

Vibration equipment division

AL30

Laser alignment

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Rel. 1.0

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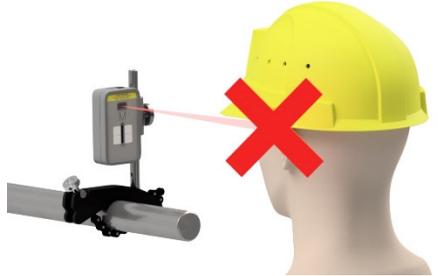
SAFETY

Retain and follow all product safety and operating instructions. Observe all warnings on the product and in the operating instructions.

Failure to observe the safety pre-cautions and operating instructions can cause bodily injury, fire, and damage to the equipment.

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

- Never stare directly into the laser transmitter.
- Never shine the laser directly into anyone else's eyes.



Your system complies with the requirements in:

- IEC-60825-1:2014
- USA FDA Standard 21 CFR, Ch 1, Part 1040.10 and 1040.11



WARNING!

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.



COMPLIES WITH 21 CFR 1040.10 AND 1040.11 EXCEPT FOR DEVIATIONS PURSUANT TO LASER NOTICE No. 50, DATED JUNE 24, 2007

LASER PRECAUTIONS

AL30 uses laser diodes with a power output of < 1.0 mW. The laser classification is Class 2.

Class 2 is considered safe for its intended use with only minor precautions required. These are:



CAUTION!

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

POWER SUPPLY

AL30 is powered by high-capacity rechargeable Li-Ion batteries mounted in the units or by the external power unit.

When used in typical conditions the Li-Ion battery will sustain good capacity for approximately 3-5 years before needing replacement. Contact your sales representative for battery replacement.

Improper replacement of batteries can cause damage and risk for personal injury.



WARNING!

BATTERY REPLACEMENT SHALL ONLY BE PERFORMED BY AUTHORIZED REPRESENTATIVES.

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.

Only use the external power adapter supplied by AL30 for use with the measurement units. Using other power adapters can cause damage to the unit and personal injury.

WIRELESS TRANSCIVER

The AL30 system is fitted with a Bluetooth wireless transceiver. Make sure that there are no restrictions on the use of radio transceivers at the site of operation before using the wireless transceivers.



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.

CARE

CLEANING

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.



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.



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



Do not use acetone.

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

MAIN MENU



Press the On/Off button to start the system and the Main Menu appears.

SYSTEM FUNCTIONS



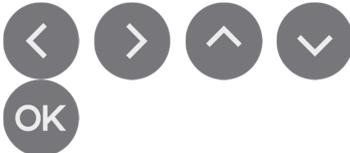
Global Settings



Battery indicator



In the Main Menu you can select the Shaft Alignment program or the Memory Manager and Global Settings.



Select icon with the arrow buttons and confirm with the OK button.

APPLICATION PROGRAMS



Shaft Alignment Horizontal Machines

MEMORY MANAGER

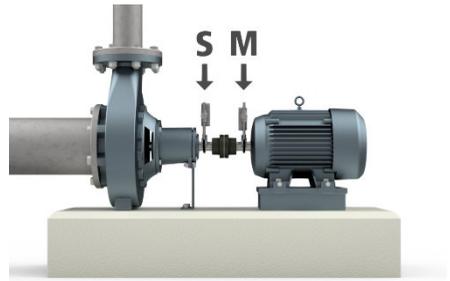
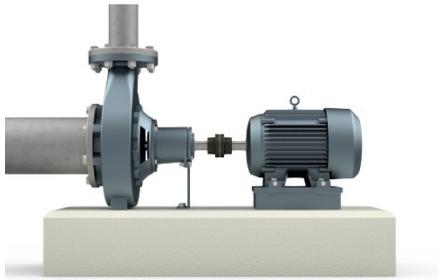


Memory Manager

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.



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.

The AL30 system has two measuring units that are placed on each shaft by using the fixtures supplied with the system.

