USER MANUAL Fixturlaser EXO

Fixturlaser

ACOEM Group

EXO防爆对中仪操作说明书

CONTENT

WELCOME TO OUR WORLD 简介

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.

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.

Disclaimer of warranties: To the maximum extent permitted by applicable law, ACOEM AB and its suppliers provide the software contained in this product 'as is' and with all faults, and hereby disclaim all other warranties either expressed, implied or statutory.

Limited liability: No liability shall exceed the price of the product, and the sole remedy, if any, to any claim shall be a right of return and refund.

ACOEM AB or its suppliers shall, to the maximum extent permitted by applicable law, not be liable to any indirect, special, incidental, punitive, and consequential damages arising from the use of the system or any part thereof, authorized or unauthorized.

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

DECLARATION OF CONFORMITY 合格声明

In accordance with the EMC Directive 2004/108/EC, the Low Voltage Directive 2006/95/EC, including amendments by the CE-marking Directive 93/68/EEC & EC directives RoHS 2011/65/EU.

Type of equipment

Alignment System

Brand name or trade mark

FIXTURLASER

Type designation(s)/Model no(s)

1-0935 FIXTURLASER EXO D
1-0913 FIXTURLASER M4
1-0914 FIXTURLASER S4

Manufacturer's name, address, telephone & fax no

ACOEM AB
Box 7
SE-431 21 Mölndal
Sweden

Tel: +15015607091
Fax: +020 85262155

The following standards and/or technical specifications, which comply with good engineering practice in safety matters in force within the EEA, have been applied:

Standard/Test report/Technical construction file/Normative document

EN 61000-6-3:2007.

EN 61000-6-2:2005, EN 61000-4-2, -3, -4, -5, -6, -11.

EN 61010-1:2010

ISO9001:2008 Ref. No/ Issued by: DNV Certification AB Certification No. 2009-SKM-AQ-2704/2009-SKM-AE-1419.

The laser is classified in accordance with the International Standard IEC-60825-1:2014, USA FDA Standard 21 CFR, Ch 1, Part 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007.

The wireless device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions;
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Additional information

The product was CE-marked in 2014.

As manufacturer, we declare under our sole responsibility that the equipment follows the provisions of the Directives stated above.

Date and place of issue

Mölndal 2014-03-11

Signature of authorized person

Hans Svensson, Managing Director

SAFETY 安全

Retain and follow all product safety and operating instructions. Observe all warnings on the product and in the operating instructions.
请留意并遵循所有产品安全与操作指导。注意所有警示说明。

Failure to observe the safety pre-cautions and operating instructions can cause bodily injury, fire, and damage to the equipment.
忽略不循序安全警告语操作说明有可能导致受伤，火灾与仪器损坏。

Do not disassemble, modify or use the equipment in other ways than explained in the operating instructions. ACOEM AB will not accept any liability for such use.

请勿拆开，维修或用不当的方式使用设备。否则Fixturlaser.不承担相关责任。

WARNING! 警告

Do not mount equipment on running machines and take all appropriate measures to prevent unintentional start-up of machines. Make sure to fully comply with all appropriate shut down procedures, safety measures and regulations at worksite and local regulations regarding safety in a machine environment.
请勿在运转设备上安装仪器并防止设备意外开启。请确认完全遵循当地关机程序，安全操作规则。

LASER PRECAUTIONS 激光防护

FIXTURLASER uses laser diodes with a power output of < 1.0 mW. The laser classification is Class 2.
FIXTURLASER.使用二级半导体激光，输出功率小于1毫瓦

Class 2 is considered safe for its intended use with only minor precautions required.
These are: 二级激光要求：

- Never stare directly into the las 请勿直视激光发射器
- Never shine the laser directly into anyone else's eyes. 请勿将激光照射到他人眼睛

CAUTION!

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.
使用其它的控制装置有可能导致设备损坏或人身伤害

Your system complies with the requirements in:

- IEC-60825-1:2007
- British Standard BS EN 60825-1
- DIN EN 60825-1

USA FDA Standard 21 CFR, Ch 1, Part 1040.10 and 1040.11

POWER SUPPLY 电源

FIXTURLASER is powered by a high-capacity rechargeable Li-Ion battery mounted in the display unit or by the external power unit. 显示单元内置高能锂电池供电，也可以外部交流供电。

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Both the display unit and the measurement units (M4 and S4) can be connected to the charger and charged while lying in the case. It is important that the lid of the case is open during the charging or else the system will not be charged properly and might be damaged.

显示单元与激光探头可以在箱内同时充电，充电时请注意不要关闭箱盖，否则有可能损坏充电器.

Do not expose the power adapter to rain. or wet conditions.

电源适配器不要暴露于潮湿环境中

Always unplug the charger from the electrical outlet after charging.
充电之后及时从插座上拔掉充电器

Leaving a display unit or a measurement unit with an empty battery for a prolonged time can reduce the capacity of the battery or even damage the battery.

让主机或探头的电池长时间处于空电状态会降低电池容量甚至损坏电池

If the system is not used for a long time, charge the batteries to approximately 50-75% before storing the system, if kept in storage repeat this every 3-4 month (if needed)
如果仪器长时间不用的话，在存放之前请将仪器电池电量保持在50%-75%之间，并且每隔3-4个月重复一次.

When used in typical conditions the battery will sustain good capacity for approximately 2-3 years before needing replacement. Contact your sales representative for battery replacement.
通常情况下使用电池可以维持2-3年，如需更换电池请联系当地供应商。

The batteries contain safety circuitry to operate safely with the display unit. The unit can therefore only be used with the Li-Ion batteries supplied by FIXTURLASER.
电池包含安全电路以保证显示单元操作安全，请勿使用非Fixturlaser提供的锂电池。

Improper replacement of batteries can cause damage and risk for personal injury.
不正确的电池更换可能导致人身伤害

WARNING!

