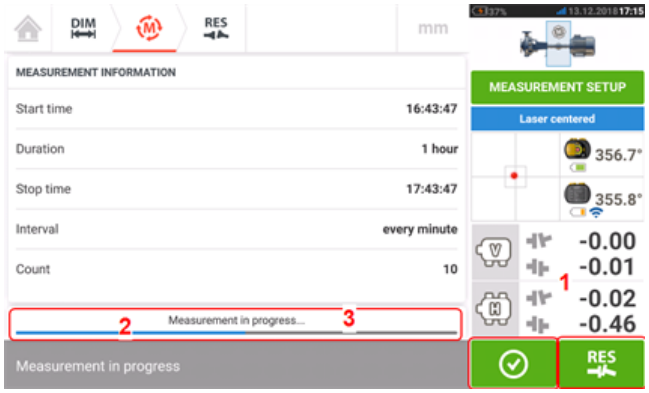
Live Trend – Measurement

If the sensor has been initialized, and laser beam centered, tap to start Live Trend measurement. (If not, refer to "Initializing sensor" on page 50 and "Laser beam adjustment" on page 42.)



Note
DO NOT touch the 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.



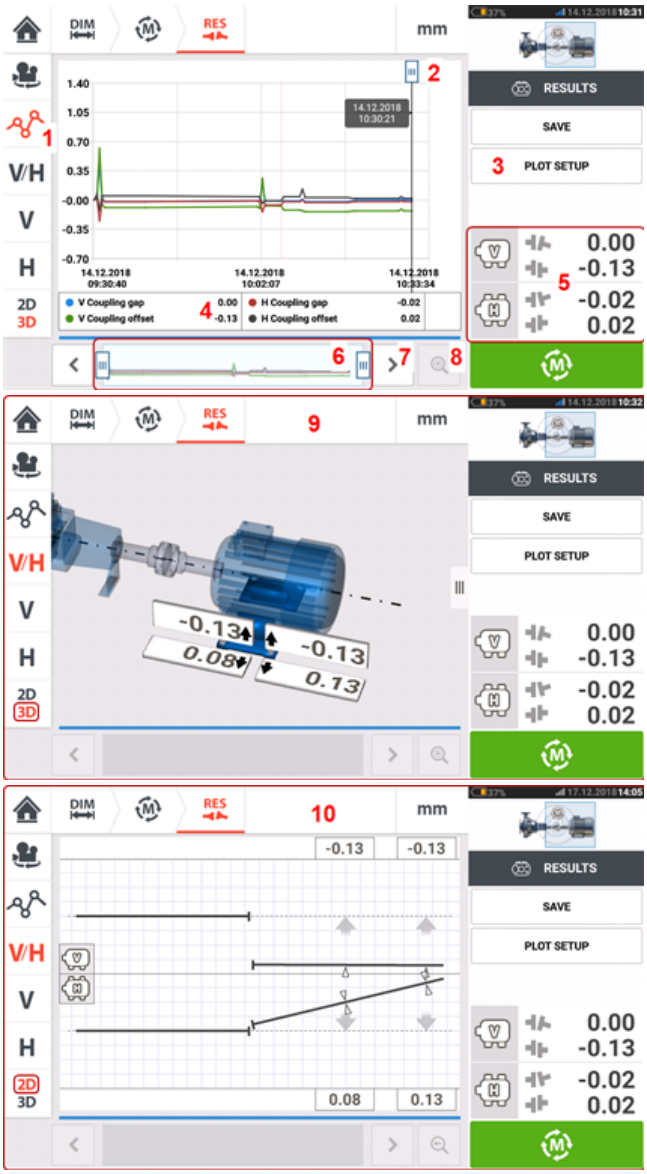
The measurement status bar (**3**) will indicate when measurement is completed. Tap to stop current measurement before set duration elapses. Tap to **evaluate results**.

Note

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

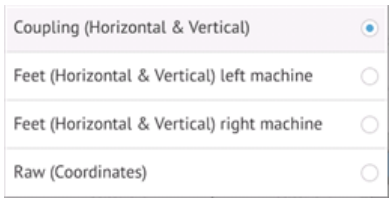
Live Trend – Evaluating results

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 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:



- 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)**

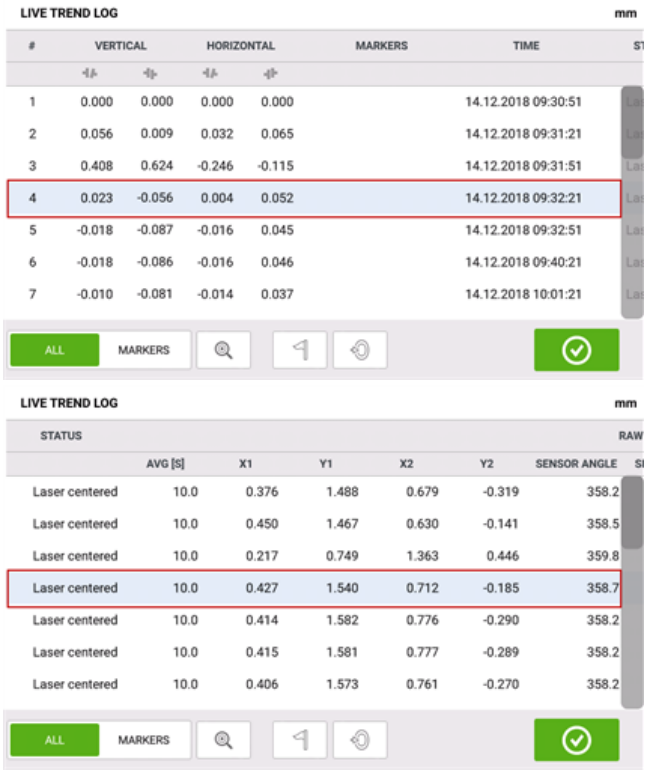
Live Trend – Log

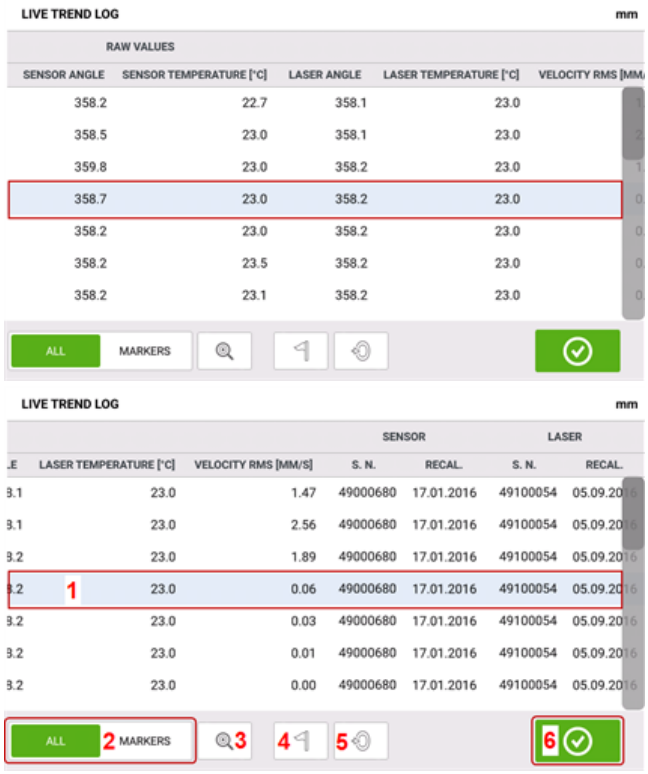
What is a Live Trend log?

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?

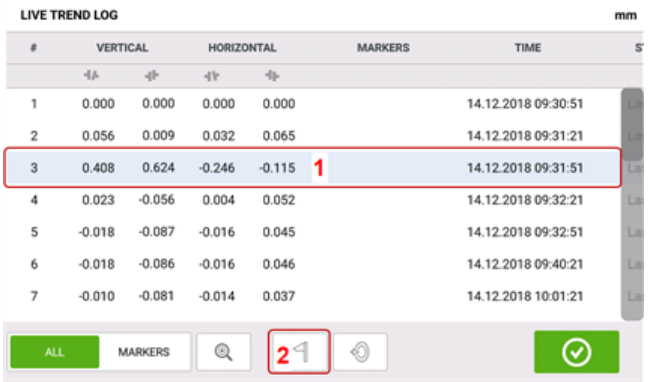
In the Live Trend application, markers are points on the graph that highlight significant events during a measurement. These may include machine startup or machine shutdown. Following markers are available.

