USER MANUAL Fixturlaser EXO

Fixturlaser

ACOEM Group

CONTENT

WELCOME TO OUR WORLD

Since the very beginning in 1984, ACOEM AB (formerly known as ELOS Fixturlaser AB) has helped industries throughout the world to achieve more profitable and sustainable production. We have reached where we are today by having the courage to think beyond the norm and follow slightly unconventional paths. We have had the courage to make mistakes and find new directions. Through our resolve, ambition and knowledge we have become a global player and a leader in innovative, user-friendly shaft alignment.

WARNING!

Read the safety instructions for Fixturlaser EXO before using the equipment.

SUSTAINABLE INNOVATIONS

During our almost 30 years in this industry, we have explored, tweaked and tested more than anyone. Some might say we are incurable innovators whereas others might say that we are highly focused. They both probably have a point. If we had not been devoted and ambitious, we would not have been the first in the industry to have a touch screen. Nor would we have been pioneers in the use of visible lasers and dual measurement heads.

Over the years, we have learnt to never compromise on quality and we are constantly in search of new, unexplored opportunities by combining advanced technology with design and function. By doing so, we have become the leading innovator in our industry. Not only do we minimize wear, production stoppages and costs, we also help save the environment. Natural resources are in short supply and if we can contribute to a more sustainable world by making it a little bit straighter, we couldn't be happier.

TRUE COMMITMENT

One reason for our success is our solid commitment. We have ensured that we remain attentive to constantly pick up on the needs of the market. Our expert employees and dedicated dealers in over 70 countries are undoubtedly our most important asset. Satisfaction and team spirit are of particular importance to us and are consistently at the top of our priority list. With experience from a wide range of industries and manufacturing processes, we are fully aware of the problems and needs of

our end-customers. We are passionate about what we do and we are driven by the desire to eliminate anything in the industry worldwide that may be even slightly out of line.

PURE USABILITY

Our design and user-friendliness are carefully interwoven. As we develop new products, they also become cleaner, smarter, more functional and more robust. An industrial environment is demanding, infinitely more difficult to work in and inevitably subject to time pressure. There is no place for equipment with unnecessary functions, complicated interfaces and that is difficult to assemble.

Usability and user friendliness mean everything, not only to us but also to our customers. We have designed products that are easy to learn and can be incorporated quickly. By removing non-essential functions, we make life less difficult for our users – and probably a little more difficult for our competitors.

END USER LICENSE AGREEMENT

The rights to use the software in this product are offered only on the conditions that you agree to all the terms stated below, i.e. the end user agreement. By using this product you agree to be bound by this agreement. If you do not accept this agreement your sole remedy is to return the entire unused product, hardware and software, promptly to your place of purchase for a refund.

The user is granted a single license to use the software contained in this product. Use is only permitted on the hardware it has been installed on at the time of purchase. The software may not be removed from the hardware.

The software contained in the system is the property of ACOEM AB, any copying or redistribution is strictly prohibited.

Modifying, disassembling, reverse engineering or decompiling the system or any part thereof is strictly prohibited.

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ACOEM AB (formerly known as Elos Fixturlaser AB) is since mid-2014 a fully owned subsidiary of ACOEM Group, headquartered in Lyon, France. Other brands within ACOEM Group are 01dB, ONEPROD and METRAVIB. For more information please visit www.acoemgroup.com

CARE

PACKING THE CASE

CLEANING

The system should be cleaned with a cotton cloth or a cotton bud moistened with a mild soap solution, except for the detector and laser window surfaces, which should be cleaned with alcohol.

For the best possible function, the laser diode apertures, detector surfaces and connector terminals should be kept free from grease or dirt.

Do not use paper tissue, which can scratch the detector surface.

Do not use acetone.

The chains on the V-brackets are delivered dry. If the system is used in highly corrosive environments, the chains should be oiled.

DATE OF CALIBRATION DISCREPANCY

Our instruments store the electronic date of the latest calibration of the instrument. Due to production processes and storage time, this date will differ from the date of the calibration certificate. Hence, it is the date of the calibration certificate which is important and that indicates when the next calibration is due.

APPS

The FIXTURLASER EXO can be provided with different apps for specific purposes.

Fixturlaser Shaft Alignment Horizontal

Fixturlaser Shaft Alignment Vertical

Download the apps from Google Play.

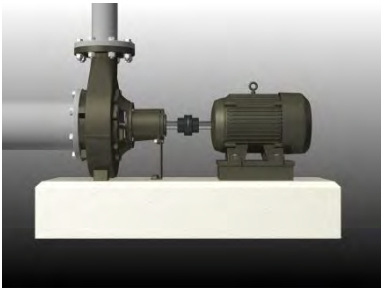
See also www.fixturlaser.com

The apps work with the measurement units FIXTURLASER S4 Ex and FIXTURLASER M4 Ex.

