

A user's handbook

Dear Customer,

Welcome to the world of intelligent shaft alignment using ROTALIGN Ultra iS Shaft, another innovative product from PRÜFTECHNIK, the inventors of laser shaft alignment. This handbook sets out to help the instrument user work through the instrument with the required ease. It is the standard work for both the 'Advanced Shaft' and 'Standard Shaft' versions, and meant to be a quick learning tool that hopefully should make compelling reading.

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Foreword

ROTALIGN Ultra iS is industry's first intelligent alignment system. The system combines the features of the tested and proven ROTALIGN Ultra iS computer together with those of the next generation sensALIGN sensor and laser. ROTALIGN Ultra iS computer features a 5.7-inch (145 mm) colour TFT sunlight readable full VGA screen, a fast processor, an alphanumeric keyboard with strategically placed navigation keys that handles all data entry functions, a long lasting rechargeable battery, handy on-screen context menu, a remarkable file storage capacity and computer LEDs that give the instant status of the alignment condition and laser beam adjustment.

sensALIGN sensor possesses an unlimited detector range making it possible to measure grossly misaligned machines or those with long couplings. Both sensor and laser incorporate Micro Electro Mechanical System (MEMs) allowing the measurement of component rotational angle and vibration. sensALIGN sensor incorporates Bluetooth for wireless transmission of measurement data to the system computer. Both sensor and laser are powered using Lithium Polymer (Li-Po) rechargeable batteries.

In its completeness, the system handles the alignment of drive trains comprising up to 14 machines and includes intelligent features such as ellipse calculation, monitoring environmental vibration, live measurement quality and suppression of coupling backlash.

If you have any suggestions for improvement or corrections (not just to this manual, but also for hardware), please drop us a line. We would be glad to make improvements wherever possible.

We look forward to hearing from you.

PRÜFTECHNIK Alignment Systems
Ismaning, Germany

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Chapter 1: ROTALIGN Ultra iS Shaft package

ALI 40.000 is the standard ROTALIGN Ultra iS Shaft package.

For details of other available ROTALIGN Ultra iS stand-alone and add-on packages, please contact your local PRÜFTECHNIK sales representative.



1.1 ROTALIGN Ultra iS Shaft package ALI 40.000

ALI 4.820

ROTAGLIGN Ultra iS Shaft case

ALI 4.202

ROTAGLIGN Ultra iS computer including:

ROTAGLIGN Ultra iS rechargeable battery

ALI 4.603

ROTAGLIGN Ultra iS stand **ALI 4.201**

ALI 4.910

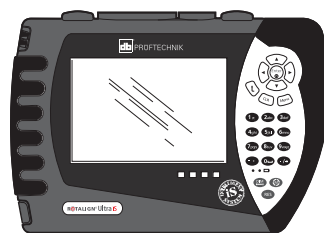
sensALIGN laser [sensALIGN rechargeable battery **ALI 4.960** is mounted]

ALI 4.900

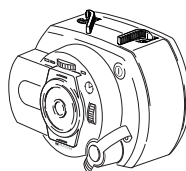
sensALIGN sensor [sensALIGN rechargeable battery **ALI 4.960** is mounted]



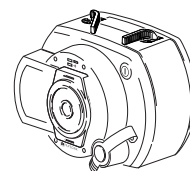
ALI 4.820



ALI 4.202



ALI 4.910

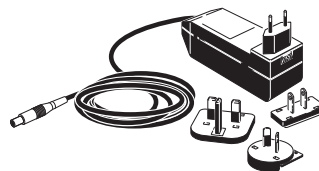


ALI 4.900

ALI 4.921-2	sensALIGN sensor and laser cable
ALI 4.651-I	sensALIGN charger/adapter (universal) – for powering and charging sensALIGN sensor/laser and rechargeable battery
ALI 12.502-2	PC/USB cable
ALI 12.503	USB/peripheral devices cable
ALI 12.651-I	AC power supply/charger (universal) – for powering and charging ROTALIGN Ultra iS computer and rechargeable battery



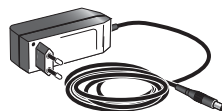
ALI 12.502-2



ALI 12.651-I



ALI 4.921-2



ALI 4.651-I



ALI 12.503

Introducing ROTALIGN Ultra iS Shaft

ALI 2.113 SET

Compact chain-type bracket set

includes: chains — ALI 2.114, ALI 2.115,
support posts — ALI 2.170, ALI 2.171,
ALI 2.172, ALI 2.173, ALI 2.174 and storage
pouch — ALI 3.590-200

ALI 2.905

Lens cleaning cloth

ALI 3.588

Tape measure mm/inch

DOC 40.100.en

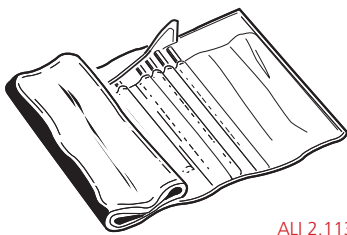
ROTALIGN Ultra iS Shaft pocket guide

DOC 40.200.en

ROTALIGN Ultra iS Shaft operating instructions

DOC 4.900.de/en

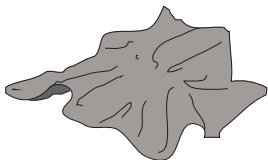
ROTALIGN Ultra product catalog



ALI 2.113 SET



ALI 3.588



ALI 2.905



DOC 4.900.de/en



DOC 40.200.en

DOC 40.100.en

ROTALIGN Ultra iS Shaft handbook

ALI 13.700 CD

ALIGNMENT CENTER CD

ALI 4.741

**ROTALIGN Ultra Advanced Shaft
Firmware registration certificate**
(not shown)

ALI 4.905

Vibration check probe

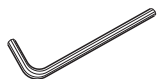
ALI 4.451

USB memory stick

0 0739 1055

Allen key (2.5 mm)

8



0 0739 1055



ALI 4.905



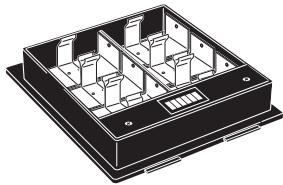
ALI 13.700 CD



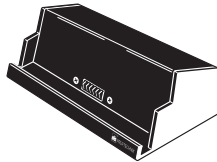
ALI 4.451

1.1.1 Optional ROTALIGN Ultra iS components

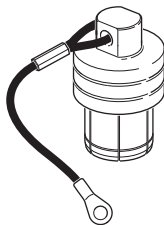
ALI 4.605	ROTAGIGN Ultra iS disposable battery housing
ALI 4.615	Desktop charging station for ROTALIGN Ultra iS rechargeable battery
ALI 4.410	Dust cap for computer sensor socket



ALI 4.605



ALI 4.615



ALI 4.410

ROTALIGN Ultra iS Shaft handbook

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Chapter 2: System description

2.1 Safety notes

ROALIGN Ultra iS is to be used in industrial environments only for alignment of turbine components, shafts, bores, measurement of straightness and flatness of different surfaces. It is dust proof and water resistant with a rating of IP 65. Although shockproof, care must be taken to ensure that the instrument is not subjected to mechanical knocks. ROTALIGN Ultra iS must be operated only by properly trained personnel. No liability will be assumed when components or operating procedures as described in this manual are altered without permission of the manufacturer.

Note that the necessary application firmware [bore alignment, flatness, straightness among others] must be purchased, installed and licenced.

2.1.1 Symbols used in this handbook

The following symbols are used in this manual in order to draw the reader's attention to especially important text, such as possible sources of danger or useful operating tips.

This symbol denotes general information and tips regarding operation of ROTALIGN Ultra iS.

This symbol denotes information which must be followed in order to avoid damage to equipment.

This symbol denotes information which must be followed in order to avoid personal injury.

Numbers in red circles indicate the corresponding operating step described in these instructions and must be performed exactly.



Note



CAUTION



WARNING

1

2.1.2 CE compliance and electromagnetic compatibility

ROALIGN Ultra iS fulfills the EC Guidelines for electric devices and those relating to electromagnetic compatibility as indicated in the conformity certificate attached in the appendix. The certificate may also be downloaded from the PRÜFTECHNIK website.

2.1.3 Laser safety

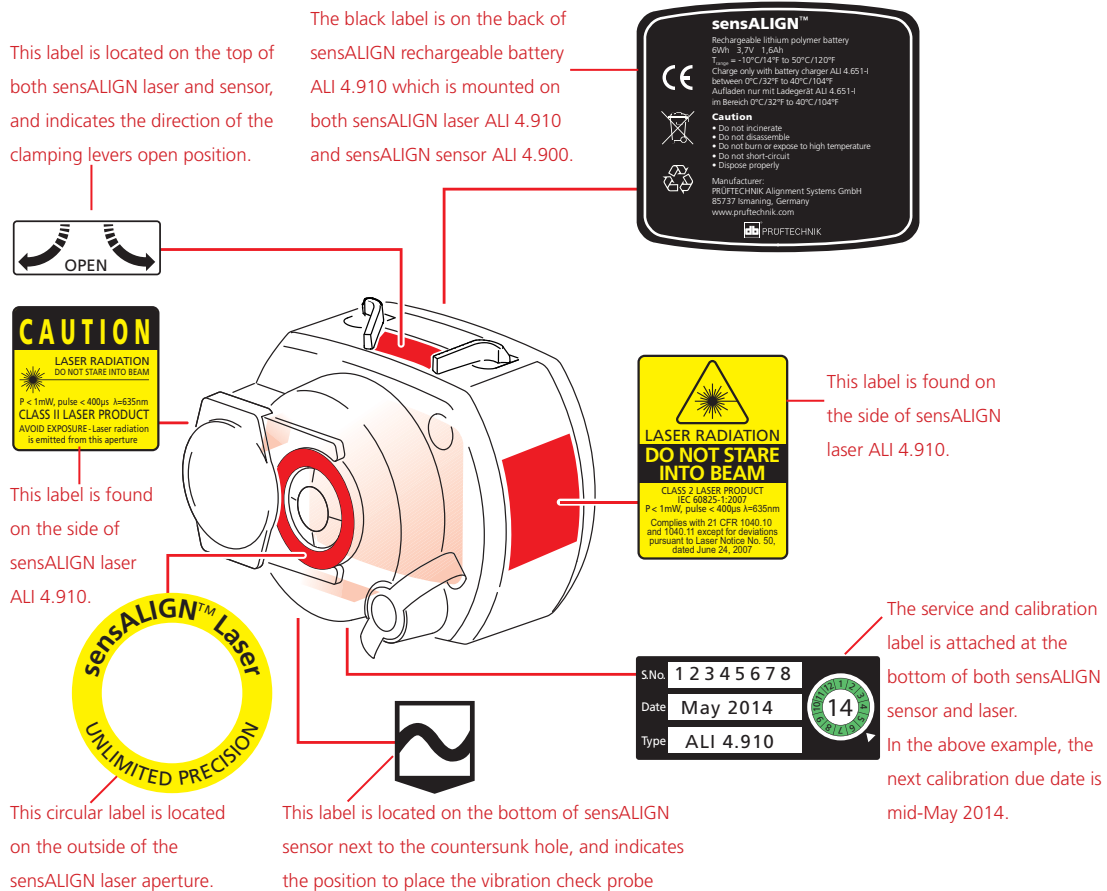
The ROTALIGN Ultra iS system uses sensALIGN laser ALI 4.910. According to IEC 60825-1, sensALIGN laser is classified as a Class 2 laser product. The laser operates at 635 nm and has a maximum radiant power <1 mW. It complies with the FDA specifications 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007. No maintenance is necessary to keep this product in compliance with the specifications referred to.

- ▶ Do not look directly into the laser beam at any time. (The natural blink reaction of the human eye is normally sufficient to protect the eyes from any dangers posed by looking at the laser beam briefly. But as natural blink reaction may fail to occur, care should be taken to avoid staring into the beam.)
- ▶ Do not insert any optical devices into the beam path.
- ▶ The red LED on the front of sensALIGN laser illuminates whenever the laser beam is emitted.
- ▶ CAUTION – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



2.1.4 Component labelling

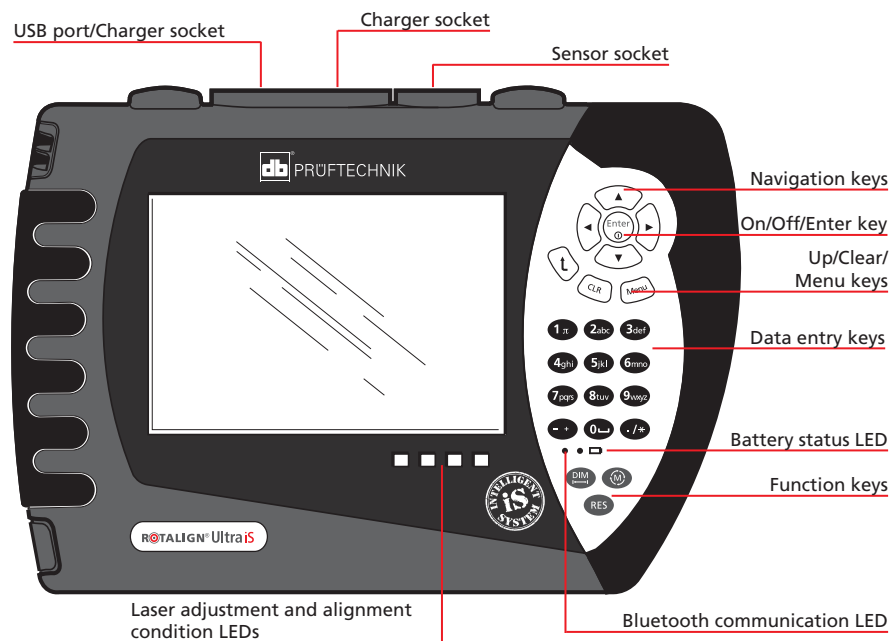
The laser safety labels are affixed on the housing of sensALIGN laser at the positions shown in the diagram below. The rechargeable battery label is located on the rear of sensALIGN rechargeable battery.




2.2 Getting to know the ROTALIGN Ultra iS computer

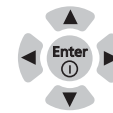
The ROTALIGN Ultra iS computer has been developed to effectively handle both simple and complex shaft, bore and turbine diaphragm applications. The computer is also used to carry out straightness and flatness measurements. ROTALIGN Ultra iS has a customer-oriented user interface. It uses easy-to-follow icons and comprehensive on-screen menus and hint texts, that enable even first-time users to operate the computer without difficulty.

ROALIGN Ultra iS is built to rugged industrial standards of shock and water resistance. It contains a complete computer with a 5.7 inch (145 mm) color TFT full VGA display, oval-shaped function and data entry keys, 4-way navigation keys, an On/Off/Enter key, an up key, a clear key and a menu key.



2.2.1 Operating keys

- ▶ The navigation keys are used to navigate through the menu and display items. The 'Enter' key in the centre is used to access any selected item or confirm an action.
- ▶ The 'On/Off/Enter' key is used to perform the dual function of switching on ROTALIGN Ultra iS, and accessing any selected item. To switch on, press and hold , the 'On/Off/Enter' key briefly.
- ▶ The 'Up' key is used as a back/return key, taking user to previously selected function, or to exit current screen.
- ▶ The 'CLR' (Clear) key is used to delete information entered inadvertently.
- ▶ The 'Menu' key is used to call-up menu options related to the selected display screen. Pressing it twice brings up the global menu.
- ▶ The data entry keys are used to enter relevant data.



ROTALIGN Ultra iS possesses 3 function keys.

- ▶ The 'Dimension' key is used to access machine set-up where machine dimensions and properties are defined.
- ▶ The 'Measurement' key is used to access the measurement screen.
- ▶ The 'Result' key is used to call alignment results into the display.



The above label is affixed on the back of ROTALIGN Ultra iS computer ALI 4.202.

The label opposite is on the back of ROTALIGN Ultra iS computer, affixed to the rechargeable battery in current use.

2.2.2 Computer LEDs

- ▶ The battery status LED blinks green during the battery recharging process, staying steady green when battery is fully charged.
- ▶ The Bluetooth communication LED blinks blue while searching the neighbourhood for Bluetooth devices, staying steady blue when connected to the sensALIGN sensor.
- ▶ The four alignment condition LEDs are used to indicate the position of the laser beam on the detector during beam adjustment, and the actual alignment status after measurement.

LED	Laser beam adjustment	Alignment status
Blue	Laser beam centred	Excellent
Green	Laser beam OK	Acceptable
Amber	Laser beam out of recommended measurement part of detector	Bad
Red	Laser beam off	Grossly misaligned

2.2.3 Power supply

ROTALIGN Ultra iS is powered using a 7.2 V 6.0 Ah Lithium-ion rechargeable battery ALI 4.603, which is to be charged only using the battery charger ALI 12.651-I. This can be done with the battery inside the computer. The computer may continue to be used if the battery is charged inside it.

Alternatively, use 6 standard 'C' size [IEC LR 14] batteries contained in the optional battery compartment ALI 4.605.

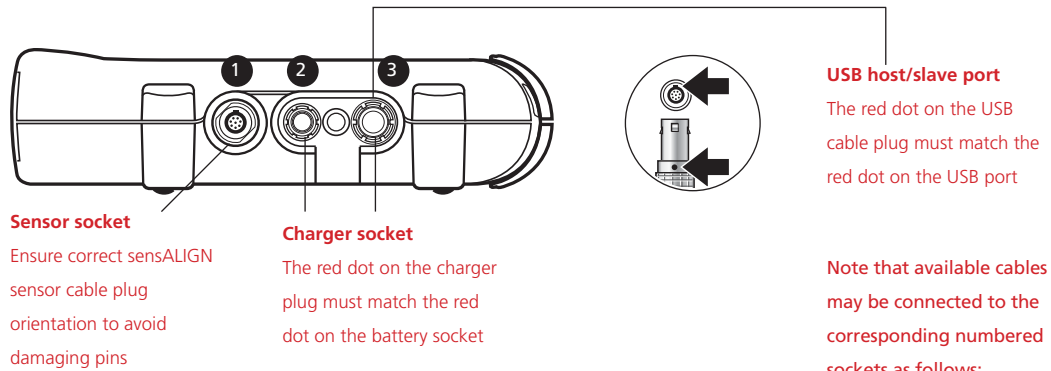
If the ROTALIGN Ultra iS computer is not in use for extended periods of time, a month or more, the rechargeable battery or the standard batteries should be removed from the unit.



2.2.4 Replacing batteries

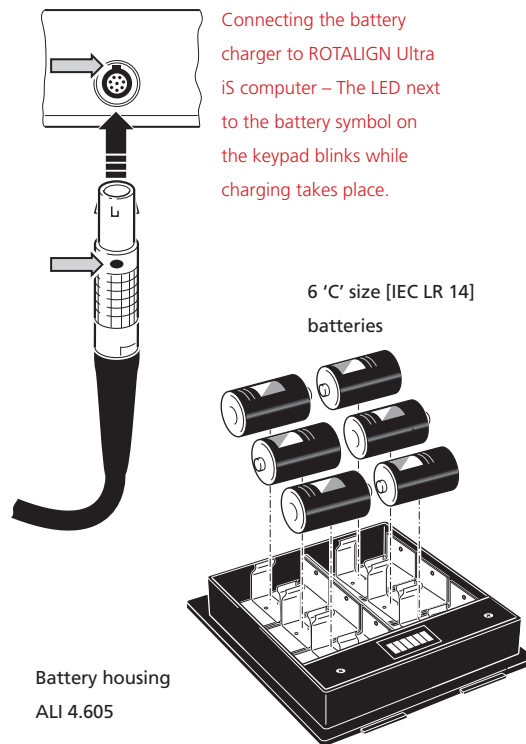
The rechargeable battery ALI 4.603 and the battery housing ALI 4.605 have identical shapes and are therefore replaceable. If batteries require removal, turn over the computer taking care not to damage the display and the hard keys. Undo the two screws by turning them counterclockwise a quarter of a turn. With the screws loosened, lift and pull the rechargeable battery or the battery housing (depending on power supply source) out. The reverse procedure is used to mount back the rechargeable battery or the battery housing back into the computer.

ROTAGIGN Ultra iS top panel connectors

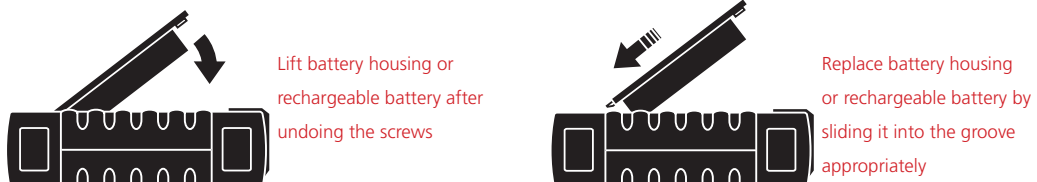


Note that available cables may be connected to the corresponding numbered sockets as follows:

- 1 ALI 4.921-2 (sensALIGN sensor and laser cable)
- 2 ALI 12.503 (short USB cable), ALI 12.651-I (charger)
- 3 ALI 12.502 (long USB cable), ALI 12.503 (short USB cable), ALI 12.651-I (charger)



If you are using the standard 'C' size batteries, it is recommended to replace all of them at once. Note the battery polarity when inserting them in the battery housing ALI 4.605. The housing is removed and replaced in the same manner as the rechargeable battery ALI 4.603



2.3 sensALIGN laser ALI 4.910

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

sensALIGN laser is turned on by pressing and holding the on/off switch briefly. The "beam active" LED lights red.



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

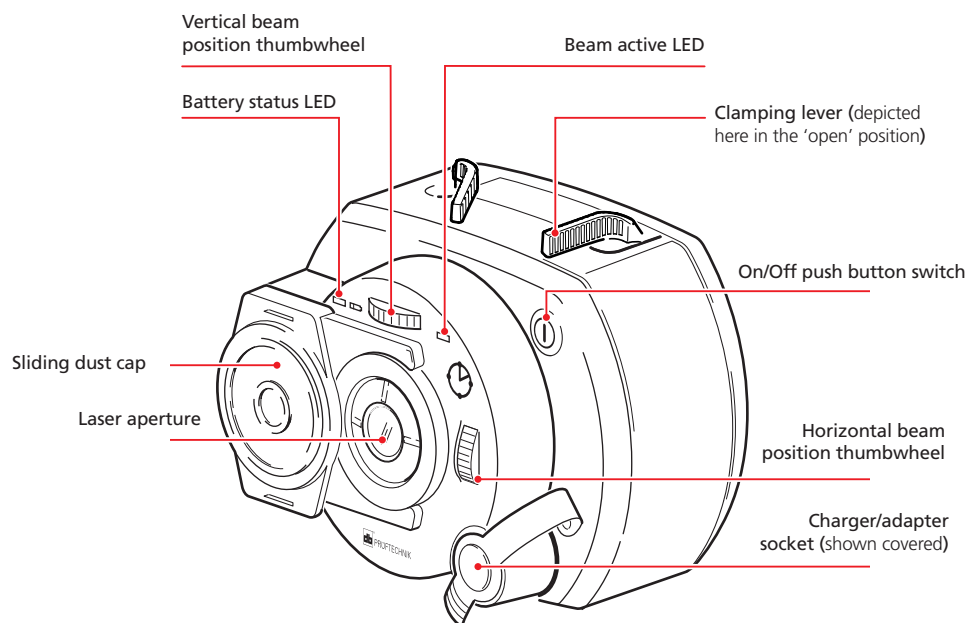


WARNING

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

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

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



sensALIGN laser ALI 4.910 is powered using sensALIGN rechargeable battery ALI 4.960 a 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/adaptor ALI 4.651-I, and is possible only when the battery is attached to the laser.

2.3.1 sensALIGN rechargeable battery ALI 4.960

Both sensALIGN laser ALI 4.910 and sensALIGN sensor ALI 4.900 are powered using the sensALIGN rechargeable battery ALI 4.960. The battery is charged via the charger/adaptor socket using the sensALIGN charger/adaptor ALI 4.651-I. 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.

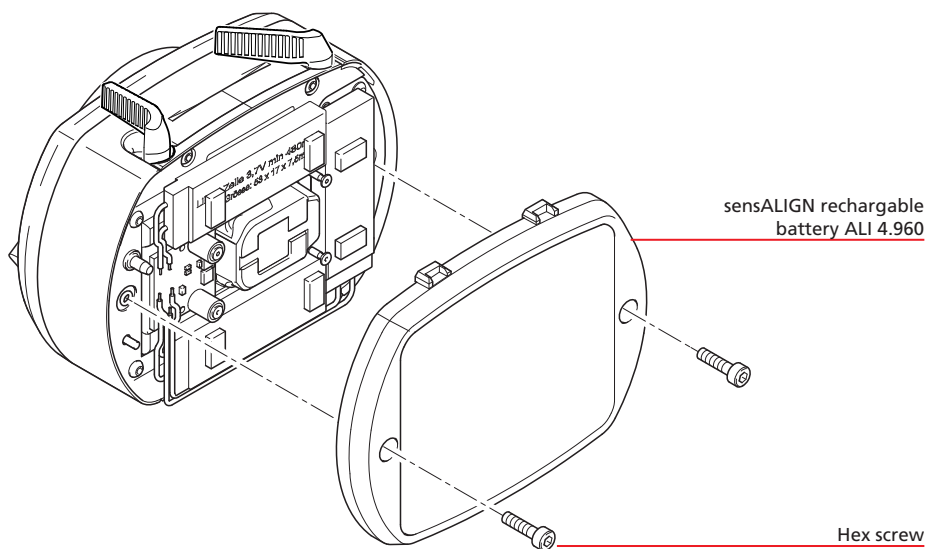
Activity	sensALIGN laser battery status LED	sensALIGN sensor battery status LED	sensALIGN laser beam active LED
Switch on	<p>Lights up green for 3 seconds when battery run time is > 10 hrs</p> <p>Blinks green every 3 seconds when battery run time is between 5 – 10 hrs</p> <p>Blinks red every 3 seconds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

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

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



The position and removal
of sensALIGN rechargeable
battery ALI 4.960 is identical
in both sensALIGN laser
ALI 4.910 and sensALIGN
sensor ALI 4.900.



2.4 sensALIGN sensor ALI 4.900

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

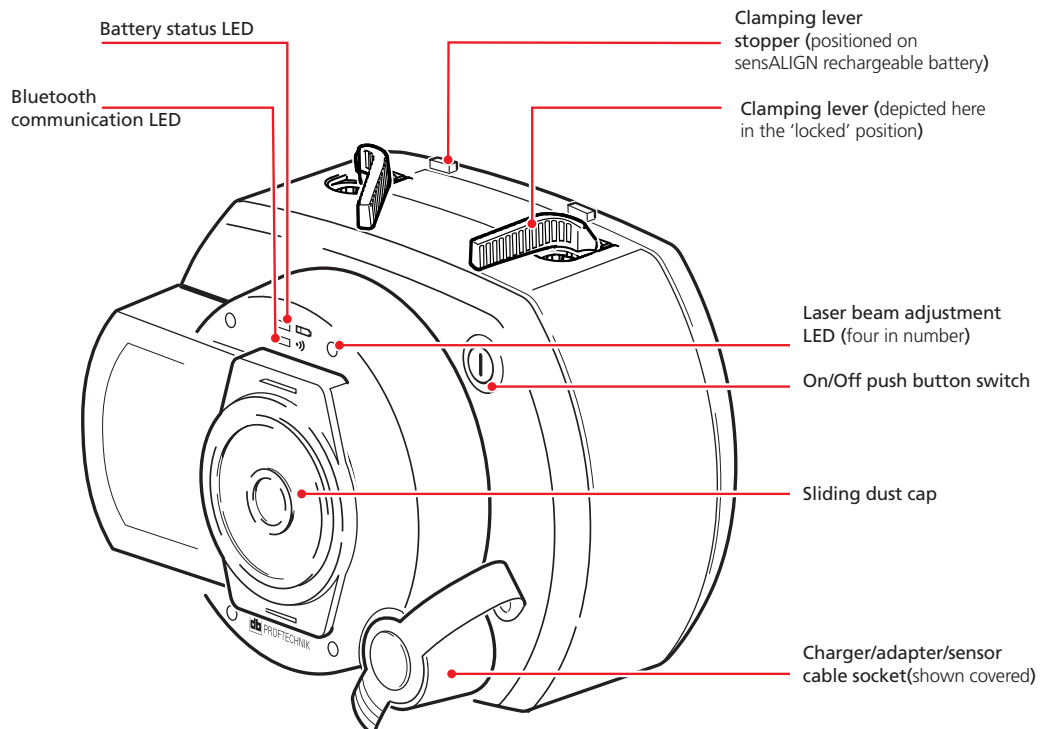
Positioned at the front of sensALIGN sensor are following indicator LEDs:

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

If for some reason (say space), the rechargeable battery is dismantled, measurement may still take place by powering sensALIGN sensor using ROTALIGN Ultra iS computer. In this case, connect the supplied sensALIGN sensor cable ALI 4.921-2 to the charger/adppter/sensor cable socket.



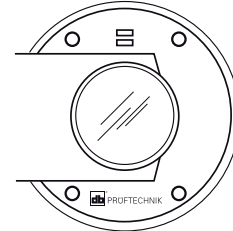
Note



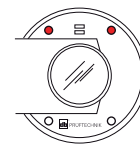
2.4.1 Understanding the beam adjustment LEDs

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

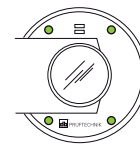
Activity	Laser beam adjustment LEDs
Switch on sensALIGN sensor	All four LEDs light up red then continue to blink every two seconds
Laser beam striking dust cap [laser off]	All four LEDs blink red every second
Laser beam entering lens with a large angular deviation	One or more LEDs blinks red every second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



All four LEDs blink red every second when the laser beam enters the lens with a large angular deviation and offset.



When one or more LEDs blinks red every second, the laser beam is entering the lens with a large angular deviation that must be corrected.



When all four LEDs are blinking green twice every second, the laser beam is entering the lens without an appreciable angular deviation. In this case, only the offset needs to be corrected.

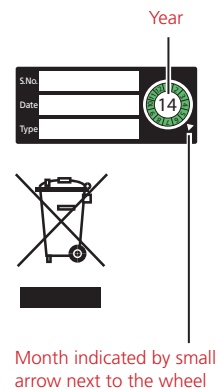
2.4.2 Adjusting the laser beam

1. With the lens covered, let the laser beam strike the centre of the sensALIGN sensor dust cap.
2. Slide the dust cap to open the lens. Observe the four laser beam adjustment LEDs while adjusting the laser beam using the vertical and horizontal beam positioning thumbwheels. The thumbwheels are used to adjust both the horizontal and vertical laser beam angles.
3. Carry out this adjustment until all four LEDs are blinking green once every second.
4. If the LEDs are blinking green twice every second, the angle at which the laser beam enters the lens is correct, but an offset is present. Eliminate the offset by sliding back the sensALIGN sensor dust cap to cover the lens, then loosen the chain type bracket supporting sensALIGN sensor and move the sensor sideways. At the same time, release the sensALIGN sensor clamping levers and move the sensor upwards and downwards until the laser beam is centred on the dust cap. During this adjustment, DO NOT touch sensALIGN laser.
5. Open the 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.