BATTERY REPLACEMENT SHALL ONLY BE PERFORMED BY AUTHORIZED FIXTURLASER REPRESENTATIVES.

电池更换必须由Fixturlaser授权经销商进行

USE OF ANY OTHER BATTERIES THAN THOSE SUPPLIED BY FIXTURLASER WILL CAUSE SEVERE DAMAGE TO THE DISPLAY UNIT AND CAN CAUSE RISK FOR PERSONAL INJURY!

使用非Fixturlaser提供的其他品牌电池有可能导致显示单元损坏并有可能引起人身伤害。

Handle any batteries with care. Batteries pose a burn hazard if handled improperly. Do not disassemble and keep away from heat sources. Handle damaged or leaking batteries with extreme care. Please keep in mind that batteries can harm the environment. Dispose of batteries in accordance with local regulatory guidelines, if in doubt contact your local sales representative.
小心操作电池，不正确的操作可能导致电池烧毁。请勿拆解电池，并请远离火源。

Only use the external power adapter supplied by FIXTURLASER for use with the Display Unit. Using other power adapters can cause damage to the unit and personal injury.
请勿使用其他品牌电源适配器充电。

WIRELESS TRANSCEIVER

The FIXTURLASER system is fitted with a Bluetooth wireless transceiver.
.系统内置蓝牙传输装置。

Make sure that there are no restrictions on the use of radio transceivers at the site of operation before using the wireless transceivers.
使用时请先确保当地关于无线电发射装置的限制规定

Please refer to the chapter "Global settings" on how to turn off the Bluetooth transmitters for use in restricted environments.
在显示使用区域，请参考 "全局设定" 章节关闭蓝牙传输。

WARNING!

Before using the wireless transceivers make sure that there are no restrictions on the use of radio transceivers at the site. Do not use on aircraft.
使用时请先确保当地关于无线电发射装置的限制规定。请勿在航空器上使用。

CLEANING 清洁

The system should be cleaned with a cotton cloth or a cotton bud moistened with a mild soap solution, with the exception of the detector and laser window surfaces, which should be cleaned with alcohol.
请使用湿棉布或棉签擦拭系统。激光接收器请使用酒精擦拭。

For the best possible function, the laser diode apertures, detector surfaces and connector terminals should be kept free from grease or dirt. The display unit should be kept clean and the screen surface protected from scratches.
请保持激光二极管缝隙，接收器表面，连接线清洁，无油污。显示单元应预防刮伤。

Do not use paper tissue, which can scratch the detector surface.
请勿使用抽纸，会导致接收器刮伤。

Do not use acetone. 请勿使用丙酮

The chains on the V-block fixtures are delivered dry. If the system is used in highly corrosive environments, the chains should be oiled.
新出厂的V.型夹具的链条是干燥的。如果在高腐蚀性环境中使用，应给链条上油。

DATE OF CALIBRATION DISCREPANCY 标定日期差异

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.
我们的仪器内记录有最新标定的日期。因为生产与仓储原因，此日期会与标定证书日期略有差异。请以标定证书日期为准。

APPS

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

Horizontal Shaft Alignment
水平对中功能

Vertical Shaft Alignment
垂直对中功能

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.

5.2

SHAFT ALIGNMENT
HORIZONTAL MACHINES

水平转轴对中
INTRODUCTION 简介

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.

轴对中：测定和调整两台连接设备，使其旋转中心共线。水平对中的调整是通过调整设备前后脚的高低和水平位移，使其达到公差允许值。

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

FIXTURLASER的对中系统有两个测量单元，分别用夹具安装在联轴器两端的轴上

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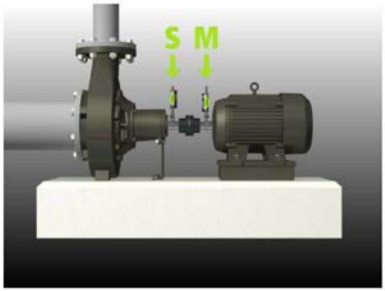

After rotating the shafts into different measuring positions the system calculates the relative distance between the two shafts in two planes. The distances between the two measuring planes, distance to the coupling and distances to the machine feet are entered into the system. The display box then shows 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 in the memory manager. The measurements in the memory manager can easily be transferred to a PC for further documentation purposes.

动测量轴到不同位置，系统会计算两轴的相对位移，并显示对中结果和调整建议。角度偏差调整需增减垫片，位移偏差需侧向移动。

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.测量结果可保存在文件存储器里，并且可以传送到电脑转换成文档格式.

PRE-ALIGNMENT FUNCTIONS

预对中功能

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. 为获得最佳的对中效果需在测量之前做一些检查工作以保证获得精确测量数据。

Before going on site, check the following:
.去现场之前，请检查下列要求：

What are the required tolerances? 测量公差?

Any offsets for dynamic movements? 动态位移补偿?

Are there any restrictions for mounting the measuring system?
装条件是否受限？

Is it possible to rotate the shaft?
测量轴是否可旋转？

What shim size is needed?
所需垫片尺寸?

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).

安装对中系统之前请检查设备底座，螺丝与垫片情况以及是否有空间限制

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

目测检查完成后，考虑以下情况:

Check that the machine has the right temperature for alignment.
设备温度是否正常?

Take away old rusty shims (check that you can remove shims).
移除旧的生锈垫片?

Check coupling assembly and loosen the coupling bolts.
检查连轴器连接情况，松开连轴器螺丝?