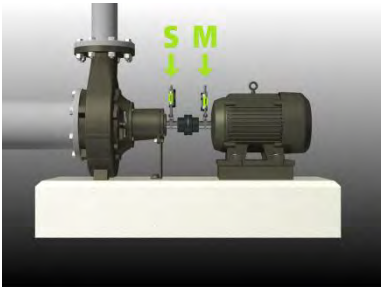
SHAFT ALIGNMENT HORIZONTAL MACHINES

INTRODUCTION

Shaft alignment: Determine and adjust the relative position of two machines that are connected, such as a motor and a pump, so that the rotational centers of the shafts are collinear, when the machines are working in a normal operating condition. Correction of horizontal shaft alignment is done by moving the front and the rear pair of one machine's feet, vertically and horizontally, until the shafts are aligned within the given tolerances. A tolerance table is available in the system.



The FIXTURLASER EXO system has two measuring units that are placed on each shaft by using the fixtures supplied with the system.



After rotating the shafts into different measuring positions the system calculates the relative distance between the two shafts in two planes. The distances between the two measuring planes, distance to the coupling and distances to the machine feet are entered into the system. The display box then shows the actual alignment condition together with the position of the feet.

Adjustment of the machine can be made directly, according to the displayed values.

The alignment results can be saved for further documentation purposes.

PRE-ALIGNMENT FUNCTIONS

In an effort to obtain the best possible conditions for shaft alignment, it is necessary to perform some pre-alignment checks. In many cases it is necessary to make these checks in order to obtain precise alignment. It is often impossible to reach the desired alignment results if you do not make any pre-alignment checks.

Before going on site, check the following:

- What are the required tolerances?
- Any offsets for dynamic movements?
- Are there any restrictions for mounting the measuring system?
- Is it possible to rotate the shafts?
- What shim size is needed?

Before setting up the alignment system on the machine, check the machine foundation, bolt and shim condition. Also check if there are any restrictions in adjusting the machine (if e.g. there is enough space to move the machine).

After the visual checks have been performed, there are some conditions that have to be considered:

- Check that the machine has the right temperature for alignment.
- Take away old rusty shims (check that you can remove shims).
- Check coupling assembly and loosen the coupling bolts.
- Check soft foot conditions.

- Mechanical looseness.
- Check coupling and shaft run-out.
- Pipe work strain.
- Coarse alignment.
- Check coupling gap (axial alignment).

STARTING

Turn on the sensors.

Turn on the tablet.

Start the Horizontal Shaft Alignment app.

MOUNTING

The sensor marked “M” should be mounted on the movable machine and the sensor marked “S” on the stationary machine. The sensors shall be assembled on their V-bracket and placed on each side of the coupling.

Hold the V-bracket upright and mount it on the shafts of the measurement object.

Lift the open end of the chain, tension it so that the slack is removed and attach it to the hook.

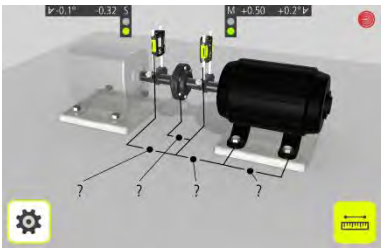
Firmly tighten the chain with the tensioning screw. Use the supplied tensioning tool. Do not over-tighten. If the shaft diameter is too large the chains can be extended with extension chains.

Adjust the height of the sensor by sliding it on the posts until a line of sight is obtained for both lasers. Secure its position by locking both clamping devices on the back of both units

DISTANCES AND TOLERANCES

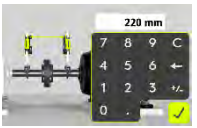
The screen displays the movable machine.

The traffic lights show green when the laser hits the detector.



Touch the distance icon.

Measure and enter distances

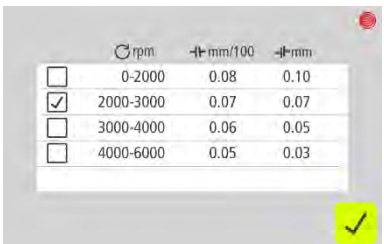


You must enter all the distances. The distance between the sensors, the distance between the centre of the coupling and the M-sensor, the distance between the M-sensor and the first pair of feet and the distance between the first and the second pairs of feet.

Enter tolerances

Alignment tolerances depend to a large extent on the rotation speed of the shafts. Machine alignment should be carried out within the manufacturer's tolerances.

The tolerances are the maximum allowed deviation from desired values.



Tolerance Table mm-mode

Tolerance Table inch-mode

Select the tolerance to use in the alignment by touching its check box to the left.

Confirm.

SOFTCHECK™

Go to Softcheck for checking soft foot conditions.

A soft foot condition needs to be corrected before any alignment takes place. If not, the measurement result will be of no value. It is more or less impossible to establish if there is a soft foot condition without using some kind of measurement tool. The FIXTURLASER Alignment System's built-in Softcheck program checks each foot and displays the result in mm or mils.

Place the sensors at the 12 o'clock position.

All the distances must be entered, before checking for soft foot.

Check that all foot bolts are firmly tightened.