2.4.3 Service and care of both sensALIGN laser and sensor

The calibration accuracy of sensALIGN sensor ALI 4.900 should be checked every two years as indicated by the service and calibration label (shown at right) affixed at the bottom of the sensor housing. sensALIGN laser does not require calibration but should also be checked every two years. Refer to the service and calibration label affixed at the bottom of the laser housing. Please return the system components to your authorized PRÜFTECHNIK service centre for calibration checking by the date indicated.

Any waste electrical and electronic parts of the ROTALIGN Ultra iS system including memory sticks must be disposed of in accordance with the WEEE (Waste Electrical and Electronic Equipment) Directive. Such parts must be taken to the nearest collection facility. If you have any questions regarding the WEEE Directive, please contact your local PRÜFTECHNIK sales representative.



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Chapter 3: Getting started with the ROTALIGN Ultra iS Shaft system

The ROTALIGN Ultra iS Shaft system is used for any shaft alignment application, regardless of complexity. This intelligent System [iS] detects and displays any operator error, eliminates the effects of unwanted external influences such as machine vibration, while producing precise and repeatable measurements.

3.1 ROTALIGN Ultra iS Shaft system composition

The system comprises:

- ▶ The proven ROTALIGN Ultra iS computer which is the core of the ROTALIGN Ultra measurement platform.
- ▶ The intelligent sensALIGN sensor that uses intelliSWEEP – a high definition measurement mode that actively assists the user by automatically detecting and eliminating error influences such as coupling backlash, rotational angle and vibration.
- ▶ The intelligent sensALIGN laser that relays the rotational angle in which the component is located as well as its battery status.
- ▶ Other shaft alignment components such as brackets and other accessories

In addition to the shaft alignment application, the ROTALIGN Ultra measurement platform also includes bore alignment, flatness and straightness measurement, hydro power application and other geometric applications.

3.2 Obtaining alignment readings in quick intelligent steps

3.2.1 Mount components on machine train to be measured

Both sensALIGN sensor and laser are mounted on the shafts of the machine train to be measured using the supplied compact chain-type brackets. The sensor and laser are fixed to the support posts by locking the yellow clamping levers. [Refer to section 4.5 for details on mounting components.]


3.2.2 Switch on both sensALIGN sensor and laser

Both sensALIGN sensor and laser are switched on by pressing their respective On/Off push button switches.

3.2.3 Centre laser beam

The laser beam is centred on the sensor detector planes using the yellow position thumbwheels and moving sensALIGN sensor vertically along the support posts or horizontally by loosening the chain-type bracket. [Refer to 'Laser beam adjustment' in section 4.10.]

3.2.4 Press to switch on the ROTALIGN Ultra iS computer


Press and hold  the 'On/Off/Enter' key briefly. The opening screen below appears.



The navigation keys are used to access available applications and options. The navigation direction is either upwards/downwards or sideways.




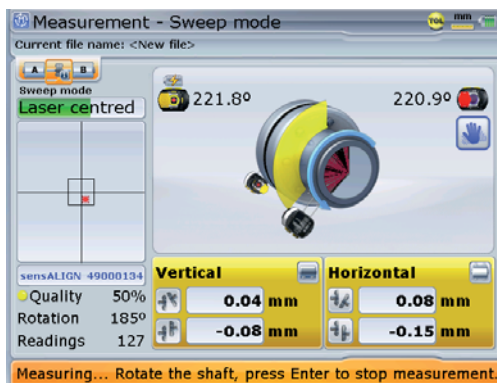
3.2.5 Enter machine dimensions

The machine set-up screen is accessed by pressing . [Refer to section 4.7 for details on how to enter machine dimensions.]



3.2.6 Start measurement

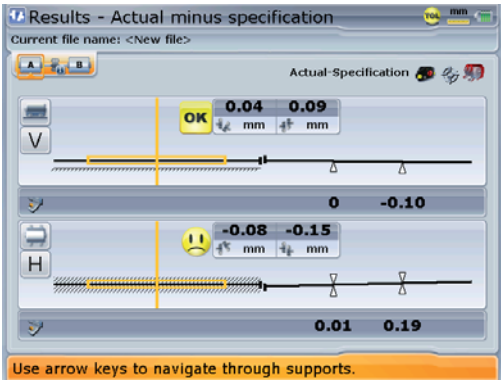
Access the measurement screen by pressing . Ensure laser beam dot is centred on the square target then rotate shafts. [Refer to section 4.11 for details on taking measurements.]



3.2.7 View alignment results



After measurement, press **RES** to view the alignment results.

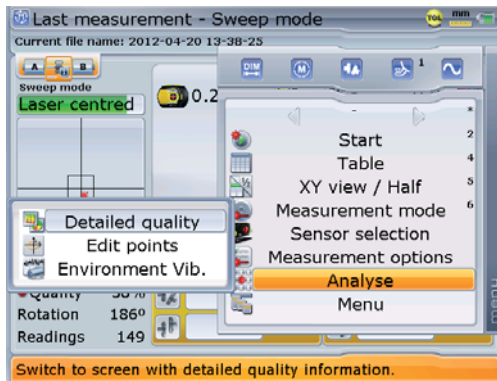


3.2.8 Context menu items

A useful feature available in ROTALIGN Ultra iS computer is the availability of display screen related context menu items for each individual screen. Useful menu items that include accessing the program manager, turning the computer off and configuring the instrument can be accessed via the context menu that appears when **Menu** is pressed at any time. The item 'Menu' is used to access the global menu.



Context menu items
available from the program
manager screen




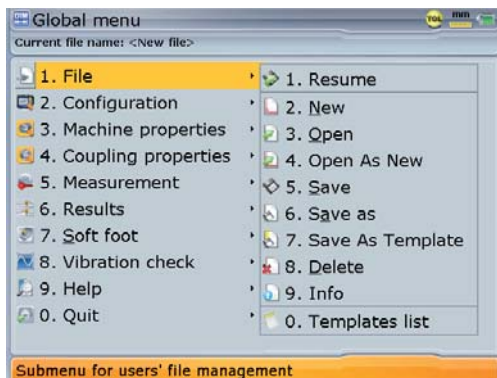
Context menu items
available from the
measurement screen

3.2.9 Global menu

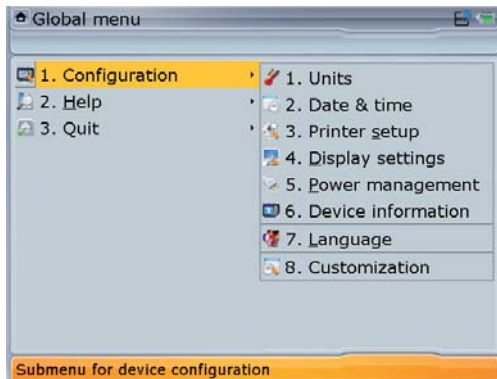
The ROTALIGN Ultra iS computer uses a global menu concept to shorten the distance to reach any required menu item. The global menu appears in the following two forms.

- › a configuration global menu that appears within the program manager
- › a complete global menu covering all menu items – this appears within the Shaft application

The global menu may be accessed at any time by pressing  twice.



Global menu when accessed
within the Shaft application









The configuration global menu accessed from the program manager screen

3.3 Tips and tricks

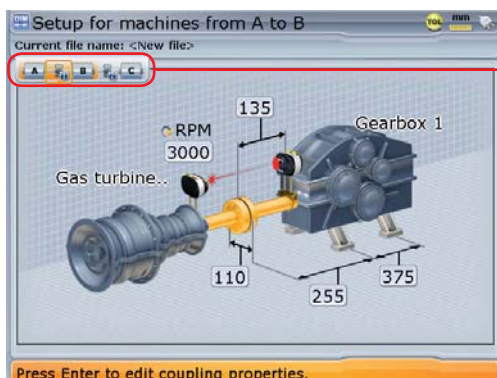
3.3.1 Program manager

- ▶ While in the program manager, the data entry keys are used to select the corresponding application icon in a numerically ascending order. This is possible only up to the tenth icon.

3.3.2 General

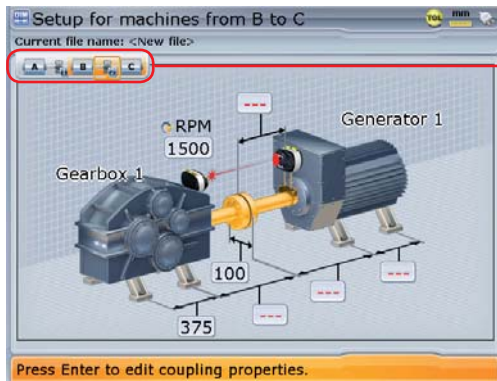
- ▶ Pressing  twice opens the global menu.
- ▶ Pressing  long enough also opens the global menu.
- ▶ Pressing  for approximately 3 seconds prompts the 'turn off system' dialog.
- ▶ Pressing  for approximately 7 seconds resets the system.
- ▶ For machine trains with more than one coupling position, pressing either  or  long enough moves the view of the train to the left or right respectively.

29



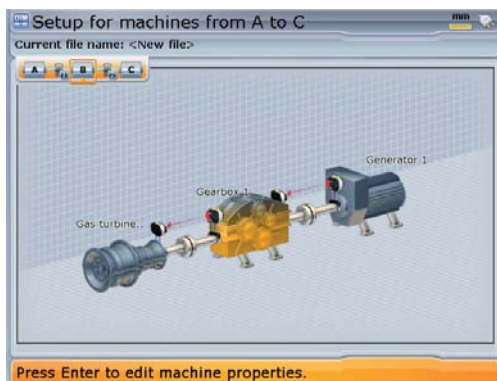
The displayed view shows machines A and B with coupling 1

- ▶ Pressing the corresponding data entry key moves the view to the respective coupling position (observe inset in display).



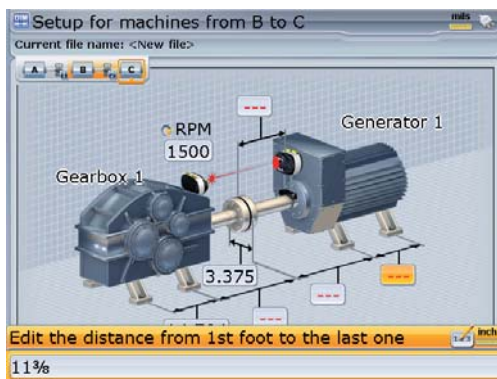
The displayed view shows machines B and C with coupling 2. The view is prompted from the previous screen by pressing either **Zabc** or **- +** or **>** long enough.

- ▶ Pressing either **- / *** or **- +** moves the view of the train to the right or left respectively.
- ▶ Pressing **Δ** or **▽** zooms out or zooms in the machine image respectively. Note that any one of the train elements has to be highlighted for the zoom function to respond.



3.3.3 Dimensions (set-up)

- ▶ When in set-up and units are set to Imperial system, entering a dimension as 11.3.8 corresponds to 11 3/8 in.



- ▶ Pressing CLR while in set-up prompts the deletion of the selected machine.
- ▶ When selecting type of machine the orientation of the machine can be altered by pressing either ◀ or ▶ .
- ▶ Pressing DIM twice while in set-up zooms the machine train out and in again.
- ▶ When entering file or element names, pressing ./* cycles through the characters that can be entered. The characters are capital letters (upper case), small letters (lower case) and numerals. With numerals selected, pressing $\text{1}\pi$ long enough enters the value π .

3.3.4 Measurement

- ▶ Pressing MM twice activates auto measurement.

In auto measurement any of the three measurement modes – Continuous Sweep, Multipoint or Static measurement is started directly by the appropriate action.

- ▶ Sweep mode is activated by rotating the shafts
- ▶ Multipoint is started by pressing Enter
- ▶ Static measurement is started by pressing either the data entry keys or any of the navigation keys



Note

3.3.5 Results

- ▶ Pressing ▽ and holding on, while in results, cycles the results between vertical (V), horizontal (H) and both H&V.

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Chapter 4: Shaft alignment application

4.1 Starting the shaft alignment application


Before the application can be started, a licence code must be entered in the licence manager. In most cases the application is licenced at the factory and the system is delivered with the Advanced Shaft firmware registration certificate ALI 4.741 which contains the entered licence code.







4.1.1 Starting the licence manager

After switching ROTALIGN Ultra on, use the navigation keys to highlight 'Configuration' icon.

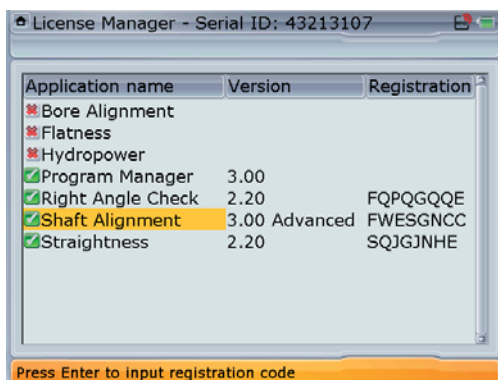


Press  to access this option, then use the navigation keys to highlight the 'Licence Manager' icon.



With the icon highlighted, press  to access the "Licence Manager" screen. Use / to highlight 'Shaft Alignment', then press  to proceed with entering the application licence code (registration key) in the editing box.

After successful registration, a green check mark appears next to the application, and the application level appears as a suffix to the firmware version.



The three application levels available are 'Standard', 'Advanced' and 'Expert' The registered level will appear as a suffix to the firmware version.

The application shaft alignment can now be started.

Please refer to section 6.5 for a brief description on upgrading from the Standard Shaft application level to the Advanced Shaft level.

4.2 Horizontal machine alignment - preparing for the alignment procedure

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Before using the Shaft Alignment application, prepare the machines as described below.

Switch off the machines before commencing work, and make sure that they cannot be started accidentally!



4.2.1 Solid, flat foundation

A solid, rigid foundation is required to obtain correct, lasting shaft alignment that allows long-term uninterrupted machine service.

4.2.2 Machine mobility

If the machine to be moved stands directly on the foundations, it cannot be lowered for alignment correction. It is therefore advisable to start with about 2 mm (80 mils) of shims beneath the feet of both machines. Hydraulic or screw-type positioning aids are recommended for horizontal movement.

4.2.3 Rigid couplings

Rigid couplings must be loosened before measurement so that they do not distort the alignment condition.

4.2.4 Shaft play and coupling backlash

Axial shaft play is detected and compensated for in alignment results (but affects machine operation).

4.2.5 Soft foot

Soft foot causes the machine frame distortion every time the bolts are loosened or tightened, making proper alignment difficult or impossible.

4.2.6 Thermal growth, alignment targets, tolerances

These values can be obtained from the individual machine specifications, and then entered into the program. In addition, a built in thermal growth calculator can help you derive these values from the observed changes in temperature.

4.2.7 Measurement separation

As the system requires no mechanical connections (such as cantilevered dial indicator brackets) to span over the coupling during measurement, alignment may easily be performed over large laser – sensor separations.

Note that over very large distances the shafts and coupling may sag, and the machines may need to be aligned to take this into account. Refer to the machine manufacturer's specifications.

4.3 Check soft foot

Refer to section 5.5 for soft foot.

4.4 Mount the 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:

- ▶ 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 Alignment (for example, do not use support posts longer than those supplied with the bracket).



4.4.1 Bracket mounting procedure

To fit the compact chain brackets, refer to the diagram shown below and follow the instructions carefully.

1. 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.
2. Fasten them in place by tightening the hex screws on the sides of the bracket frame.
3. 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.
4. Catch the chain loosely on the anchor peg.
5. Turn the bracket thumbscrew to tighten the assembly onto the shaft.
6. Clip the loose end of the chain back onto itself.

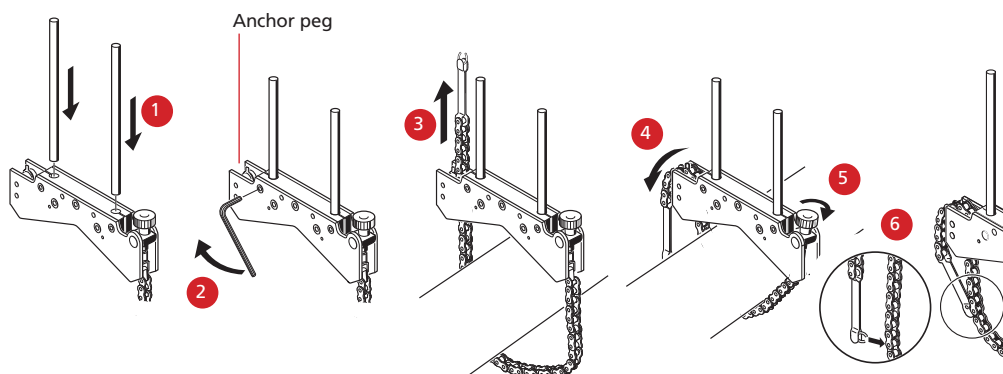
The bracket should now be tight upon the shaft. Do not push or pull on the bracket to check, since this could loosen its mounting.

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

The compact chain-type brackets cover most situations, but in cramped or special cases, other types of brackets may be required. Ask your PRÜFTECHNIK representative for details.



Note



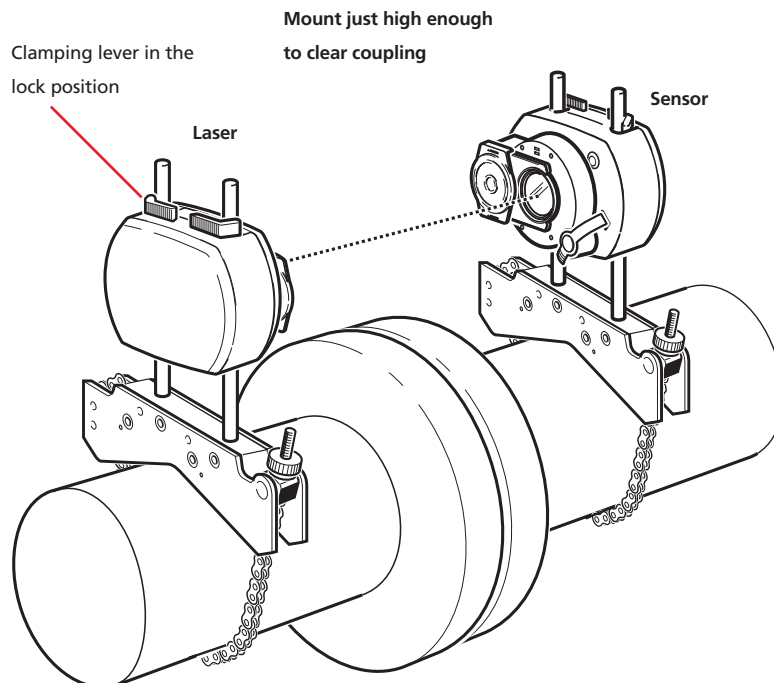
4.5 Mount sensALIGN laser and sensor

Mount sensALIGN laser on the support posts of the bracket fixed on the shaft of the left machine (usually reference machine), and sensALIGN sensor on the support posts of the bracket fixed on the shaft of the right machine (usually moveable machine) – as viewed from normal working position. Before mounting both sensALIGN laser and sensor, make sure that the yellow clamping levers are in the open position by placing them to the front. This enables components to slide onto the support posts.

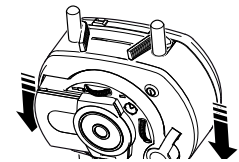
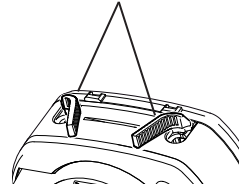
Fix both sensALIGN laser and sensor onto the respective support posts by locking the yellow clamping levers. Lock the levers by pushing them backwards until they rest on the stoppers. Ensure that the laser can pass over or through the coupling and is not blocked.

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

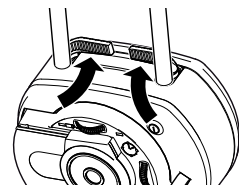
Make the final adjustments, loosening the brackets slightly if necessary, then rotating them and retightening.



Clamping levers in the open position




Clamping levers in the open position allows sensALIGN laser or sensor to slide onto the support posts.




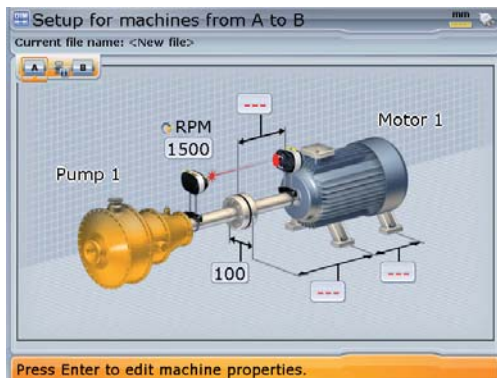
Locking the clamping levers by pushing them against the stoppers fixes sensALIGN laser or sensor onto the support posts.

4.6 Switch ROTALIGN Ultra iS on and start application

Press  and hold for a few seconds. The four laser adjustment and alignment condition LEDs light up. Shortly afterwards, the splash screen appears, followed by the program manager screen below.



Use the navigation keys to highlight 'Shaft Alignment'. Press  to access the application. The opening template in the set-up screen below appears.



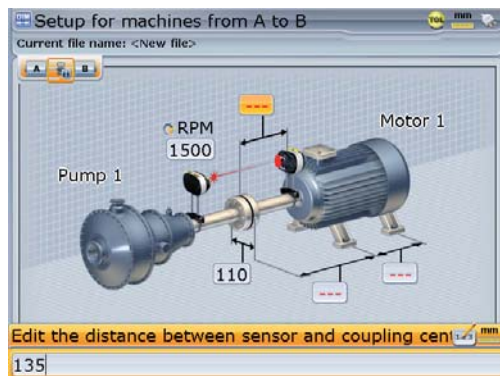
If desired, elements in the machine train can be displayed in 2-D format using the dimensions screen context menu item 'Switch to 2D mode'. One may revert to the 3-D format using the corresponding 'Switch to 3D mode' context menu item. Both formats will be used in this handbook.



The above screen will appear only if the customization option 'Resume policy' has been set to 'Resume files manually'. (See customization - described in section 6.1.9)

4.7 Enter machine dimensions

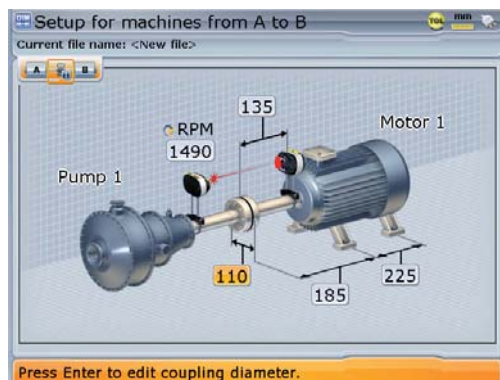
Machine information and dimensions are entered using the grey data entry keys. The required missing dimensions are entered directly. Use the navigation keys to highlight the dimension box and enter dimension by pressing the appropriate data entry keys. The editing box appears as soon as the first key is pressed.



Editing box



Confirm the entered value by pressing either Enter or t . The highlight springs to the next empty dimension box. If necessary, use the navigation keys to highlight the dimension to be edited.

The dimensions to be entered vary according to machine and type of coupling. In a standard horizontal alignment application enter dimensions as follows:



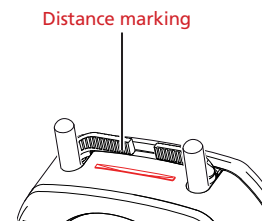
4.7.1 Coupling diameter

The coupling diameter can be obtained by measuring the circumference of the coupling and dividing the value by π (3.142).

The default value is 100 mm (10" if set to US units). Should there be need to edit the value, highlight the value using the navigation keys. Edit the value directly using the data entry keys. Confirm the new value by pressing either  or . The highlight springs to the next dimension box automatically.

4.7.2 Sensor to coupling center

This is the distance between the "distance marking" on top of sensALIGN sensor and the coupling center. Should there be need to edit the value, use the navigation keys to highlight it, and edit it directly using the data entry keys.



4.7.3 RPM (revolutions per minute)

The default value is 1500 (1800 if set to US units). Should there be need to edit the value, use the navigation keys to highlight it, and edit it directly using the data entry keys.

4.7.4 Coupling center to front foot, right machine

This is the distance from the coupling center to the pair of feet on the right machine nearest to the coupling.

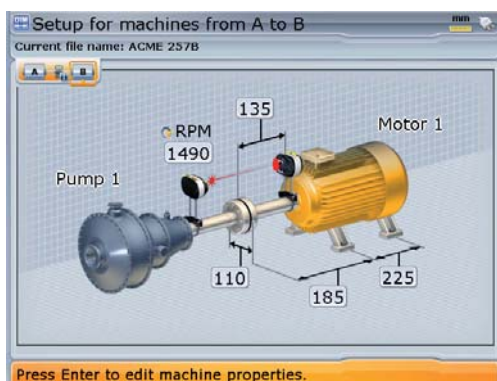
The distance marking groove is practical for attaching a tape measure lip when determining required machine train dimensions.

4.7.5 Front foot to back foot, right machine





4.8 Machine properties

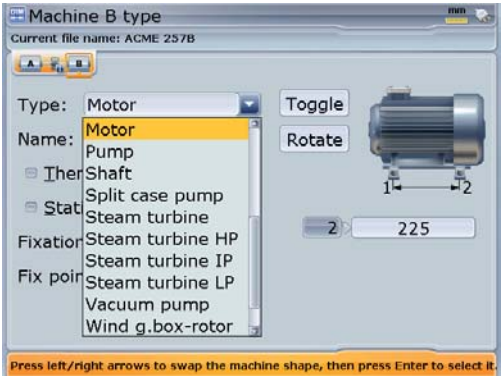
The set-up screen is used to enter machine dimensions as well as editing machine properties.

Use   to highlight machine to edit.




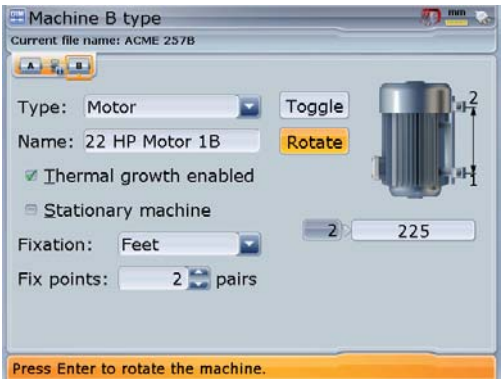
Horizontal shaft alignment

Press  to access machine properties. To select machine type, use the navigation keys to highlight the 'Type' box then press . Select type of machine from the drop down menu that appears using  / .





Confirm selection by pressing either  or .

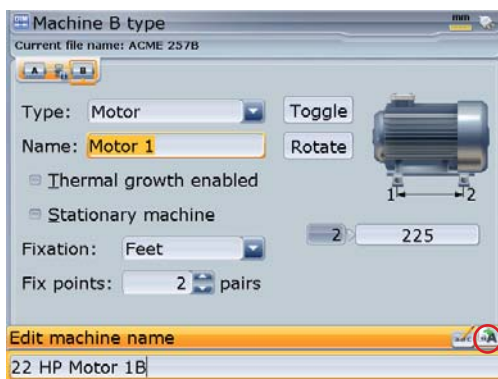
The orientation of the machine may be changed using the 'Toggle' and/or 'Rotate' buttons. Use the navigation buttons to highlight either button, confirming selection by pressing . The toggle button is used change the orientation of the selected machine along the shaft axes. The rotate button is used to change the orientation of the entire machine train from horizontal to vertical orientation and vice versa.






The toggle button flips the selected train element along the shaft axes.

The rotate button changes the entire machine train orientation (from **Horizontal** to **Vertical** and vice versa).




To edit machine name, use   to place cursor on the 'Name' box then enter the machine name directly using the data entry keys. The editing box appears as soon as the first key is pressed.



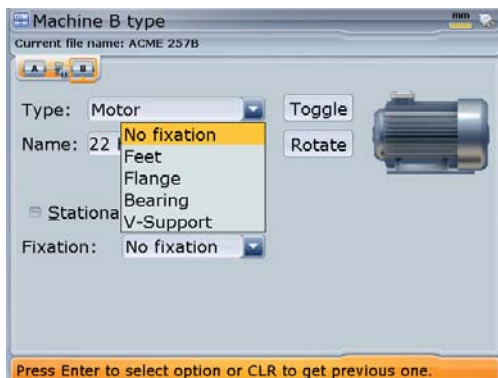
Repeatedly pressing  brings you back to the set-up screen. When entering names that contain both upper and lower case characters, as well as numerals, use  to cycle through the three options.

Press and hold down  while observing the status indicator at the bottom right corner of the screen. This displays the character to be entered.

Confirm entry by pressing either  or .






To enter the type of machine mounting, use the navigation keys to place cursor on the 'Fixation' box then press . Select type of mounting from the drop down menu that appears using  / .

Note that the navigation is dependent on the scheme selected under 'Customization'. In this case we are using the default scheme.




Confirm selection by pressing either  or .

Horizontal shaft alignment




Depending on the type of mounting, either the position or number needs to be edited. If the machine is mounted on feet or bearings, the number is edited by placing cursor using   on the fixed points box. Press  to highlight the numeral. Edit value using  (increases values) or  (decreases value).

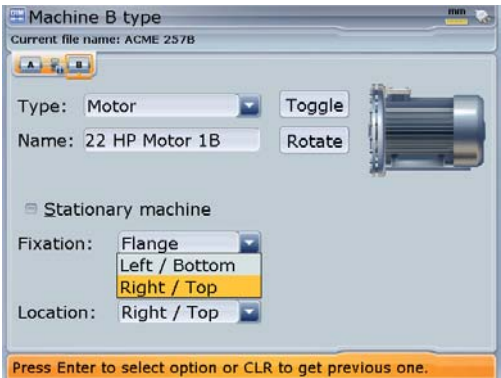


To check or uncheck the 'thermal growth enabled' or the 'stationary machine' box, highlight either box using the navigation key. Pressing  with the box highlighted, checks or unchecks the respective box.


Note that the above navigation depends on the scheme selected. In this particular case the default scheme is used.

Confirm value by pressing either  or .

If however the machine is flange-mounted, the position of the flange requires to be entered. To enter flange location, use the navigation keys to place cursor on the 'Location' box then press . Select location from the drop down menu that appears using  .







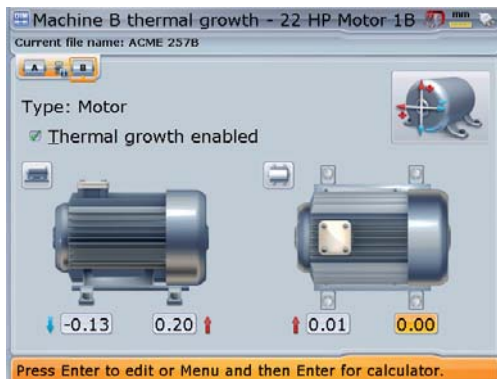
Confirm selection by pressing either  or .