- '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

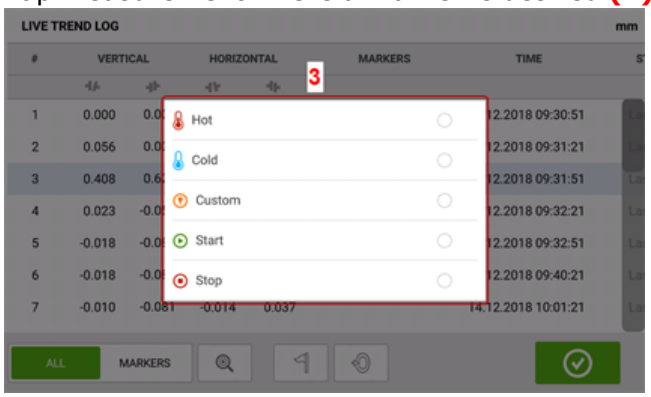
Applying markers

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

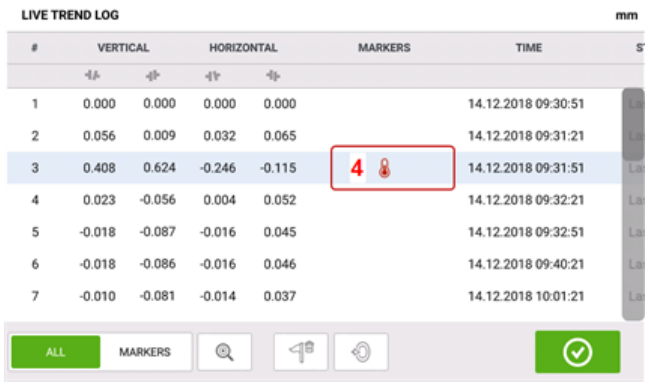
Tap the area where the coupling results are displayed **(1)**. This opens the Live Trend log.



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

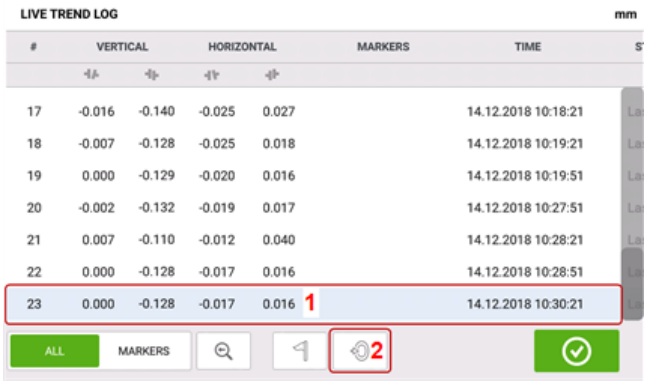
User-specified markers are set using the marker 'Custom'. Tap the desired measurement from the log then tap . Tap 'Custom' from the displayed markers list. Use the keyboard that appears to customize the marker data tip. Data tip is a small display that appears on the cursor. It shows the date, time and customized marker information at the current cursor position.

Set measurement point to zero

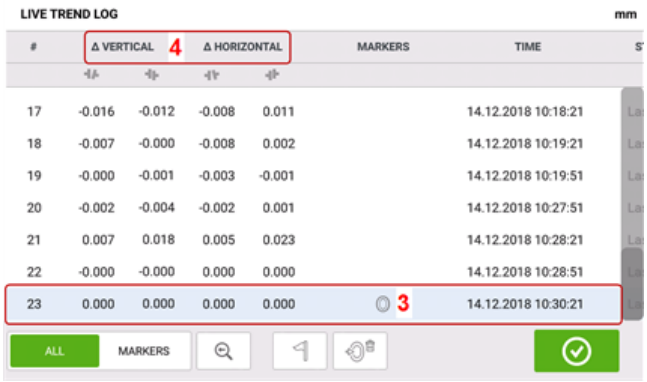
If desired, any measurement point may be set to zero using the "set to zero" marker .

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.



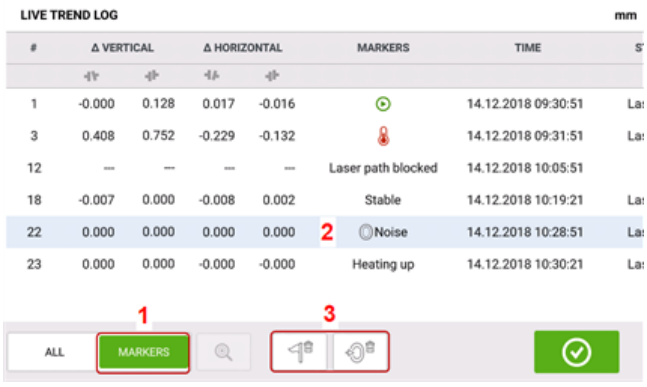
The "set to zero" marker appears on the measurement **(3)** with the vertical and horizontal coupling values set to zero. Coupling values **(4)** are then displayed relative to the point set to zero.



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.

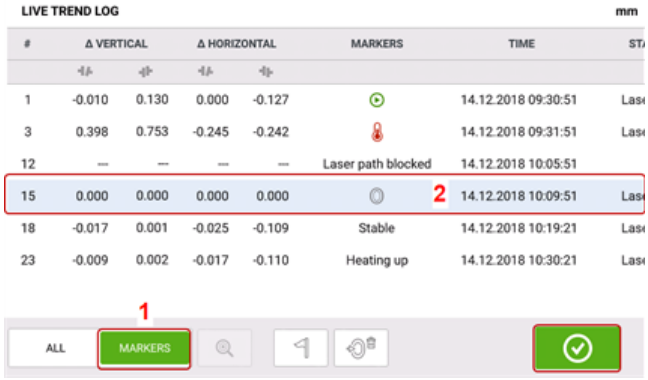
Deleting markers

From the log, slide the green 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.

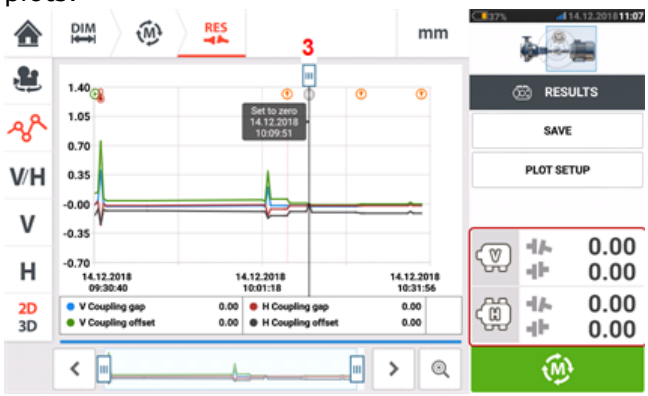


Identifying markers

The markers on the plots may be identified using the log. While in the log, slide the green button **(1)** to the right. Only measurements with markers will be displayed.



Select the measurement **(2)** whose marker is to be identified then tap to view the plots.



The cursor on the plots **(3)** corresponds to the highlighted measurement on the log **(2)**.

In this example, the highlighted measurement is measurement number 15, and the "set to zero" marker has been applied to that measurement. The "Start" and "Hot" markers have also been set at measurement numbers 1 and 3 respectively.

Live Trend in multiple coupling

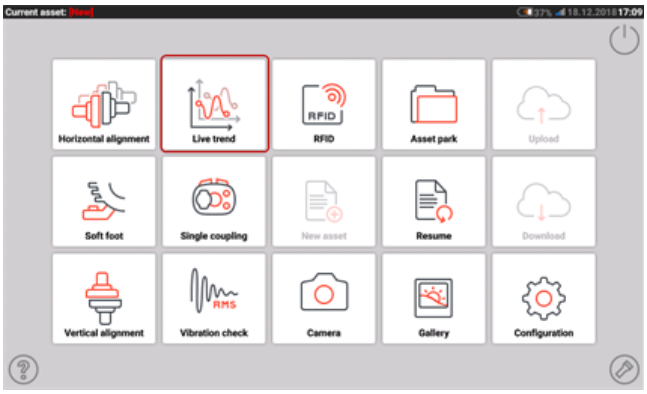
Note
This functionality is available only with ROTALIGN touch features.

What is Live Trend in multiple coupling?

This functionality is used to perform Live Trend measurements of multiple-element drives with three or more machines simultaneously. The functionality may be used to measure up to seven machines.

Accessing the Live Trend multiple coupling functionality

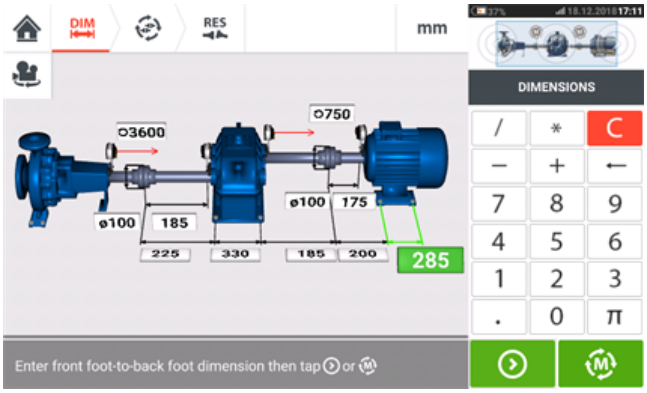
The multiple coupling functionality is accessed by tapping the "Multiple coupling/Single coupling" icon [ ] within the home screen. With "Multiple coupling" selected, the only icons active are Live Trend for multiple coupling and multiple coupling for horizontal shaft alignment.



Tap to start the Live Trend for multiple coupling functionality. The application starts with a default pump-gearbox-motor template.