Measurement value registration

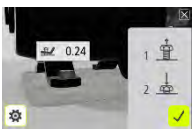
The program will guide you to the different feet.

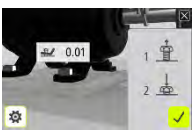
The first foot.

1. Loosen the bolt fully and wait a few seconds.
2. Tighten the bolt firmly, preferably with a dynamometric wrench.
3. Register the measurement value.

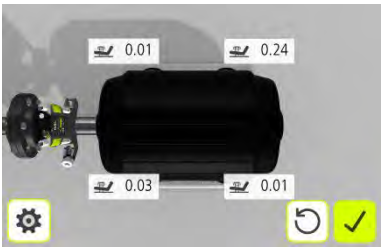
Register the measurement value by touching the confirmation icon.

Repeat the procedure at the rest of the feet.





Measurement result and Corrections



Make the necessary corrections and then check each foot again (the values show approximately how many shims that are needed to eliminate the soft foot).

Re-measurements can be done by touching the re-measure icon to re-measure all feet, or by touching a single foot to re-measure just that foot.

Re-measure all feet.

Re-measure a single foot.

TARGET VALUES

Go to Target Values for entering target values.

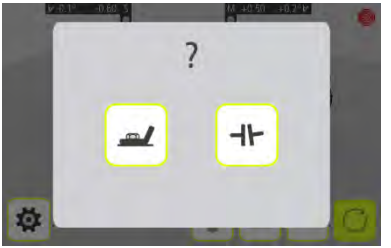
Introduction

Most machines develop a certain amount of heat while running. In the best case both the driving and the driven machine are affected equally requiring no input of compensation values. But in some applications the driven machine is either hotter, i.e. a pump for hot liquid, or cooler than the driving machine.

Machine manufacturers define the thermal expansion of machines differently, but in most cases you will find it as a factor of deliberate misalignment expressed in parallel offset and angular error.

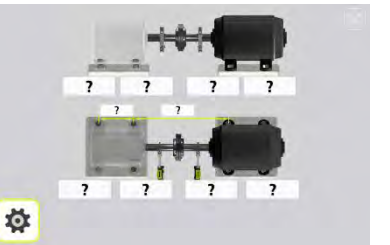
In the FIXTURLASER EXO system, you can pre-set target values before starting your alignment work. Accepted values are feet values and angle and offset values.

The entered values are target values. Target values mean that these are the values at which the machine should be positioned when not running (cold condition) in order to obtain correct alignment while the machine is running (hot condition).

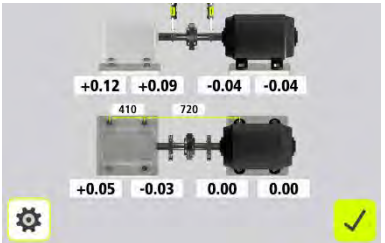


Select one of two ways to express the offset values: Feet values or angle and offset values.

Feet values

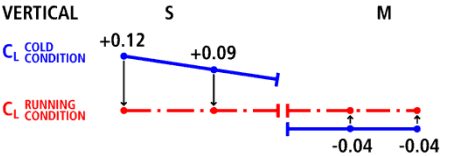


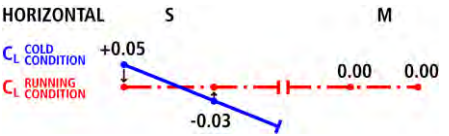
Touch the feet value boxes. Enter target values for the feet in mm or mils according to the pre-set measurement unit together with the required distances.



In the example above, the stationary machine will shrink vertically by 0.12 mm at the rear feet and 0.09 mm at front feet while the movable machine will expand 0.04 mm while running.

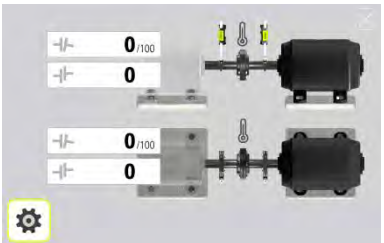
Horizontally, the rear feet will move 0.05 mm towards you and the front feet will move 0.03 mm away from you while the movable machine does not change its position while running.



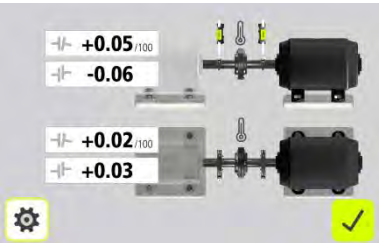


After having entered these feet values, the system calculates how the movable machine should be positioned (target position) in cold condition to obtain perfect alignment during running condition.

Angle and offset values

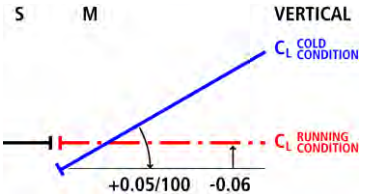


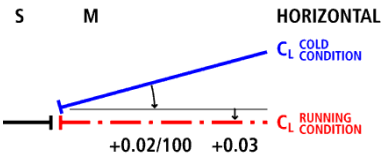
Touch the value boxes and enter target values for the angles in mm/100 mm and target values for the offsets in mm, or mils/inch and mils, according to the pre-set measurement unit.