Check soft foot conditions.
检查软脚情况

Check coupling and shaft run-out. 检查连轴器与转轴离合情况

- Pipe work strain. 管道张力
- Coarse alignment. 粗对中
- Check coupling gap (axial alignment). 检查耦合间隙

Mechanical looseness.
设备有无负载?

MOUNTING 安装

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-block fixture, and placed on each side of the coupling.

Hold the V-block fixture upright and mount it on the shafts of the measurement object.
有M.的单元装在可动设备端，有S.的装在固定端。用V.型夹具固定

Lift the open end of the chain, tension it so that the slack is removed and attach it to the hook.
将V.型夹具向上安装在轴上，用锁紧链条固定。

Firmly tighten the chain with the tensioning screw. If necessary, use the supplied tensioning tool. Do not over-tighten. If the shaft diameter is too large the chains can be extended with extension chains.
将用提供的扳手锁紧螺丝，不要过紧。如轴径过大，需使用延长链条。（可选）

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
调整激光器高度直到两侧的激光都可以接收，锁紧两侧的夹子使其固定。

The laser of the M-sensor can be adjusted with the adjustment screw on the top of the unit. There is normally no need to adjust the laser, but this might be necessary when measuring at long distances.

NOTE: Make sure that the adjustment screw is secured with the locking nut after adjustment.
在M.激光发射器顶端有一个微调螺丝，可以调整M.激光器发射激光的高低位置。不过除了长距离的测量外，通常没有必要调整激光。
注意：请在调整前后锁紧固定螺母

STARTING

Turn on the sensors. 开启测量探头

Turn on the tablet.

Start the Horizontal Shaft Alignment app.
点击图标进入水平对中程序

Go to settings for connecting the sensors, if they are not already connected.
进入设置界面连接探头（如果探头还没有连接）

Settings.
设置界面

Settings are described in the end of the chapter. 设置功能讲解在最后一章节

Measure and enter distances输入距离数据

You must enter all the distances. The distance between the sensors, the distance between the center 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.

必须输入两激光器间距，M.激光器到连轴器中心距，M.激光器到设备前脚距离与设备前后脚距离。

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.
对中的公差值取决于设备的转速，结果必须在最大公差值允许的范围内

Tolerance Table inch-mode

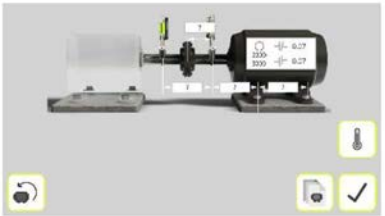
Select the tolerance to use in the alignment by touching its check box to the left.
在列表中选择合适的公差值，确定后左边的方框会打钩.

Confirm.
点击确认

Machine list

Under construction.

Configuration screen 参数界面



?

Distances
Opens window for entering distance.
点击输入或修改距离数值

2000-3000 0.07 0.07

Tolerance table
Open the tolerance table.
点击选择合适的公差值

Target Values
Opens Target Values.
点击设置温度补偿值

Machine List
Opens the machine list.
设备列表

Restart
Deletes all entered data and restarts the app.
删除所有参数重开始

Confirm
Confirms the machine configuration.
确认

MEASUREMENT METHOD 测量方法

Tripoint™ method 三点法

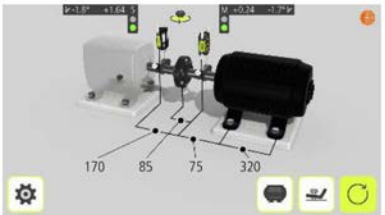
In the Tripoint method, the alignment condition can be calculated by taking three points while rotating the shaft at least 90°.
三点法需要测量三个位置，每个位置点距离至少90.度。

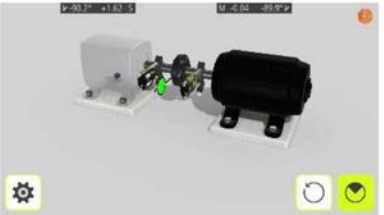
NOTE: The shafts should be coupled during measurement in order to achieve as reliable and accurate results as possible, when using the Tripoint method.
注意：当使用三点法测量时，为了达到尽可能可信和精确的测量结果，转轴连轴器需要连接

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°. 提示：所测三点距离角度越大，重复性越好。两次测量之间的最小角度为45.度

A green flashing arrow suggests suitable measurement positions.
闪烁的绿色箭头显示合适的测量位置。

MEASUREMENT POINT REGISTRATION 测量点采集





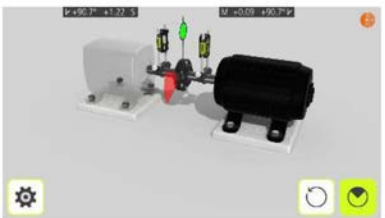
Set the sensors at approximately the same rotational angle at the first measurement position.
第一个测量点，将激光器调至大概的角度位置

Go to measurement.
进入采集

Touch the measurement icon, to register the first position.
点击图标采集数据

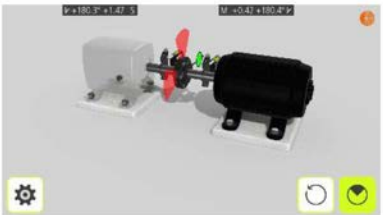
Rotate the shafts to the next position. The shafts must be rotated over a minimum of 45°.
转动测量轴到下一个测量位置。轴的转动最小角度必须大于45度.