Thermal growth values can be entered only when the type of mounting is either machine feet or bearing or V-shaped support, and 'Thermal growth' enabled. To enter thermal growth values press  while in the "Machine type" screen. The context menu appears.







Thermal growth values are activated when the 'thermal growth enabled' box is checked.

Press  to access the thermal growth screen. Alternatively, use either  /  to highlight 'Thermal growth', confirming selection by pressing .







Thermal growth values may be entered directly using the data entry keys.

Use  /  to cycle through the feet positions, highlighting the value boxes. When a value box is highlighted, enter thermal growth value directly using the data entry keys. Confirm entry by pressing either  or .

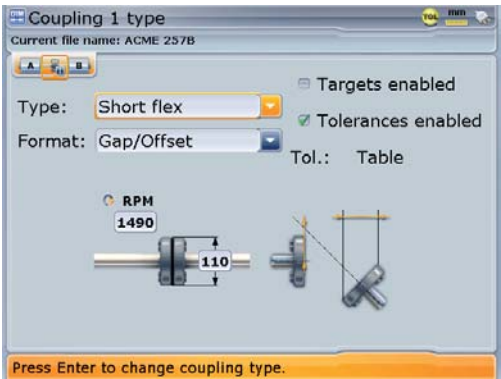
4.9 Coupling properties

Coupling properties are entered and edited in the same manner as for machine properties.

Use the navigation keys to place cursor on the 'Type' or 'Format' box then press . Select type of coupling or result format from the drop down menu that appears using  / .

Use the navigation keys to highlight the 'targets enabled' or 'tolerances enabled' check box. With either box highlighted, press  to check or uncheck the respective box.


Targets and tolerances are activated only when the respective box is checked.




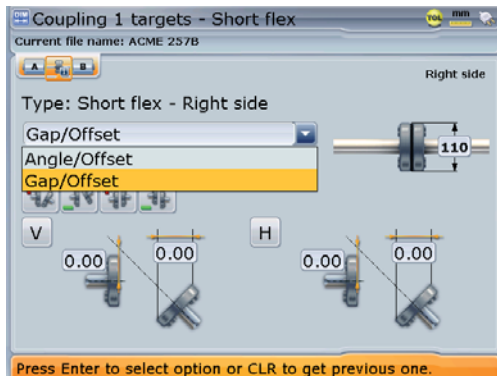
Note that the navigation is dependent on the option selected in 'Customization'.






To enter coupling target values, press  while in the "Coupling type" screen. The context menu appears. Use either  or  to highlight 'Targets'.





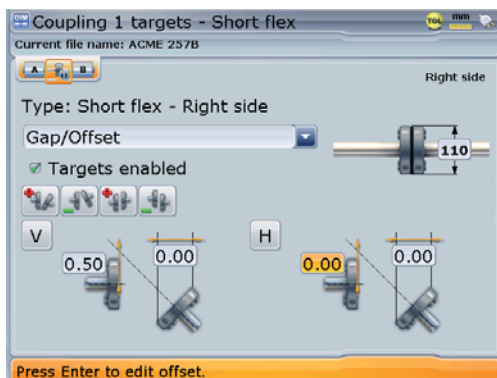
The coupling targets screen may alternatively be accessed directly from the context menu by pressing .

Press  to confirm selection. The coupling targets screen that follows appears.



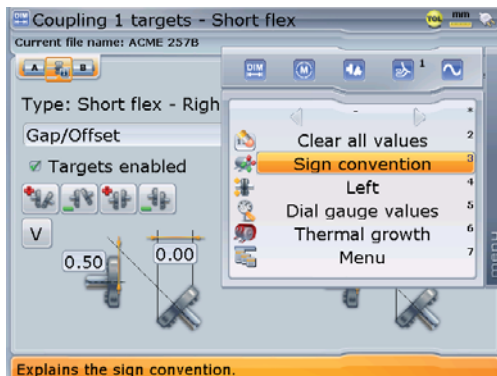
With the 'Type' box highlighted, pressing  reveals a drop down menu with the available coupling targets formats. Select required format using either  or , confirming selection by pressing either  or .

Use the navigation keys to cycle through the coupling properties. To enter coupling target value, highlight the value box using the navigation keys. With the value box highlighted, enter target value directly using the data entry keys. Press  or  to confirm entry.



Horizontal shaft alignment

Pressing **Menu** while in “Coupling targets” screen reveals the context menu shown below.



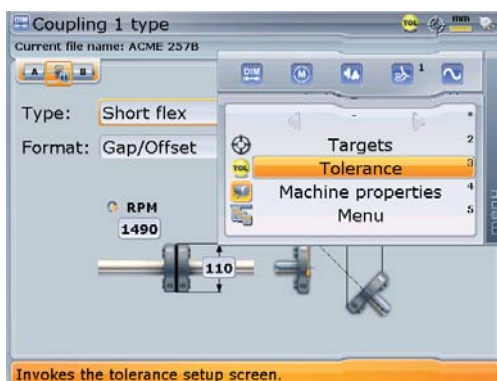
The displayed context menu items can be accessed directly by pressing the corresponding data entry key, e.g. pressing **3def** opens the sign convention display.

The displayed menu items perform the following functions:

- › Clear all values – used to clear all entered coupling target values
- › Sign convention – displays the definition and graphic depiction of sign convention
- › Left/Right/Both – used to select the direction considered when analyzing coupling targets. If the option “Both” is selected, coupling target values cannot be edited
- › Dial gauge values – used to enter coupling target values as dial indicator readings
- › Thermal growth – used to access the machine thermal growth screen

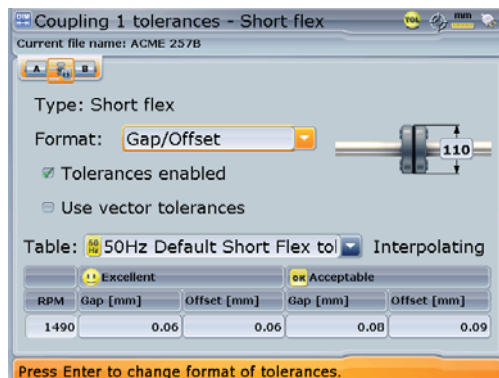
The context menu to the coupling type screen discussed previously has in addition to the menu item ‘Targets’, also ‘Tolerance’ and ‘Machine properties’.

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Press **3def** to display the system tolerance table. Alternatively, highlight ‘Tolerance’ using **Δ** / **▽** and confirm selection by pressing **Enter**. The menu item ‘Machine properties’ is used to access the machine properties dialog screen.

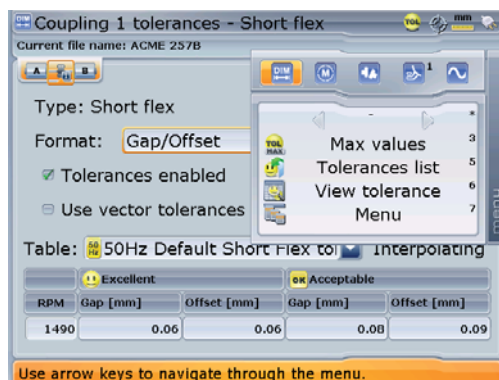
The menu item 'Tolerance' is used to display the system tolerance table.




The displayed tolerance values are coupling format, frequency and rpm dependent. These parameters may be selected from the two drop down menus and the rpm edited directly.

Note: The item 'User vector tolerances' is not available in the standard level.

Pressing  while in 'Coupling tolerances' reveals the context menu shown below.



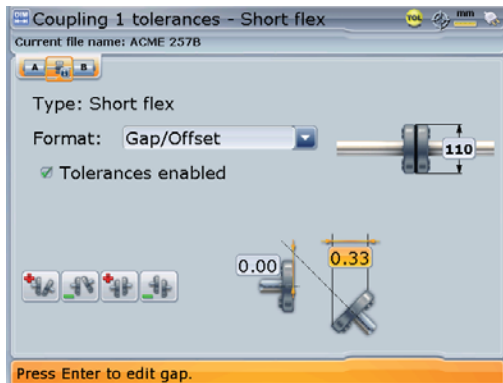
All the displayed context menu items can be accessed directly by pressing the corresponding data entry key, e.g. pressing  opens the global menu.

The displayed menu items perform the following functions:

- › Tolerances list – used to display types of couplings and rpm frequencies available in the tolerance table
- › View tolerance – displays the coupling tolerance details
- › Max values – used to specify individual tolerances

Horizontal shaft alignment

Use the context menu item 'Max values' to access the coupling tolerance screen used to enter maximum tolerance values.



Use the navigation keys to highlight the 'Format' box. Access the drop down menu by pressing Enter . Use Δ / ∇ to highlight the required format, confirming selection by pressing Enter or L . Using the navigation keys proceed to highlight the respective value box and enter maximum tolerance values with the data entry keys directly. The values entered above are independent of rpm. When these values are enabled, they override the system tolerance table.

After machine and coupling properties have been entered, use L to return to the set-up screen.

4.10 Laser beam adjustment

After entering all dimensions, proceed to adjust the laser beam such that it strikes the sensALIGN sensor lens perpendicular to the lens surface.

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

sensALIGN laser MUST remain off.

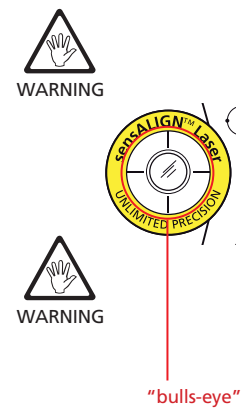
2. With the laser OFF, carry out a preadjustment to ensure that the laser beam will be emitted perpendicular to the laser housing. Use the two yellow beam position thumbwheels to centre the 'bulls-eye' as accurately as possible.
3. Press the ON/OFF push button switch to turn sensALIGN laser on.

Do not stare into the laser beam!

4. If both sensALIGN laser and sensor have been positioned at the same height and roughly the same angular position during mounting (see section 4.5 – "Mount sensALIGN laser and sensor"), the laser beam should strike the sensor dust cap.
5. Slide the sensALIGN sensor dust cap to open the sensor lens and observe the four sensALIGN sensor laser beam adjustment LEDs. If all four LEDs are blinking green once every second, then the laser beam is correctly centered on the sensor, and you may proceed with measurement (section 4.11).
6. If however, the laser beam is still not correctly centered, readjust the laser beam using the yellow vertical and horizontal positioning thumbwheels. Observe the four laser beam adjustment LEDs while adjusting the thumbwheels.
7. If all four LEDs are blinking green TWICE every second, the angle at which the laser beam enters the lens is correct, but an offset is present. To eliminate the offset, slide the sensALIGN sensor dust cap to cover the lens, then (if necessary) loosen the chain type bracket supporting sensALIGN sensor and move the sensor sideways. At the same time, if necessary, release the sensALIGN sensor clamping levers and move the sensor upwards and downwards until the laser beam is centred on the dust cap.

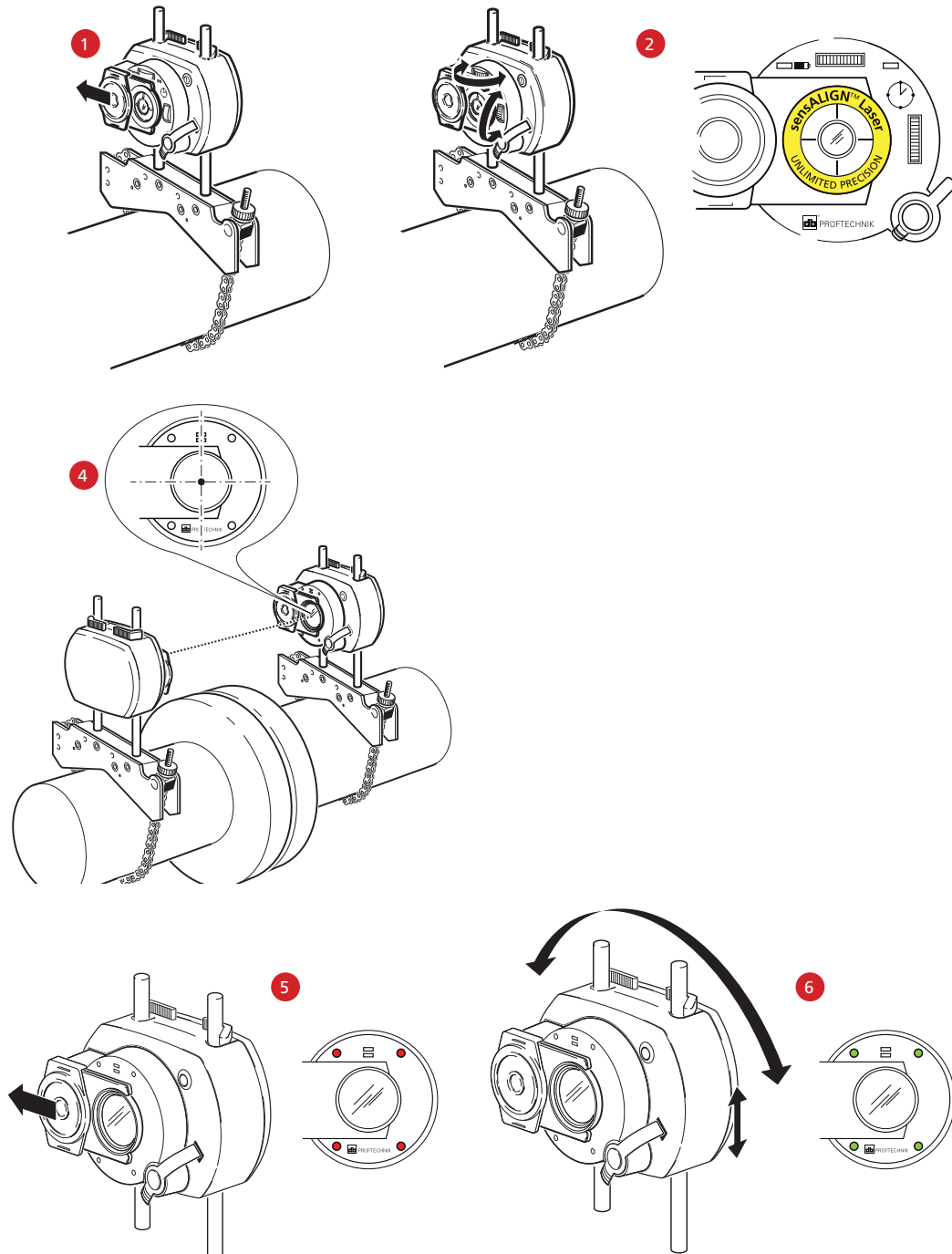
During this adjustment, DO NOT touch sensALIGN laser.

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







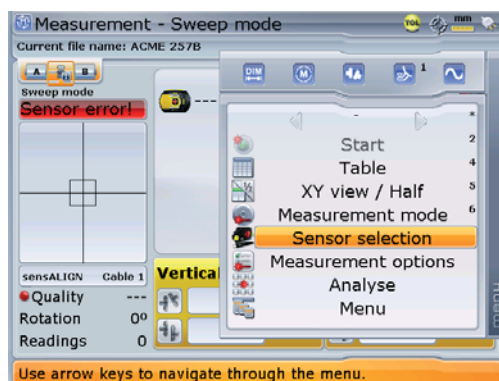
Note

Horizontal shaft alignment

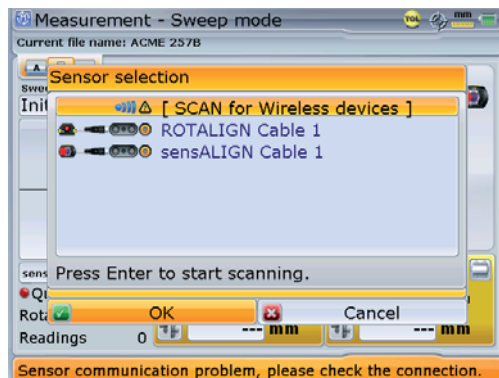


4.11 Taking measurements




With all four sensALIGN laser beam adjustment LED blinking green once every second – an indication that the laser beam has been correctly adjusted – press  to open the measurement screen. As sensALIGN sensor has not yet been initialized, the 'Sensor error' message will appear on the screen. Press  then use / to highlight the context menu item 'Sensor selection'.



Confirm selection by pressing . The sensor selection window opens.

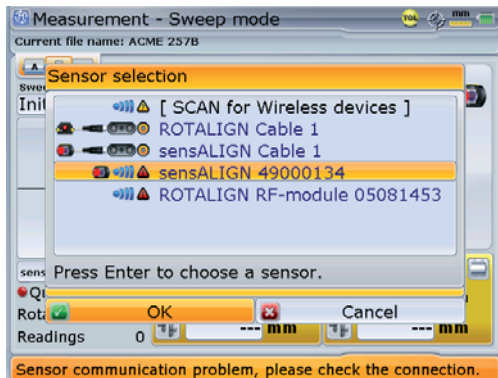


The sensor selection window may also be used to select the sensALIGN sensor and laser cable ALI 4.921-2 to transmit data between ROTALIGN Ultra iS computer and sensALIGN sensor. This emergency alternative is described in section 4.11a.

Use / to highlight 'Scan for wireless devices', then press  to confirm selection. With this step, the neighbourhood is scanned for Bluetooth devices.

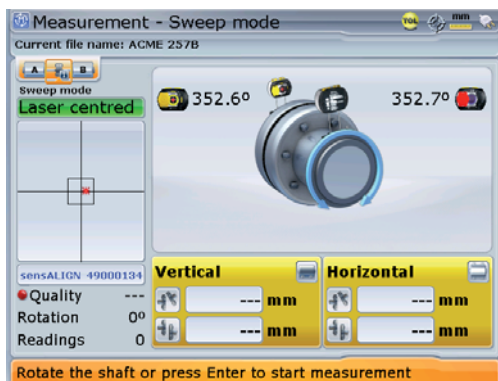
Horizontal shaft alignment

After the scanning process is completed, any Bluetooth devices detected will be listed on the screen.



sensALIGN sensors that have been detected are stored in the system and always appear in the sensor selection screen. Sensors may be deleted from the displayed list by pressing with the sensor highlighted.

Use / to select the appropriate sensALIGN sensor (e.g. 'sensALIGN 49000134'). Press to confirm selection and proceed with measurement. When sensALIGN sensor is initialized, and the laser beam correctly adjusted, the measurement screen below appears.

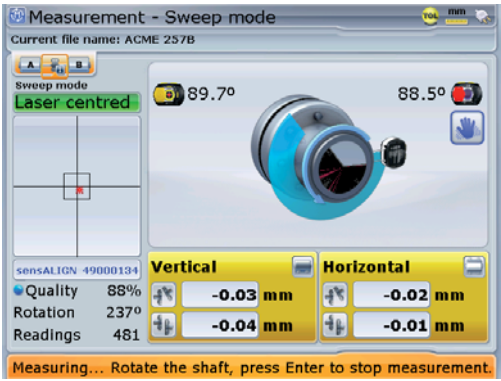


Before proceeding with rotating shafts, ensure that the laser dot is inside the center square.

Other measurement modes are available. The table below gives a guide as to which measurement mode is ideal for which measurement. In this section we describe the Continuous Sweep. Details on the other modes can be found under ‘Measurement modes’ in section 5.1.

Measurement mode	Application
Continuous Sweep	Standard machines
Multipoint measurement	Uncoupled shafts, nonrotatable shafts, sleeve bearings, white metal bearings, journal (radial) 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	Vertical machines (four feet or flange mounted)
Pass mode	Uncoupled shafts, nonrotatable shafts
Dial gauge	Verifying measurements taken using dial indicators


Rotate the shafts a full turn, or as far as possible.



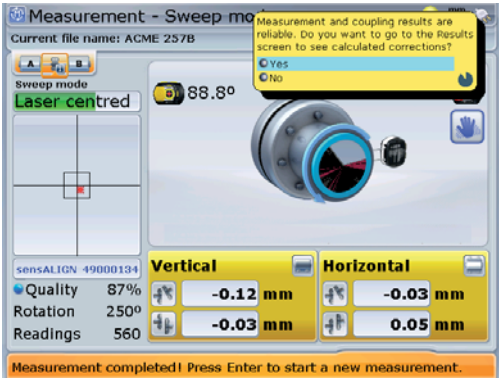
Measurement quality is an intelligent feature based on several measurement and environmental criteria. The resulting quality is depicted using the following colour codes:




- excellent
- good
- acceptable
- poor

If the intelligent features are not licenced, the measurement standard deviation (SD) will be displayed if selected under the measurement screen context menu item ‘Measurement options’.


Press  to finish measurement and collect data in order to display results. The following screen appears.

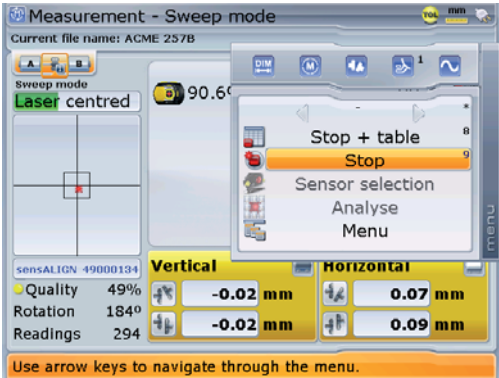
Horizontal shaft alignment



The hint appears only if the customization option 'Workflow' is enabled. The option is selected via 'Configuration' -> 'Customization'. Highlighting 'Yes' using  /  and confirming selection by pressing , displays feet and coupling results.

Note that the coupling values presently displayed are real-time values.

Alternatively, the coupling results may be displayed after shaft rotation by pressing  and highlighting the menu item 'Stop' from the context menu that appears.



4.11a Taking measurements using the sensALIGN sensor and laser cable

If necessary, measurement data from sensALIGN sensor may be transferred to ROTALIGN Ultra iS computer using the sensALIGN sensor and laser cable ALI 4.921-2. Such cases may arise due to low sensor battery capacity or when measurement is carried out with the sensor rechargeable battery dismantled.

1. Insert the quick fit straight-ended sensALIGN sensor and laser cable plug into the eight-pin sensor socket on the top of ROTALIGN Ultra iS computer housing with the red dot at the front.

Match the double-sided arrow head on the plug to the red marking on the socket to ensure proper plug orientation; otherwise the pins inside the plug may be damaged.

To disconnect, grasp the ribbed collar of the plug on the sensALIGN sensor and laser cable (ALI 4.921-2) and carefully pull it out of the ROTALIGN Ultra iS computer sensor socket.

2. Insert the right-angle connector on the sensALIGN sensor and laser cable ALI 4.921-2 into the sensALIGN sensor "charger/adaptor/cable" socket.

Insert the connector such that the red dot on the connector matches the red marking on the sensALIGN sensor socket to ensure proper plug orientation; otherwise the pins inside the connector may be damaged.

To disconnect, grasp the ribbed collar of the right-angled connector and carefully pull it out of the sensALIGN sensor "charger/adaptor/cable" socket.

Note that sensALIGN laser may also be powered through the ROTALIGN Ultra iS computer using the sensor/laser cable ALI 4.921-2. Connection between ROTALIGN Ultra iS computer and laser is similar to the sensor connection described on the main column.

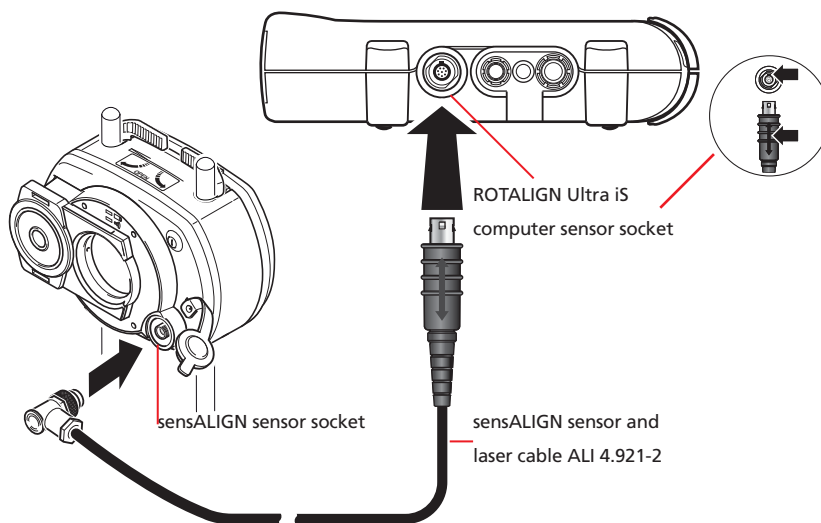


CAUTION

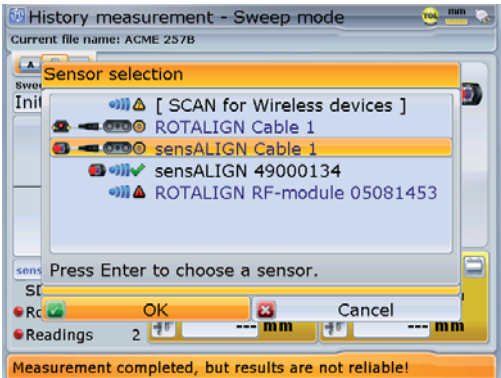


CAUTION

If sensALIGN sensor rechargeable battery capacity is low, connecting the sensALIGN charger/adaptor during measurement cuts off the sensor measurement mode. Measurement may be resumed only by pressing the sensor 'On/Off' push button briefly. Refer to the appendix for the sensor/laser 'on/off/charge' workflow.



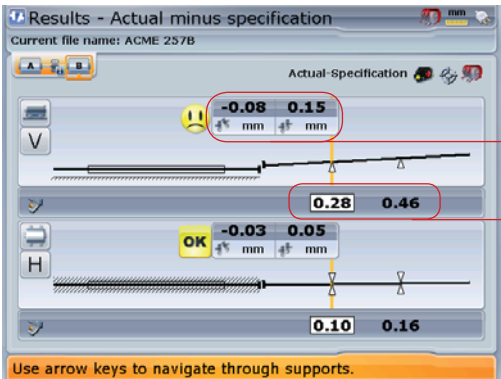
3. Use the "Measurement screen" context menu item 'Sensor selection' to set the mode in which measurement data is transferred from sensALIGN sensor to ROTALIGN Ultra iS computer.



4. Use / to highlight 'sensALIGN cable 1' then press to confirm selection. sensALIGN sensor will be initialized and measurement using the sensALIGN sensor and laser cable ALI 4.921-2 may proceed.

4.12 Results

Once measurement is completed, press to view alignment results. ROTALIGN Ultra iS intelligent features guide the user to obtain reliable alignment results.



In this example, the left machine was defined during set-up as static.

Coupling values

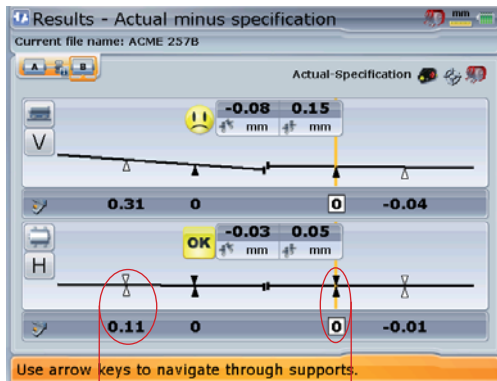
Feet position

The above display shows the measured alignment condition along with numerical values for the actual machine feet positions.

With ROTALIGN Ultra iS, any one pair of feet can be designated as static.



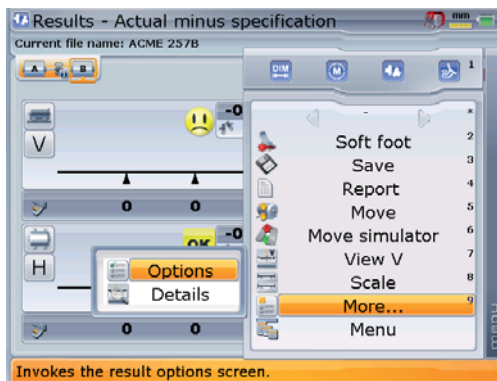
Note



Unfixed feet pair

Static feet pair

The context menu shown below appears when is pressed while in results screen.



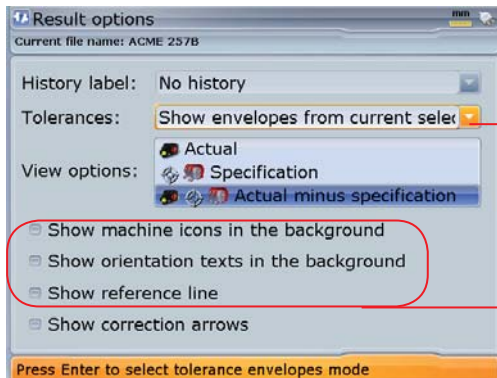
To designate any pair of feet fixed, place the yellow vertical cursor line on the feet pair using . Press to fix the selected pair of feet. The feet position is highlighted black. To unfix any pair of feet, place the cursor line on the static pair of feet pair using , then press .

Note that certain context menu items contain sub-menu items that are accessed using . These include: 'Save', 'View', 'Scale' and 'More...'.

The context menu items are scrolled using . Item selection is confirmed by pressing . Alternatively, access the numbered menu items directly by pressing the corresponding data entry key.

Horizontal shaft alignment

The “Results options” screen below is accessed via the context menu item ‘More...’ followed by the sub-menu item ‘Options’.

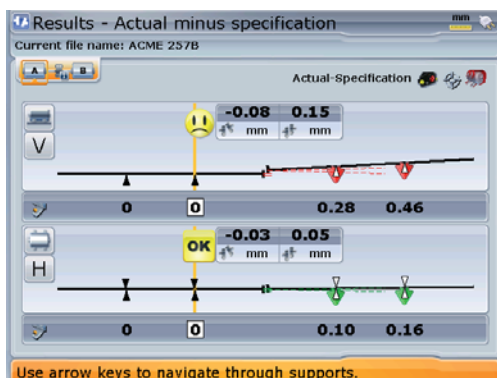


Tolerance envelopes can be activated or deactivated from the drop down menu in this screen.

Note that these three options are related to the scaling of the machine graphics. Only one of the two options (‘Show machine icons’ or ‘Show reference line’) can be selected at any one time. When machine icons are selected, the options ‘Show orientation text’ and ‘Show reference line’ are greyed out.

The viewing option can be set to show just the measured alignment values without regard to any target values or thermal growth values that have been entered, even if they are active. Select ‘Actual’ view for this option. Alternatively, you may also select ‘Specification’ view which shows just the effect of any target specifications and/or thermal growth values that may have been entered and activated, without regard to any measured misalignment. The default view, and the option that should be used when actually performing alignment corrections is ‘Actual – Specification’.