In the example above, the movable machine should be vertically adjusted to a position with an angular misalignment of +0.05 mm/100 mm and an offset of -0.06 mm.

Horizontally, the movable machine should be positioned with a +0.02 mm/100 mm angular misalignment and a +0.03 mm offset, in cold condition to obtain perfect alignment while running.


S
M
VERTICAL
C_L COLD CONDITION
C_L RUNNING CONDITION
+0.05/100
-0.06


S
M
HORIZONTAL
C_L COLD CONDITION
C_L RUNNING CONDITION
+0.02/100
+0.03

MEASUREMENT METHOD

Tripoint™ method

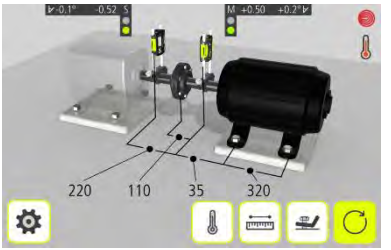
In the Tripoint method, the alignment condition can be calculated by taking three points while rotating the shaft at least 90°.

NOTE: The shafts should be coupled during measurement in order to achieve as reliable and accurate results as possible, when using the Tripoint method.

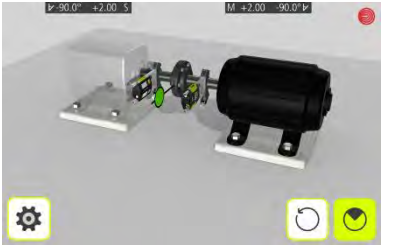
TIP: The larger the angle over which the three points are measured, the fewer moves and repeat measurements will have to be made. Minimum angle between readings is 45°.

Shadowed sensors suggests suitable measurement positions.

MEASUREMENT POINT REGISTRATION



Go to measurement.



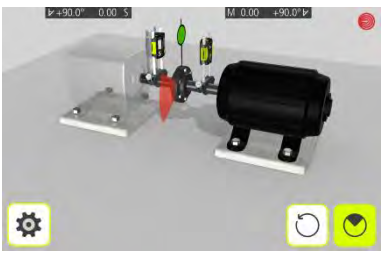
Set the sensors at approximately the same rotational angle at the first measurement position.

Touch the register icon.

This registers the first reading.

Rotate the shafts to the next position. The shafts must be rotated over a minimum of 45°.

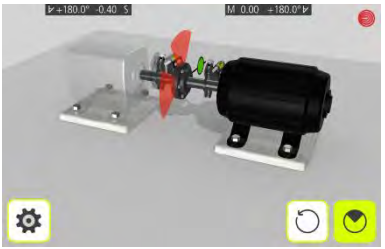
Red sector shows forbidden positions. The Register icon is not shown if the rotation is less than 45°.



Touch the register icon.

This registers the second reading.

Rotate the shafts to the third position.

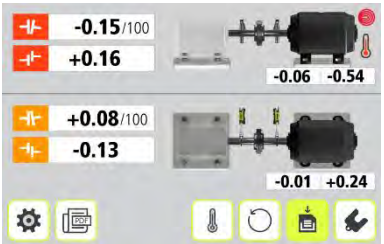


Touch the register icon.

This registers the third reading.

TIP: When registering the third reading at the 3 o'clock position, the sensors will already be in the right position for horizontal alignment.

MEASUREMENT RESULTS



The Measurement Result screen shows coupling values and foot values in both the vertical and horizontal direction.

The symbol to the left of the coupling values indicates the angular direction and offset, and also if the values are within tolerance.

Within tolerance (green).

Within double tolerance (yellow and inverted).

Out of double tolerance (red and inverted).

When a coupling is in tolerance in one direction, this is indicated with a check symbol at the motor.

EVALUATING AND SAVING THE RESULT

The angle and offset values are used to determine the alignment quality. These values are compared with the alignment tolerances to determine whether correction is necessary. If suitable tolerances are selected in the tolerance table, the symbols described above indicate if the angle and offset values are within tolerance or not.

The foot values indicate the movable machine's foot positions where corrections can be made.

Depending on the result, the program will also guide the user.

First, the program will always guide the user to save the measurement.

Touch the save icon to save the result.

(The measurement is saved in the app and can be handled further by generating a PDF report.)

Then, if the measurement result shows that the machine is misaligned, the user will be guided to go to shimming.

If the measurement result is within tolerance and has been saved, the user is recommended to exit the measurement.

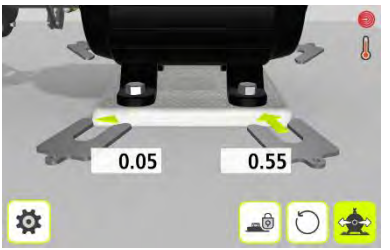
VERTIZONTAL™

Align faster with the VertiZontal Moves feature.