Setup

- After starting the application configure the machines as appropriate.



- Ensure that the measurement components have been mounted as required.

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

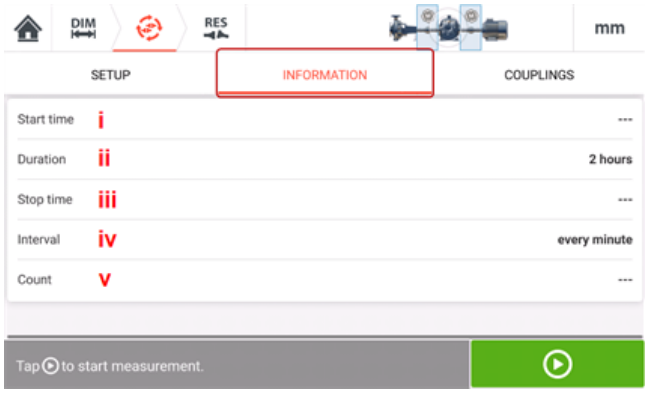
- After entering all necessary dimensions, tap then proceed to set sampling interval and measurement duration in the setup screen that appears.

Items under "Setup"

- **(7)** Tap "Setup" to display the measurement parameters and machine running condition **(1)** to **(6)** which are defined in **Live Trend setup**.

Items under "Information"

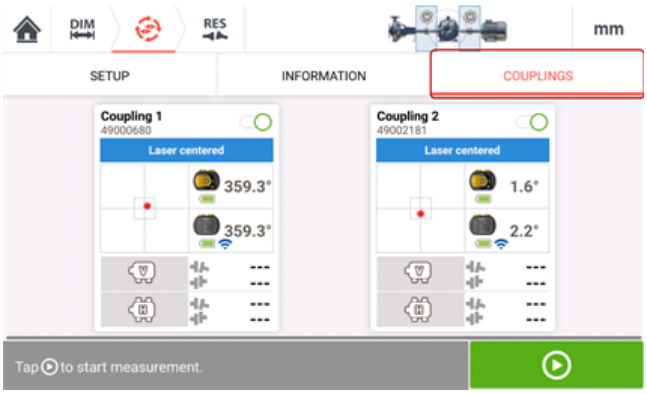
- **(8)** Tap "Information" to display the following times:



i) Time measurement started
ii) Elapsed time (or duration if measurement has not been started)
iii) Time when measurement stopped
iv) Time between measurements
v) Number of measurement samples taken.

Items under "Couplings"

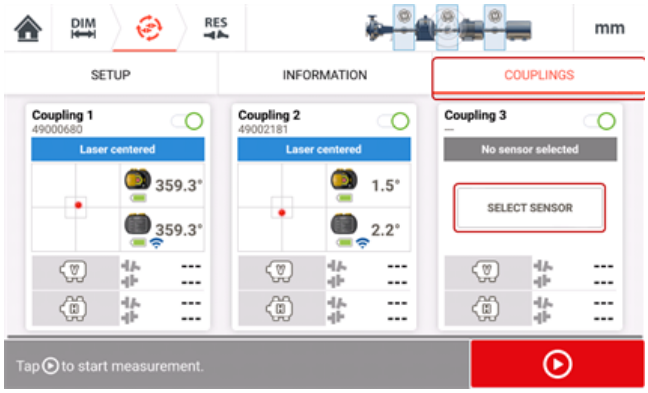
- **(9)** Tap "Couplings" to access the measurement screen where sensor initialization and laser beam adjustment may be carried out if necessary.


DIM
RES
mm
SETUP
INFORMATION
COUPLINGS
Coupling 1
49000680
Laser centered
359.3°
359.3°
Coupling 2
49002181
Laser centered
1.6°
2.2°
Tap to start measurement.

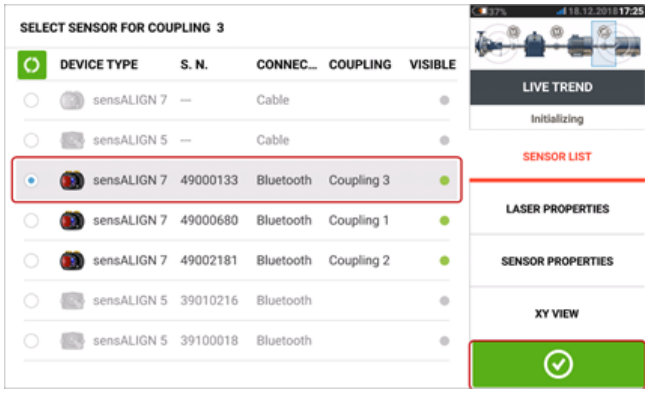
LT in multiple coupling – selecting and initializing sensors

Live Trend in multiple coupling – selecting and initializing sensors

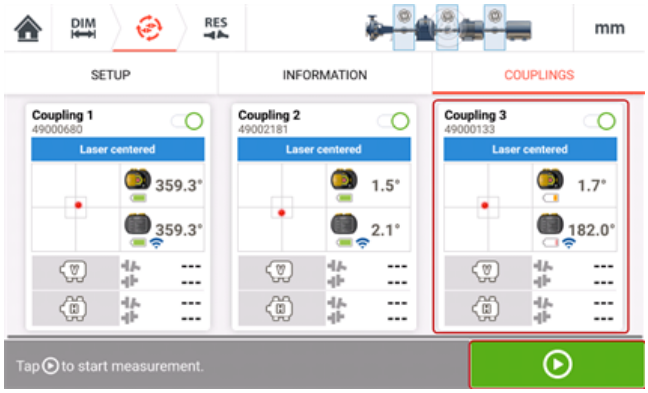
If at any coupling position, the sensor has neither been selected nor initialized, the hint "Select sensor" will appear in the measurement when "Couplings" is selected.



Tap "Select sensor" and proceed with sensor initialization.



After selecting sensor for required coupling position, tap to proceed with measurement.



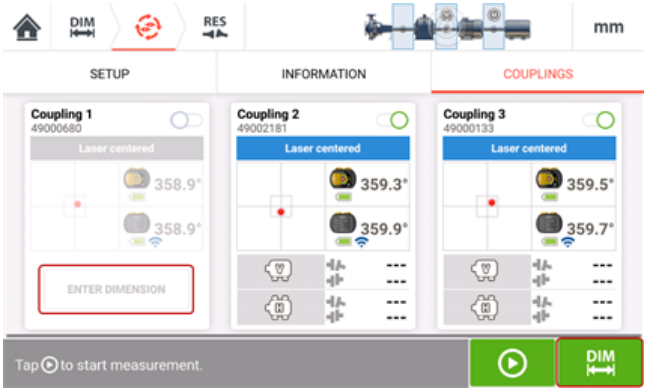
Tap to start multiple coupling Live Trend measurement.

LT in multiple coupling – missing dimensions

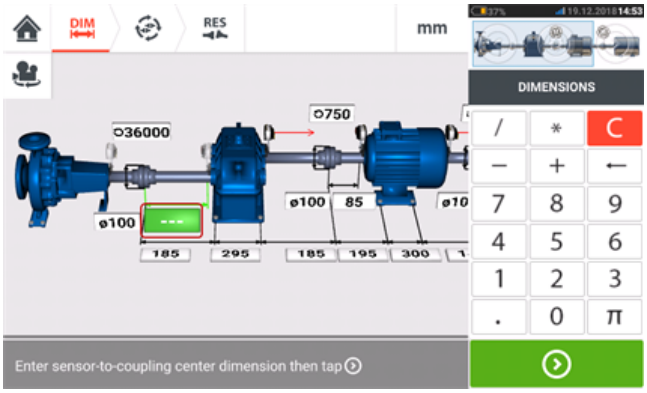
Live Trend in multiple coupling – missing dimensions

If any dimension is missing in Live Trend measurements of multiple-element drives, a hint will appear in the measurement screen.

- The hint "Enter dimension" only appears when any coupling center-to-sensor dimension is missing.
- The dimension icon DIM appears whenever any dimension is missing.



Tap either "Enter dimension" or DIM to access the dimensions screen and enter the required dimension. In this example, the missing dimension is the coupling center-to-sensor dimension on the first coupling..