The S unit is placed on the stationary machine and the M unit is placed on the machine to be moved during alignment i.e. the movable machine. The movable machine is typically an electric motor.

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).

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-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.



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 the nut on the side of the unit.



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. 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.

STARTING THE PROGRAM



Start the program by selecting the Shaft Alignment icon in the Main Menu and press OK.

This will start the lasers on the M and S measurement units. Adjust the height and angle of both units so both laser lines are roughly in the centre of the detector opening of the opposite unit.



TOLERANCE TABLE

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 table provided in AL30 can be helpful if no tolerances are specified. The suggested tolerances can be used as a starting point for developing in-house tolerances when the machinery manufacturer's recommended tolerances are not available. The tolerances are the maximum allowed deviation from desired values.

rpm	mm/100	mm
0-2000	0.08	0.10
2000-3000	0.07	0.07
3000-4000	0.06	0.05
4000-6000	0.05	0.03

Select tolerance

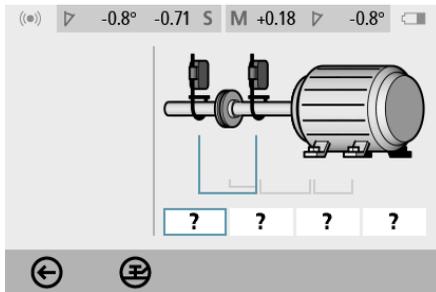
The arrow to the left indicates selected tolerance.

Select tolerance by scrolling up/down and press OK.



Select the OK icon and press OK to continue to shaft alignment.

ENTER DIMENSIONS



The screen displays the movable machine.

 Select the dimension boxes to enter dimensions.

Measure and enter dimensions.

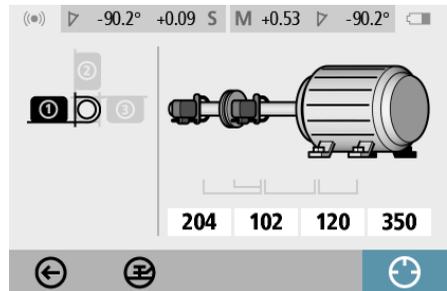
You must enter all the distances. The distance between the sensors, the distance between the centre of the coupling and the M-sensor, the distance between the M-sensor and the first pair of feet and the distance between the first and the second pairs of feet.

SOFTCHECK

 Go to Softcheck for checking soft foot conditions.

See chapter “Softcheck”.

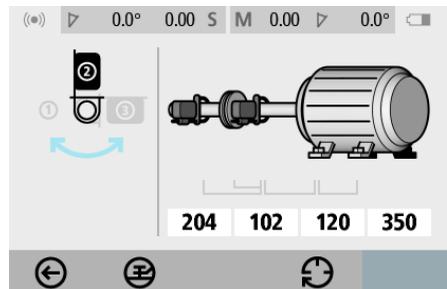
MEASUREMENT POINT REGISTRATION



Set the sensors so that they are at 9 o'clock when viewed from behind the movable unit as indicated in the screen.

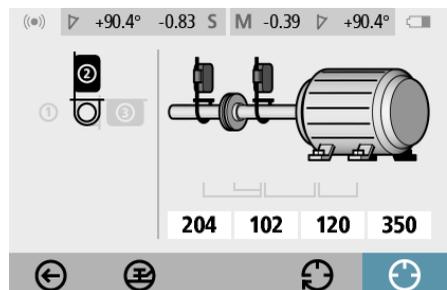
 Select the register icon and press OK.

This registers the first reading.



Rotate the shafts to the next position at 12 o'clock as indicated.

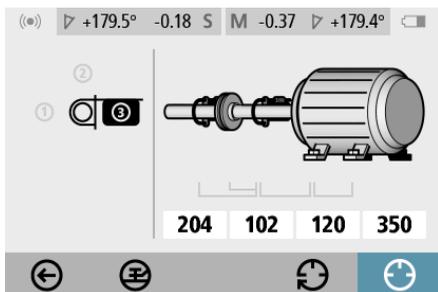
For best result make sure to eliminate any backlash in the coupling.