First correct the vertical misalignment in the shimming screen. The system shows how much you need to remove or add shims in order to correct the machine vertically.

Next correct the horizontal misalignment in the alignment screen. The system goes live and will deliver real time values during the adjustment phase.

SHIMMING



The Shimming screen shows foot values in the vertical direction as suitable shim values (0.05 mm / 1 mil).

The arrows show if shims must be added or removed to adjust the machine in the vertical direction.

The check signs show that shimming is not needed.

When shimming is completed, continue to alignment for adjustments in the horizontal direction.

Go to alignment.

ALIGNMENT

If the machine has been adjusted vertically in the shimming screen, go directly to alignment in the horizontal direction.

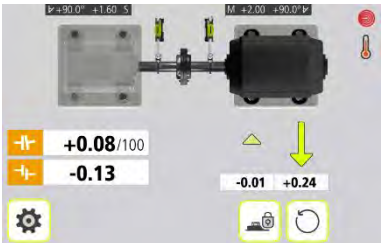
If the machine has not been adjusted in the shimming screen, alignment in the vertical direction has to be done first.

Vertical direction

Rotate the shafts to the 12 or 6 o'clock position to make adjustments in the vertical direction. The angle guide helps you to reach the right position.

Adjust the machine vertically until the values for both angular and parallel alignment are within tolerance. The arrows by the feet show in which direction the machine should be moved.

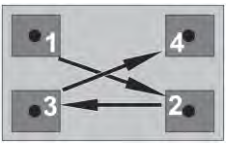
Horizontal direction



Rotate the shafts to the 3 or 9 o'clock position to make adjustments in the horizontal direction. The angle guide helps you to reach the right position.

Adjust the machine horizontally until the values for both angular and parallel alignment are within tolerance. The arrows by the feet show in which direction the machine should be moved.

Tighten the bolts using the tightening sequence, as below.



Check and re-measure

Rotate the shafts back to the 12 or 6 o'clock position and check that the machine is still within tolerance.

Alignment is now completed. To confirm the result, re-do the measurement.

Re-measure.

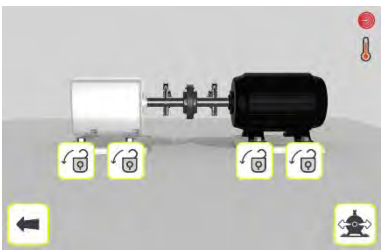
FEET LOCK FUNCTION

In some cases the machine that is displayed as the movable machine is not movable, or maybe some of the feet are not adjustable. In order to perform proper alignment in these cases, the Feet Lock function can be used. This function allows you to select which feet are locked and which feet are adjustable.

Feet Lock is available both in shimming and alignment.

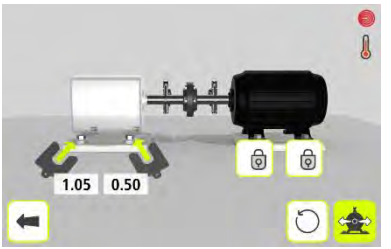
Touch the Feet Lock icon to enter the Feet Lock function.

Enter dimensions. The required distances are those between the first and second pairs of feet on the stationary machine and between the first pair of feet on the stationary machine and the first pair of feet on the movable machine.



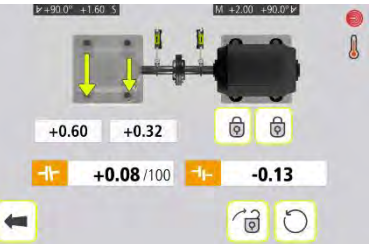
Select the two pairs of feet you want to lock.

Feet Lock Shimming



Shim values are shown for the two pairs of feet that are not locked.

Feet Lock Alignment



Live values are shown for the two pairs of feet that are not locked.

PDF REPORT

A PDF report with several measurements can be generated.

Touch the PDF icon to create a PDF report.

(The PDF icon is found in the result screen and/or the setting screen.)

Enter data

Touch the white field at the top to enter a header for the PDF report.

Touch the white fields to enter data.

Select files

Touch the check box to the left to select files.

Customized logo

Touch the logo up to the right to change it.

Generate and save the PDF report

Touch the save icon to generate and save the PDF report.

Enter a file name and confirm.

The PDF report will then be shown, for further handling.

OTHER FEATURES

Looseness indicator

The system has a function for detecting coupling backlash and looseness in order to achieve optimum accuracy. The system will display the looseness indicator if one of the following conditions is met:

- The M and S units are more than 3° apart.
- The mutual angular position changes more than 0.7° from that when the first measurement point was taken.

When the coupling backlash or looseness is eliminated to avoid any of the above conditions, the looseness indicator will automatically disappear.

Target Value symbol

When Target Values are used in the measurement, this is indicated with the Target Value symbol in the upper right corner of the screen.

SETTINGS

Measurement unit

Select mm mode or inch mode.

Bluetooth settings

When entering settings, the system starts searching for pair able sensors.

Only FIXTURLASER sensors, that are switched on, will be discovered.