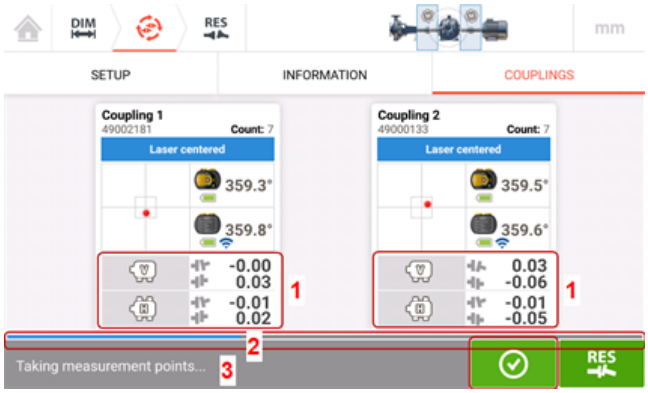


LT measurement in multiple coupling

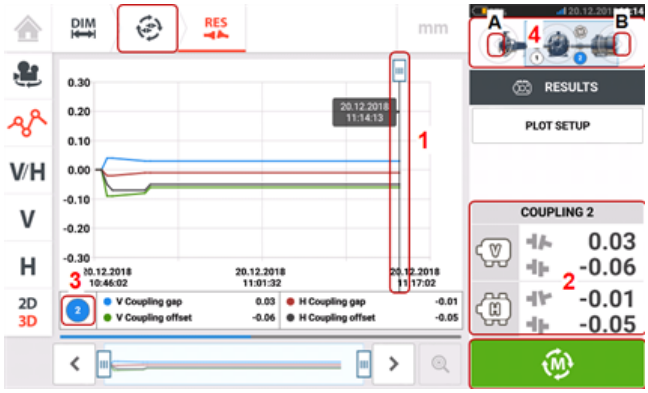
Live Trend measurement in multiple coupling

- If the sensors have been initialized, and laser beam centered, tap to start multiple coupling Live Trend measurement.

> **Note**
> DO NOT touch the sensALIGN sensors and lasers in use or adjust the laser beams once measurement has started.



- Once measurement is started, the "Measurement screen" displays the current coupling gap and offset values at all couplings **(1)**.
  Note: Tapping the coupling values frame opens the Live Trend log.
  The blue measurement progress bar **(2)** shows the approximate percentage of completed measurement. Tapping “Information” displays the time measurement commenced, the scheduled duration, time when measurement will end, the sampling interval and number of measurements taken.
  The measurement status bar **(3)** displays the current status of the measurement.
  Current measurement may be stopped before set duration elapses by tapping .
  During measurement, tapping displays live measurement results.

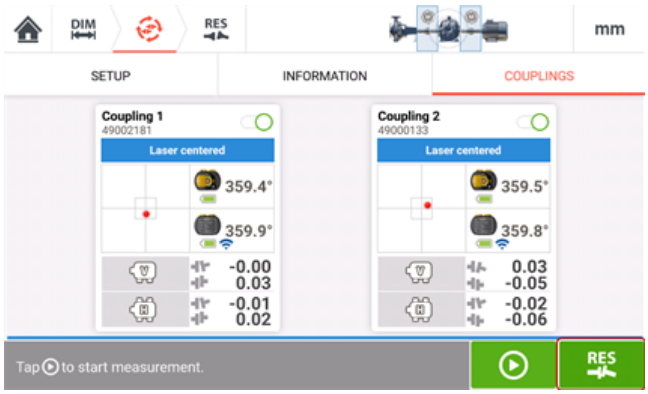


- **(1)** The cursor shows current live results on the plots for the selected coupling.
- **(2)** Live coupling results for selected coupling (in this case coupling 2) are displayed.
- **(3)** Shows coupling whose current live results are on display (in this case coupling 2).

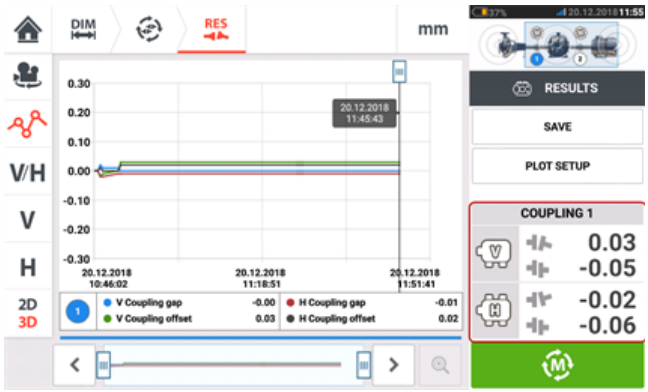
- **(4)** Mini train inset used to select coupling whose live results are to be displayed. Select desired coupling by tapping the arrow located at its respective end (in this example arrow at end **B** for coupling 2).
- Tap either or to return to the measurement screen displaying all coupling positions.

LT results in multiple coupling

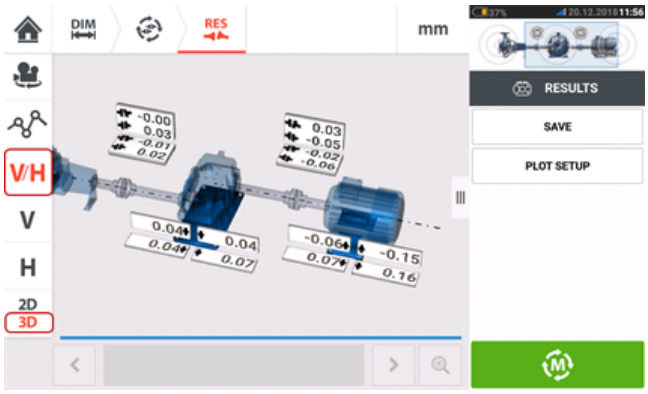
Live Trend results in multiple coupling



Tap RES to display and evaluate results. Results may be evaluated during or after measurement.
Results may be displayed as plots, feet results, and coupling values.



Note
Tapping the coupling values frame opens the Live Trend log.



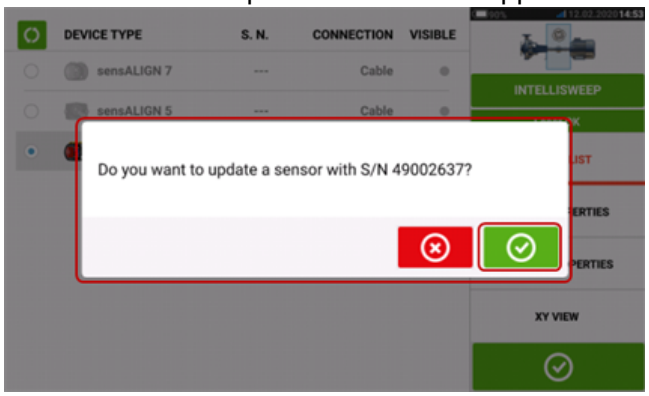
DIM
RES
mm
0.04
0.04
-0.06
-0.15
-0.00
0.03
0.03
-0.05
V/H
V
H
2D
3D
-0.01
0.02
-0.02
-0.06
0.04
0.07
0.07
0.16
RESULTS
SAVE
PLOT SETUP

sensALIGN 7 sensor and laser firmware update

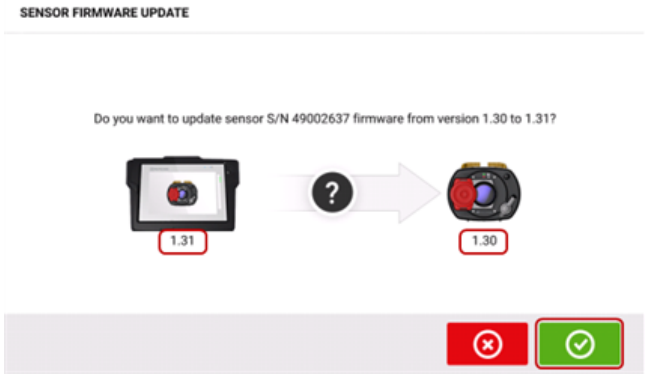
Note
If both sensor and laser are running on older firmware, it is recommended to update the sensor first followed by the laser.

Updating sensor firmware to a newer version

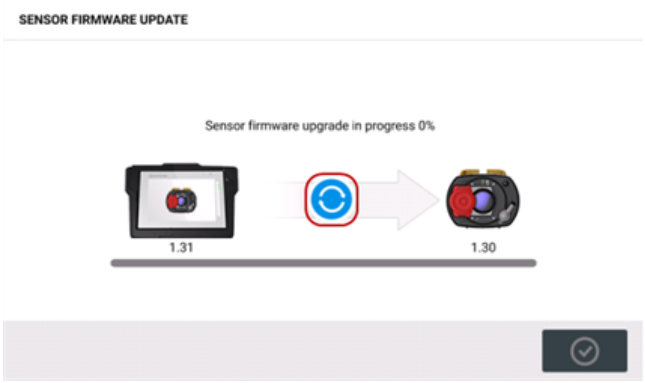
It is possible to carry out a sensor firmware update directly via the rugged touch device. If a sensor with an older firmware version is connected via Bluetooth to the rugged device, a sensor firmware update notification appears on the display.

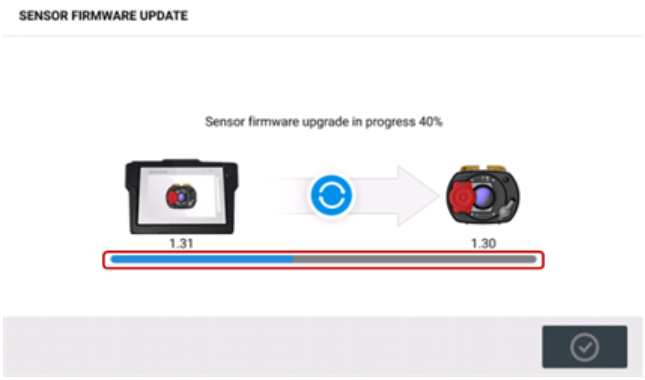


It is recommended to update the sensor firmware. Tap to proceed to update the sensor. The following sensor firmware update screen appears.