Red sector shows already measured zone. The Register icon is not shown if the rotation is less than 45°.
已测量位置会出现红色区域，需超出红色区域才能采集第二个点的数据，最小45度



Touch the measurement icon, to register the second position
点击采集第二点的数据

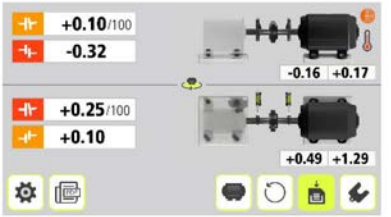
Rotate the shafts to the third position.
转动到第三点位置



Touch the measurement icon, to register the third position.
点击采集第三点数据

TIP: When registering the third position at the 3 o'clock position, the sensors will already be in the right position for horizontal alignment.
程序会提示最好以9-12-3点钟位置进行测量

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.
测量结果同时显示水平竖直方向的对中值与调整值。左侧的符号表示位移偏差与角度偏差，以及是否在公差范围内。

Within tolerance (green).绿色表示在公差范围内

Within double tolerance (yellow and inverted).
橙色表示超出一倍公差

Out of double tolerance (red and inverted).
红色表示超出两倍公差

When a coupling is in tolerance in one direction, this is indicated with a check symbol at the motor.
绿色图勾表示结果符合要求

EVALUATING THE RESULT
测量结果评估

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.
角度偏差与位移偏差可以衡量对中情况，并计地算是否需要进行调整。如果已经选择合适的公差，测量结果会通过不同颜色表示是否在公差范围之内。地脚调整值给出设备对中需要进行的地脚调整数据。
.

Depending on the result, the program will also guide the user. First, the program will always recommend the user to save the measurement.
.基于对中结果，程序会一直指导用户。首先程序会建议用户保存测量数据。

Then, if the measurement result shows that the machine is misaligned, the user will be recommended to go to shimming.
之后，如果测量结果显示设备存在不对中，程序会建议用户进行调整

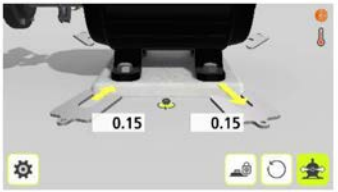
If the measurement result is within tolerance and has been saved, the system will recommend the user to exit the measurement.
如果测量结果是在公差范围之内并且已经被保存则系统会建议用户退出程序。

SHIMMING 调整

Align faster with the VertiZontal Moves feature.点击图标调整设备在竖直方向的对中

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.
首先通过垫片调整界面校准设备的高度偏差系统会提示增加或者减小垫片的厚度来达到对中效果.

Next correct the horizontal misalignment in the alignment screen. The system goes live and will deliver real time values during the adjustment phase.
之后通过实时显示界面校准设备在水平方向的偏差，系统会实时提示设备在水平方向的调整量和调整方向，已达到对中效果



The Shimming screen shows foot values in the vertical direction as suitable shim values (0.05 mm / 1 mil). 垫片界面显示竖直方向地脚调整值

The arrows show if shims must be added or removed to adjust the machine in the vertical direction. 箭头表示加或者减垫片

The check signs show that shimming is not needed. 对勾图标表示无需更改垫片厚度

When shimming is completed, continue to alignment for adjustments in the horizontal direction. 垫片加减完成后，继续进行水平方向调整

Go to alignment.
进入对中

ALIGNMENT对中

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

如竖直方向已完成调整，直接进入水平方向调整

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

如未在垫片界面进行调整，此时可在对中界面先进行竖直方向调整.

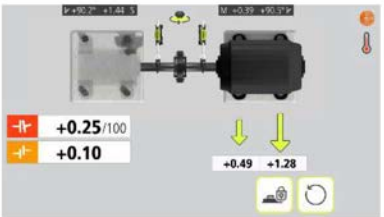
Vertical.direction.竖直方向

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. 旋转主轴至.12.点或.6.点钟方向调整竖直方向对中，倾角仪帮您达到正确的位置。

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.

在竖直方向调整设备直到角度与位移同时达到公差范围内。黄色箭头表示需要调整的方向。

Horizontal direction 水平方向



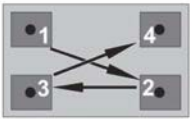
Rotate the shafts to the 3 or 9 o'clock position to make adjustments in the horizontal direction. The angle guide helps you to reach the right position.

旋转主轴到.3.点或.9.点钟方向调整水平对中。

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. 在水平方向调整设备直到角度与位移都达到公差范围内。黄色箭头表示需要调整的方向。

Tighten the bolts using the tightening sequence, as below.

锁紧螺栓按照以下顺序预紧并锁紧



Check and re-measure 检查与重新测量

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

主轴转回12.点或.6.点钟方向，检查测量结果是否发生变化。

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

Re-measure.

对中调整完成，为确保对中结果，可以重新测量。

FEET LOCK FUNCTION地脚锁定功能

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.

在某些情况下，调整端不可移动或受限。为了达到合适的对中调整，需要地脚锁定功能。此功能允许选择需锁定的地脚与可调整地脚。

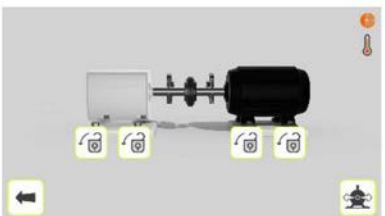
Feet Lock is available both in shimming and alignment.

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

点击地脚锁定按钮进入

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.

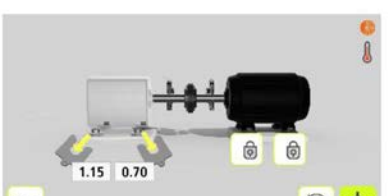
输入静止端设备前后地脚的距离，同时输入静止端设备与可动端设备前脚之间的距离。



Select the two pairs of feet you want to lock.