Pair able sensors will appear in the list.

Touch the check box beside the sensors to pair. (Maximum two units.)

Paired units are marked with a check mark.

If there are units paired to the app, they must be unpaired before it is possible to pair new units.

To unpair units, touch the check mark icon beside the units.

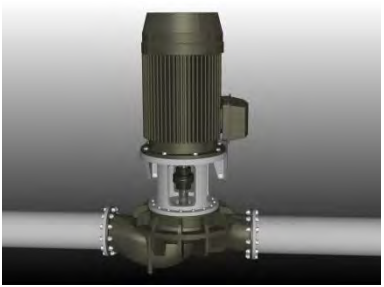
Confirm

Exits the Settings and returns to the application.

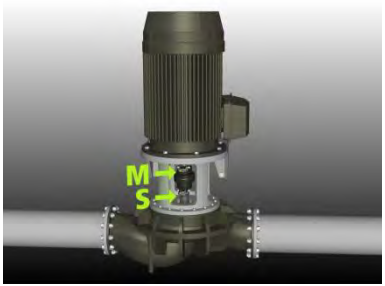
SHAFT ALIGNMENT VERTICAL MACHINES

INTRODUCTION

Shaft alignment: Determine and adjust the relative position of two machines that are connected, such as a motor and a pump, so that the rotational centers of the shafts are collinear, when the machines are working at a normal operating temperature. Correction of vertical shaft alignment is done by moving the flange of the machine until the shafts are aligned within given tolerances. A tolerance table is available in the system.



The FIXTURLASER system has two measuring units that are placed on each shaft by using the fixtures supplied with the system.



After rotating the shafts to different measuring positions, the system calculates the relative distance between the two shafts in two planes. The distances between the two measuring planes, distance to the coupling, number of bolts and pitch circle diameter are entered into the system. The display box then shows the actual alignment condition together with the position of the feet. Adjustment of the machine can be made according to the values displayed. The angular misalignment is corrected by placing shims under the bolts and offset is corrected by moving them laterally.

The alignment results can be saved for further documentation purposes.

PRE-ALIGNMENT FUNCTIONS

In an effort to obtain the best possible conditions for shaft alignment, it is necessary to perform some pre-alignment checks. In many cases it is necessary to make these checks in order to obtain precise alignment. It is often impossible to reach the desired alignment results if you do not make any pre-alignment checks.

Before going on site, check the following:

What are the required tolerances?

Any offsets for dynamic movements?

Are there any restrictions for mounting the measuring system?

Is it possible to rotate the shafts?

What shim size is needed?

Before setting up the alignment system on the machine, check the machine foundation, bolt and shim conditions. Also check if there are any restrictions in adjusting the machine (if e.g. there is enough space to move the machine).

After the visual checks have been performed, there are some conditions that have to be considered:

- Check that the machine has the right temperature for alignment?
- Take away old rusty shims (check that you can remove shims).
- Check coupling assembly and loosen the coupling bolts.
- Check soft foot conditions.

- Mechanical looseness.
- Check coupling and shaft run-out.
- Pipe work strain.
- Coarse alignment.
- Check coupling gap (axial alignment).

STARTING

Turn on the sensors.

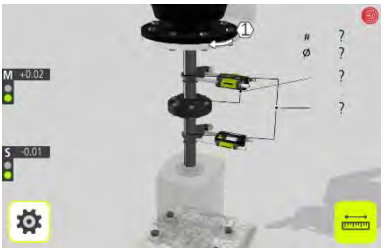
Turn on the tablet.

Start the Vertical Shaft Alignment app.

MOUNTING

The sensors are mounted as described in chapter “Shaft Alignment Horizontal Machines”.

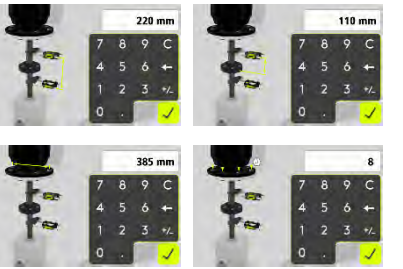
ENTER DISTANCES AND TOLERANCES



The screen displays the movable machine. The traffic lights show green when the laser hits the detector.

Touch the distance icon.

Measure and enter distances

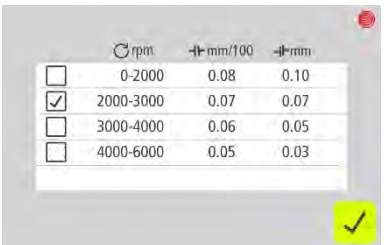


You must enter all the distances. The distance between the sensors, the distance between the centre of the coupling and the M-sensor, the pitch circle diameter and the number of bolts.

Enter tolerances

Alignment tolerances depend to a large extent on the rotation speed of the shafts. Machine alignment should be carried out within the manufacturer's tolerances.

The tolerances are the maximum allowed deviation from desired values.