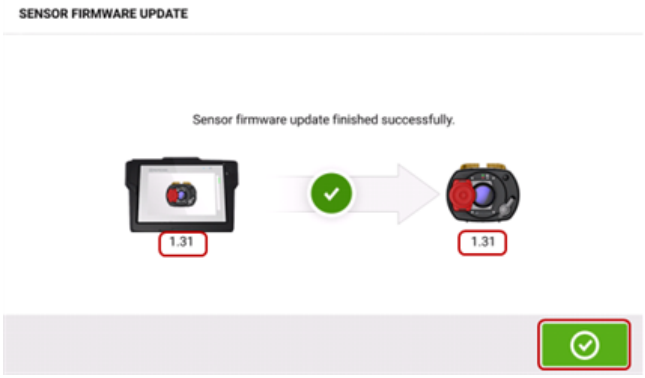


The screen shows that a newer sensor firmware version is available within the rugged touch device. Tap to update the sensor connected via Bluetooth.





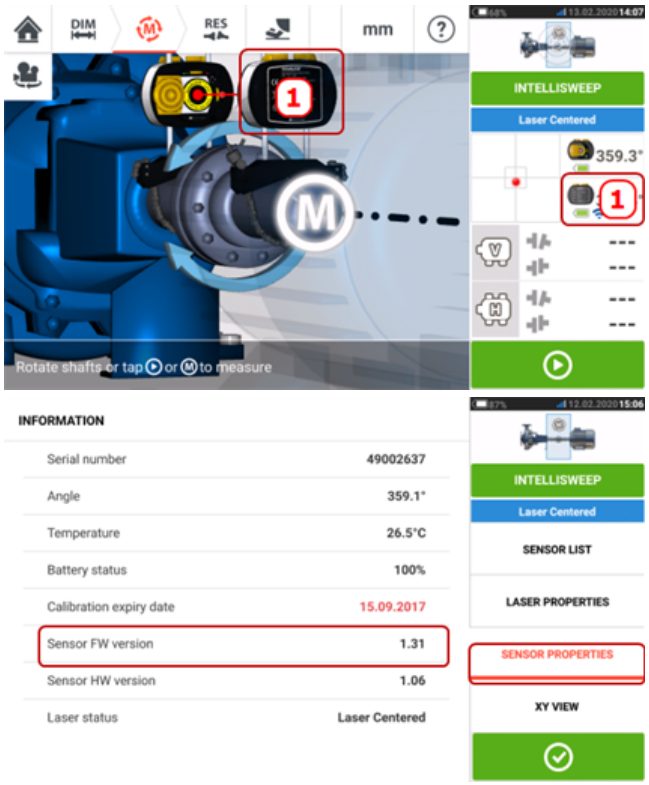
Once the update process is successfully completed, the following screen appears.



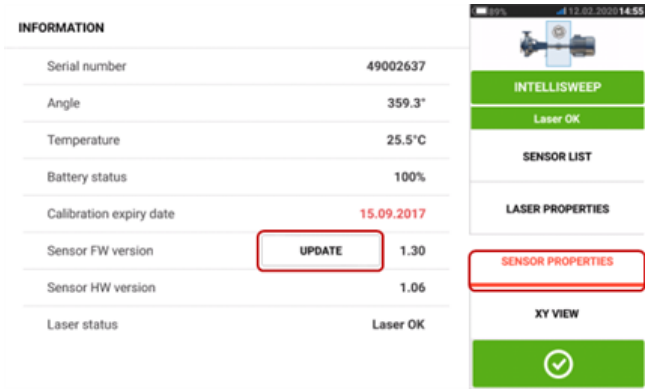
The sensor has now been updated to the newer version available on the rugged touch device.

Tap to exit the update screen.

The new sensor firmware version appears under "Sensor properties" which is accessed by tapping either sensor area **(1)** in the measurement screen.



If the sensor firmware update is not carried out when the notification appears, the update action may be initiated via "Sensor properties". An "UPDATE" hint appears next to the older sensor firmware version.

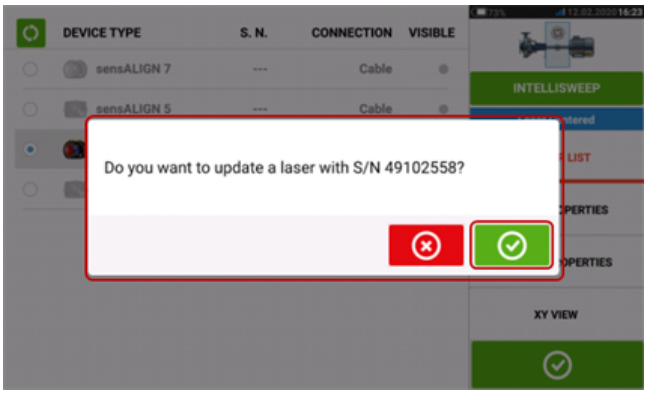


Tap "UPDATE" to proceed with the sensor firmware update.

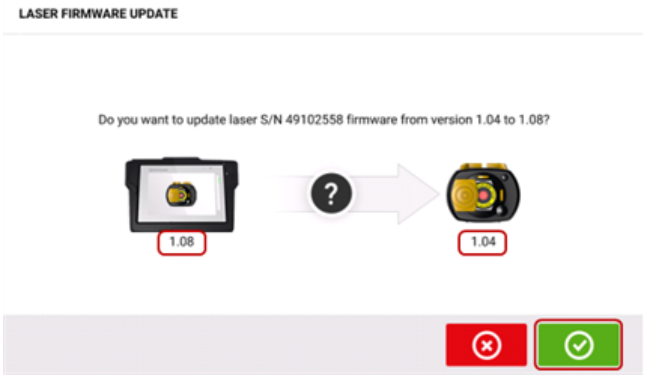
Note
The sensor firmware update notification continues to appear once per day until the firmware update is completed.

Updating laser firmware to a newer version

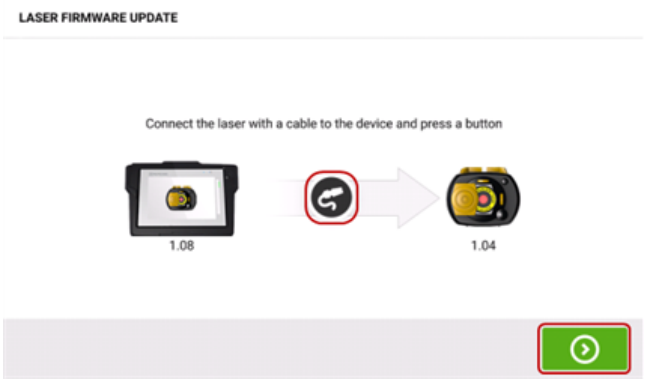
If a laser with an older firmware version is in use, a laser firmware update notification appears on the display of the rugged touch device.



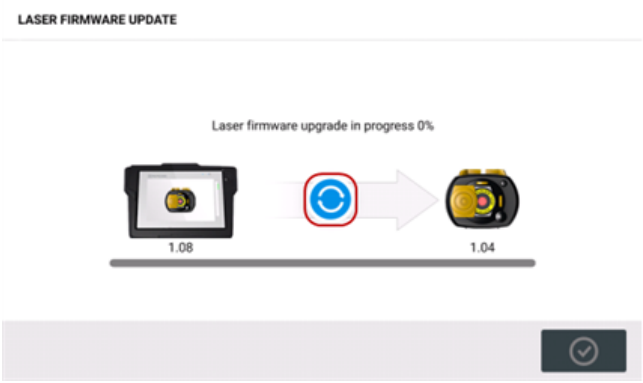
Tap to proceed to update the laser. The following laser firmware update screen appears.

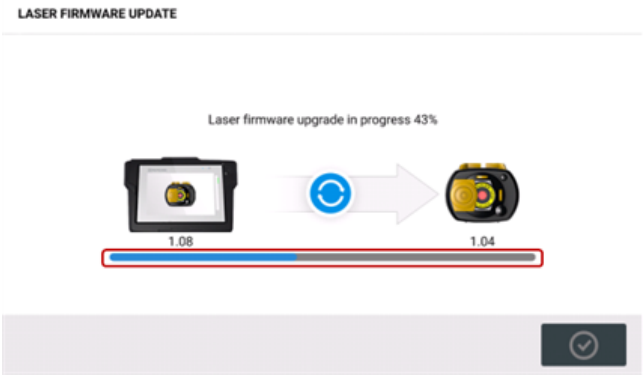


The screen shows that a newer laser firmware version is available within the rugged touch device. Tap to proceed.