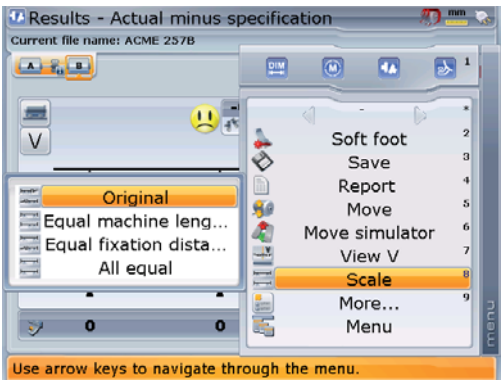
If the option ‘Show correction arrows’ is activated, coloured tolerance arrows appear at the feet positions as further help in determining the coupling alignment condition.



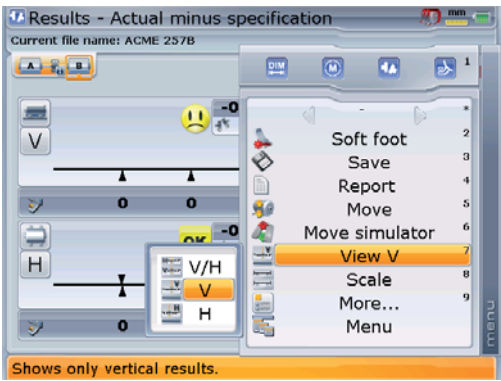
The colour codes are translated with respect to the coupling alignment condition as follows:

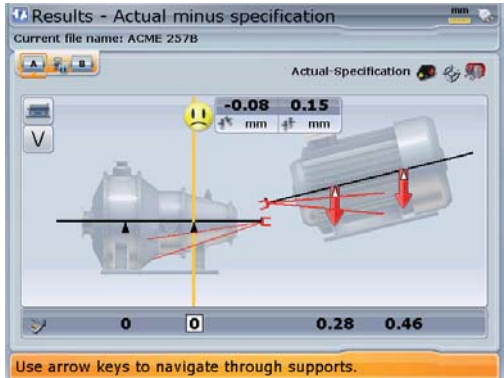
- Blue – excellent [foot should not be moved]
- Green – good [if possible foot should remain unaltered]
- Red – poor [foot requires moving to attain a better alignment condition]


Further scaling options are provided by the context menu item 'Scale' whose sub-menu items include 'Original' – refers to scaling to size, 'Equal machine length' – both stationary and moveable machines are displayed with equal size, 'Equal fixation distance' – graphic is displayed with equal separation between the machine forward and back feet, 'All equal' – displays the graphic with identical sizes for both machine and feet positions.



The context menu is also used to select the desired depiction.





The different views may also be cycled by pressing .

In this example following results options have been selected:
'Show both left and right envelopes', 'Show machine icons', 'Show correction arrows'

4.12.1 Sign convention

The following sign convention is used in the evaluation of alignment results.
With left machine stationary, 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.
Both vertical and horizontal results show the foot position relative to the stationary machine centerline. Positive values indicate that machine is upwards or away from viewer. Negative values indicate that machine is downwards or towards the viewer.

4.12.2 Alignment quality

The 'smiley' symbol by the coupling results indicates the degree to which the measured alignment condition meets tolerances. The smiley face appears only when tolerances have been enabled (see section 4.9).

	Excellent
	Acceptable
	Out of tolerance

If all results lie within tolerance, no alignment corrections are necessary.



Note

4.13 Align machine

To align your machine you need to move it vertically by shimming the feet, and horizontally by shifting it sideways. You can perform these operations in either order or simultaneously.

4.13.1 Shim first

It is recommended to perform vertical corrections first, since the horizontal condition is easily affected by the process of loosening anchor bolts and inserting/removing shims, whereas the vertical condition is less prone to being affected when performing horizontal moves. You may need to recheck soft foot before proceeding.






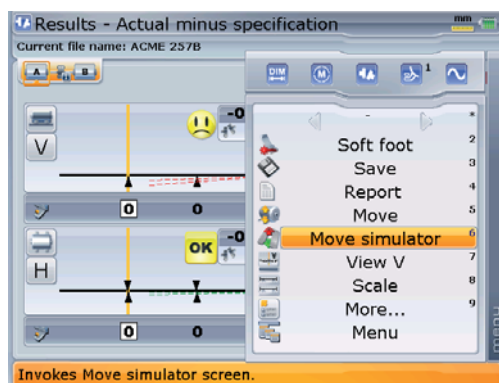
Note



4.13.2a Move simulator

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

4.13.2b Initiating the Move simulator

Press  while in the results screen. The context menu appears. Use / to highlight the context menu item 'Move simulator'.

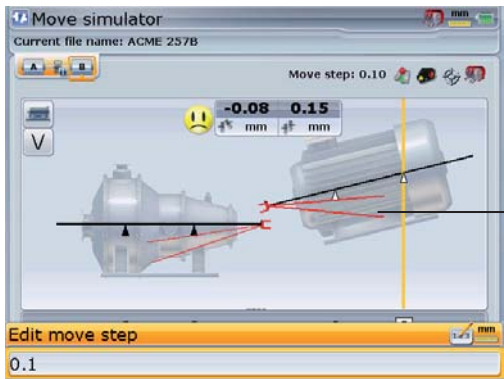


Confirm selection by pressing . The "Move simulator" screen opens. To effectively use the Move simulator, it is necessary to set the required machine movement step. This value is set using the Move simulator screen context menu 'Move step'. Call up the context menu by pressing  while in the Move simulator screen.

Horizontal shaft alignment

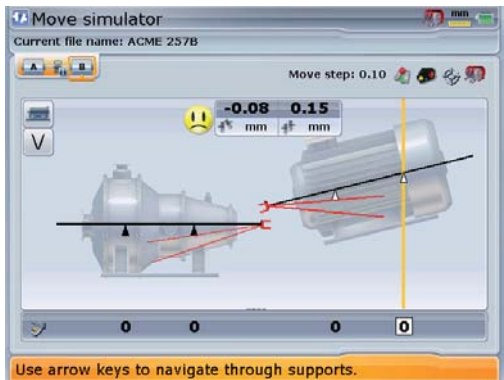








Use / to highlight the context menu item 'Move step' then press to confirm selection. The screen below with the editing box appears.

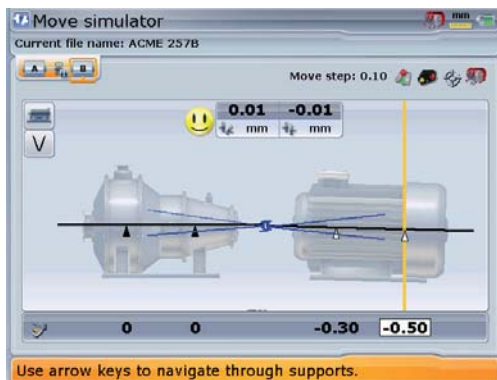


The activated tolerance envelopes are an assistance to determining the alignment condition of machines.


Use the data entry keys to entire the desired movement step value, confirming entry by pressing or .

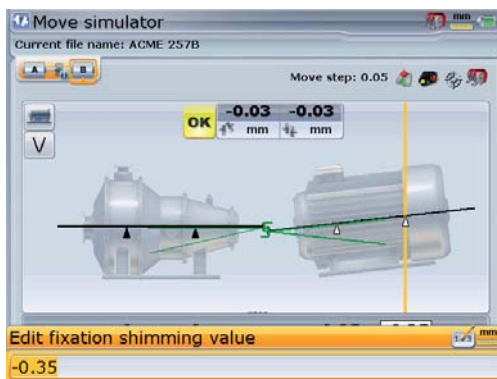


Use  /  to place the cursor on the feet pair requiring simulation. With the cursor on the selected feet pair, use  /  to simulate the movement in accordance with the set step value. Pressing  moves the machine upwards (in vertical view) or away from viewer (in horizontal view) by the movement value factor. Pressing  moves the machine downwards (in vertical view) or towards viewer (in horizontal view) by the movement value factor.



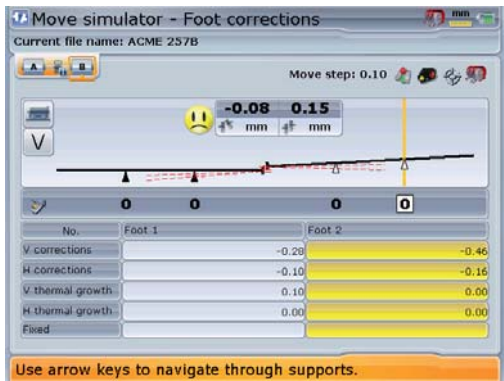
In this example, an excellent alignment condition has been achieved by sinking the front feet 0.30 mm (2x the movement step value) and the back feet 0.50 mm. (5x the movement step value)

Test shimming/movement values may be entered directly by highlighting feet pair to be shimmed/moved then confirming selection by pressing . The test values are entered in the editing box that appears.




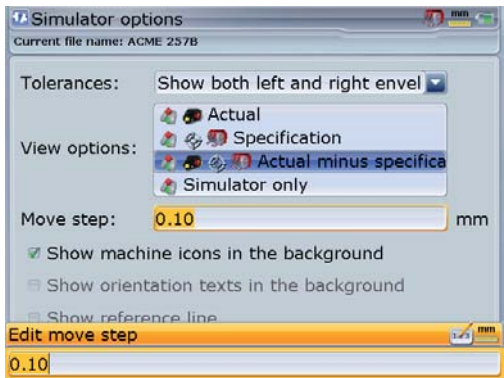
The Move simulator context menu contains items that are helpful in analysing a simulation. These include the menu item 'Reset values' and the submenu item 'Details' ['More...' -> 'Details']. Selecting 'Reset values' and confirming selection resets the simulator to the original result values. Selecting 'Details' and confirming selection reveals the feet corrections to zero alignment, as well as any entered thermal growth values.

Horizontal shaft alignment






The correction values displayed from the submenu item 'Details' match those obtained using the Move simulator.




The Simulator options screen may be accessed via the Move simulator screen context menu item 'More...'. Select 'More...' -> 'Options' then press  to confirm selection. The "Simulator options" screen opens.

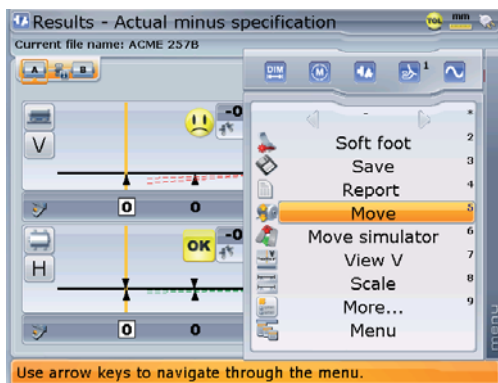


The "Simulator options" screen may also be used to edit the movement step value, activate the tolerance envelopes, set the results format and display machine icons in the background.

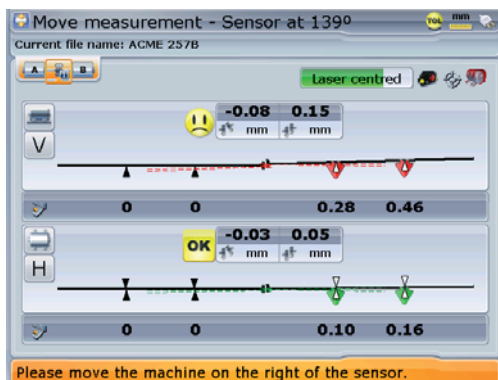
While in "Simulator options" screen, use the navigation keys to highlight the movement step value. With the value highlighted, use the data entry keys to edit this value. The editing box appears as soon as any data entry key is pressed. After editing the movement value, press  or  to confirm entry. Press  to return to the Move simulator screen.

4.13.3 Horizontal and vertical live MOVE

The alignment corrections involving shimming and the lateral positioning of the machines can be followed in a real-time interactive display. From the results screen, press . The context menu appears. Use / to highlight 'Move'.




Press  to confirm selection and start live Move.






Live horizontal and vertical Move can be monitored simultaneously. Move is carried out in one direction (say vertical shimming first) then in the other direction (say horizontal Move).

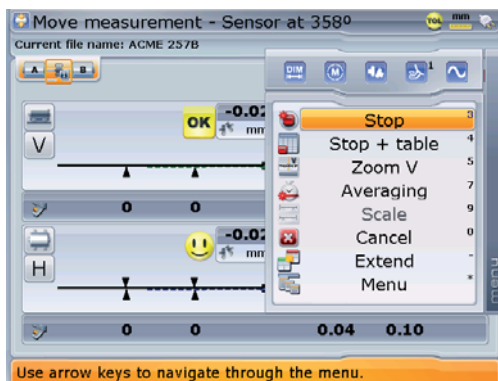
If the laser beam is centered proceed to carry out live horizontal and vertical Move.

If however the laser beam is not centered, use the "Move measurement" screen context menu item 'XY view' (see section 5.2.7) to center the laser beam then press  to go back to the results screen to proceed with live Move.



Horizontal shaft alignment

Live Move may be stopped via the "Move measurement" screen context menu item 'Stop'. Use / to highlight the menu item 'Stop' then confirm selection by pressing .



Note that the "Move measurement" screen context menu item 'Averaging' may be used to set the number of readings to be averaged. The context menu item 'Extend' may be used to broaden the laser beam detection range measurement range.

The features 'Extend' and 'Averaging' are described in sections 5.2.6 and 5.2.9 respectively.

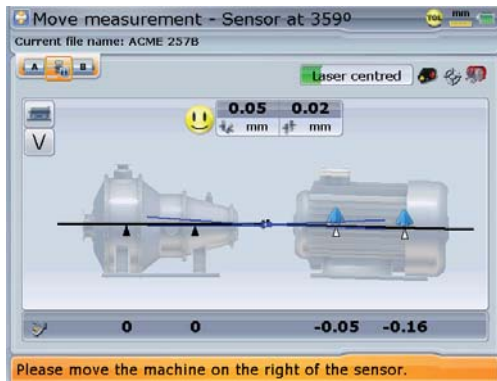
If the results view is zoomed to the vertical view when the Move function is started, only the vertical condition will be monitored. Likewise, if the results view is zoomed to the horizontal view when the Move function is started, only the horizontal condition will be monitored. If the view is set to both vertical and horizontal (as illustrated above) then both conditions will be monitored simultaneously. This information is recorded in the measurement table.



Note

4.13.4 Shimming

- i) Prepare the machines for shimming by ensuring the following:
 - The foot bolts are clean, intact and removable
 - Soft foot has been eliminated
 - The feet have enough shims under them should lowering the machine be necessary.
 - Good quality shims such as PERMABLOC, MYLAR or LAMIBLOC are available from PRÜFTECHNIK Alignment Systems
- ii) Loosen foot bolts while avoiding to move the machine horizontally. If any foot comes off the ground when loosened, suspect soft foot.
- iii) Use the vertical foot correction values to shim BOTH front and back feet as required. Positive feet values indicate that the feet are high and therefore shims should be removed, while negative feet values indicate that the feet are low and suggest addition of shim thickness.

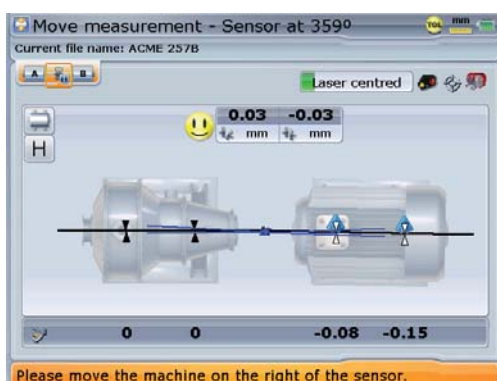


- iv) Retighten and remeasure to verify shimming results and determine the exact alignment condition.

4.13.5 Lateral positioning

- i) With foot bolts loosened, move machine feet keeping an eye on the smiley on the display screen.
- ii) Note the following sign convention – Positive feet values indicate that the machine feet should be removed towards viewer, while negative feet values suggest the moving of machine feet away from viewer.

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





- iii) Tighten anchor bolts and recheck alignment by taking another set of measurements and viewing results. If they are in tolerance, then the machines are aligned.

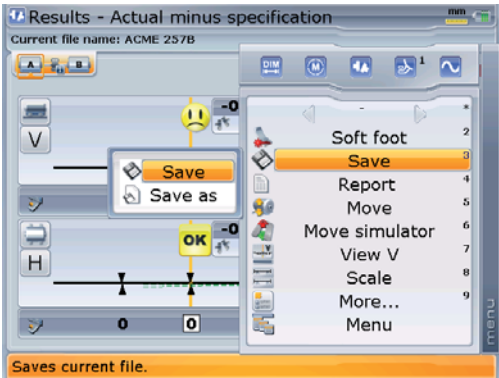
4.14 Saving and printing measurement files

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 non-volatile memory.


Files can be set up and then saved with or without carrying out measurement.

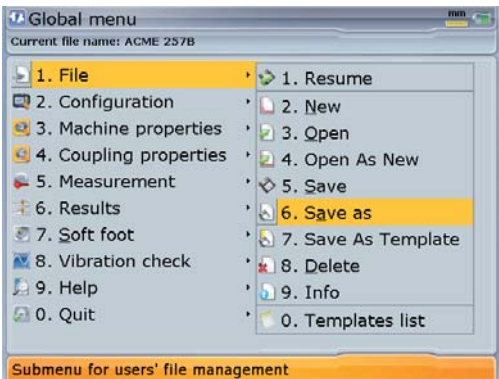
If a measurement file was saved during set-up, the results may be saved after measurement as follows.


With results displayed, press  and use the navigation keys to highlight 'Save'/'Save', confirming selection by pressing .

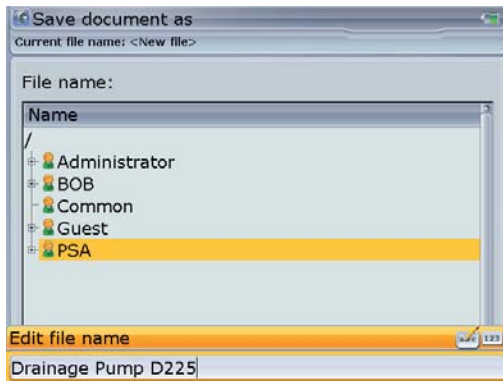


4.14.1 To save a file the first time

- a) Measurement files may be saved using the global menu. Open the global menu by pressing  twice. Use the navigation keys to highlight either 'File'/'Save as' or 'File'/'Save'

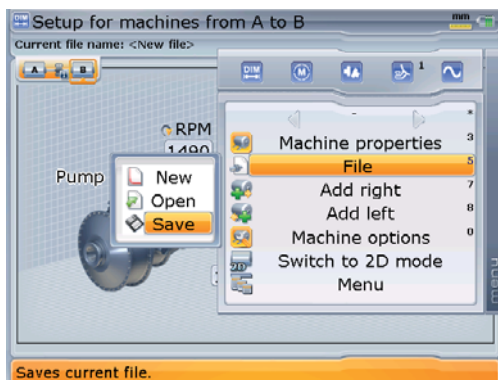


- b) . Confirm selection by pressing . The "Save document as" screen appears.







In this example, the measurement file 'Drainage Pump D225' has been saved in the folder 'PSA'. Parent folders are created in 'User Accounts' which is accessed through 'Configuration' within the program manager (see section 6.1).

- c) Use / to select a location to save the file. Press then proceed to enter the file name using the data entry keys. Confirm file name by pressing either or .
- d) Measurement files may also be saved from the set-up screen. Press while on set-up screen. The context menu appears. Use the navigation keys to highlight 'File' followed by 'Save'.




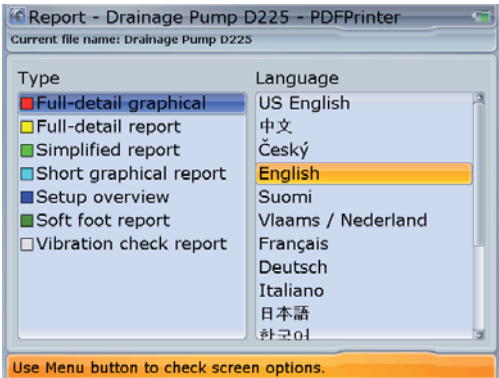
Press to confirm selection. The "Save document as" screen appears and file may be saved as described previously in step (c) above.




4.14.2 Saving report as a PDF

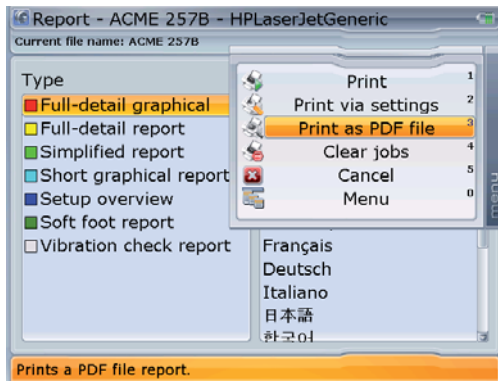
- a) Measurement files may be saved directly from the system as a PDF copy.
- b) While within the application, press  repeatedly to open the machine configuration overview screen then press . The context menu appears. Use / to highlight the context menu item 'Report'.



- c) With 'Report' highlighted, press  to confirm selection.



- d) Press  with the "Report" screen displayed. The context menu appears. Use / to highlight the menu item 'Print as PDF file'.



- e) Before proceeding to print to PDF connect the 'short' ROTALIGN Ultra USB/peripheral devices cable ALI 12.503 to the ROTALIGN Ultra USB port. Attach the especially approved PRÜFTECHNIK Alignment Systems memory stick (aka jumpdrive) ALI 4.451-1GB into the 'short' USB cable.
- f) When all set, press . When printing to PDF is finished the message "PDF file has been saved" appears on the display. The report has now been saved onto the memory stick as a PDF copy and may be transferred to a PC for archiving or printing to any Windows compatible printer.

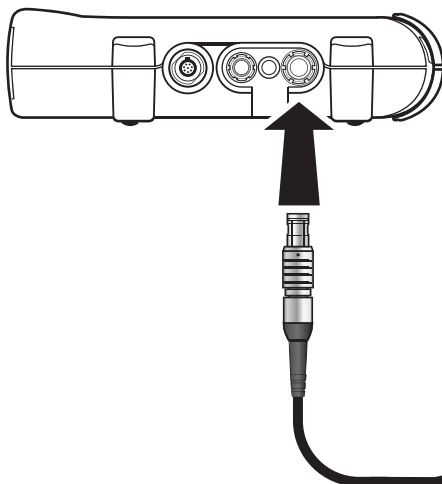
Note that the submenu items may be accessed directly by pressing the corresponding data entry key:

Pressing prints the selected report, in the highlighted format and language, to the configured printer.

Pressing opens the "Printer" screen where the desired printer is selected.

Pressing prints the report to PDF.

Note that when using the data entry keys for direct access, ensure that the ROTALIGN Ultra iS computer is connected to the necessary accessory as described here in section 4.13





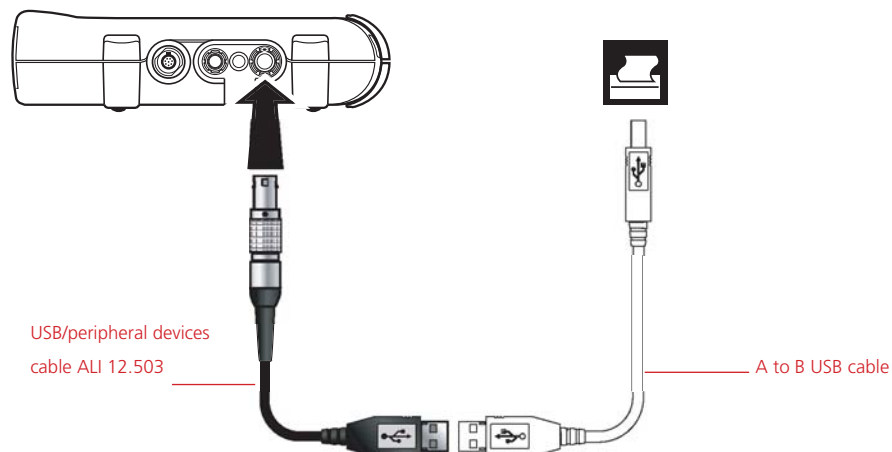
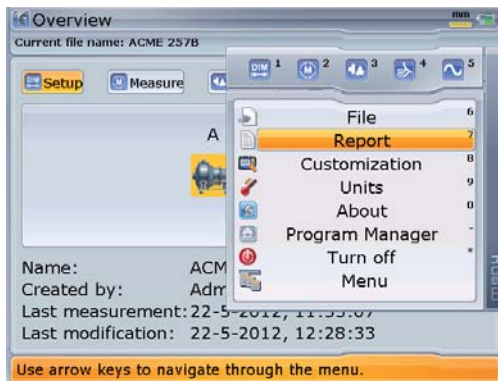
PRÜFTECHNIK Alignment Systems memory stick (aka jumpdrive) ALI 4.451. Other PRÜFTECHNIK approved memory sticks may also be used.

ROTALIGN Ultra USB/peripheral devices cable ALI 12.503

4.14.3 To print report after measurement

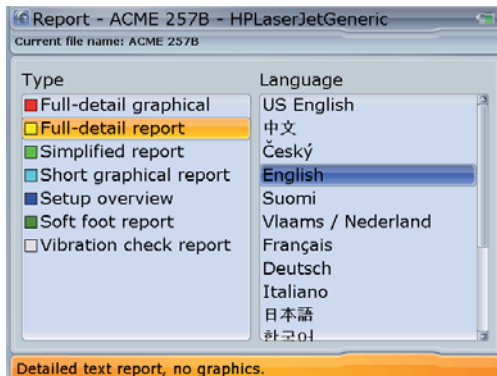
Measurement files can be printed either direct from the results screen or from the shaft alignment overview screen.





- a) Connect the ROTALIGN Ultra iS computer to your printer using the USB/peripheral devices cable ALI 12.503. Depending on your printer interface, you may require an A to B USB cable. Most printers are delivered with this USB cable which is also readily available from most electronic goods dealers.
- b) Press  repeatedly until the machine configuration overview appears on the display screen. Press . The context menu appears.




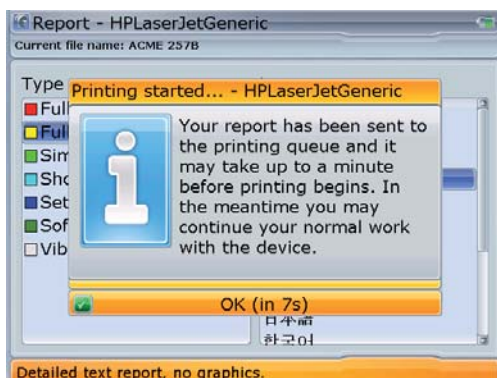
ROTALIGN Ultra iS Shaft handbook

- c) Select 'Report' using either / then confirm selection by pressing .




Use / to switch between the two panes.
Use / to select the required report format and language. Item selected from any pane appears in blue when the opposite pane is highlighted.

- d) Use the navigation keys to select language and type of report to be printed. The title bar shows the printer to which the report will be printed. When ready, press  to print report.



If no report is printed, check the printer set-up described in section 6.1.5.

4.15 Alignment completion

After completion of an alignment measurement or job, press  and hold down for a moment to switch ROTALIGN Ultra iS computer off. Alternatively one may use the global menu combination 'Quit'/'Turn off device'. If the measurement file has not been saved, the following query appears:

- ▶ 'Do you really want to turn off the system?'

Selecting 'Yes' to turn off the system prompts the following question:

- ▶ 'Do you want to save changes in file?'

Save file if required for record and analysis. If it is not required, selecting 'No' turns off the system.

- ▶ Switch both sensALIGN laser and sensor off and slide back both laser and sensor dust caps to cover the apertures.

Remove the components from the shafts and store them in the case.
Replace guards before you switch the machine back on.



WARNING

ROTALIGN Ultra iS Shaft handbook

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Chapter 5: Alignment features

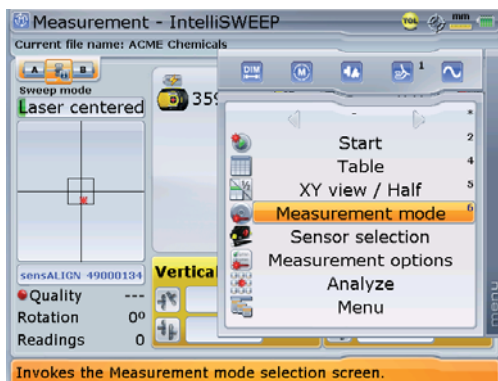
5.1 Measurement modes

ROTALIGN Ultra iS Shaft also offers the following measurement modes: Sweep, Multipoint, Pass, Static (0369) and Dial gauge measurement.

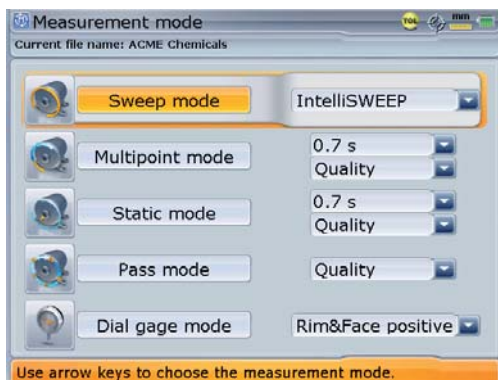
Within Sweep mode and depending on the Shaft level licenced, it is possible to activate the intelligent continuous Sweep mode 'IntelliSWEEP'




IntelliSWEEP is discussed in detail in section 5.1.1.

The measurement modes are accessed via the measurement screen. Press  to access the measurement screen. While on this screen, press . The context menu appears. Use / to highlight the context menu item 'Measurement mode'.



Press  to confirm selection.

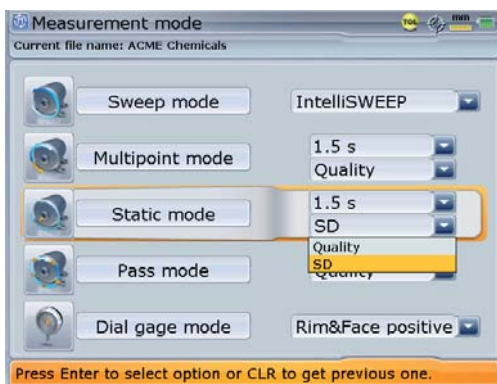


Use / to select the required measure mode. Note that the cursor can be moved along the measurement modes only when a measurement mode is highlighted. Confirm selection by pressing .

The "Measurement mode" screen may also be used to set up the following measurement properties:

- ▶ Type of Sweep mode to be used – this can be either 'IntelliSWEEP' or the customary 'Sweep' method.

- ▶ The duration in which readings are to be averaged – the longer the duration of the averaging, the higher the number of readings collected. This feature applies to 'point' measurements such as 'Multipoint' and 'Static mode'.
- ▶ Measurement factor – this is expressed as either 'Quality' or 'Standard Deviation' (SD)
- ▶ Dial indicator set-up used – these include 'Rim and Face' and 'Reverse Indicator' configurations.



The measurement properties appearing on the right side of the screen are measurement mode dependent. To set the properties for any particular measurement mode, press with the particular measurement mode highlighted. The cursor box moves as shown opposite to enclose the related measurement properties.