选择需要锁定的一组地脚

Feet Lock Shimming .高低方向锁定



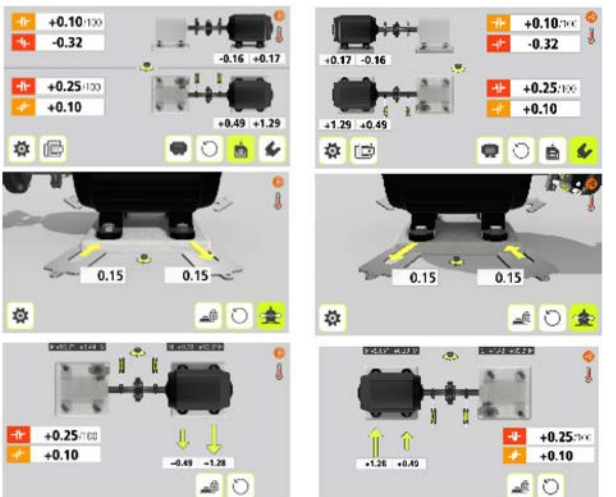
Shim values are shown for the two pairs of feet that are not locked.
未锁定的一组地脚所需加减垫片量显示出来

Feet Lock Alignment 水平对中方向锁定

Live values are shown for the two pairs of feet that are not locked.
此时数据实时显示未锁定地脚的调整值。

SCREEN FLIP视角切换

Screen Flip enables the user to see the machine set-up from the actual view.
视角切换功能能够让用户看到设备的真实相对位置



PDF REPORT .PDF报告

A PDF report with several measurements can be generated. 完成对中之后可以生成报告

Touch the PDF icon to create a PDF report.
点击图标生成PDF报告

(The PDF icon is found in the result screen and/or the setting screen.)
图标可在对中结果界面或设置界面找到

Enter data 报告编辑

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

Touch the white fields to enter data.
点击白色区域可编辑报告的标题和日期

Select files

Touch the check box to the left to select files.
点击方框选择文件

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.
点击保存并生成PDF报告

Enter a file name and confirm.

The PDF report will then be shown, for further handling.
在编辑文件名称并确认后，报告会在之后显示出来.

OTHER FEATURES 其他特性

Looseness indicator松动标识

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: 系统通过此功能监测联轴器间隙与松动，以达到优化的精度。如下列情况之一发生则松动标识出现：

- The M and S units are more than 3° apart. 两激光单元角度差大于3度
- The mutual angular position changes more than 0.7° from that when the first measurement point was taken.

第一点测量完成后两激光器同步角度大于0.7度

When the coupling backlash or looseness is eliminated to avoid any of the above conditions, the looseness indicator will automatically disappear.
联轴器间隙与松动消除之后，此图标自动消失

Target Value symbol 目标值预设

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

设置的目标值后，此图标会显示

SHAFT ALIGNMENT 立式转轴对中
VERTICAL MACHINES

INTRODUCTION简介

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.
轴对中：测定和调整两台连接设备，使其旋转中心共线。水平对中的调整是通过调整设备前后脚的高低和水平位移，使其达到公差允许值

The FIXTURLASER system has two measuring units that are placed on each shaft by using the fixtures supplied with the system.
FIXTURLASER的对中系统有两个测量单元，分别用夹具安装在联轴器两端的轴上

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 in the memory manager. The measurements in the memory manager can easily be transferred to a PC for further documentation purposes.

转动测量轴到不同位置，系统会计算两轴的相对位移，并显示对中结果和调整建议。角度偏差调整需增减垫片，位移偏差需侧向移动。

.

测量结果可保存在文件存储器里，并且可以传送到电脑转换成文档格式.

PRE-ALIGNMENT FUNCTIONS 预对中功能

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. 为获得最佳的对中效果，需在测量之前做一些检查工作以保证获得精确测量数据。

Before going on site, check the following:

What are the required tolerances? 公差要求

Any offsets for dynamic movements?是否带有动态补偿

Are there any restrictions for mounting the measuring system? 安装条件是否受限

Is it possible to rotate the shafts? 轴是否可旋转

What shim size is needed? 所需垫片类型

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). 安装对中系统之前请检查设备底座，螺丝与垫片情况以及是否有空间限制

After the visual checks have been performed, there are some conditions that have to be considered: 目测检查后，考虑以下情况

- Check that the machine has the right temperature for alignment? 设备温度是否正常
- Take away old rusty shims (check that you can remove shims).移除生锈垫片
- Check coupling assembly and loosen the coupling bolts.检查联轴器连接情况松开连接螺栓
- Check soft foot conditions. 检查软脚情况

- Mechanical looseness..机械松动
- Check coupling and shaft run-out.

检查联轴器与轴的磨损情况

- Pipe work strain. 管道应力
- Coarse alignment. 粗调整
- Check coupling gap (axial alignment).

检查联轴器间隙

STARTING

Turn on the sensors.

Turn on the tablet.

Start the Vertical Shaft Alignment app.
点击图标进入垂直对中程序

Go to settings for connecting the sensors, if they are not already connected.

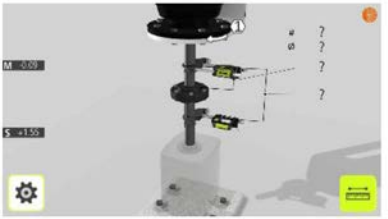
Settings.

Settings are described in the end of the chapter.