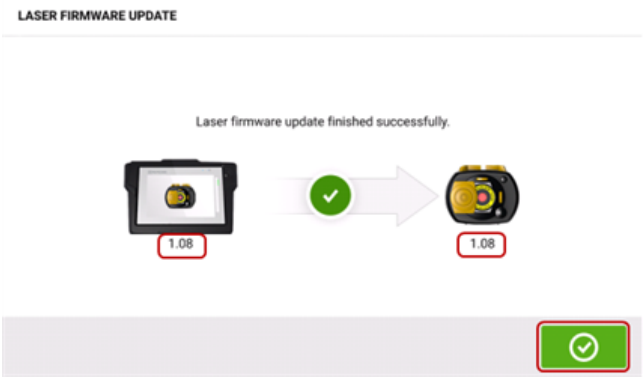


The above prompts the user to connect the laser to the rugged touch device using the provided cable. Connect as shown then tap to start the firmware update.





Once the update process is successfully completed, the following screen appears.

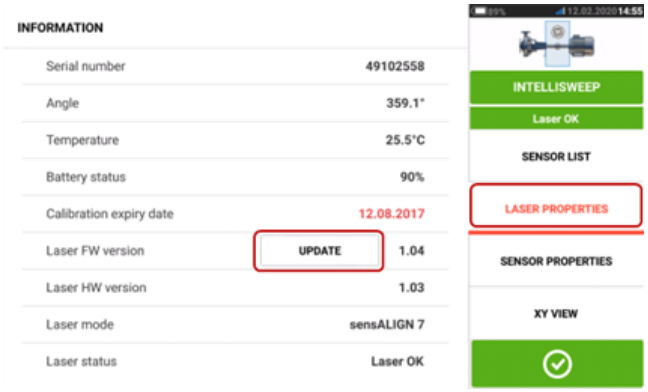


The laser has now been updated to the newer version available on the rugged touch device.

Tap to exit the update screen.

The new laser firmware version appears under "Laser properties" which is accessed by tapping either laser area **(1)** in the measurement screen.

If the laser firmware update is not carried out when the notification appears, the update action may be initiated via "Laser properties". An "UPDATE" hint appears next to the older laser firmware version.



Tap "UPDATE" to proceed with the laser firmware update.

Note
The laser firmware update notification continues to appear once everyday until the firmware update is completed.

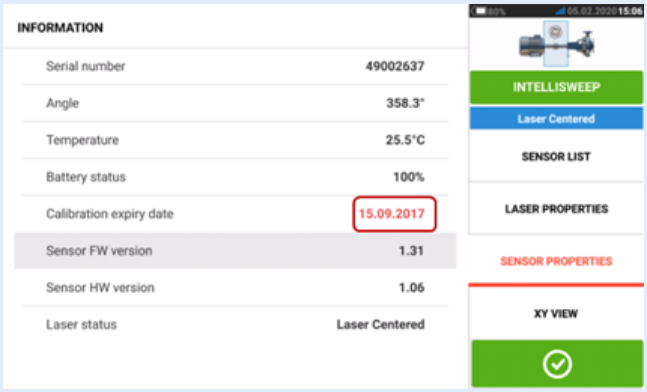
Notification on sensor and laser calibration

Note
The calibration accuracy of both the sensor and the laser should be checked every two years as indicated on the round label affixed to the bottom of the respective component. Both sensor and laser should be returned to an authorized PRÜFTECHNIK service center

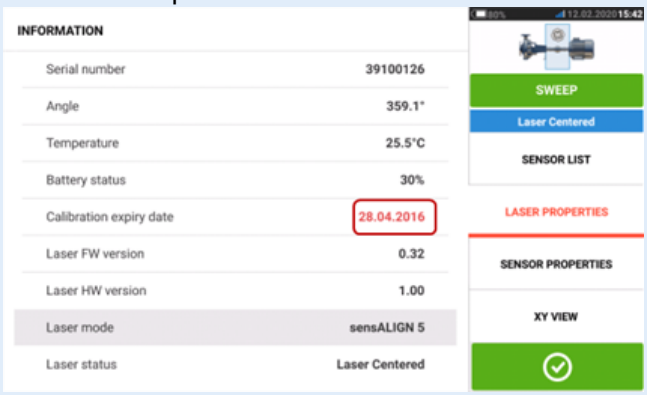
for calibration checking and inspection. You may contact your local PRÜFTECHNIK representative for assistance or visit www.pruftechnik.com.

Note

The sensor calibration due date is also be found under "Sensor properties".

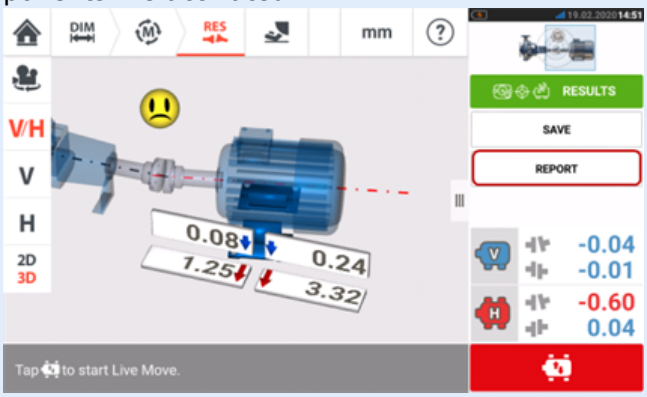


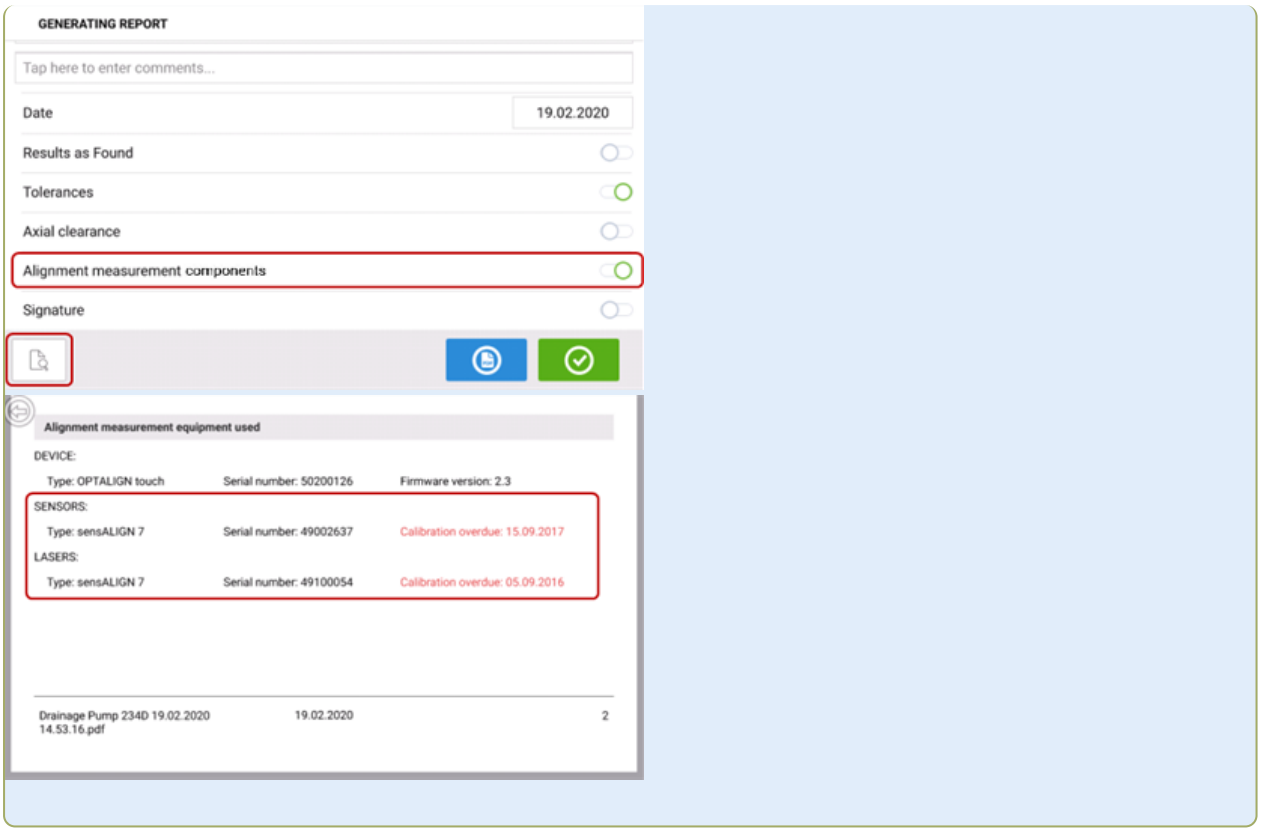
The laser inspection due date is also found under "Laser properties".



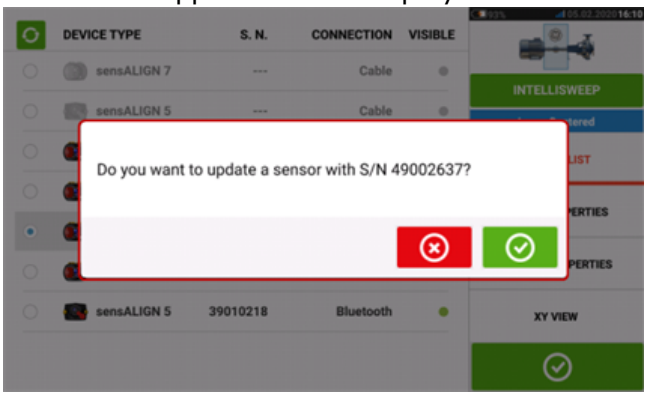
If the calibration or inspection due date has expired, the due date will be highlighted red.