Use / to select the required measurement property then press to display the drop down menu. Use / to highlight desired property then confirm selection by pressing . Exit the measurement property box by pressing .

5.1.1 IntelliSWEEP

IntelliSWEEP is a measurement method that actively assists the user by automatically detecting errors and providing guidance on how to avoid such errors. The method also eliminates error influences such as coupling backlash, machine rotational angle and environmental vibration, resulting in extremely precise measurement results. The method is used to measure all standard machines.

Other IntelliSWEEP features include:

- ▶ Intelligent filtering and averaging of results – this leads to high data reduction without loss in measurement accuracy
- ▶ Detection and elimination of coupling backlash and friction resulting from abrupt starts and stops during shaft rotation
- ▶ Monitoring both shaft rotational speed and direction during measurement
- ▶ Providing real time quality values during measurement
- ▶ Monitoring and measuring machine train vibration

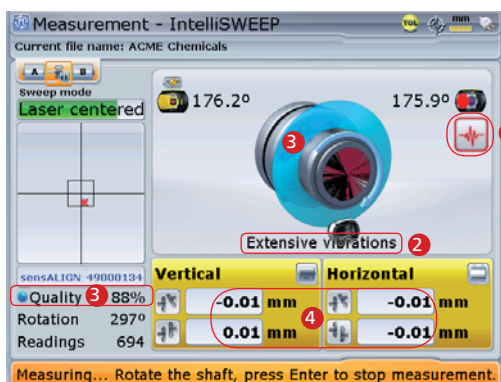
IntelliSWEEP features are available only if ROTALIGN Ultra Advanced Shaft firmware has been installed and licenced in the ROTALIGN Ultra iS computer. This is done by acquiring the ROTALIGN Ultra Advanced Shaft firmware certificate ALI 4.741.



Note

Measurement modes

After adjusting the laser beam and initializing sensALIGN sensor as described in sections 4.10 and 4.11 in chapter 4, rotate shafts to take measurement. In IntelliSWEEP, hints are displayed to guide the user through an error-free measurement. The quality of the measurement as well as real time coupling values are displayed on the screen.

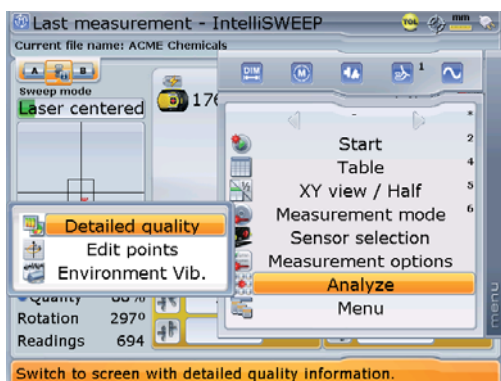


The following IntelliSWEEP features are displayed on the measurement screen:

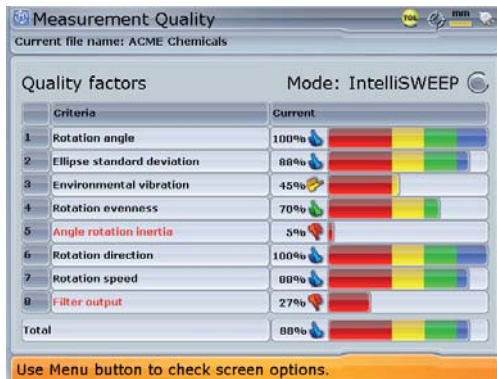
- 1 An extensive vibration icon
- 2 Corresponding hint
- 3 Measurement quality
- 4 Real time coupling results

Note that measurement may be started automatically when the shafts are rotated or triggered manually by pressing . This preference may be set in the "Measurement options" screen accessed via the "Measurement" screen context menu item 'Measurement options'.

Measurement quality may be analysed in details via the "Measurement" screen context menu item 'Analyze'. While in "IntelliSWEEP Measurement" screen, press . The context menu appears. Use the navigation keys to highlight 'Analyze' -> 'Detailed quality'.



With 'Detailed quality' highlighted, press to confirm selection. The "Measurement quality" screen opens. The screen displays all the factors and the respective weighting used to determine the measurement quality.



In this example, when all quality factors have been considered, the resulting measurement quality of 88% is classified as excellent with the colour code blue.

Measurement quality is depicted using the following colour codes:



- — excellent
- — acceptable
- — not acceptable
- — poor

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

- ▶ Rotation angle – the angle through which sensALIGN sensor/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 sensALIGN sensor/shaft is rotated during measurement
- ▶ Filter output – the amount of measurement data filtered out

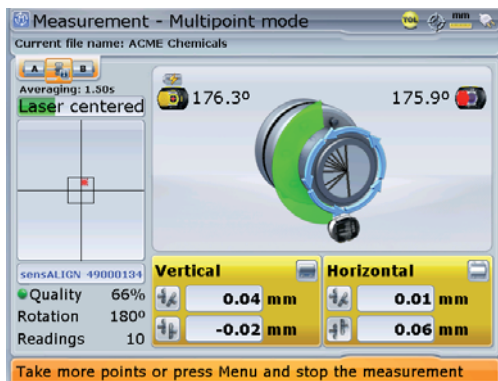
5.1.2 Multipoint measurement

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.

After centering the laser beam as described in section 4.10, press  to take the first measurement point. Rotate shafts in their normal direction of operation from one measurement position to the next. Press  to take measurement at each new position. Measurements must be taken in at least three positions over at least 60° of rotation, but more measurements over a wider angle is recommended.

While in the “Measurement mode” screen you may also set-up the averaging duration and the measurement factor.

Measurement modes



After finishing measurement, press **RES** to view results.

5.1.3 Static measurement

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

After centering the laser beam as described in chapter 4, turn the shaft 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. Press **Enter** to take the first measurement point.

Rotate shaft to the next measurement position. Use the navigation keys to position the displayed sensALIGN laser and sensor at an angular rotation corresponding to the actual position of the components as mounted on the shafts.

Take next measurement point by pressing **Enter**.

Note that after **Enter** has been pressed, the displayed sensALIGN laser and sensor move to the next clock position on the display.

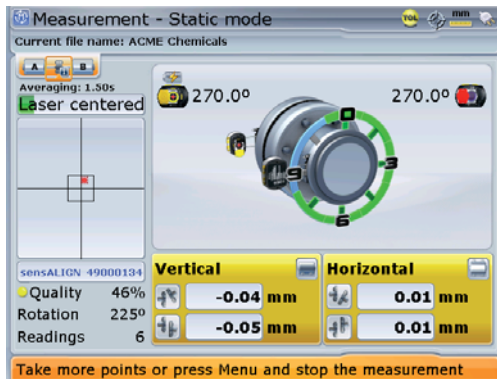
If shaft rotation restrictions hinder the taking of measurements at particular shaft positions, bypass these using the navigation keys.

Coupling results are displayed after a rotation of at least 60°. If using standard deviation (SD), the value appears after 4 or more readings. For best results take 5 or more points. The more points that are taken the more points can be deleted in the "Edit points" screen to maximize accuracy. A detailed description of this utility appears under 'Edit raw data' in section 5.2.5.

Note that after **Enter** has been pressed, the displayed sensALIGN laser and sensor move to the next clock position on the display. Use the navigation keys to position both laser and sensor manually.



Note



The navigation keys are used to position the laser unit on the display screen to correspond to the actual shaft position. Measurement may be stopped or finished using the context menu item "Stop measurement"

Measurements must be taken in at least three positions over 90°, but more measurements over a wider angle is recommended. After finishing measurement, press **RES** to view results.

5.1.4 Pass mode

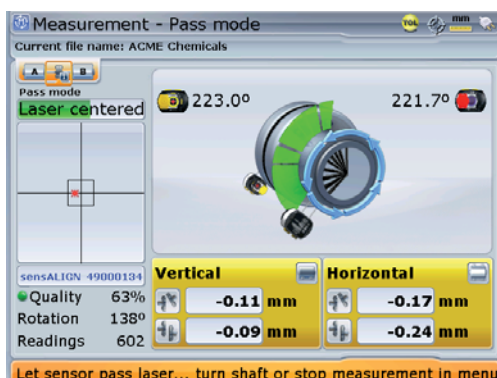
Uncoupled or nonrotatable shafts (one or both) can best be measured in 'pass' mode, where the laser is rotated past the sensor in several different rotational positions. The laser and sensor can be mounted in a variety of ways depending on the alignment situation.

After centering the laser beam as described in section 4.10, press **Enter** to take the first measurement point, then rotate the sensor to the next measurement point.

Rotate the laser slowly past the sensor. When the sensor takes a measurement at its current position, the four sensALIGN sensor laser beam adjustment LEDs on the front of its housing blink green once every second.

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Cover the laser aperture (i.e. with one hand) and rotate the sensor to the next measurement position; repeat the procedure to take measurements in at least three positions over at least 60° of rotation, but more measurements over a wider angle is recommended.



It is recommended to take several sets of readings and then compare them for repeatability in the measurement table (accessible from the "Measurement" screen context menu item 'Table'. If necessary average together multiple sets of readings for greater accuracy.

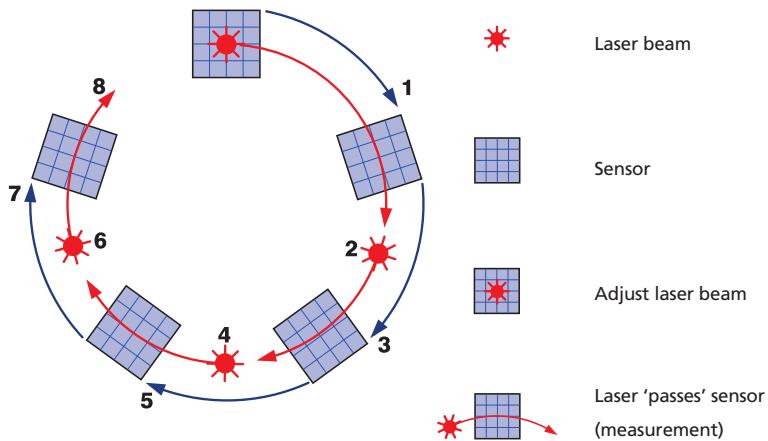
Measurement modes

After finishing measurement, press **(RES)** to view results.

If only one shaft is nonrotatable 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 emitter on the nonrotatable 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 static feet utility in the results screen. Enter all dimensions in accordance with your actual set-up, following the normal orientation of the laser and sensor in the dimensions screen.

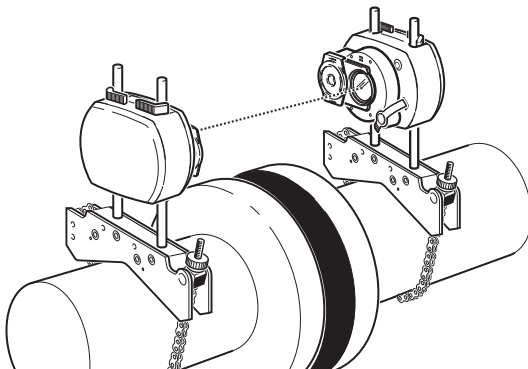


Note



Uncoupled shafts:

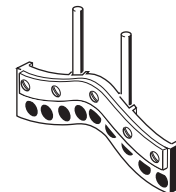
Mount laser and sensor
using chain-type brackets



For nonrotatable shaft(s):

Mount sensor using
magnetic sliding bracket
(ALI 2.230).

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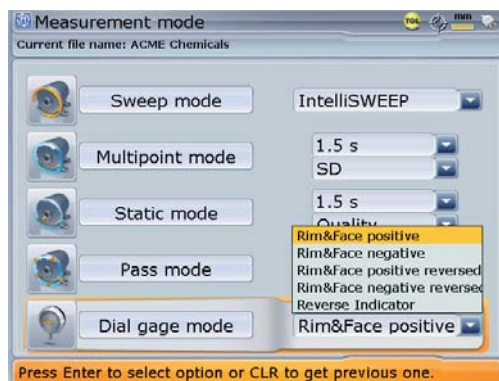


Magnetic sliding bracket
ALI 2.230

5.1.5a Dial gauge mode

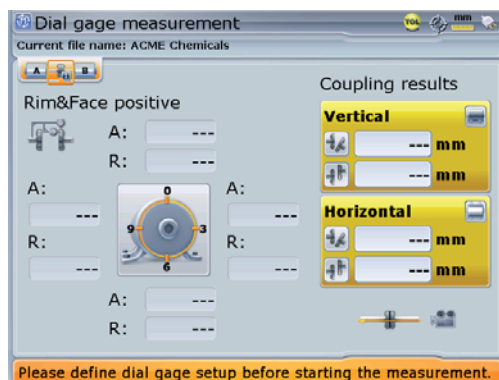
This mode is used to convert dial gauge readings into ROTALIGN Ultra iS Shaft values, hence verifying calculations and comparing measurement results with those obtained using ROTALIGN Ultra iS Shaft. It can also be used to convert ROTALIGN Ultra iS Shaft alignment results into the commensurate dial gauge readings.

- Press to open the measurement screen. With the measurement screen open, press . The context menu appears. Use / to highlight the context menu item 'Measurement mode', then press to confirm selection. From the measurement mode screen that appears, use the navigation keys to select 'Dial gauge mode' and the desired dial indicator configuration.



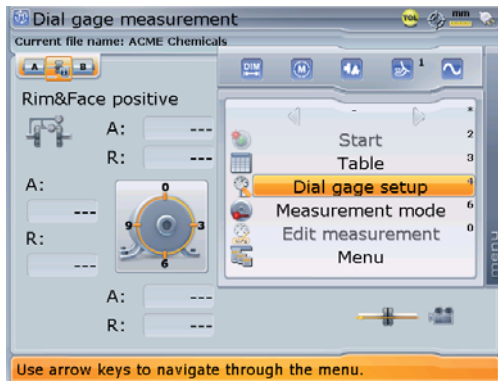
- Press to confirm the set-up then exit to the "Dial gauge measurement" screen by pressing .

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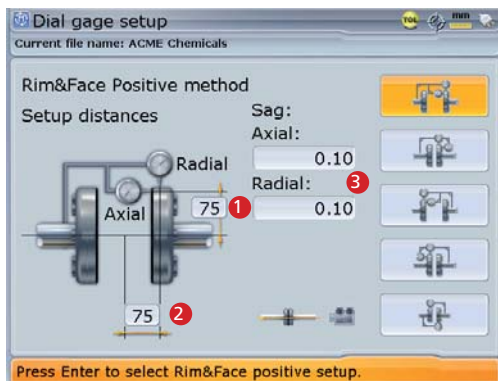


- When back to the "Dial gauge measurement" screen, press then use / to highlight the context menu item 'Dial gauge set-up'.

Measurement modes



- d. Press Enter to confirm selection, then proceed to enter required axial and radial dimensions, and sag values using the data entry keys .



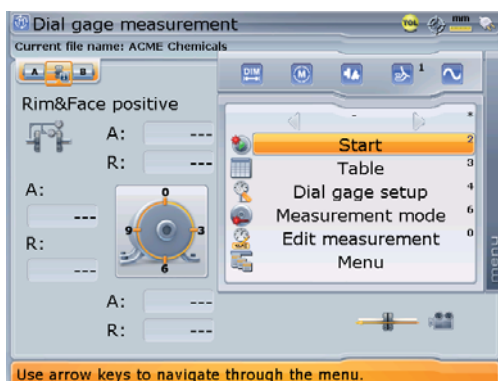
1 In this method, enter the radius of the axial gauge from the shaft center.




2 Here, we enter distance from the radial gauge to the coupling center.

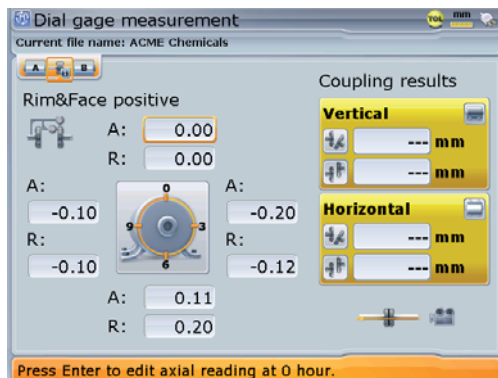
3 Enter radial and axial sag values.




Values are entered directly using the data entry keys and confirmed by pressing either Enter or t .

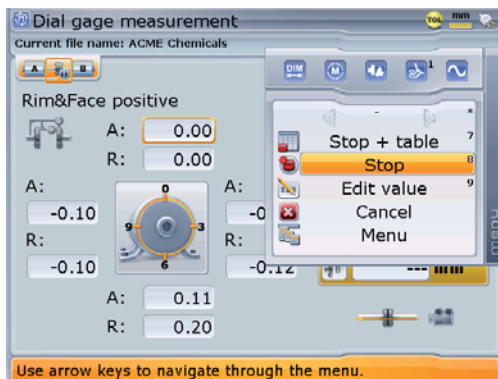
- e. After entering the required dimensions and the amount of bracket sag, press t to return to the dial gauge measurement screen. To enter the dial gauge values, press Enter then use Δ / ∇ to highlight the context menu item 'Start'.



- f. Press  to confirm selection. The cursor moves to the first value entry box. Proceed to enter the dial gauge reading directly using the data entry keys. Confirm entry by pressing either  or . The next empty entry box is highlighted. You may use the navigation keys to cycle through the value entry boxes.

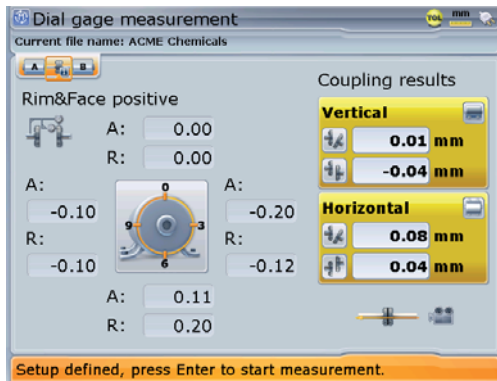


- g. To view ROTALIGN Ultra iS Shaft gap and offset coupling values, press , then use / to highlight the context menu item 'Stop'.

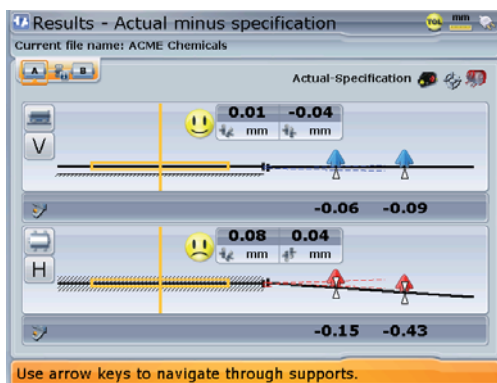


- h. Confirm selection by pressing . Coupling results are displayed.

Measurement modes



i. Press **RES** to view foot results.

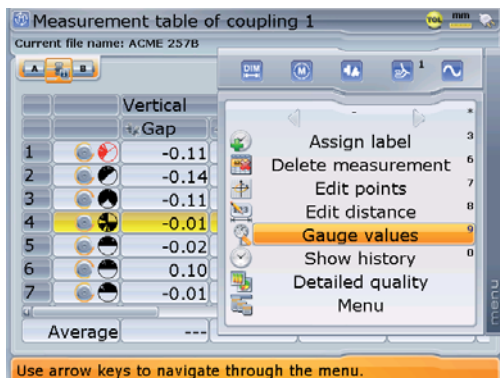


Pressing **RES** reveals the results screen showing feet positions if the dimensions have already been entered. If dimensions are missing, the set-up screen prompting dimensions appears.

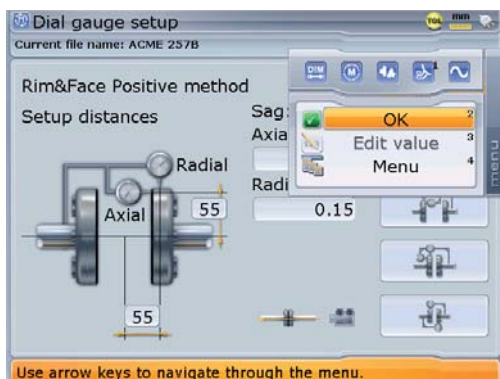
5.1.5b Converting measurement table readings to dial gauge readings

It is also possible to convert existing measurements from the measurement table into dial indicator readings for comparison and analysis.

Access the "Measurement table" screen via the global menu ['Measurement' -> 'Measurement table'] or the "Measurement" screen context menu item 'Table'. While in the "Measurement table" screen, use Δ/∇ to highlight measurement whose values are to be converted into dial indicator readings then press Menu . Use Δ/∇ to highlight the item 'Gauge values' from the context menu that appears.

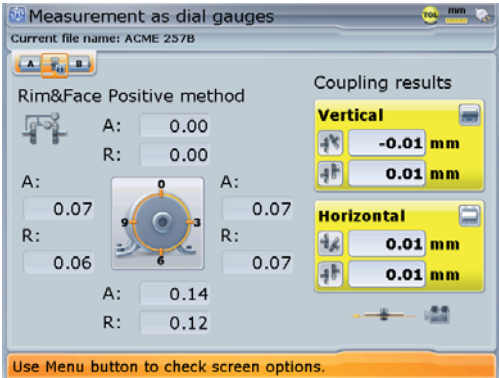


On confirming selection by pressing Enter , a hint appears requesting the set-up of the dial gauge configuration. Use Δ/∇ to highlight 'Yes' then press Enter to confirm selection. The "Dial gauge set-up" screen appears.



Enter the axial and radial dimensions, and the respective sag values then press Menu . Use Δ/∇ to highlight the context menu item 'OK'. Press Enter to confirm selection and display the corresponding dial indicator readings.

Measurement table



In this example, the dial indicator readings for the ‘rim and face positive’ method for the given coupling results are displayed.

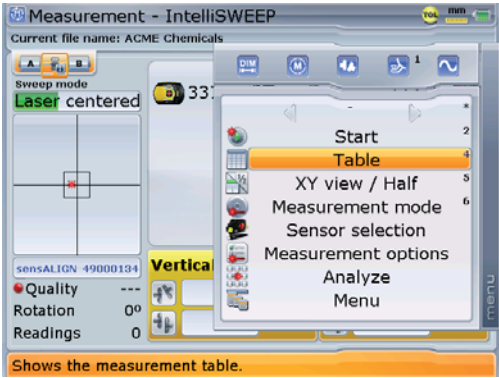
Note that if a dial gauge set-up already exists within the measurement table, dial indicator readings for any highlighted measurement will be displayed instantly when the context menu item ‘Gauge values’ is selected.

5.2 Measurement options

5.2.1 Measurement table

All measurements taken on the current set of machines are registered in a measurement table which can be viewed directly following measurement. The measurement table is accessed through the “Measurement” screen context menu item ‘Table’. Press while on “Measurement” screen, then use / to highlight the context menu item ‘Table’.

Measurement table can also be accessed via the global menu. Press twice to open the global menu, the select ‘Measurement’ -> ‘Measurement table’.



Press to view the measurement table.

Measurement table of coupling 1
Current file name: ACME 257B

		Vertical		Horizontal	
		Gap	Offset	Gap	Offset
1		-0.14	-0.03	-0.09	-0.06
2		-0.11	-0.04	-0.07	-0.10
3		-0.01	0.01	0.01	0.01
4		-0.02	0.02	0.00	0.01
5		0.10	0.14	0.03	0.04
6		-0.01	0.01	0.09	0.10
7		0.03	-0.02	0.01	-0.00
Average		0.10	0.14	0.03	0.04

Press Enter to include/exclude measurement from averaging.

Measurement table of coupling 1
Current file name: ACME 257B

	Vertical	Horizontal	Additional	Sensor
	Gap	Offset	QF / SD	Distance
1	0.09	-0.06	60%	135 sensALIGN 49
2	0.07	-0.10	71%	135 sensALIGN 49
3	0.01	0.01	95%	135 sensALIGN 49
4	0.00	0.01	89%	135 sensALIGN 49
5	0.03	0.04	60%	135 sensALIGN 49
6	0.09	0.10	69%	135 sensALIGN 49
7	0.01	-0.00	93%	135 sensALIGN 49
0.03		0.04	---	---

Press Enter to include/exclude measurement from averaging.

The measurement table is scrolled downwards, upwards and sideways using the navigation keys. The contents of the measurement table from left to right include the measurement position (indicated by nos. 1,2,3 ...), measurement mode (or live move) – indicated by symbols, vertical and horizontal coupling values, measurement quality or standard deviation, distance from coupling center to sensor, used sensALIGN sensor serial number, the duration of the used averaging, use of the extend range, date and time when a particular measurement was taken, and labels used.

Up to 50 measurements can be stored in a measurement table. Changes made in the set-up screen affect only later results, not earlier ones.

Multiple measurement sets can be averaged to achieve more representative results. This feature is particularly useful for uncoupled shafts or when bearing play is considerable. To calculate this average, proceed as follows:




1. Use / to highlight a measurement for inclusion in the average.
2. Press to select the measurement. A check mark appears next to the measurement position indicating that the measurement has been included in calculating the average.
3. Repeat steps 1 and 2 for all other measurements to be included.

Measurement table of coupling 1
Current file name: ACME 257B

		Vertical		Horizontal	
		Gap	Offset	Gap	Offset
1	<input checked="" type="checkbox"/>	-0.14	-0.03	-0.09	-0.06
2	<input checked="" type="checkbox"/>	-0.11	-0.04	-0.07	-0.10
3	<input checked="" type="checkbox"/>	-0.01	0.01	0.01	0.01
4	<input checked="" type="checkbox"/>	-0.02	0.02	0.00	0.01
5	<input checked="" type="checkbox"/>	0.10	0.14	0.03	0.04
6	<input type="checkbox"/>	-0.01	0.01	0.09	0.10
7	<input type="checkbox"/>	0.03	-0.02	0.01	-0.00
Average		-0.04	0.02	-0.03	-0.03

Press Enter to include/exclude measurement from averaging.




Measurement table

To remove a measurement from the average calculation, highlight the measurement using / then press . The check mark next to the measurement position disappears indicating that the measurement is not included in calculating the average.

It is not possible to average readings taken before a Move with readings taken after a Move.

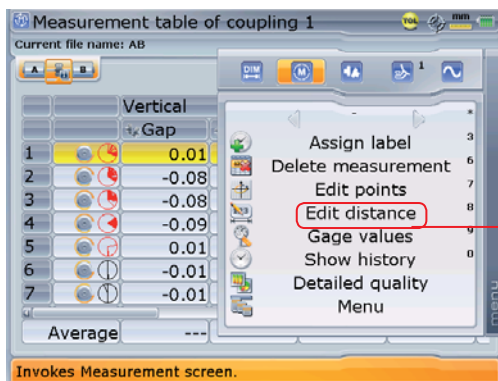


Note

Measurement points, alignment records, and the coupling to sensor distance can be edited from the measurement table screen. To access these items, press  while in the 'Measurement table' screen. Use / to highlight item required from the context menu that appears.

The context menu items of the "Measurement table" screen are applied to the measurement currently highlighted on the measurement table.

The measurement table may also be accessed directly via the global menu items 'Measurement' -> 'Measurement table'










Note that the function 'Assign label' can be effected only on checked measurements.

The measurement table context menu item 'Edit distance' is used to edit the dimension coupling centre-to-sensor. This function makes it possible to interpret new results without necessarily having to remeasure.

5.2.2 Measurement history

To help keep measurement and alignment records, use is made of the "Measurement table" screen context menu item 'Assign label'. Using this feature, it is possible to apply labels to particular measurements avoiding confusion when analysing alignment records.

To assign a label to a measurement, proceed as follows:

- Access the measurement table from the measurement screen by pressing  while in the measurement screen. From the context menu that appears, use / to highlight 'Table', then press  to confirm selection. Use / to highlight measurement to be assigned a label, confirming by pressing . A check mark appears next to the measurement.

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History measurements of coupling 1
Current file name: Drainage Pump 2B

☒ Current measurement ☐ [No history label]

		Vertical		Horizontal		
		Gap	Offset	Gap	Offset	
1		-0.03	0.00	-0.07	0.12	A
2		0.24	0.21	1.66	0.91	S
3		0.24	0.22	0.06	-0.04	
4		-0.03	0.01	0.08	-0.01	
Average		-0.03	0.01	0.08	-0.01	

Press Enter to include/exclude measurement from averaging.

In this example, measurement no. 4 has been highlighted and checked

- b. Press then use the navigation keys to highlight 'Assign label' from the context menu that appears.

History measurements of coupling 1
Current file name: Drainage Pump 2B

☒ Current measurement

		Vertical		Horizontal		
		Gap	Offset	Gap	Offset	
1		0.24	0.21	1.66	0.91	A
2		0.24	0.22	0.06	-0.04	S
3		0.24	0.22	0.06	-0.04	
4		-0.03	0.01	0.08	-0.01	
Average		-0.03	0.01	0.08	-0.01	

Assigns a new label to the measurement table.

Note that the menu item 'Edit label' appears after any single measurement has been assigned a label. The submenu items under 'Edit label' now allow measurements be assigned labels or existing labels be edited.

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- c. Press to confirm selection. A dialog window with predefined labels appears.

Measurement table of coupling 1
Current file name: Feeder Pump 4C

Choosing the new history label

Please select new history label from the predefined list.

		Vertical		Horizontal		
		Gap	Offset	Gap	Offset	
1		0.23	0.09	-1.68	-0.47	A
2		0.23	0.09	-1.68	-0.47	S

OK Edit label Cancel

Press Enter to include/exclude measurement from averaging.

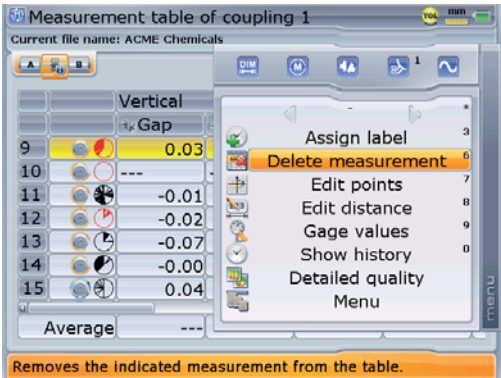
If desired, customized labels may be defined using the 'Edit label' button.

Measurement table

- d. Use Δ/∇ to highlight the appropriate label. Confirm selection by using \leftarrow/\rightarrow to highlight 'OK', then press Enter to accept label.

5.2.3 Deleting measurement

- a. With the measurement table displayed, use Δ/∇ to highlight measurement to be deleted.
- b. Press Menu then use Δ/∇ to highlight the context menu item 'Delete measurement'.



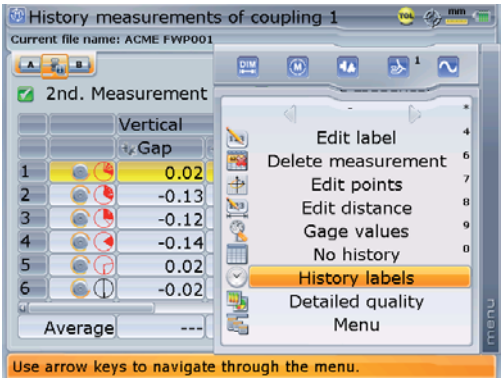
Highlighted measurements may also be deleted by pressing CLR . Note that measurements assigned with labels cannot be deleted without first deleting the label.