MOUNTING 安装

The sensors are mounted as described in chapter “Shaft Alignment Horizontal Machines”.
卧式对中的探头安装参考立式对中的章节

MACHINE CONFIGURATION



The screen displays the movable machine. The traffic lights show green when the laser hits the detector.
图示可动端设备。当激光照射到探头接收窗口时显示指示灯显绿色

Touch the distance icon.
点击输入距离数值

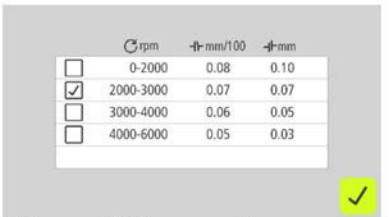
Measure and enter distances

You must enter all the distances. The distance between the sensors, the distance between the center of the coupling and the M-sensor, the pitch circle diameter and the number of bolts.
必须输入所有测量距离，包括两激光器间距，M.激光器到连轴器中心距，输入节距圆直径与总螺栓数

Enter tolerances 公差值选择

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.
中的公差值取决于设备的转速，结果必须在最大公差值允许的范围内



Tolerance Table mm-mode

Tolerance Table inch-mode

Select the tolerance to use in the alignment by touching its check box to the left.
点击左边方框选择合适的公差值范围

Confirm.
确认

MEASUREMENT METHOD

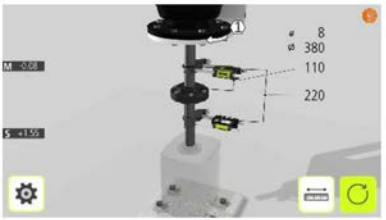
In the Vertical Shaft Alignment program, machinery positions are calculated by taking three points with 180° of rotation.
在垂直对中程序里面，设备的对中情况通过转动180度采集三个点的数据计算得到

Place yourself at the position corresponding to the second measurement position, where it is easiest to turn the shafts through 180°.
保证你的视角是在2号点的位置，这样在转动角度测量时很容易控制方向

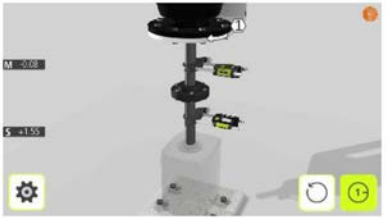
The first measurement position must be at bolt number 1.
第一个测量点必须在第一个螺栓的位置开始

Tip: Mark the positions 1, 2 and 3 before you start measuring.
提示：在测量之前，标记好第1,2,3.....个螺栓的位置点.

MEASUREMENT POINT REGISTRATION



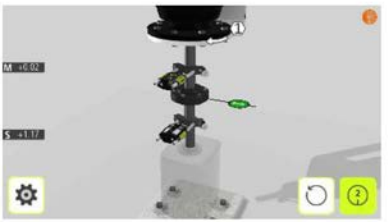
Go to measurement.
点击图标开始测量



Set the sensors at approximately the same rotational angle at the first measurement position, with bolt number 1 to the right.
第一个测量位置，将激光器调整至第一个螺栓大约相同位置

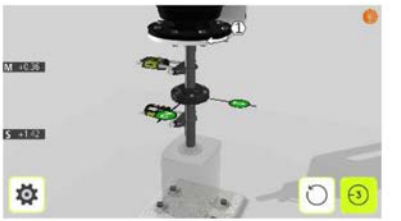
Touch the register icon to register the first position.
点击图标采集第一个点的数据

Rotate the shafts 90° to the second position (where you are standing).
把轴转动90度的位置（你所站的位置）.



Touch the register icon to register the second position.
点击图标采集第二点数据

Rotate the shafts 90° to the third position, to the left.
把轴转动90度到第三点位置，你的左边方位



Touch the register icon to register the third position.
点击图标采集第三点数据

MEASUREMENT RESULTS

The Measurement Result screen shows coupling values in both directions, and bolt values.
测量结果同时显示两个方向的对中值与调整值

The symbol to the left of the coupling values indicates the angular direction and offset, and also if the values are within tolerance
左侧的符号表示位移偏差与角度偏差，以及是否在公差范围内

Within tolerance (green).
绿色表示结果在公差值范围内

Within double tolerance (yellow and inverted).
黄色表示超出一倍公差

Out of double tolerance (red and inverted).
红色表示超出两倍公差

When a coupling is in tolerance in one direction, this is indicated with a check symbol at the motor.
当绿色出现绿色的勾时表示结果符合公差要求

EVALUATING THE RESULT 测量结果评估

The angle and offset values are used to determine the alignment quality. These values are compared with alignment tolerances to determine if any 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.
角度偏差与位移偏差可以衡量对中情况，并计算是否需要进行调整。如果已经选择合适的公差，测量结果会通过不同颜色表示是否在公差范围之内

The bolt values indicate the movable machine's bolt positions where corrections can be made.
螺栓调整值给出设备对中需要进行的螺栓调整数据

Depending on the result, the program will also guide the user.
系统会指导操作者根据对中结果做调整

First, the program will always guide the user to save the measurement.
首先系统会提示操作者保存对中原始数据

Touch the save icon to save the result. 点击图标保存

(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.
如果设备不对中，系统会指导操作者校准

Go to shimming
点击图标进行校准

If the measurement result is within tolerance and has been saved, the user is recommended to exit the measurement.
如果设备对中符合公差要求且已经保存
操作者可以直接退出程序

SHIMMING 垫片调整

The Shimming screen shows bolt values as suitable shim values (0.05 mm / 1 mil).
垫片视图显示根据垫片厚度所需的调整量

Adjust the angular error by placing shims under the bolts as required
通过在螺栓下放置垫片调整角度

The arrow show if shims must be added to adjust the machine. 箭头表示需调整垫片

The check sign shows that shimming is not needed. 对勾标志表示无需调整

When shimming is completed, continue to alignment for adjustments of parallel offset.
调整垫片完成后，继续调整平行偏移

Go to alignment. 进行对中

ALIGNMENT对中调整

If the angular error has been correctly adjusted in the shimming screen the angular value should now be in tolerance.
如角度误差已在垫片界面修正，此时应显示公差内。

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.