Both the sensor and laser calibration due dates will also appear on the asset measurement report if the "Generating report" menu item "Alignment measurement components " is activated.

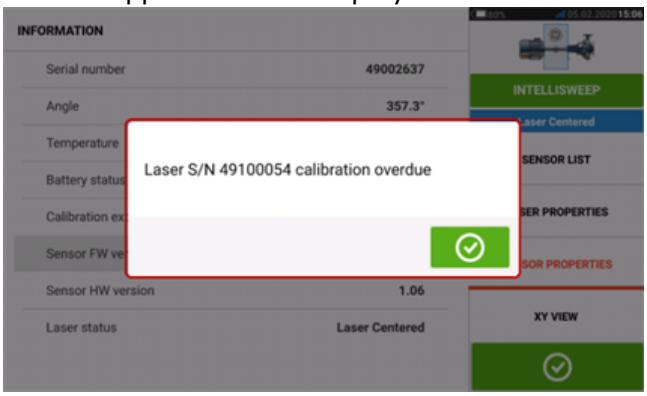




If the calibration due date of sensor and/or laser have expired and the components are connected via Bluetooth or cable to the rugged touch device, the corresponding calibration expiry notification appears on the display.



If the laser inspection due date has expired, and the laser is in use, an inspection expiry notification appears on the display.

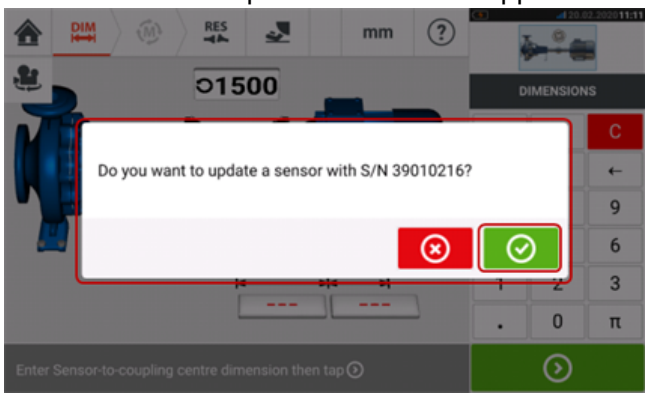


In both cases, tap to close the respective notification.

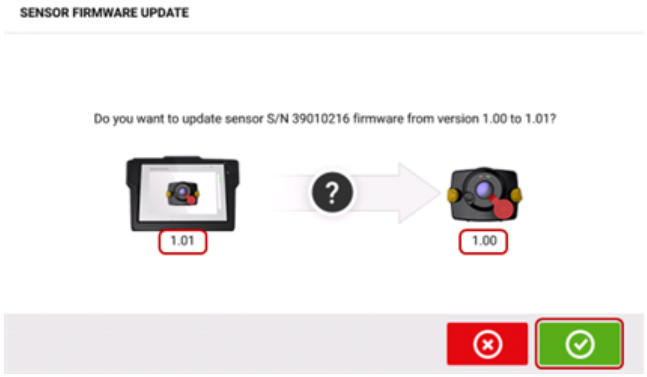
sensALIGN 5 sensor firmware update

Updating sensor firmware to a newer version

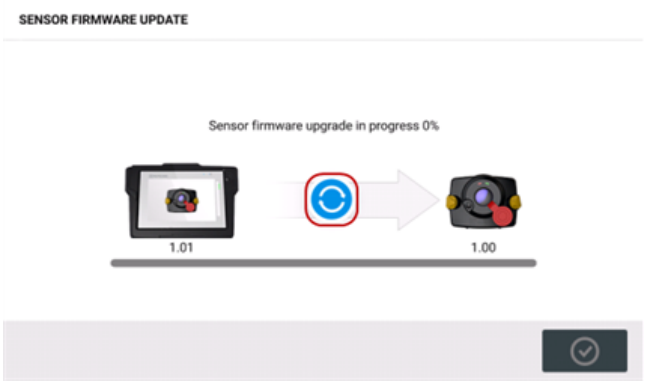
It is possible to carry out a sensor firmware update directly via the rugged touch device. If a sensor with an older firmware version is connected via Bluetooth to the rugged device, a sensor firmware update notification appears on the display.

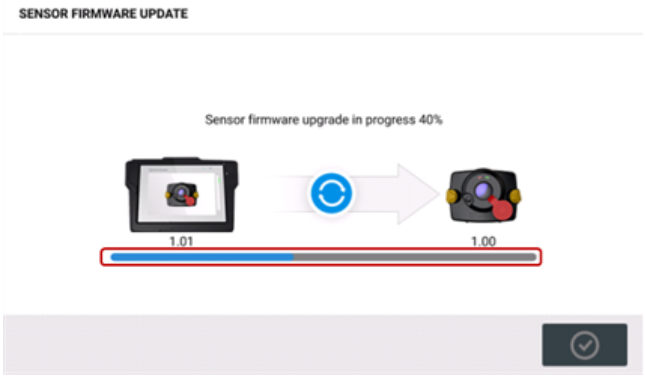


It is recommended to update the sensor firmware. Tap to proceed to update the sensor. The following sensor firmware update screen appears.

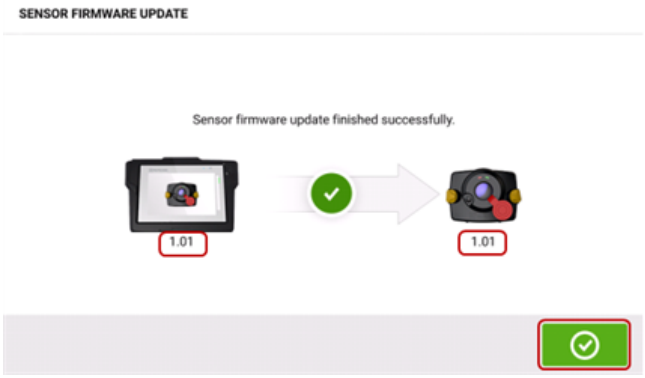


The screen shows that a newer sensor firmware version is available within the rugged touch device. Tap to update the sensor connected via Bluetooth.





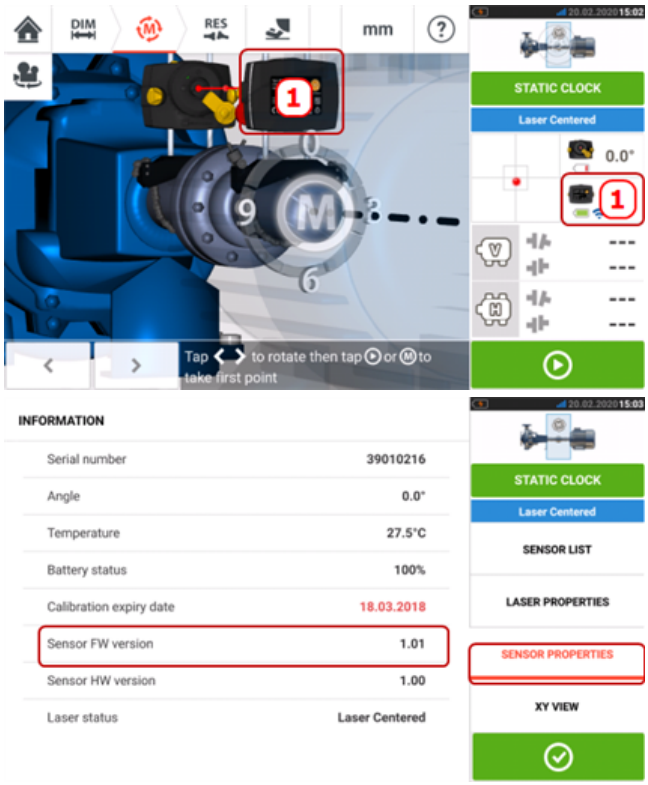
Once the update process is successfully completed, the following screen appears.



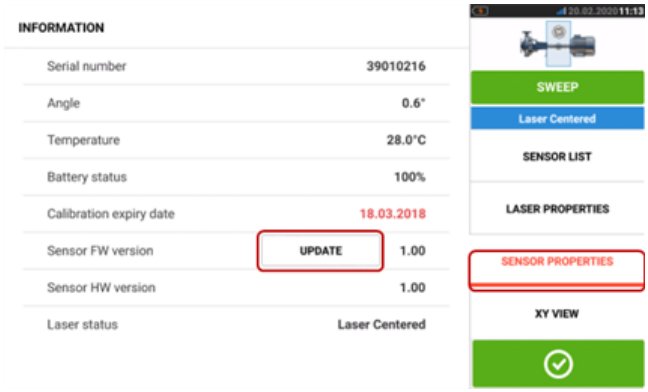
The sensor has now been updated to the newer version available on the rugged touch device.