- c. Press Enter to confirm selection. A hint box requesting confirmation to delete measurement appears. Use the navigation keys to highlight 'Yes'. With 'Yes' highlighted, pressing either Enter or L deletes the measurement permanently.

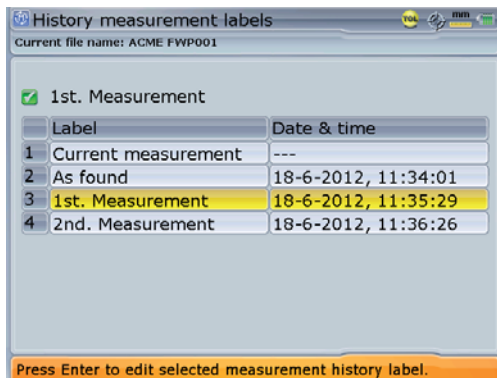
5.2.4 Identifying history labels






To find out how many different labels have been assigned in measurement history table, proceed as follows:

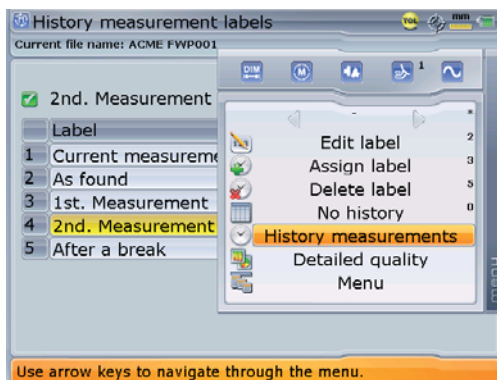
- a. With measurement table displayed, press Menu then use Δ/∇ to highlight 'History labels'.




- b. Press  to confirm selection. The "History measurement labels" screen appears showing all labels used on the file.



- c. To identify the measurement related to a particular label, use / to highlight the respective label, then press . Use / to highlight the context menu item 'History measurements'.



- d. Press  to view the measurement under the selected label (in this case '2nd Measurement').

Measurement table

History measurements of coupling 1
Current file name: ACME FWP001

2nd. Measurement

[No history label]

		Vertical		Horizontal	
		Gap	Offset	Gap	Offset
1		0.02	-0.03	-0.89	-0.62
2		-0.13	-0.12	-0.62	-0.45
3		-0.12	-0.09	-0.70	-0.56
4		-0.14	-0.08	-0.35	-0.34
5		0.02	0.02	-0.02	-0.02
6		-0.02	-0.00	0.00	-0.01
Average		-0.14	-0.08	-0.35	-0.34

Press Enter to include/exclude measurement from averaging.

History measurements of coupling 1
Current file name: ACME FWP001

2nd. Measurement

[No history label]

	on Date & time	History labels
1	20-4-2012, 11:50:36	[No history label]
2	20-4-2012, 11:51:06	As found
3	20-4-2012, 11:51:51	1st. Measurement
4	20-4-2012, 12:22:44	2nd. Measurement
5	20-4-2012, 12:24:52	[No history label]
6	20-4-2012, 12:25:17	[No history label]

Press Enter to include/exclude measurement from averaging.

The measurement with the label '2nd Measurement' is measurement no. 4 (with check mark) on the measurement table. Use to horizontally scroll the measurement table.

5.2.5 Edit raw data

To improve the quality of the alignment results, it may be necessary to edit measurement data that deviates severely from other measurements taken.

After completion of measurement, use the "Measurement screen" context menu item 'Stop + table' to access the measurement table. With the particular measurement highlighted, press then use to highlight the menu item 'Edit points'.

Measurement table of coupling 1
Current file name: ACME Chemicals

Vertical

Gap

23	0.00
24	-0.11
25	-0.26
26	0.00
27	0.01
28	0.00
29	-0.16
Average -0.16	

Invokes the edit raw data screen for the indicated measurement.

Assign label

Delete measurement

Edit points

Edit distance

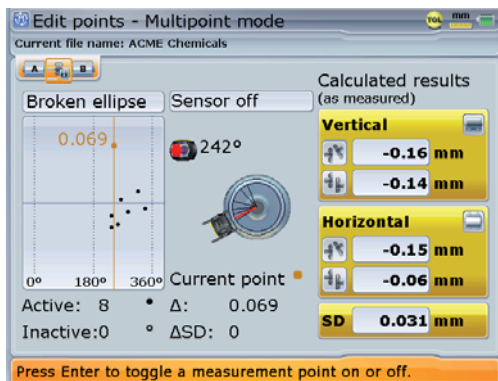
Gage values

Show history

Detailed quality

Menu

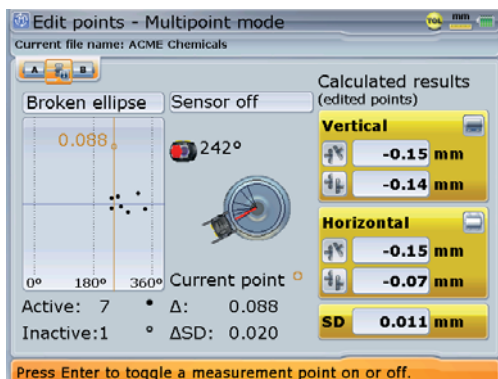
Press to view and edit ellipse points.



In this example, the selected ellipse view mode is a broken ellipse. The currently selected point deviates by 0.069 mm. The standard deviation SD is 0.031.

Any measurement point that deviates severely from the other values can be deactivated from the measurement set.

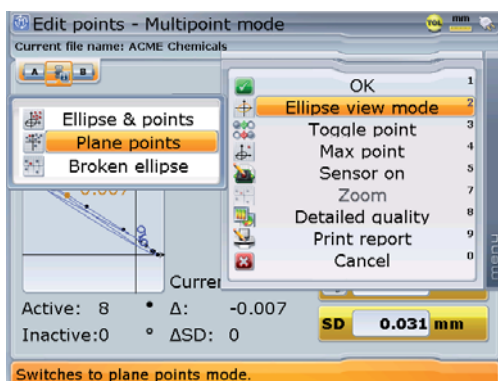
Use the navigation keys to select the measurement point to be deactivated. Any selected point can be deactivated by pressing .



In this example, the deactivated point is the one that was highlighted in the previous example. The point appears as a clear circle on the display and SD has improved to 0.011. The change in SD is recorded on the screen.


The current status of the marked point is displayed on the screen allowing the reactivation of points by pressing .




The context menu of the "Edit points" screen includes the items 'Ellipse view mode', 'Toggle point', 'Max point' and 'Sensor on/off'.



The menu item 'Detailed quality' is used to access the "Measurement quality" screen which can also be accessed via the "Measurement" and "Measurement table" screens shown previously.

Extend

The 'view mode' allows raw data to be examined from three different views. The three views are: ellipse and corresponding points, plane points and broken ellipse. Use the navigation keys to highlight the desired view then confirm selection by pressing . In the "Ellipse and points" view, the width of the ellipse along the X axis gives an indication of shaft angularity, and its height (on the Y axis) indicates shaft offset. When shafts are perfectly aligned, the ellipse is reduced to a single point.

'Toggle point' is used to deactivate any selected measurement point. Use  /  to highlight 'Toggle point', then press  to deactivate the selected point. This point may be reactivated by the same procedure. The 'deactivated' measurement position can be remeasured in the 'Multipoint', 'Pass' and 'Static' measurement modes. If several 'active' points result for the same position, they will be averaged together.

'Max point' is used to highlight the measurement point with the maximum deviation from the calculated ellipse.

Selecting **'Sensor on'** shows the current beam position on the screen. With this function, repeatability can be checked by following the path of the beam as the shafts are turned through the measurement positions again. The beam should move along the curve of the ellipse without appreciable deviation.

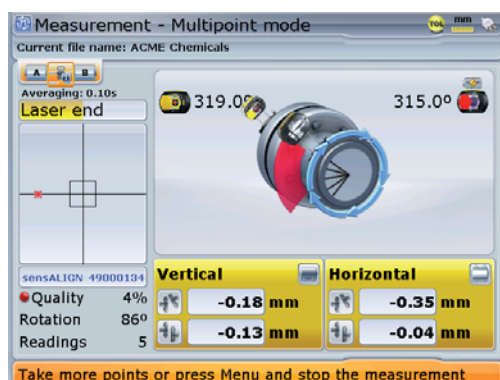
5.2.6 Extending the measurement range

Gross misalignment of shafts or small angular misalignment over large distances can cause the laser beam to miss the detector surface during measurement. When this happens, 'Laser end' appears on the display screen and the instrument's 'Extend' function can be used.


The 'Extend' option is available only in 'Multipoint' and 'Static' measurement modes.

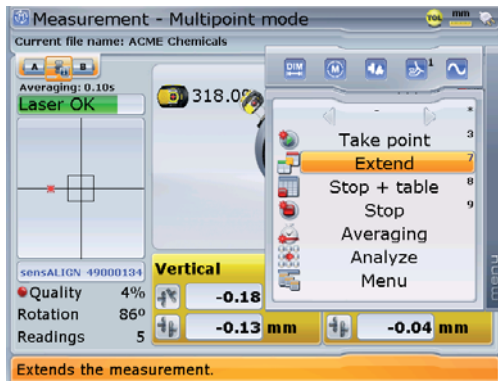


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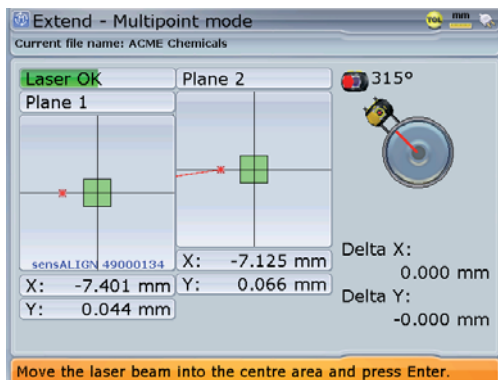


'Laser end' is displayed when the laser misses the center area of the detector.

1. When measuring and 'Laser end' message appears, rotate the shafts backwards until the laser beam reenters the measurement range. The message 'Laser OK' reappears on the display. Press . The context menu shown next appears.




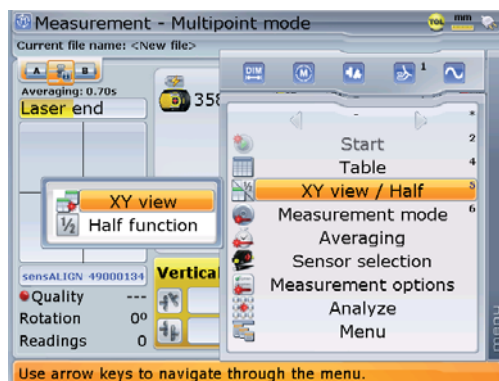
2. Use / to highlight 'Extend', then press . The program interrupts measurement and switches to 'XY View' in the "Extend" screen. The current beam position is automatically taken as the starting point for range extension.




3. Readjust the beam into the target circles using the two yellow sensALIGN sensor horizontal and vertical position thumbwheels then press or .
4. Continue measurement as before, rotating the shafts and pressing to take measurement at the desired positions.
ROTALIGN Ultra iS Shaft program includes the displacement of beam readjustment in the alignment calculations.

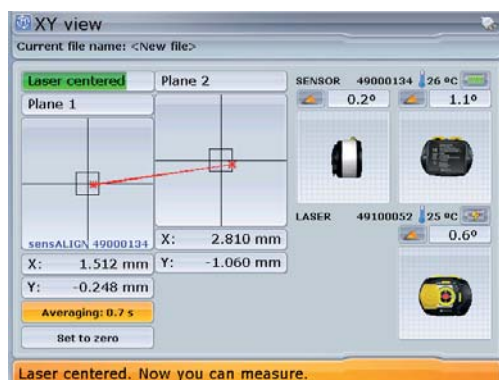
5.2.7 XY View

The XY View function is used to facilitate the centering of the laser beam on the two sensALIGN sensor detector planes before proceeding with measurement. After accessing the "Measurement" screen, press  then use the navigation keys to highlight the submenu item 'XY View'.

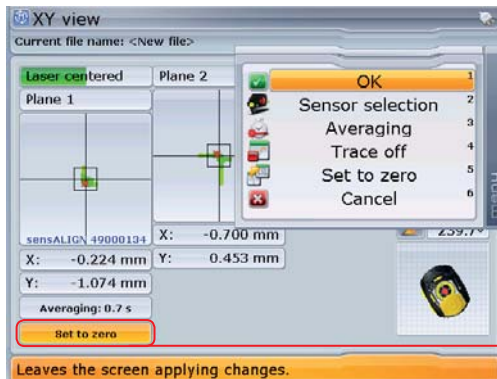



Note that the context menu item 'Averaging' is present when the measurement mode is either Multipoint or Static measurement.

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



The context menu of the "XY View" screen include the items 'Trace on' and 'Set to zero'/'Set to absolute'.



With the 'Set to zero' button highlighted, pressing  toggles between the 0,0 values and the absolute values.

Note that the measurement averaging may also be set on this screen.

'Set to zero' button


Trace on literally traces a path showing the laser dot movement on both planes.

Set to zero / Set to absolute toggles X,Y values of the laser beam dot on both planes between 0,0 and the absolute values. The laser beam dot positions may be set to 0,0 to act as a reference.

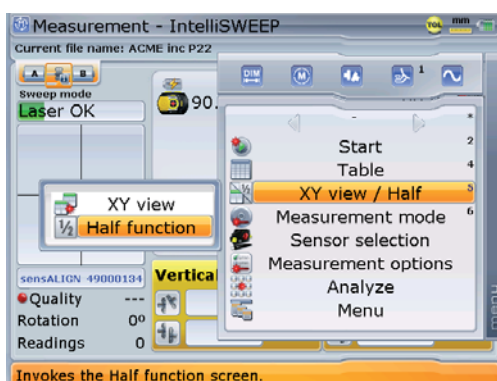
5.2.8 Half function


There are specific shaft alignment applications where the 'half function' is used to help ensure that the laser beam does not deviate away from the sensor detector during shaft rotation. The measuring of long spacer shafts is one such example.

The 'half function' procedure would be as follows.

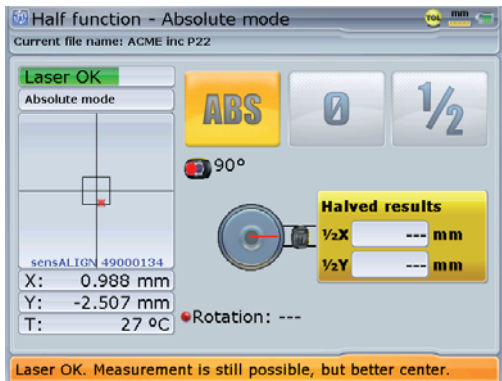
- Mount the components such that the laser beam strikes the center of the sensALIGN sensor sliding dust cap, then remove the dust cap.
- Press  then use the navigation keys to highlight the context menu item 'Half function'.

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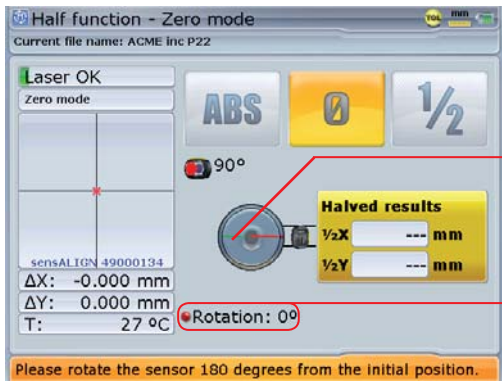


- Press  to confirm selection. The "Half function" screen opens displaying the absolute X,Y values of the laser beam on the detector.

Half function

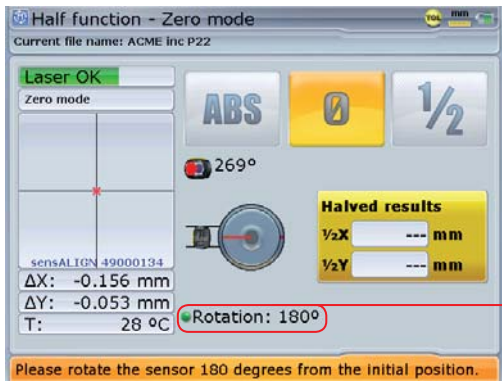


- d) Use to highlight the '0' half function icon then press to confirm selection. The current laser dot position assumes the X,Y value 0,0.





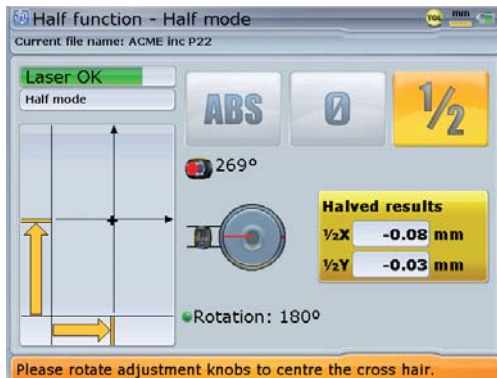
Note that the position where the sensor should be rotated to is marked by a green sector. Rotation is carried out in any direction - clockwise or anti-clockwise [counterclockwise]. Also note the rotation angle and its corresponding button.

- e) Now rotate the sensor through 180° as indicated on the screen.



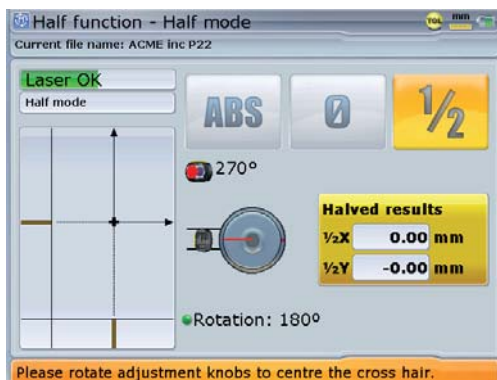
Note that the sensor rotation angle button turns green when the sensor rotation is at 178° up to 180°.


- f) Use  to highlight the '1/2' half function icon, then press  to confirm selection.



Note that the documented 1/2 X and 1/2 Y values correspond to the ΔX and ΔY values recorded previously.

- g) Now use the two yellow beam position thumbwheels to position the cross hair at the centre of the two axes. The displayed 1/2 X and 1/2 Y results should be as near 0.0 as possible










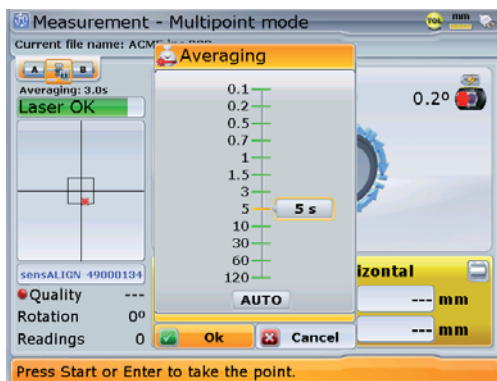
- h) After attaining the required 1/2X and 1/2Y values [as near 0.0 mm as possible], the laser is now on the shaft axis. Press  to proceed with actual shaft alignment measurements.

5.2.9 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 'Multipoint' and 'Static mode'. The duration of the averaging of individual readings which form one measurement is selected from either the "Measurement screen" or the "Measurement mode" screen or via the "XY view" screen. The XY view screen is primarily for live Move and soft foot measurement.

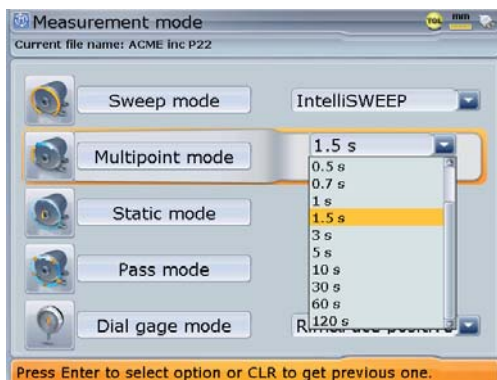
When setting the duration of the averaging from the corresponding "Measurement" screen, press  then use / to highlight the context menu item 'Averaging'. Press  to confirm selection then use / to select the desired averaging duration. Press  to confirm duration.



Setting averaging in the
"Measurement" screen

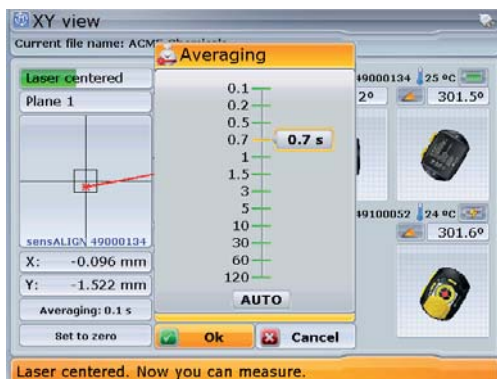
In surroundings where environmental vibration is high, a higher averaging duration is recommended. ROTALIGN Ultra iS has the capability to set 'Auto' averaging. In 'Auto' averaging, the system records measurements automatically only when the readings are stable.

When setting the duration of the averaging while in the "Measurement mode" screen, use Δ/∇ to highlight the desired 'point' measurement mode, then use \triangleright to highlight the averaging duration drop down menu. Use Δ/∇ to highlight desired averaging duration then confirm using Enter or t .



Setting averaging in the "Measurement mode" screen

If averaging is set via the XY view, press Menu from the corresponding measurement screen and use the navigation keys to highlight 'XY view'. Press Enter to confirm selection. The XY view screen appears with the averaging box highlighted. Press Enter to expand the drop down menu, then use Δ/∇ to select the desired averaging duration from the drop down menu.



Setting averaging in the "XY view" screen

Confirm value by pressing either Enter or t .





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

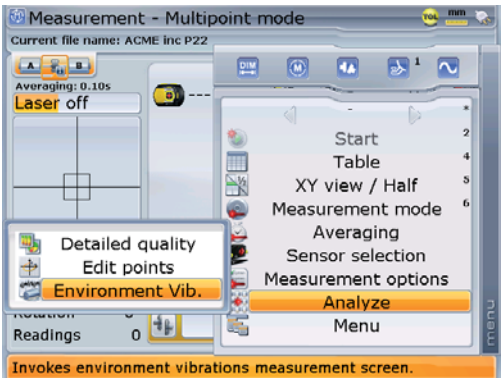
5.3 Measuring vibration

Using sensALIGN sensor only, it is now possible to measure any vibration that may influence the alignment results. The vibration may be inherent in the machine train or a result of external influence.

To measure the vibration, use is made of the “Measurement” screen submenu item ‘Environmental vibration’.

With sensALIGN sensor switched on and mounted on the machine, press  to access the “Measurement” screen. Press  to display the context menu items. Use the navigation keys to highlight ‘Analyze’ then select the submenu item ‘Environmental vibration’.

Note that for vibration measurement, use may be made of the vibration check probe ALI 4.905.

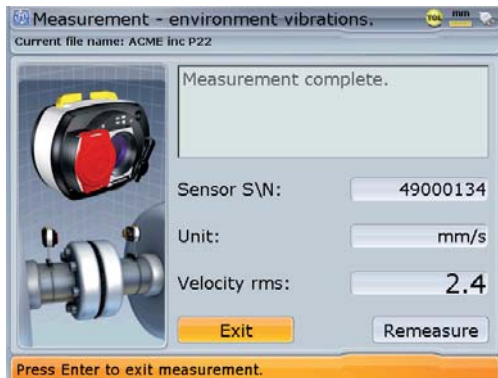


The submenu item ‘Environmental vibration’ is selected by first highlighting the context menu item ‘Analyze’.

Press  to confirm selection. Vibration measurement begins.



As soon as measurement is completed, the vibration velocity measured in mm/s (or in/s) is displayed.

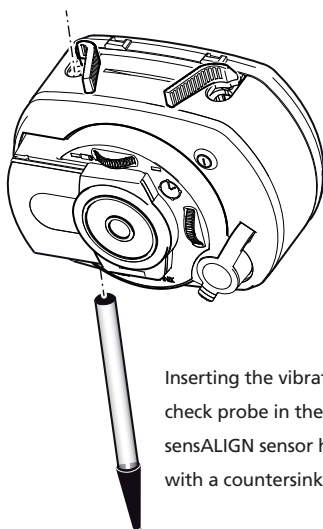


5.3.1 Using the vibration check probe

The above vibration velocity measurement may also be carried out using the vibration check probe ALI 4.905.

Insert the probe in the sensALIGN 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.

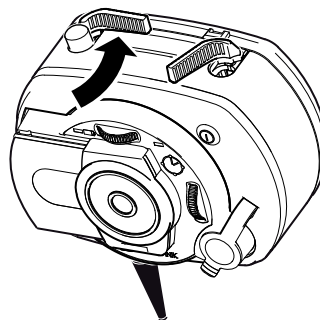
With the probe securely locked in, hold the probe firmly against the appropriate measurement location on the machine until measurement is completed.



Inserting the vibration check probe in the sensALIGN sensor hole with a countersink



The sinusoid symbol indicates the sensALIGN hole where the vibration check probe is to be inserted.



With the probe fully inserted and resting on the housing, push the clamping lever to the 'locked' position.

Environmental vibration



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

Transferring vibration measurement results via Bluetooth to ROTALIGN Ultra iS computer.

ROTALIGN Ultra iS Shaft handbook

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5.4 Set-up options

5.4.1 Machine type and fixation

ROALIGN Ultra iS Shaft provides the user with a feature to designate the type and fixation for both left and right machines.

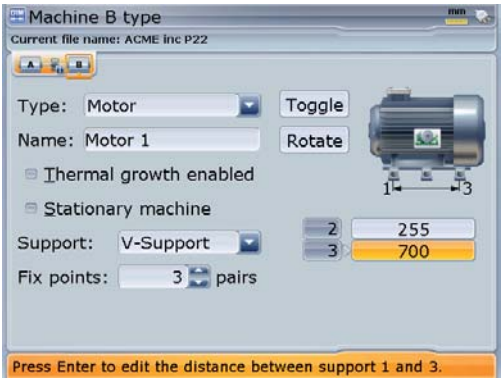
Please refer to "Machine properties in section 4.8



Use the navigation keys to highlight machine item boxes. Press  to either check selected item box or prompt the corresponding drop down menu.

5.4.2 Machine mounting

Detailed machine mounting can be specified in set-up. In the set-up screen that follows, machine mounting has been defined as 6 feet (3 pairs of feet), has a V-foundation and is moveable.

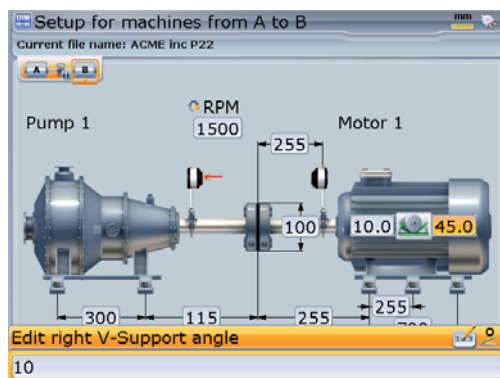


For machines with V-shaped supports, the angle between support surfaces and foundation must be entered in order to calculate corrections.

The respective angles are entered as follows:

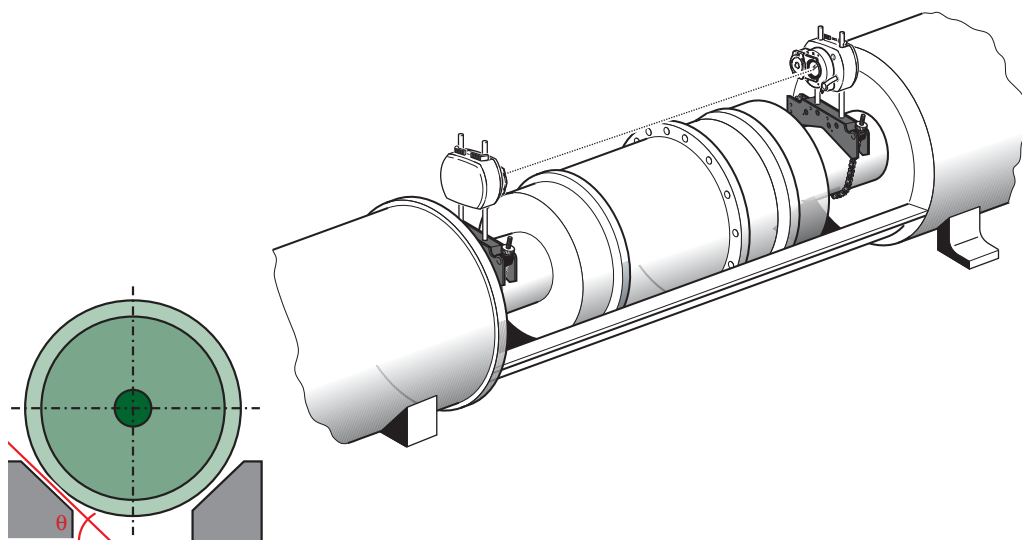
- › From the dimension screen, use the navigation keys to highlight either of the support angle boxes (left side or right side). Note that the default angle is 45°, and a 0° angle indicates that the machine feet are parallel to the foundation, while a 90° angle indicates that the feet are perpendicular to the foundation.

Note that the support angle can be entered only on a 2-D dimensions screen.



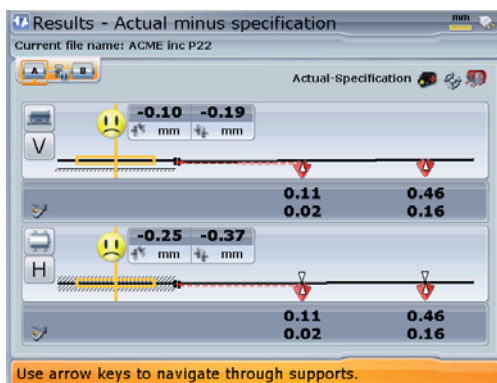
Dimensions screen in 2-D mode

- › Use the data entry keys to enter the support angle for the selected feet position, confirming entry by pressing either Enter or t .
- › Select next position using the navigation keys and enter the support angle as described above.

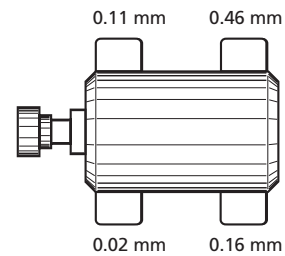


Special alignment options

All alignment corrections are achieved solely by inserting and removing the proper combination of shims; corrections are indicated for each individual machine foot to yield the required horizontal and vertical displacement for the machine upon angled supports. These corrections correspond to the values in the results screen as shown below.



The vertical corrective values for each foot are shown below.