Tolerance Table mm-mode

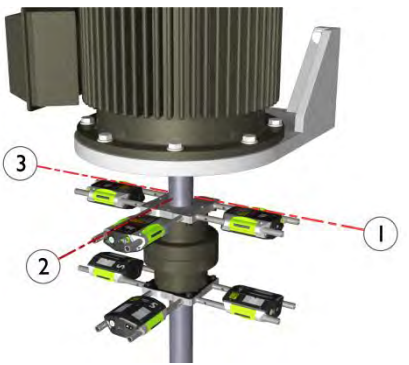
Tolerance Table inch-mode

Select the tolerance to use in the alignment by touching its check box to the left.

Confirm.

MEASUREMENT METHOD

In the Vertical Shaft Alignment program, machinery positions are calculated by taking three points with 180° of rotation.

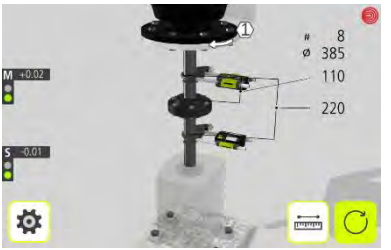


Place yourself at the position corresponding to the second measurement position, where it is easiest to turn the shafts through 180°.

The first measurement position has to be at bolt number 1.

Tip: Mark the positions 1, 2 and 3 before you start measuring.

MEASUREMENT POINT REGISTRATION



Go to measurement.

Set the sensors at approximately the same rotational angle at the first measurement position, with bolt number 1 to the right.

Touch the register icon.

This registers the first reading.

Rotate the shafts 90° to the second position (where you are standing).

Touch the register icon.

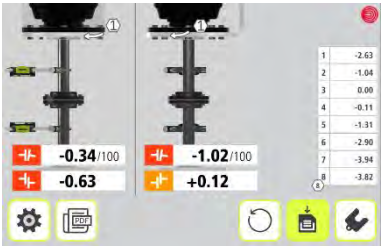
This registers the second reading.

Rotate the shafts 90° to the third position, to the left.

Touch the register icon.

This registers the third reading.

MEASUREMENT RESULTS



The Measurement Result screen shows coupling values in both directions, and bolt values.

The symbol to the left of the coupling values indicates the angular direction and offset, and also if the values are within tolerance.

Within tolerance (green).

Within double tolerance (yellow and inverted).

Out of double tolerance (red and inverted).

When a coupling is in tolerance in one direction, this is indicated with a check symbol at the motor.

EVALUATING AND SAVING THE RESULT

The angle and offset values are used to determine the alignment quality. These values are compared with the alignment tolerances to determine whether correction is necessary. If suitable tolerances are selected in the tolerance table, the symbols described above indicate if the angle and offset values are within tolerance or not.

The bolt values indicate the movable machine's bolt positions where corrections can be made.

Depending on the result, the program will also guide the user.

First, the program will always guide the user to save the measurement.

Touch the save icon to save the result.

(The measurement is saved in the app and can be handled further by generating a PDF report.)

Then, if the measurement result shows that the machine is misaligned, the user will be guided to go to shimming.

Go to shimming

If the measurement result is within tolerance and has been saved, the user is recommended to exit the measurement.

SHIMMING

The Shimming screen shows bolt values as suitable shim values (0.05 mm / 1 mil).

Adjust the angular error by placing shims under the bolts as required.

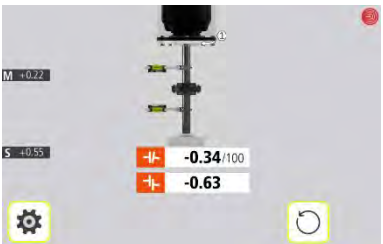
The arrow show if shims must be added to adjust the machine.

The check sign shows that shimming is not needed.

When shimming is completed, continue to alignment for adjustments of parallel offset.

Go to alignment.

ALIGNMENT



If the angular error has been correctly adjusted in the shimming screen the angular value should now be in tolerance.

Now adjust the parallel offset in both directions. The parallel offset is displayed live in the first direction when the sensors are placed in position number 1, and in the second direction when they are placed in position number 2.

Check that both the angular value and the parallel offset are within the required tolerances once the adjustments are completed.

Alignment is now complete. To confirm the result, re-do the measurement.

Re-measure.

PDF REPORT

A PDF report with several measurements can be generated.

Touch the PDF icon to create a PDF report.

(The PDF icon is found in the result screen and/or the setting screen.)

Enter data

Touch the white field at the top to enter a header for the PDF report.

Touch the white fields to enter data.

Select files

Touch the check box to the left to select files.

Customized Logo

Touch the logo up to the right to change it.

Generate and save the PDF report

Touch the save icon to generate and save the PDF report.

Enter a file name and confirm.

The PDF report will then be shown, for further handling.

SETTINGS

Measurement unit

Select mm mode or inch mode.

Bluetooth settings

When entering settings, the system starts searching for pair able sensors.