Tap to exit the update screen.

The new sensor firmware version appears under "Sensor properties" which is accessed by tapping either sensor area **(1)** in the measurement screen.



If the sensor firmware update is not carried out when the notification appears, the update action may be initiated via "Sensor properties". An "UPDATE" hint appears next to the older sensor firmware version.



Tap "UPDATE" to proceed with the sensor firmware update.

Note
The sensor firmware update notification continues to appear once per day until the firmware update is completed.

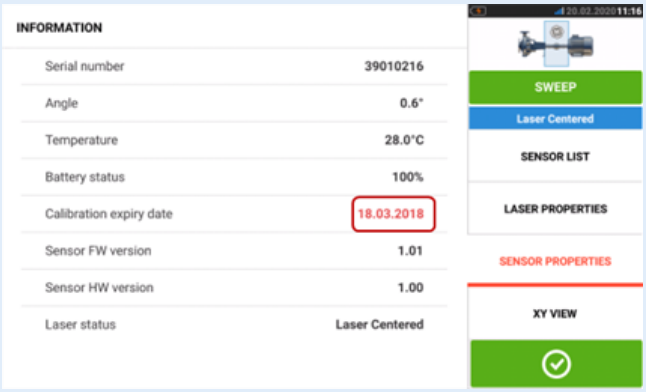
Notification on sensor and laser calibration

Note
The calibration accuracy of both the sensor and the laser should be checked every two years as indicated on the round label affixed to the back of the respective component. Both sensor and laser should be returned to an authorized PRÜFTECHNIK service center

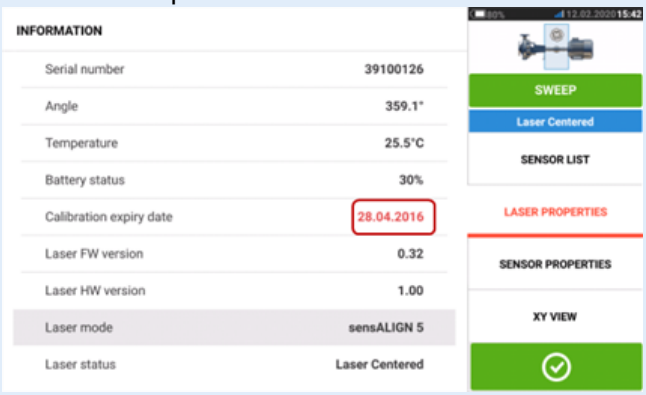
for calibration checking and inspection. You may contact your local PRÜFTECHNIK representative for assistance or visit www.pruftechnik.com.

Note

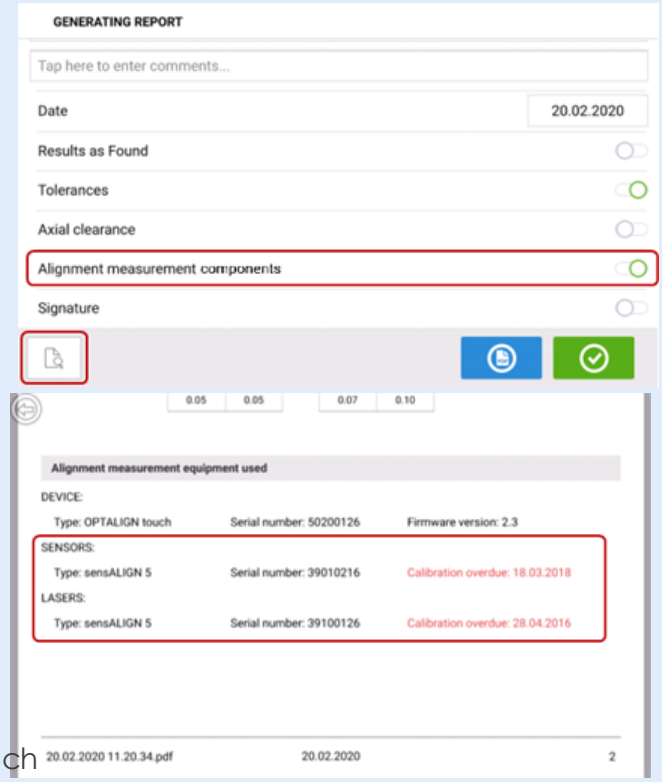
The sensor calibration due date is also found under "Sensor properties".



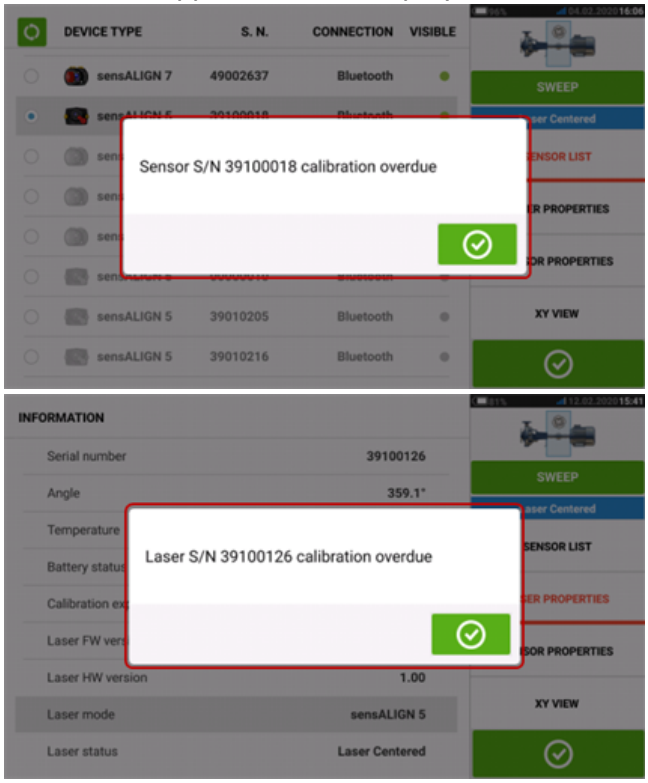
The laser inspection due date is also found under "Laser properties".



If the calibration due date has expired, the due date will be highlighted red.
Both sensor and laser calibration due dates will also appear on the asset measurement report if the "Generating report" menu item "Alignment measurement components " is activated.



If the calibration due date of sensor and/or laser have expired and the components are connected via Bluetooth or cable to the rugged touch device, the corresponding calibration expiry notification appears on the display.



Tap to close the notification.

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 ± 3 mm [± 1/8 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.

Technical data – touch device

touch device	
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

touch device	
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')
Country radio certifications	Approvals granted for specific regions (refer to the provided 'Safety and general information' document)

Technical data – sensALIGN 7 laser

sensALIGN 7 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

Technical data – sensALIGN 7 sensor

sensALIGN 7 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
Country radio certifications	Approvals granted for specific regions (refer to the provided 'Safety and general information' document)

Technical data – sensALIGN 5 sensor

sensALIGN 5 sensor	
Type	5-axis sensor: 2 planes (4 displacement axes and angle)
LED indicators	1 LED for laser adjustment and battery status 1 LED for Bluetooth® communication
Power supply	Battery: Lithium-Ion rechargeable battery 3.7 V / 5 Wh Operating time: 10 hours (continuous use) Charging time: Using charger – 2.5 h for up to 90%; 3.5 h for up to 100% Using USB port – 3 h for up to 90%; 4 h for up to 100%
Environmental protection	IP 65 (dustproof and water jets resistant), shockproof Relative humidity: 10% to 90%
Ambient light protection	Yes
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. 105 x 74 x 58 mm (4 9/64" x 2 29/32" x 2 1/4")
Weight	Approx. 235 g (8.3 oz)
Measurement range	Unlimited, dynamically extendible (US. Patent 6,040,903)
Measurement resolution	1 µm (0.04 mil) and angular 10 µRad
Measurement rate	Approx. 20 Hz
Measurement accuracy (avg)	> 98 %
Inclinometer resolution	0.1°
Inclinometer error	0.3 % full scale
External interface	Integrated Bluetooth 4.1 Smart Ready wireless communication USB 2.0 Full Speed
Transmission distance	Up to 30 m (98 ft) direct line of sight
CE conformity	Refer to the CE compliance certificate in www.-pruftechnik.com
Country radio certifications	Approvals granted for specific regions (refer to the provided 'Safety and general information' document)

Technical data – sensALIGN 5 laser

sensALIGN 5 laser	
Type	Semiconductor laser
Power supply	Batteries 2 x 1.5 V IEC LR6 (“AA“) Operating time: 180 hours
Environmental protection	IP 65 (dustproof and water jets resistant), shockproof Relative humidity: 10% to 90%
Temperature range	Operation: -10°C to 50°C (14°F to 122°F) Storage: -20°C to 60°C (-4°F to 140°F)
Dimensions	Approx. 105 x 74 x 47 mm (4 9/64" x 2 29/32" x 1 27/32")
Weight	Approx. 225 g (7.9 oz)
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.
Safety precautions	Do not look into laser beam
Beam power	< 1mW
Beam divergence	0.3 mrad
CE conformity	Refer to the CE compliance certificate in www.pruftechnik.com