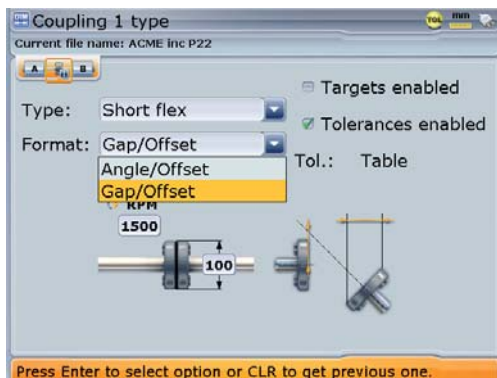


5.4.3 Coupling type

The following coupling types are available for selection:

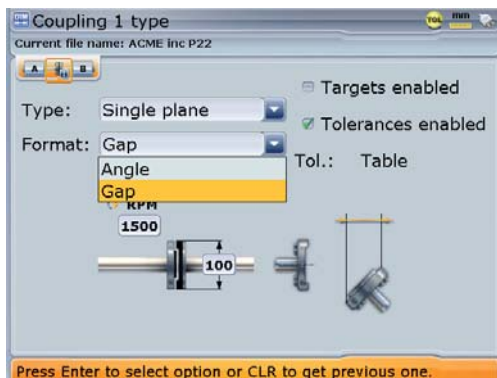
- ▶ **Short flex** – These couplings feature fitted transmission elements with play (such as teeth, claws or bolts) or elastic connecting elements like rubber ‘tires’ or springs.
- ▶ **Single plane** – The coupling halves are bolted directly together. Loosen the bolts before taking measurements, since they would otherwise distort the true alignment condition.
- ▶ **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.

5.4.4i Short flex



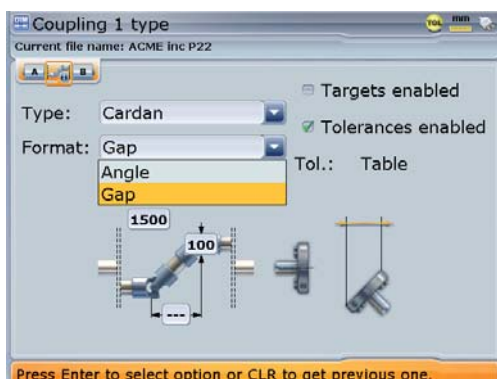
Short flex is for most common types of "compact" flexible coupling. Coupling results may be displayed either as 'Angle/Offset' or 'Gap/Offset'.

5.4.4ii Single plane



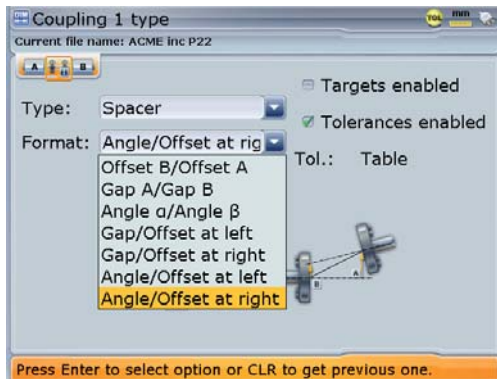
Single plane is for simple non-flexible couplings which are usually just two flanges bolted together. Coupling results may be displayed either as 'Angle' or 'Gap'.

5.4.4iii Cardan shafts



Dimensions screen in 2-D mode

5.4.4iv Spacer shaft



Spacer shaft is a coupling with two bending planes and a spacer. Coupling results may be displayed in any one of the following formats:

- 'Angle/Offset at right'
- 'Offset B/Offset A'
- Gap A/Gap B'
- 'Angle α /Angle B'
- 'Gap/Offset at left'
- 'Gap/Offset at right'
- 'Angle/Offset at left'
- 'Angle/Offset at right'

5.4.5 Sign convention

- ▶ Vertical alignment plane:
 - › Offset is positive when the right shaft centerline is higher than the left centerline.
 - › Gap and angularity are positive when the coupling opens toward the top.
- ▶ Horizontal alignment plane:
 - › Offset is positive when the right axis is further away from the viewer than the left axis.
 - › Gap and angularity are positive when the coupling opens away from the viewer.

5.4.6 Coupling targets

The position of machines at rest can be considerably different than that during operation (e.g. due to thermal growth or load-related displacements). This effect can be compensated through use of alignment target values for the coupling, which allow precise 'misalignment' when the machines are at rest so that they will be in proper alignment position during operation.

Alignment target values may be found in the machine documentation or upon request from the manufacturer or can be measured using PERMALIGN. For details on PERMALIGN, contact your local PRÜFTECHNIK representative.

The coupling type determines the targets to be entered. These values are entered as described in section 4.9 – 'Coupling properties'.

5.4.7 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 coupling type and diameter 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. (See suggested shaft alignment tolerances within the 'Appendix'.)

In ROTALIGN Ultra iS Shaft the 'live' tolerance function can be activated or deactivated from either the coupling properties window or the tolerances window. When the function is checked active, the alignment quality is indicated with the 'smiley' symbol.

Tolerance tables are viewed as follows:

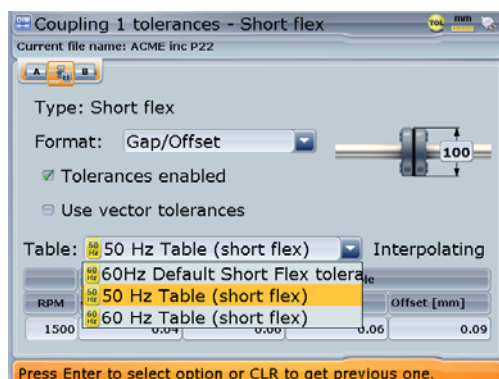
Access coupling properties as described in section 4.9 – 'Coupling properties'.

Press . The context menu appears. Use / to select 'Tolerance'.





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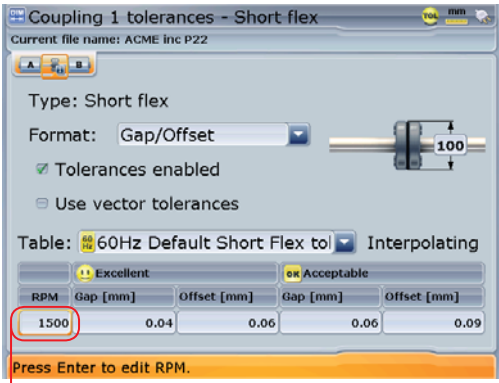
Press  to confirm selection. The tolerances screen appears.



Use the navigation keys to cycle through the screen elements. You may use the 'Table' drop down menu to set the appropriate machine operating frequency (either 50 Hz or 60 Hz).

Special alignment options

The machine RPM may also be edited on the tolerances screen. Use the navigation keys to highlight the RPM value box then use the data entry keys to enter the desired value. Confirm entry by pressing either  or .



Excellent		Acceptable		
RPM	Gap [mm]	Offset [mm]	Gap [mm]	Offset [mm]
1500	0.04	0.06	0.06	0.09

Alignment tolerances are divided into two quality ranges - 'acceptable' values are relatively generous and intended for noncritical machines and RPM ranges; 'excellent' values are intended for machines and RPM ranges that require especially accurate shaft alignment.

RPM value box



The given alignment tolerances are based upon standard industry norms and must not be exceeded, and they are to be used only if existing in-house standards or the machine or coupling manufacturer has not given any binding values.


5.4.8 Thermal growth calculator




Machine conditions change from the time the machine is off line to when it is running under normal operating conditions. Some of these changes are due to process forces (e.g. fluid pressures, airflow). The most notable of these changes is the change in the temperature of the machine bearings and supports. This is called the machine's thermal growth.

ROALIGN Ultra iS Shaft may be used to calculate thermal growth compensation if no other values are available. Thermal growth is calculated from the material characteristics, expected temperature difference and height of the shaft centerline above the shim plane.


Thermal growth is calculated as follows:




From machine set-up, use the navigation keys to highlight the machine whose thermal growth requires calculating.

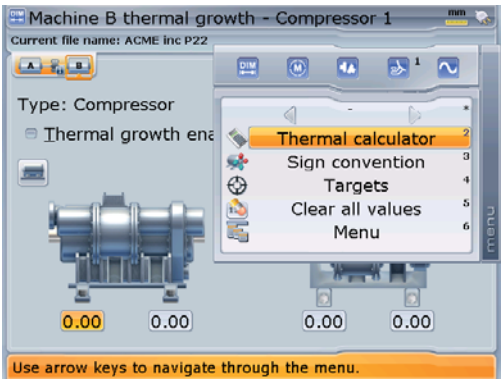
With the machine highlighted, press  to access the machine properties screen.

Press . The context menu appears. Use / to select 'Thermal growth'.




Press . The thermal growth screen appears.

Press . The context menu appears. Use / to select 'Thermal calculator'.

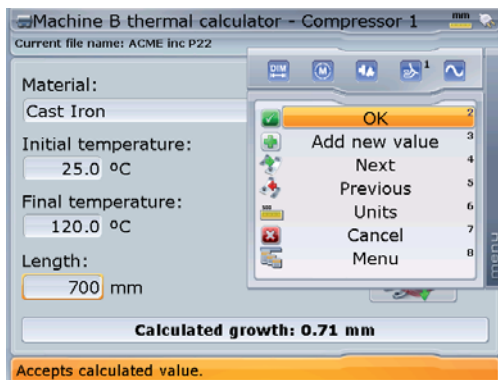


Special alignment options

Press  to access the thermal calculator screen.

Proceed to select type of material using the drop down menu.

Use the navigation keys to highlight the respective value boxes and enter directly, the ambient temperature, the machine running temperature and the distance from machine base to the shaft centerline using the data entry keys.



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5.5 Soft foot

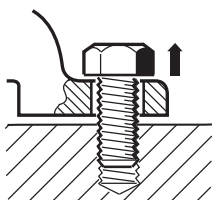
Soft foot is the condition of machine frame distortion. Any cause that results in machine frame distortion when the machine is anchored to its foundation is a soft foot. Some principal causes are:

- › Non-coplanar machine mounting surfaces,
- › Deformed machine frame or feet,
- › External forces e.g. from connecting pipe or bracket,
- › Improper shimming or dirty machine feet.
- › Too many shims under a machine foot (a maximum of 3 should be used)

The consequences of forcibly tightening down the feet are deformed machine frames, bent shafts and distorted bearings. This leads to high vibration and premature failure.

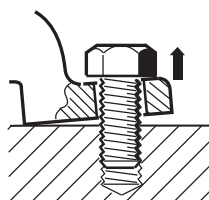
Soft foot should be checked before aligning the shafts, and this can be done quickly and conveniently with the aid of the ROTALIGN Ultra iS Shaft soft foot function. With the sensALIGN laser and sensor mounted on the shaft in the usual way, the system is able to sense any machine movement when the machine bolts are loosened individually. By entering the machine dimensions, the computer is able to calculate, from shaft movement, by how much each foot has moved as it is loosened.

Once foot movements have been established, the results are interpreted and translated into shim thicknesses to be placed under the feet. How straightforward this is, depends on the type of soft foot present.



Parallel soft foot

One or more feet are too short or too long. This usually results in the machine rocking on the longer feet. This is corrected by shimming the shorter feet.



Angular soft foot

The base of the foot is at an angle to its foundation and they are only partly in contact. In this case, suspect foot is checked with a feeler gauge and corrected by building a custom 'shim wedge' or machining the underside of the foot

5.5.1 Checking and correcting soft foot conditions

The three main types are parallel soft foot, angular soft foot, and induced soft foot. There are instances where the soft foot is a combination of two or more types. Checking for soft foot is part of machine and job preparation.

The machine(s) to be measured should be treated first as normal four-foot machines. A machine with 6 or more feet is set up and measured like a four-footed machine (provided it is a compact rigid frame), with all the middle feet left loose, and after soft foot is corrected at the four main supports, the rest are feeler gauged and shimmed according to the feeler gauge readings or dial indicator readings on the foot itself.



Note

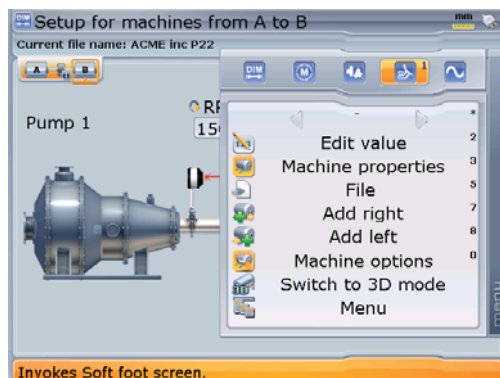
5.5.2 The measurement procedure

Soft foot may be measured from virtually any screen.



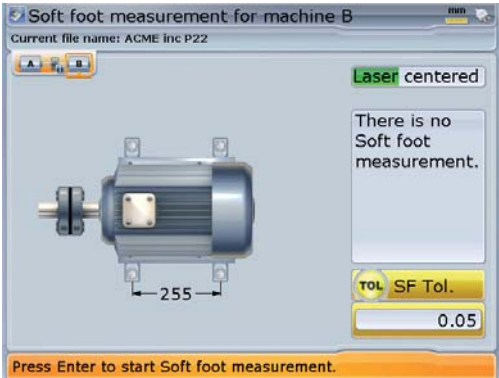
Note





1. Mount sensALIGN laser and the sensor in the normal way then carry out the laser beam adjustment (refer to section 4.10 – 'Laser beam adjustment').
2. With the lens aperture open, use the navigation keys to highlight machine whose feet are to be measured.
3. With the machine highlighted, press . The context menu appears. Use the navigation keys to highlight .

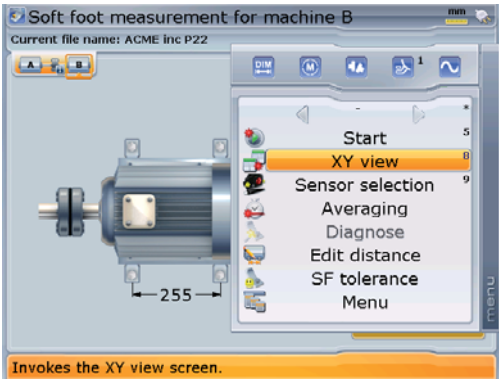


4. Press to confirm selection. If the laser is centered the following screen appears.

Soft foot

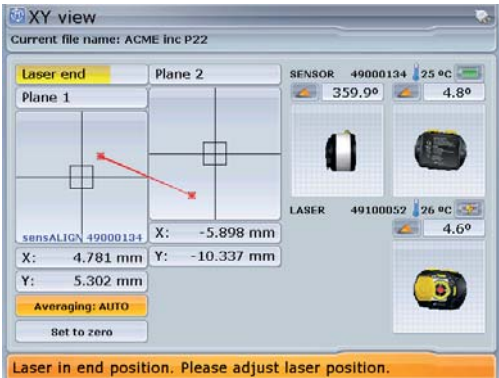


5. Press  to continue with soft foot measurement. If however, the laser beam is not centered, press . The context bar appears. Use / to highlight 'XY view'.



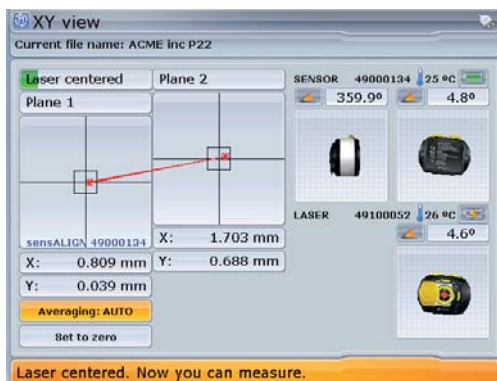
121 

6. Press  to access the XY view screen.



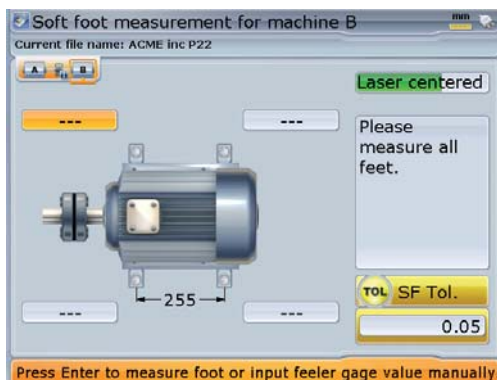
ROTALIGN Ultra iS Shaft handbook

- Use the position thumbwheels to center the laser beam. Use the top thumbwheel to move the beam up/down. The side thumbwheel is used to move the beam sideways.



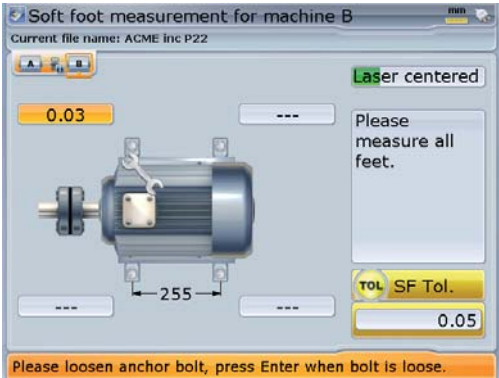
- After centering the laser beam, press to return to the soft foot screen. Press to proceed with measurement.

If machine dimensions have not been entered, pressing prompts the entering of the missing dimension.

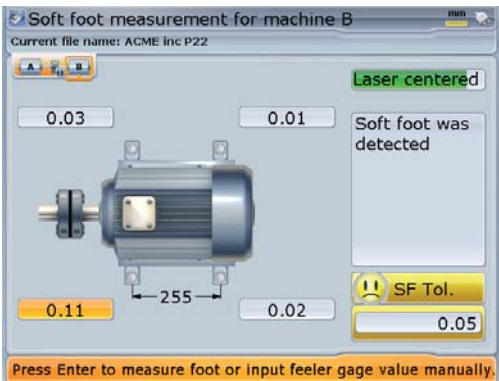
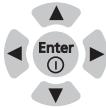


- With foot to be measured highlighted, press . A wrench symbol appears on the screen. Loosen the corresponding foot bolt. When the displayed value no longer rises, press . The wrench symbol disappears and the highlight springs to the next empty value box. Tighten the bolt.




Soft foot

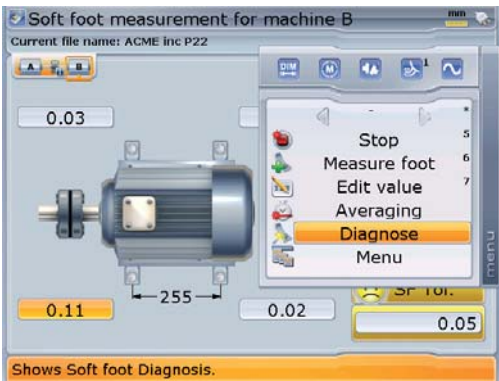



10. Repeat step 9 for each machine foot. You may use the navigation keys to highlight any foot to measure.

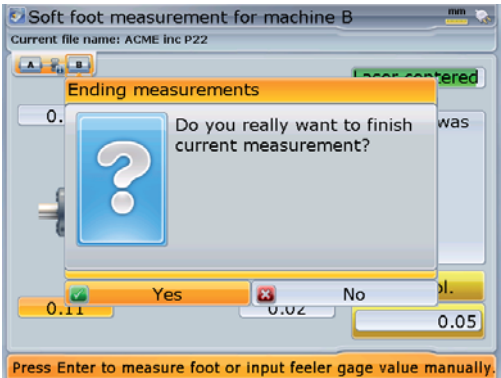





In this example, soft foot has been detected and must be eliminated before proceeding with the alignment of the machines.

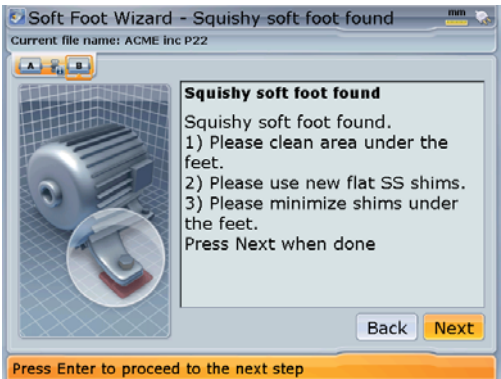
11. To correct soft foot, press . The context menu appears. Use / to highlight 'Diagnose'. ROTALIGN Ultra iS Shaft presents the user with concise instructions on how to eliminate the prevailing soft foot.



12. Press  to proceed. A hint appears requesting confirmation as to whether the soft foot measurement should be ended and diagnosis started.




13. Use / to highlight 'Yes' confirming selection by pressing , then proceed with diagnosis using the soft foot wizard.



The wizard screen indicates that squishy soft foot has been detected.

The wizard offers the relevant remedy instructions for each different soft foot situation.

Soft foot

14. Follow the wizard instructions by highlighting 'Next' using the navigation keys then pressing  until the diagnosis and correction is completed.



15. After correcting the soft foot, continue with alignment of the machines.

ROTALIGN Ultra iS Shaft handbook

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Chapter 6: ROTALIGN Ultra iS Shaft configuration

6.1 Configuration

From the “Program Manager” screen use the navigation keys to highlight the icon ‘Configuration’.



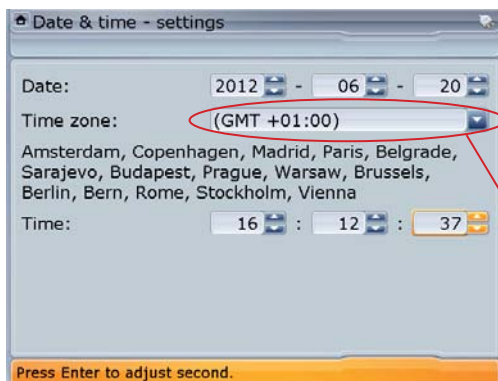
Press  to reveal the items used to configure the ROTALIGN Ultra iS computer.



The “Configuration” screen allows the following computer settings to be made:
‘Date and time’, ‘Language’, ‘Dimension and temperature units’, ‘System power management’, ‘Printer set-up’, ‘Display brightness’, ‘Word completion’ and ‘Customization’.

6.1.1 Setting date and time

Accessing this section allows you to set the current date and time, choose the proper time zone, and change the date and time presentation formats.

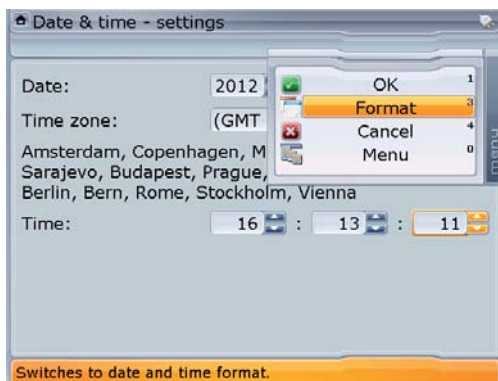


Use the navigation keys to select item to be changed.

To change digit values press **Enter** then use **Δ** to increase value or **▽** to decrease value.

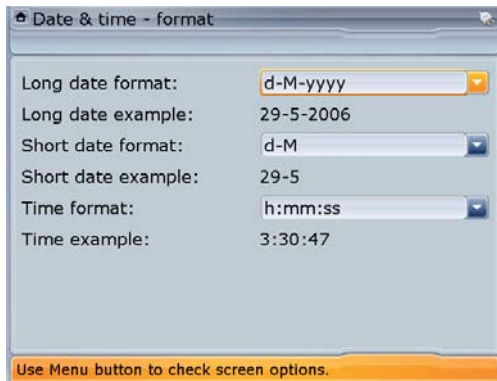
A drop down menu is available for the selection of time zones.






To change the presentation format, press **Menu**. The context menu appears.



Use **Δ**/**▽** to highlight 'Format' then press **Enter** to confirm selection. The "Date and time format" screen appears.

Configuration





Use the navigation keys to move from one drop down menu to the next. When a drop down menu box is highlighted, press  to display the available formats. Use  /  to highlight the desired format, confirming selection by pressing either  or .

6.1.2 Language selection

Accessing this section allows you to select preferred country language.

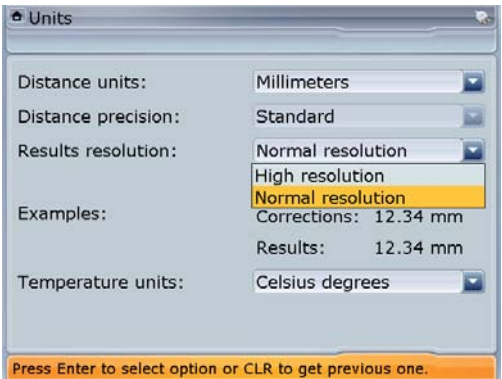


The green check mark indicates the currently set language.

Use  /  to highlight preferred language. Press  to confirm selection.

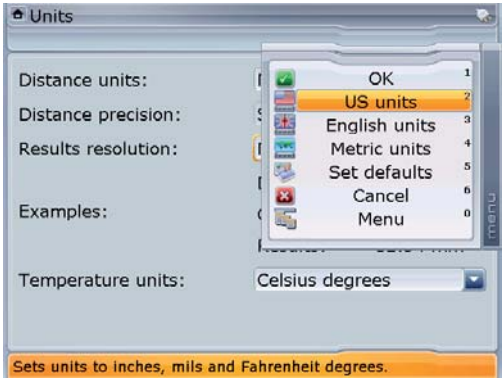
6.1.3 Setting units

Accessing this section allows you to change the dimensions and temperature units, as well as the resolution of physical quantities used in ROTALIGN Ultra iS. In this case, resolution is defined as the measurement precision in two or three decimal places



Use the navigation keys to move from one drop down menu to the next. When a drop down menu box is highlighted, press to display the available options. Use / to highlight the desired option, confirming selection by pressing either or .

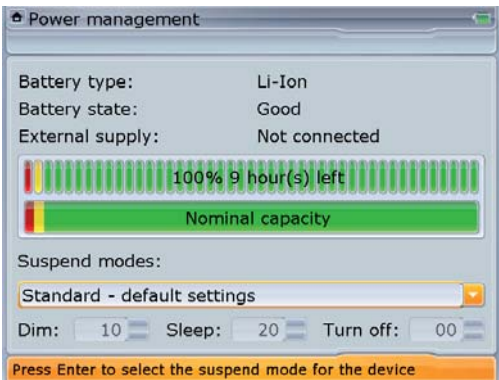
Different system units can be configured by pressing while in the unit screen. The context menu appears.








Use / to highlight the preferred system of units. Confirm selection by pressing .

6.1.4 Power management

This section displays the current battery status, allows you to control the power management features of shutdown, hibernate (sleep mode), and standby.

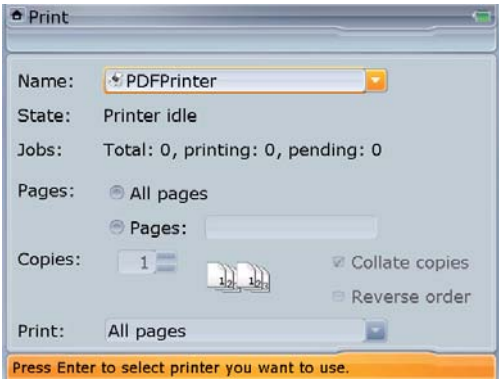








To set standby and hibernate modes, press  while in the "Power management " screen then use  /  to highlight required mode from the drop down menu that appears. Confirm selection by pressing  or .

In hibernate, power is cut off completely while in standby it is not cut off completely.



6.1.5 Printer set-up

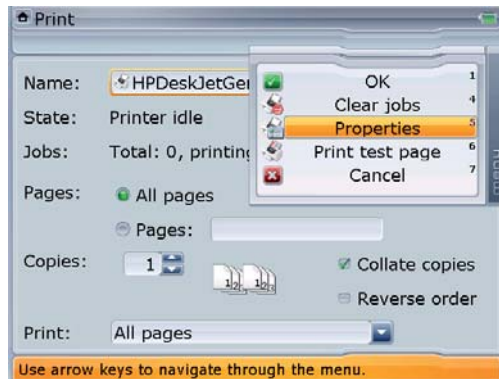
Accessing this section allows you to set-up printers and the printing configuration on ROTALIGN Ultra iS.



Select printer by pressing ,while in the "Print" screen then use  /  to highlight required printer from the drop down menu that appears. Selection is confirmed by pressing any one of these keys –  or  or .

The default printer is 'PDF printer'. Using this printer setting, measurenet files are saved as PDF directly to a memory stick (aka jump drive).

Use the navigation keys to scroll through the settings and print options. Press  to select or edit an option or setting. More printing options can be accessed by pressing  while in the print screen. The context menu appears.



Scroll the context menu using Δ / ∇ . Press Enter to confirm selection. 'Properties' context menu item is used to access the screen where page size and page orientation may be set. This menu item is not available if the selected printer is 'PDF printer'.

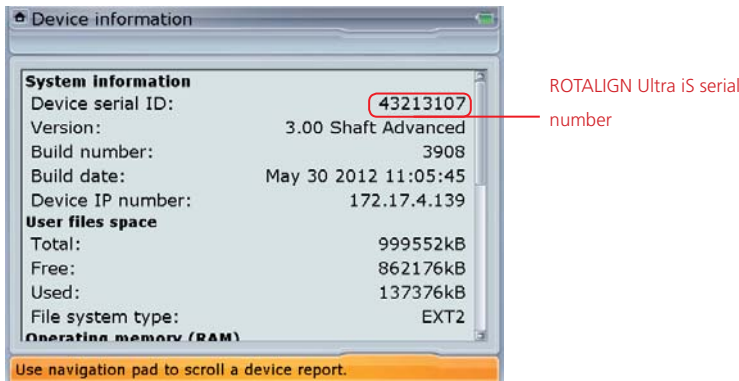
6.1.6 Device info

Accessing this section allows you to see the current file space and operating memory statistics, the CPU data, the ROTALIGN Ultra iS serial number, and information about the core software used in the device.

'Device information' is accessed via either the 'Application information' icon or the 'Application options' icon within the "Configuration" screen. When the "About Program Manager" screen or the "Applications options" screen appears, press Menu . A context menu with the item 'Device information' appears.

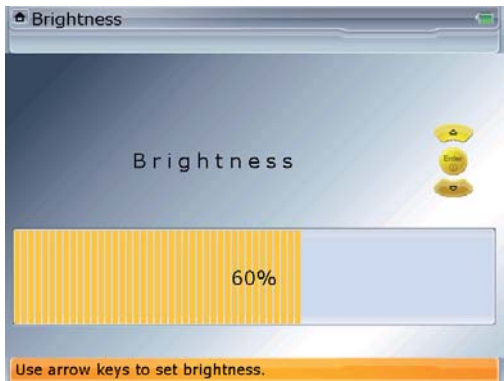


Use Δ / ∇ to highlight 'Device information'. Press Enter to confirm selection and display device information.