现同时调整两个方向的位移偏差，实时显示值随着激光器在位置一、二的变化而改变

Check that both the angular value and the parallel offset are within the required tolerances once the adjustments are completed. .调整过程完成后，再次检查角度与位移偏差是否在所要求的公差范围内。

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

对中调整完成后，可重新测量确认
Re-measure.
从新测量

SOFTCHECK™软脚测试

INTRODUCTION 简介

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.
在对中调整开始前，应先进行软脚测试，否则对中结果是没有意义的。如果没有使用专业工具，软脚情况通常很难发现。Fixturlaser.对中测量系统内置软脚测试程序可以帮您精确检测软脚情况。

The Softcheck program is entered from the Horizontal Shaft Alignment program.
可以从水平轴对中程序里进入软脚测试程序

STARTING THE PROGRAM 开始程序

Start the Softcheck by touching its icon in the Shaft Alignment program.
在轴对中程序里选择此按钮

Place the sensors at the 12 o'clock position.
将激光器置于12.点位置

All the distances must be entered, before checking for soft foot.
Check that all foot bolts are firmly tightened.
开始软地脚测量之前，必须输入激光器间距M.端激光器与前地脚间距，以及设备前后地脚的间距。检查每个地脚螺栓是否拧紧。

MEASUREMENT VALUE REGISTRATION 测量

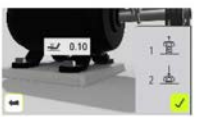
The application will guide you to the different feet. 程序会指出不同的地脚

The first foot. 第一地脚

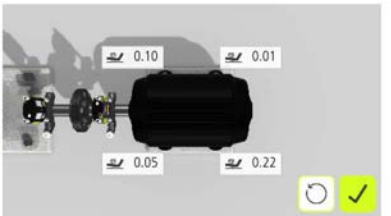
1. Loosen the bolt fully and wait a few seconds. 完全放松螺栓，然后等待几秒
2. Tighten the bolt firmly, preferably with a dynamometric wrench.
紧固螺栓，最好用扭力扳手紧固
3. Register the measurement value.
记录测量数据

Touch the confirmation icon.
点击确认图标

Repeat the procedure at the rest of the feet.
重复以上操作测量其余三个地脚



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).
根据测量结果做调整，然后重新测量。（测量结果指导您需要多少垫片以消除软脚）

Re-measurements can be done at any time by touching the icon for the requested bolt again. 任何时间都可重新测量

Re-measure all feet.
重新测量全部地脚

Re-measure a single foot.
点击图标重新测量单个地脚

TARGET VALUES 目标治预设

INTRODUCTION 简介

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.
大部分设备在运行过程中都会发热，最好的情况是驱动端和被驱动端发热情况一样，无需补偿。不过有些情况下两端的温度并不一致

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.
生产厂家会定义每台设备的热膨胀系数，但大多数情况下只是作为测量结果的平行偏差和角度偏差的来表示的。

In the FIXTURLASER EVO system, you can pre-set target values before starting your alignment work. Accepted values are feet values and angle and offset values.
系统可以方便您在对中开始之前预设地脚值，角度与位移偏差。
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).
输入值为目标值。也就是设备在未运行状态下对中调整，在运行状态下达到正常对中状态。

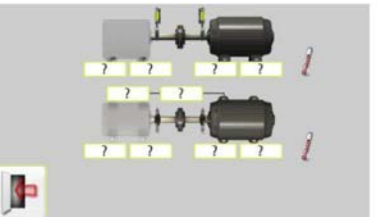
STARTING THE PROGRAM 开始程序

Go to Target Values for entering target values.
点击图标进入温度补偿程序

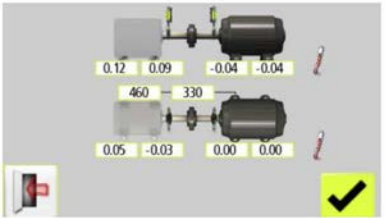
(Target Values are reached from the configuration screen.)
温度 补偿功能在参数界面可找到

Select one of two ways to express the offset values: Feet values or angle and offset values.
选择任意一种方式输入补偿值：地脚值或角度位移偏差值

FEET VALUES 地脚值



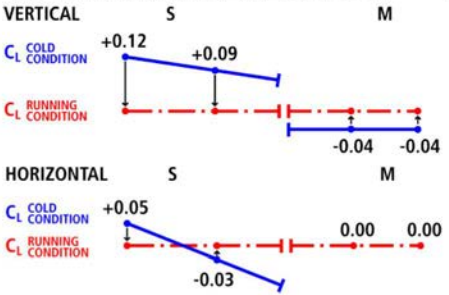
Touch the feet value boxes. Enter target values for the feet in mm or mils according to the pre-set measurement unit together with the required distances.
点击地脚值按钮，根据预设单位输入目标值（mm.或mils）



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.
此例中竖直方向，静止端设备后脚会膨胀0.12.毫米，前脚会膨胀0.09.毫米；可动端设备在运转过程中会下降0.04.毫米。

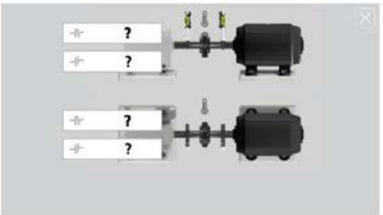
Horizontally, the rear feet will move 0.05 mm towards you and the front feet will move 0.03 mm away from you while the movable machine does not change its position while running.