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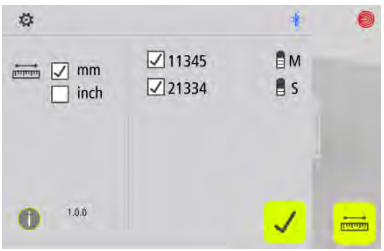

If there are units paired to the app, they must be unpaired before it is possible to pair new units.

To unpair units, touch the check mark icon beside the units.

Confirm

Exits the Settings and returns to the application.

SENSORS M4 EX AND S4 EX

1. ON/OFF button with status indication LED
    a. Continuously green – On
2. Mini USB for charging
3. Laser transmission indication LED
    a. Green – laser transmission
4. Bluetooth indication LED
    a. Continuously blue – paired and ready.
    b. Flashing blue – searching/ready to pair
    c. No light – Bluetooth disabled.

5. Battery status button – press to instantly show the battery status (also works when the unit is switched off).

6. Battery status LED
   a. One LED continuously red – less 10% charge left.
   b. One LED flashing red – less than 5% charge left.
   c. One LED continuously orange – charging
   d. One LED continuously green – fully charged.

7. Battery status LED when battery button is pressed
   a. Continuously green – battery status
   b. Rolling green – battery charging

OPERATING MODES

M4 Ex and S4 Ex units has two operating modes: On and Off.

Turn the units on and off by pressing the ON/OFF button firmly.

In case the units fail to respond, it is possible to turn it off by pressing down the ON button for more than 10 seconds.

CONNECTIONS

Bluetooth connection

The M4 Ex and S4 Ex units are connected by the built in Bluetooth connection. The units will automatically connect to the app when turned on as long as they are paired. See chapters about apps for instructions on how to pair measurement units.

To avoid accidental Bluetooth transmission in a restricted area the Bluetooth function can be completely disabled – contact your local sales representative for more information.

If the Bluetooth has been disabled (as indicated by the fact that the Bluetooth LED is not flashing or continuously blue when the unit is turned on) it can be enabled by

pressing the battery status button quickly 5 times in a row.

POWER SUPPLY

The M4 Ex and S4 Ex units are powered by a high-capacity rechargeable Li-Ion cell.

The operating time of the batteries is approximately 12 hours when the system is used for a typical alignment work (continuously on).

The M4 Ex and S4 Ex units are charged with the supplied charger.

The units must be turned off while being charged.

When the external power supply is connected, the unit will automatically start charging the batteries. This will be indicated by the first battery status LED turning orange, when the unit is fully charged the LED will turn green. By pressing the battery

status button the exact charging status can be monitored.

The charging time is approximately 5 hours for fully drained batteries.

When used in typical conditions the batteries will sustain good capacity for approximately 2-3 years before needing replacement. Contact your sales representative for battery re-placement.

The batteries contain safety circuitry to operate safely with the unit. The unit can therefore only be used with the Li-Ion batteries supplied by FIXTURLASER. Improper replacement of batteries can cause damage and risk for personal injury. Please refer to the chapter on safety for further instructions.

TECHNICAL SPECIFICATION – M4 EX AND S4 EX

Part. No. M4 Ex 1-1043, S4 Ex 1-1044

Housing Material	Anodized Aluminum frame and high impact PP plastic over molded with TPE rubber
Operating Temp	0 to 50°C (32 to 122°F)
Storage Temp	-20 to 70°C (-4 to 158°F)
Long term storage temp	Room temp. 18 to 28°C (64 to 82°F)
Battery Charging Temp	5 to 40°C (41 to 104°F)
Relative humidity	10 – 90%
Weight	M4 Ex: 220 g (7,8 oz) S4 Ex: 190 g (6,7 oz)
Dimensions	92 mm x 77 mm x 33 mm (3,6 in x 3,0 in x 1,3 in)
Environmental protection	IP65 (Dust tight and protected against water jets)
Laser	650 nm class II diode laser
Laser line fan angle	6°
Laser line width ($1/e^2$)	1.6 mm
Laser line divergence (full angle)	0.25 mrad
Laser power	< 1 mW
Measurement distance	Up to 5m

Detector	2nd gen. digital sensor
Detector length	30 mm (1,2 in)
Detector angular subtense	30 mrad/m (3mm/100mm per meter)
Detector resolution	1 µm
Measurement accuracy	0,3% ± 7 µm
Signal processing:	Digital signal processing with Sidespot rejection, edge detection, ambient light elimination and anti-vibration mode
Ambient light protection	Optical filtering and digital ambient light signal elimination
Inclinometer:	Dual High Performance MEMS inclinometers
Inclinometer resolution	0,01°
Inclinometer accuracy	±0,2°
Wireless communication	Class I Bluetooth transmitter
Communication range	10 m (33 ft)
Connectors	1 USB Mini port (IP67); Charging: 5V, 0,5A
Power supply	High performance Li Ion battery or external power.
Operating time:	12 hours continuous use (measuring)
Battery Charging time (system off, room temperature)	5 h

Battery Capacity	9.0 Wh
LED indicators	Unit state, laser transmission and 5 battery status indicators with instant battery check

Specifications are subject to change without notice.

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