 Select the register icon and press OK.

This registers the second reading.

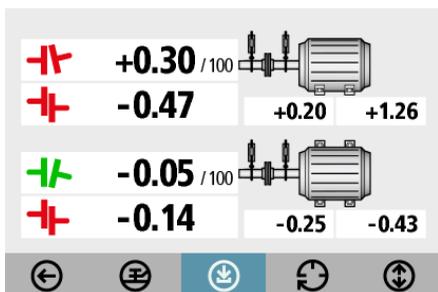
Rotate the shafts to the third position at 3 o'clock.



 Select the register icon and press OK.

This registers the third reading.

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).

 Out of tolerance (red).

EVALUATING 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 recommend the user to save the measurement.

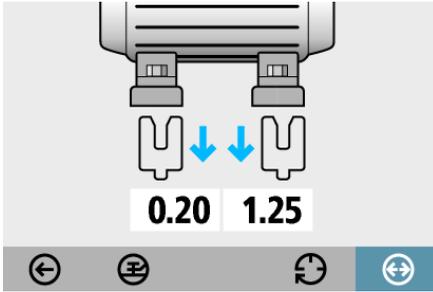
Then, if the measurement result shows that the machine is misaligned, the user will be recommended to go to shimming.

If the measurement result is within tolerance, the system will recommend the user to exit the measurement.

 Save the measurement result.

 Go to shimming.

SHIMMING



The Shimming screen shows foot values in the vertical direction as suitable shim values.

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

The OK show that shimming is not needed.

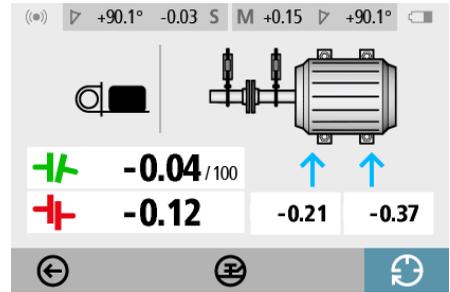
When shimming is completed, continue to alignment for adjustments in the horizontal direction.



Go to alignment.

ALIGNMENT

Live alignment shows how to adjust the movable unit in the horizontal direction.



If the units have moved since taking the last measurement point rotate the shafts to the 3 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 at the feet show in which direction the machine shall be moved.

Re-measure

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



Re-measure.

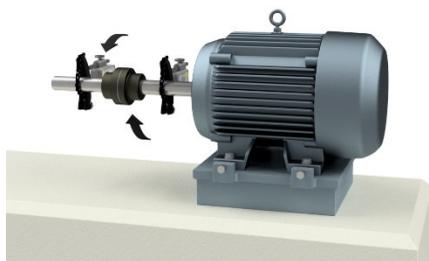
OTHER FEATURES

Eliminate coupling backlash



To get repeatably measurement it is important to control the backlash in the coupling if present.

This can be done by engaging the coupling in the direction or rotation at all the measuring points.



SOFT FOOT CONTROL

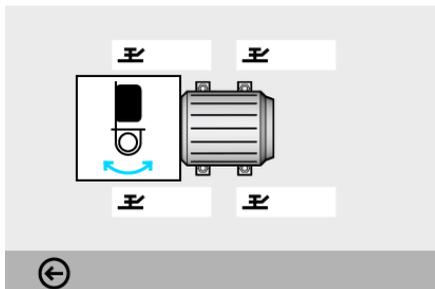
INTRODUCTION

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 AL30System's built-in Soft foot program checks each foot and displays the result in mm or mils.

The Soft Foot Control program is entered from the Horizontal Shaft Alignment program.

STARTING THE PROGRAM

 Start the Soft Foot Control by selecting its icon in the Shaft Alignment program and press OK.