水平方向，如可动端设备在运转中不会改变位置，静止端设备后地脚需要向远离测量者方向移动0.05.毫米，前地脚需要向靠近测量者方向移动0.03.毫米。



After having entered these feet values, the system calculates how the movable machine should be positioned (target position) in cold condition in order to obtain perfect alignment during running condition.
输入完这些地脚值之后，系统会计算可动端设备在未运转状态需要调整的位置，以达到设备运转之后的完美对中。

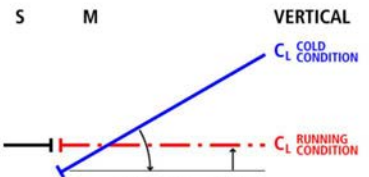
ANGLE AND OFFSET VALUES
角度与位移偏差

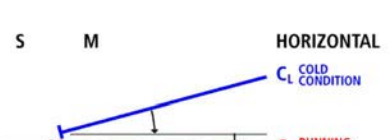


Touch the value boxes and enter target values for the angles in mm/100 mm and target values for the offsets in mm, or mils/inch and mils, according to the pre-set measurement unit.
选择预设按钮输入角度与位移的目标预设值

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.
此例中，设备未运转条件下，可动端设备在竖直方向需要调整至角度0.05mm/100mm，位移-0.06mm；水平方向需调整至角度0.02mm/100mm，位移0.03mm。在设备正常运转情况下即可达到对中。


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

SETTINGS 设置

Log in

Under construction.

Photo

Touch the Photo icon to take a photo.
照相功能

PDF report

Touch the PDF icon to create a PDF report.
PDF报告功能

Measurement unit

Select mm or inch.
选择单位毫米或英寸

Info

Touch the Info icon to go to website for downloading user manual.

Bluetooth settings 蓝牙连接

When entering settings, the system starts searching for pair able sensors.
在进入设置界面时，系统会自动搜索探头的蓝牙信号

Only ACOEM sensors, that are switched on, will be discovered.
探头只有在开启时蓝牙才会被系统发现

Pair able sensors will appear in the list.

Select the sensors to pair. (Maximum two units.)
被发现的探头蓝牙信号会显示在列表中（系统最多连接2个探头）.

Paired units are marked with a check mark.
在左边方框打钩确认连接

If there are units paired to the app, they must be unpaired before it is possible to pair new units.
如果系统配对了原有探头， 配对新的探头时需要重新搜索并点击配对.

To unpair units, touch the check mark icon beside the units.
取消配对探头，取消掉左边方框的勾即可

Search
Starts searching for pairable sensors. 点击搜索可配对的探头

Cancel search
Stops searching for pairable sensors. 停止搜索配对探头

Confirm
Exits the Settings and returns to the application.
确认并返回对中程序

SENSORS M4 AND S4
M4和S4激光探测器

1. ON/OFF button with status indication LED 电源键及LED指示灯
   a. Continuously green – On持续绿灯-开启
   b. Switching green/red – Gyro activated.红绿闪烁-陀螺仪启动
2. Mini USB for charging USB充电接口
3. Laser transmission indication LED 激光指示灯
   a. Green – laser transmission 绿色-激光发射
4. Bluetooth indication LED 蓝牙指示灯
   a. Continuously blue – paired and ready. 持续蓝光-蓝牙已连接
   b. Flashing blue – searching/ready to pair 闪烁蓝光-蓝牙搜索中或未连接
   c. No light – Bluetooth disabled. 无蓝光-蓝牙未开启

5. Battery status button – press to instantly show the battery status (also works when the unit is switched off).
电池状态按钮—显示当前电量（即使激光单元处于关闭状态也能查看）

6. Battery status LED.电池状态指示灯
   a. One LED continuously red – less 10% charge left.
   一个红灯持续亮—电量小于10%
   b. One LED flashing red – less than 5% charge left.
   一个红灯闪烁—少于5%电量
   c. One LED continuously orange – charging
   一个橙灯长亮—充电中
   d. One LED continuously green – fully charged.
   一个绿灯持续亮—充满

7. Battery status LED when battery button is pressed
按下电池状态按钮
   a. Continuously green – battery status
   绿灯长亮—电池电量显示
   b. Rolling green – battery charging
   滚动绿色—充电中

OPERATING MODES工作模式

M4 and S4 units has two operating modes: On and Off. 开启与关闭

Turn the units on and off by pressing the ON/OFF button firmly. 按开关键开启与关闭激光器

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.
如正常关闭没有反应，长按10秒可以关闭

CONNECTIONS 通讯连接

Bluetooth connection蓝牙连接

The main connection for M4 and S4 units is the built in Bluetooth connection. The units will automatically connect to the display unit when turned on as long as they are paired. See chapter "Global settings" for instructions on how to pair measurement units to the display unit.

激光单元的主要通信通过蓝牙，参见"全局设定" 匹配蓝牙单元

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

为避免在受限区域使用蓝牙传输，蓝牙功能应完全关闭，请联络当地经销商

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.
如蓝牙未激活（蓝牙指示灯无任何闪烁），快速按电池状态按钮5次可激活蓝牙。

POWER SUPPLY电源

The M4 and S4 units are powered by a high-capacity rechargeable Li-Ion cell, or by the external power unit.
M4,S4激光单元使用高性能可充电锂电池，或连接外部电源

The operating time of the batteries is approximately 17 hours when the system is used for a typical alignment work (continuously on).
电池可连续使用17小时

The M4 and S4 units can be charged with the supplied combined charger or any 5V USB charger or battery life extender.
可使用组合的充电器通过5V.USB接口充电

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.
当外部电源连接后，激光单元自动开始充电。电量指示灯第一个会变成橙色。完全充满后会变成绿色。按下电量状态按钮可监控电池状况。

The charging time is approximately 8 hours for fully drained batteries. The charging time will be longer if the unit is turned on while being charged.
完全充满需要8个小时，如激光单元开启，充满时间更长。

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.
典型的使用状况下电池可使用2-3年，如需更换电池请联络当地经销商。

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.
电池包含安全电路，请勿使用非Fixturlaser提供的电池。不当的电池更换可能导致人身伤害。

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