6.1.7 Display brightness

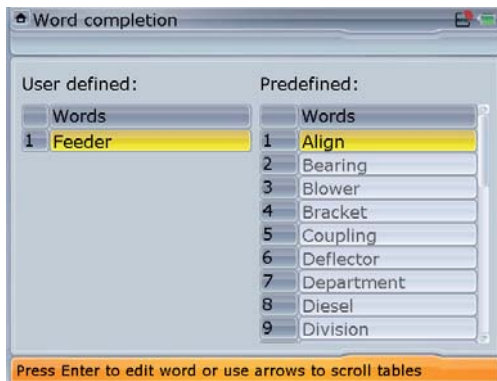
Accessing this section allows you to change the brightness of the display screen.




The display brightness is adjusted using  (increases) or  (decreases).

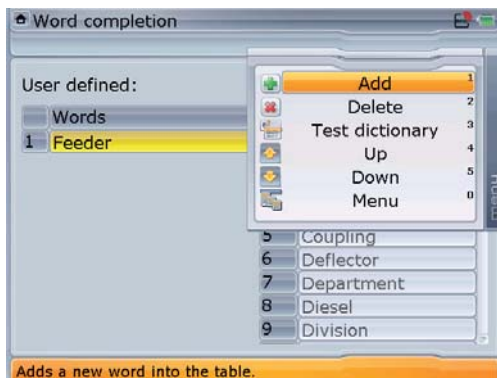
6.1.8 Word completion




The word completion mechanism helps save keystrokes and time while typing. It also helps you to make sure that the misspelling of words is avoided. When a user begins the entry of a word already listed in the system dictionary, the word is completed automatically, and may be adopted by pressing .






The 'Word completion' screen displays choice of words available for the automatic completion mechanism.

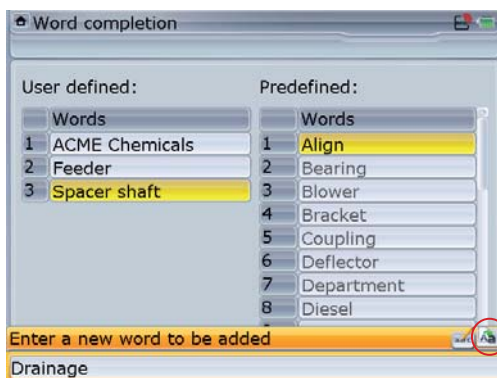
To add, delete or test the completion mechanism, press . The context menu appears.






Use  /  to highlight action required from the context menu confirming selection by pressing .



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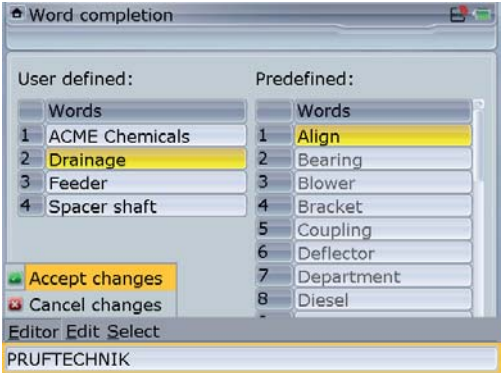
New additions are made on the 'User defined' column only. To do this, use  /  to highlight 'Add'. Press  to confirm selection. Use the data entry keys to enter the new word in the dialog box that appears.







When entering user defined words that contain both upper and lower case characters, as well as numerals, use  to cycle through the three options. Press and hold down  while observing the status indicator at the top right corner of the dialog box. This displays the character to be entered.

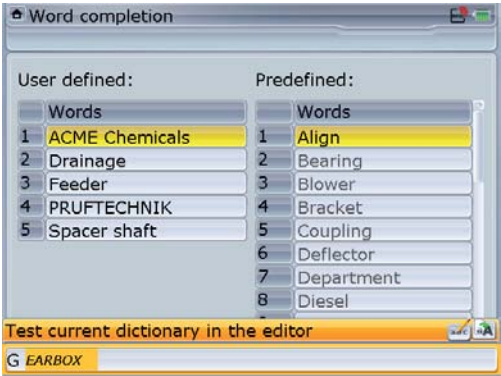
When entering letters,  is used to enter a blank space.

The new word is adopted within the user defined column by pressing either /  or using the context menu item 'Accept changes'.



An additional editing facility is achieved using the dialog box menu bar items. The bar appears by pressing  when the dialog box is open. The menu bar is navigated using the navigation keys.

To test if a word is available in the dictionary, use /  to highlight the context menu item 'Test dictionary'. Press  to confirm selection. Use the data entry keys to enter the first letter of the word required. The word high up in alphabetical order will appear in the dialog box. Test further by entering the second letter. If necessary enter the third and fourth letters to confirm whether the word is available in the dictionary.




In this example, the letter 'G' has been entered first revealing that the word 'Gearbox' exists in the dictionary. If looking up the word 'Generator', we would be required to enter the first three letters ('gen') for results.

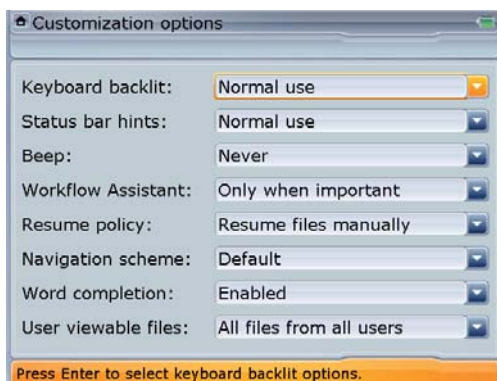
Addition and deletion of words is possible only with user defined words. Predefined words are not available for editing.








Note

6.1.9 Customization

Customization makes it possible to change the device settings such that the information displayed is suited to individual needs. These settings are carried out in the "Customization options" screen which is accessed by pressing  with the 'Customization' icon highlighted.



Select item to be customized by highlighting the respective item box using the navigation keys. Press  and use  /  to select desired setting from the drop down menu that appears. Confirm setting by pressing  /  or any of the navigation keys.

Options available include:

Keyboard backlit

Two options are available – backlit is set either 'Off' or in 'Normal use'

Status bar hints

Four options are available – 'Normal use', 'Never in menu', 'Only in menu' and 'Never'

Beep

The internal beeper can emit sound signals when specific tasks take place. The drop down menu reveals the following options:

'Never' – beeper is permanently off

'System events only' – the sound signal is emitted only when a system event occurs

'Every key stroke' – the sound signal is emitted when a system event occurs and each time a button is pressed

Workflow assistant

This option is used to provide hints to the user on how to proceed with using the system. Options available include – 'Never', 'Always', and 'Only when important'

Resume policy

This option is useful for the resume functionality of ROTALIGN Ultra iS. The drop down menu reveals the following items:

'Resume files manually' – a new job is started by loading a default template

'Always resume last file' – the most recent job resumes automatically

Navigation scheme

There are two navigation options – 'Default' and 'Editing moves focus'

This customization option is very important in that it determines how a user navigates through the system. It would be advisable to try out the different options to establish which option suits you best. In this operating instruction we will try to stay with the option 'Editing moves focus'.



Note

Word completion

Two options are available – 'Enabled' or 'Disenbled'

User viewable files


Two options are available – 'Only user files and templates' or 'All files from all users'

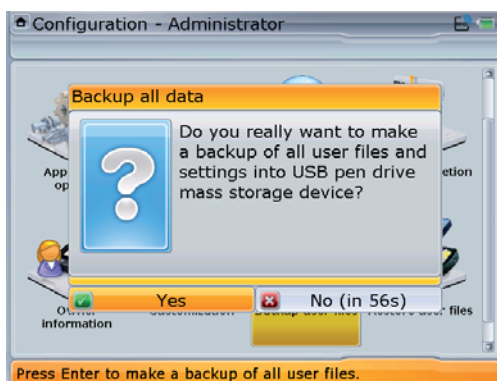
6.1.10 Measurement file backup




As an extra data storage capability, ROTALIGN Ultra iS Shaft measurement files may be saved and stored on memory devices such as memory sticks (aka jump drives) or on PCs.

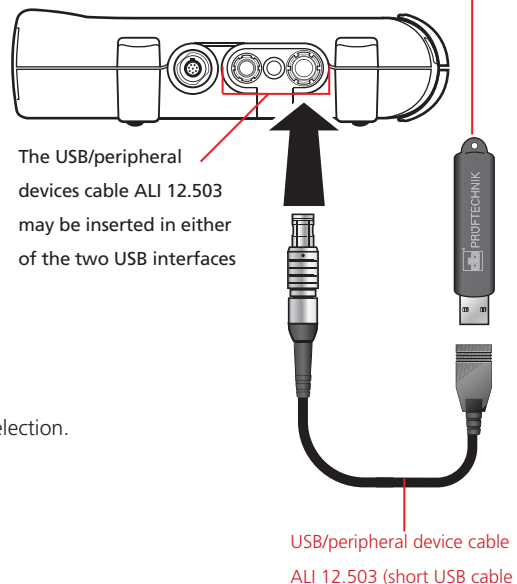
The configuration item 'Backup user files' is used to create a backup file of all measurement files on any particular ROTALIGN Ultra iS computer.


Attach an approved memory stick to the USB/peripheral devices cable ALI 12.503 (short USB cable) then connect the USB cable to the ROTALIGN Ultra iS computer USB port (refer to figure below).

Highlight 'Backup user files' icon then confirm selection by pressing . The following hint appears.



Use   to highlight 'Yes' then press  to confirm selection.




After backup completion, the following hint appears. Press  to confirm. You may now transfer the backup file to another storage device such as a PC.



The backup file is stored in the ULTRA directory.

6.1.11 Restoring user files

Measurement files saved and stored as backup may be restored to the ROTALIGN Ultra iS computer using the facility 'Restore user files'.

Attach the memory stick containing the backup file to the short USB cable ALI 12.503 then connect the USB cable to the ROTALIGN Ultra iS computer as described in the previous section 6.1.10. Select the "Configuration" screen icon 'Restore user file' then press  to confirm selection. A hint to give the user the opportunity to ascertain whether the backup restoration should proceed appears on the screen.



Use / to highlight 'Yes' then press  to confirm selection. A further hint appears on the screen

Restoring files



This final hint is to ensure that restoration of the backup file is carried out on the original ROTALIGN Ultra iS computer where the backup was made.

DO NOT restore backup files to a different computer other than the one which the backup file was created from.



Note

Use   to highlight 'Yes' then press  to confirm selection and transfer the backup file into the ROTALIGN Ultra iS computer.



The backup file is the ULTRA directory has been restored to the ROTALIGN Ultra iS computer..

6.2 Creating templates

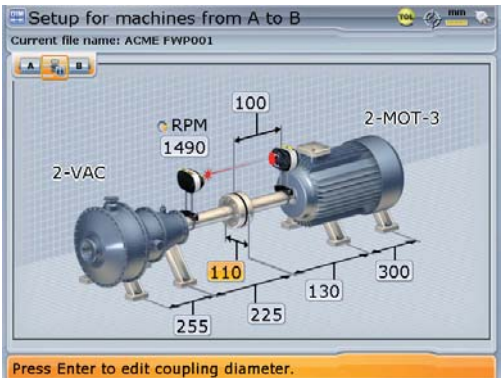
A template is a file that serves as a pattern for alignment set-ups that are repeated frequently. Their main purpose is to save you time by not having to configure the same set-up many times. As such, it can contain all known dimensions, target specifications, thermal growth values, preferred measure mode, preferred machine icons and coupling types.


Any readings already taken and present in the measurement table will be flushed. Readings should only be saved in active job files and cannot be saved with a template.

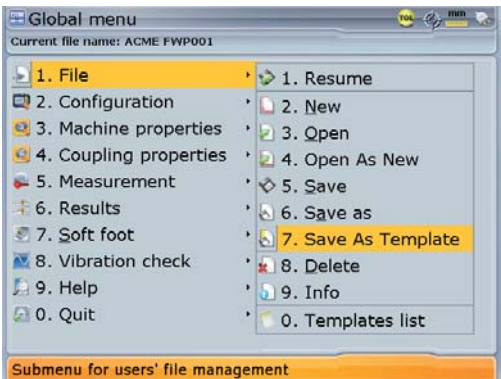


Note

Start Shaft Alignment application and define template.

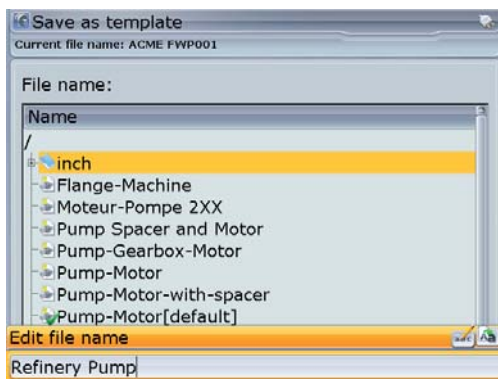


Press  twice to open the global menu.

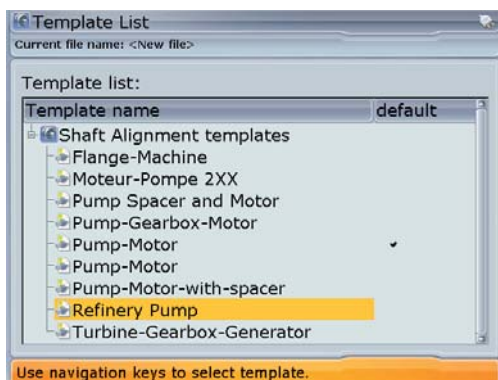


Creating templates


Use the navigation keys to highlight 'File' / 'Save as template'. Confirm selection by pressing **Enter**. The "Save as template" window appears. Press **Enter** to edit the name of the template in the editing box that opens.

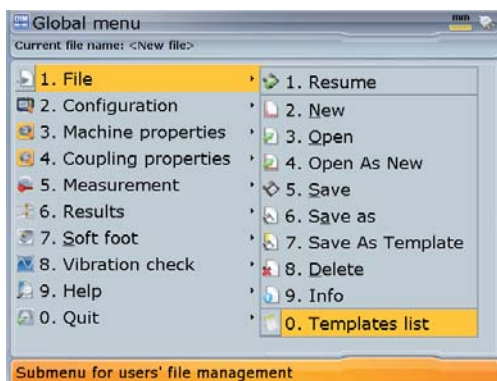






Press **Enter** to confirm template name and save template. The new template will now appear on the templates list. It is accessed via the global menu item 'Templates list'. Highlighting 'Templates list' from the global menu, then pressing **Enter** to confirm selection reveals the templates list.

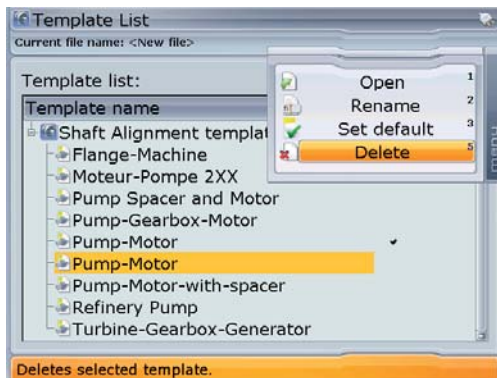


6.3 Deleting created templates from the program manager




Press  twice to open the global menu while in the Shaft Alignment application.






Confirm selection by pressing . The "Template list" screen opens. Use / to highlight the template to be deleted, then press  to open the screen context menu.



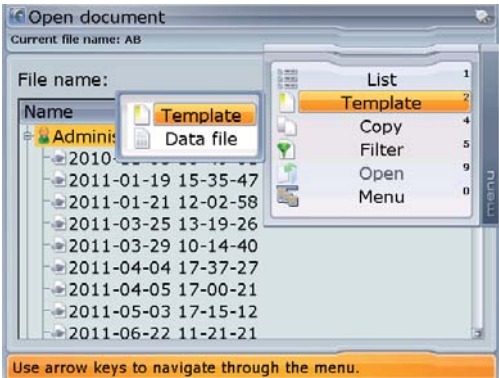
If you select a template and set it as the 'default' template, a working file based on this template will be started every time you launch the Shaft Alignment application. If you do not designate a default template, a working file based on the factory default template will launch instead.

With the context menu displayed, use / to highlight the item 'Delete'. Confirm by pressing .

A message pops up requesting confirmation if the file should actually be deleted. Use / to highlight 'Yes' and confirm selection by pressing . The template is deleted from the templates list.

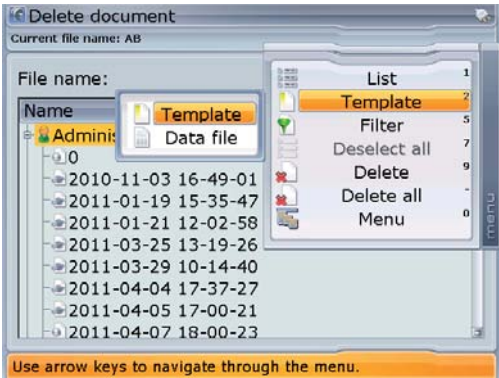
Deleting templates

Alternatively, templates may be opened via the global menu items 'File'->'Open', followed by the "Open document" screen context menu items 'Template'/'Template'.

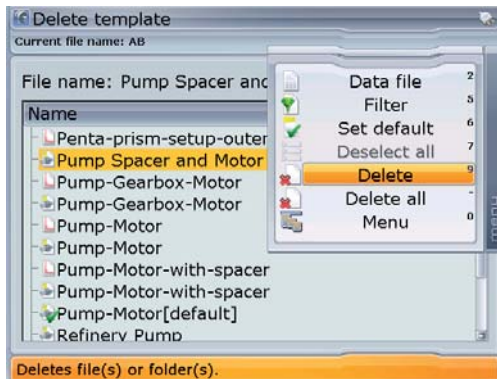








The templates list is revealed when selection is confirmed by pressing . Use / to highlight the template to be opened. You may open the template by pressing . The template could also be opened via the "Template list" screen context menu item 'Open'.

As an alternative, templates may also be deleted via the global menu items 'File'->'Delete', followed by the "Delete document" screen context menu items 'Template'/'Template'.



Confirm selection by pressing . The "Delete template" screen opens with a complete list of all available templates. Use / to highlight the template to be deleted, then press to open the screen context menu.



With the context menu displayed, use  /  to highlight the item 'Delete'. Confirm by pressing . A message pops up requesting confirmation if the file should actually be deleted. Use  /  to highlight 'Yes' and confirm selection by pressing . The template is deleted from the templates list.

6.4 Available applications and options

The following applications and options can be selected via the program manager start screen.

- i) Resume – Depending on the set customization option, the resume option loads a default template or the most recent job.
- ii) Shaft Alignment – used to position the centerlines of rotation of two (or more) machinery shafts in line with each other.
- iii) Straightness – used to measure straightness.
- iv) Flatness – used to determine levelness and flatness of surfaces.
- v) Bore Alignment – used for bore and turbine alignment.
- vi) Live Trend – used to monitor machine positional change and measure machine vibration
- vii) Vibration Acceptance Check – used to measure and evaluate the vibration level according to machine classification threshold
- viii) Hydropower – measure the alignment condition of a hydro turbines
- vi) Right angle check – used to measure perpendicularity.
- vii) Tolerance editor – used to define individual alignment tolerance levels in terms of any desired coupling alignment parameters such as offset and angularity.
- viii) Soft foot – starts the soft foot wizard [the wizard is available in Advanced Shaft only] which assists in correcting soft foot.
- ix) Templates – used to select a specified template for a new measurement job.

- x) Device configuration – used to configure the ROTALIGN Ultra computer settings.
When this option is selected, the following computer settings can be configured: date and time, language, units, power management, printer set-up, device info, display, owner info and users' list. The option is also used to open the licence manager, start the word completion function, customization, change users, backup and restore files.
- xi) Turn off – is used to turn ROTALIGN Ultra off.

Certain applications must be purchased and licenced. Applications and options that have not been licenced will appear in program manager grayed out.

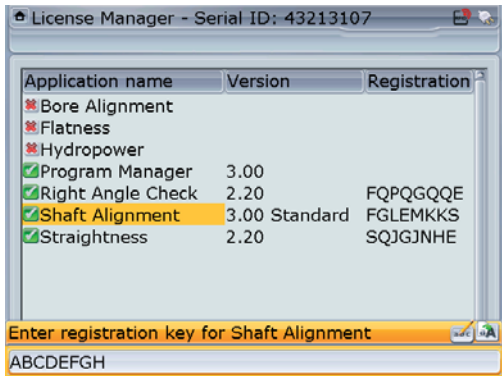


Note

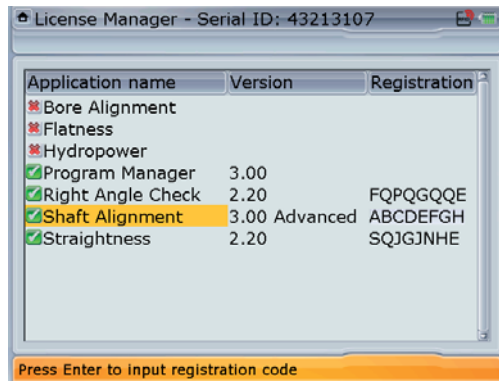
6.5 Upgrading from Standard Shaft to Advanced Shaft version

To benefit from all the ROTALIGN Ultra iS intelligent features, which are available only in Advanced Shaft, it is necessary to upgrade from ROTALIGN Ultra iS Standard to Advanced version. For this upgrade, only the Advanced Shaft firmware registration certificate ALI 4.741 needs to be purchased. Use the licence manager and the licence code supplied on the registration certificate to activate the ROTALIGN Ultra iS Advanced Shaft firmware.

After starting the licence manager, use / to highlight the application 'Shaft Alignment'. Press and use the data entry keys to enter the licence code in the editing box.



Confirm entry by pressing either or .



The suffix 'Advanced' appears next to the version number indicating successful registration.

On successful registration, following features in addition to the standard features of ROTALIGN Ultra iS Standard will be available:

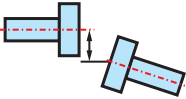




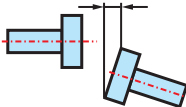
- ▶ Live simultaneous Move in both horizontal and vertical directions
- ▶ Soft foot diagnosis using the wizard
- ▶ Alignment of trains with up to 14 machines
- ▶ Measurement in Pass mode
- ▶ Standard Deviation
- ▶ Editable ellipse
- ▶ Thermal growth calculator
- ▶ Under- and over-constrained feet
- ▶ File and machine templates
- ▶ Vector tolerances
- ▶ History table





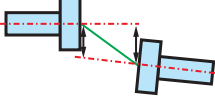
Also included are the following ROTALIGN Ultra iS intelligent features:

- ▶ Ellipse calculation from thousands of real measurement points
- ▶ Monitoring rotation angle speed
- ▶ Monitoring environmental vibration
- ▶ Live quality filter
- ▶ Monitoring and suppressing coupling backlash
- ▶ Determining live measurement quality
- ▶ sensALIGN™ on-board intelligence

Appendix

Suggested shaft alignment tolerances

	[RPM]	metric [mm]		imperial [mils]	
Soft foot	any	0.06		2.0	
Short "flexible" couplings Offset 		Acceptable 	Excellent 	Acceptable 	Excellent 
	600			9.0	5.0
	750	0.19	0.09		
	1500	0.09	0.06		
	1800			3.0	2.0
	3000	0.06	0.03		
	3600			1.5	1.0
	6000	0.03	0.02		
	7200			1.0	0.5
Angularity (coupling gap difference per 100 mm or 10" diameter) 	600			15.0	10.0
	750	0.13	0.09		
	1500	0.07	0.05		
	1800			5.0	3.0
	3000	0.04	0.03		
	3600			3.0	2.0
	6000	0.03	0.02		
	7200			2.0	1.0
[continued]					

	[RPM]	metric [mm]		imperial [mils]	
		Acceptable	Excellent	Acceptable	Excellent
					
Spacer shafts and membrane (disk) couplings Offset (per 100 mm spacer length or per inch of spacer length) 	600			3.0	1.8
	750	0.25	0.15		
	1500	0.12	0.07		
	1800			1.0	0.6
	3000	0.07	0.04		
	3600			0.5	0.3
	6000	0.03	0.02		
	7200			0.3	0.2

ROTALIGN Ultra iS technical data

ROTALIGN Ultra iS computer

CPU	Intel XScale® Processor 520 MHz
Memory	64 MB RAM, 64 MB Internal Flash, 1024 MB Compact Flash Memory
Display	Type: Transmissive (sunlight-readable) backlit TFT colour graphic display Resolution: Full VGA, 640 x 480 Pixel Dimensions: 5.7 inch (145 mm) diagonal Keyboard elements: Navigation cursor cross with up, clear and menu keys; Alphanumeric keyboard with dimensions, measure and results hard keys
LED indicators	4 LEDs for laser status and alignment condition 2 LEDs for wireless communication and battery status
Power supply	Operating time: 25 hours (using Li-Ion rechargeable battery) 12 hours (using disposable batteries) typical use (based upon an operating cycle of 25% measurement, 25% computation and 50% 'sleep' mode) Disposable batteries: 6 x 1.5 V IEC LR14 ("C") [optional] Lithium-Ion rechargeable battery: 7.2 V / 6.0 Ah
External interface	2 x USB host for printer, keyboard, USB stick 1 x USB slave for PC communication RS-232 (serial) for sensor RS-485 (serial) for sensor I-Data socket for sensor Ethernet Integrated wireless communication, class 1, transmitting power 100 mW AC adapter/charger socket
Environmental protection	IP 65 (dustproof and water jets resistant), shockproof Relative humidity 10% to 90%
Temperature range	Operation: 0°C to 45°C [32°F to 113°F] Storage: -20°C to 60°C [-4°F to 140°F]
Dimensions	Approx. 243 x 172 x 61 mm [9 9/16" x 6 3/4" x 2 3/8"]
Weight	1 kg / 2.2 lbs (without battery)
CE conformity	Refer to the attached CE compliance certificate attached in the appendix

sensALIGN sensor

CPU and memory	ARM Cortex™ M3 and 2GB Flash memory
Environmental protection	IP 65 (dustproof and water jets resistant), 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] Storage: -20°C to 60°C [-4°F to 140°F] Charging: 0°C to 40°C [32°F to 104°F]
Dimensions	Approx. 103 x 84 x 60 mm [4 1/32" 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 to 30 mm/s
External interface	Integrated Bluetooth™ Class 1 wireless communication, RS232, RS485, I-Data
LED indicators	4 LEDs for laser adjustment, 2 LEDs for Bluetooth™ communication and battery status
Power supply	Lithium Polymer rechargeable battery 3.7 V / 1.6 Ah 6 Wh
Operating time	12 hours continuous use

ROTALIGN Ultra iS Shaft handbook

sensALIGN laser

Type	InGaAlP semiconductor laser
Beam divergence	0.3 mrad
Environmental protection	IP 65 (dustproof and water jets resistant), shockproof Relative humidity 10% to 90%
Beam power	< 1mW
Wavelength (typical)	635 nm (red, highly visible)
Safety class and Precautions	Class 2 according to IEC 608251-1; DO NOT stare into laser beam
Temperature range	Operation: -10°C to 50°C [14°F to 122°F] Storage: -20°C to 60°C [-4°F to 140°F] Charging: 0°C to 40°C [32°F to 104°F]
Dimensions	Approx. 103 x 84 x 60 mm [4 1/32" x 3 5/16" x 2 3/8"]
Weight	Approx. 330 g [11.6 oz]
Inclinometer resolution	0.1°
Inclinometer error	± 0.25% full scale
LED indicators	2 LEDs for battery status and laser transmission
Power supply	Lithium Polymer rechargeable battery 3.7 V / 1.6 Ah 6 Wh External mains supply
Operating time	70 hours continuous use [Li-polymer battery]

Carrying case

Standard	ABS, drop tested (2 m / 6 1/2 ft.)
Dimensions	Case dimensions: approx. 565 x 375 x 193 mm [22 2/9" x 14 3/4" x 7 7/12"]
Weight	Including all standard parts: approx. 9 kg [19.8 lb]

sensALIGN sensor and laser 'ON/OFF/CHARGE' workflow

Action	sensALIGN laser status	sensALIGN sensor status
With both laser and sensor OFF, press the 'On/Off' push button briefly	Laser turns ON	Sensor turns ON and measurement is POSSIBLE
Either laser or sensor connected to ROTALIGN Ultra iS computer using the sensALIGN sensor and laser cable ALI 4.921-2 (applied when the sensALIGN rechargeable battery ALI 4.960 has a very low capacity or has been removed due to clearance area restrictions)	Laser turns ON	Sensor turns ON and measurement is POSSIBLE
Either laser or sensor connected to mains supply using sensALIGN charger/adapter ALI 4.651-I with rechargeable battery ALI 4.960 attached	Laser switches to 'charge' mode and may be turned on by pressing the 'On/Off' push button briefly	Sensor switches to 'charge' mode and measurement is NOT possible. Measurement may be reactivated by pressing the 'On/Off' push button briefly
Either laser or sensor connected to mains supply using sensALIGN charger/adapter ALI 4.651-I with rechargeable battery ALI 4.960 detached	Laser turns ON	Sensor turns ON and measurement is POSSIBLE
With both laser and sensor ON, press the 'On/Off' push button and hold down for a few seconds	Laser turns OFF	Sensor turns OFF

Declaration of conformity

CERTIFICATE

Declaration of conformity

We, **PRÜFTECHNIK Alignment Systems GmbH**
Address **Freisinger Str. 34
85737 Ismaning
Germany**



Quality management system
certified according to ISO 9001

declare of our own responsibility that the products

Product name **ROTALIGN Ultra Computer with accessories**
Product Order no. **ALI 4.202**
Accessories Order no. **ALI 3.600 Sensor
ALI 4.603 ROTALIGN Ultra rechargeable battery
ALI 3.610 Laser
ALI 4.621 Radio Modul
ALI 4.900 sensALIGN sensor
ALI 4.910 sensALIGN laser
ALI 4.960 sensALIGN rechargeable battery**

Configuration **Laser- optical system for shaft alignment**

comply with the standards, directives and regulations

- Directive 2004/108/EC
of the European parliament and the council of 15 December 2004 on the approximation of
the laws of the member states relating to electromagnetic compatibility
- Directive 2006/95/EC
of the European parliament and the council of 12 December 2006 on the harmonisation of
the laws of Member States relating to the electrical equipment designed for the use within
certain voltage limits
- Directive 1999/5/EC
of the European parliament and of the council Directive of 9 March 1999 on radio equipment
and telecommunications terminal equipment and the mutual recognition of their conformity
- DIN EN 61326-1; VDE 0843-20-1
Electrical equipment for measurement, control and laboratory use – EMC requirements –
Part 1: General requirements (IEC 61326-1:2005); German version EN 61326-1
- DIN EN 61326-2-2; VDE 0843-20-2-2
Electrical equipment for measurement, control and laboratory use - EMC requirements -
Part 2-2: Particular requirements - Test configurations, operational conditions and
performance criteria for portable test, measuring and monitoring equipment used in low-
voltage distribution systems (IEC 61326-2-2); German Version EN 61326-2-2

Ismaning,

17.7.2012

Michael Stolze
managing director



PRÜFTECHNIK

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