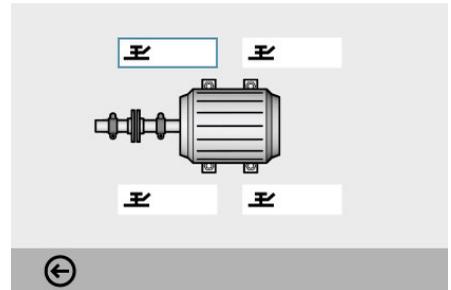


Place the sensors at the 12 o'clock position.

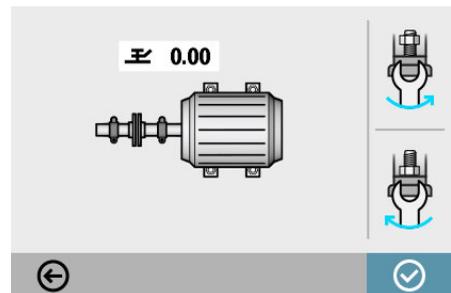
All the distances must be entered, before checking for soft foot.

Check that all foot bolts are firmly tightened.

MEASUREMENT VALUE REGISTRATION

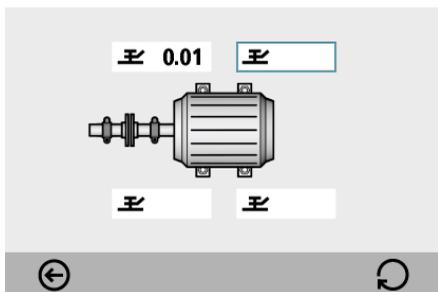


 Select a bolt of your choice and press OK.



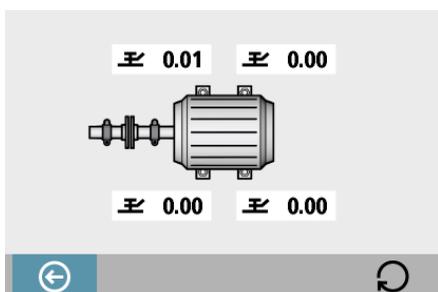
Loosen the bolt fully and then tighten it firmly, preferably with a dynamometric wrench.

 Press OK to register the measurement value.



Continue with the rest of the bolts.

Re-measurements can be done at any time by selecting the requested bolt again and press OK.



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).

SHAFT ALIGNMENT

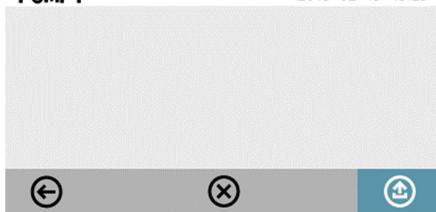


Return to shaft alignment by selecting the Exit icon and press OK.

MEMORY MANAGER

FILE MANAGER

PUMP2 ALIGNED	2015-02-19 13:40
PUMP2 FOUND	2015-02-19 13:33
PUMP1	2015-02-19 13:25



manager, a folder with the older files will be automatically created. These folders can then be found in the archive.

NOTE: When there are a lot of files in the memory, processing can be slow. It is recommended to transfer files regularly to a PC for long term storage.

Select file

Files can be selected by scrolling.



Scroll upwards.



Scroll downwards.

Open file



Opens selected file.

Archive



Goes to archive

(only available when it contains folders with older files).

Delete



Deletes selected file.

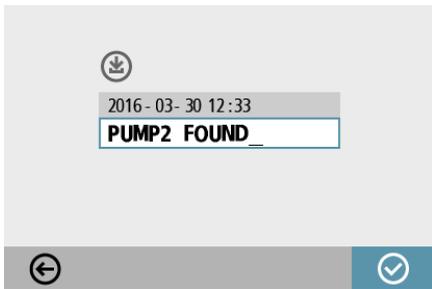
Exit



Exits the Memory Manager.

The Memory has the capacity to store approximately 1500 measurements. When the number of measurements, exceeds 100 measurements in the file

SAVE MEASUREMENT



Enter file name

Enter file name with the keyboard, when the file name field is selected.

Confirm



Confirm.

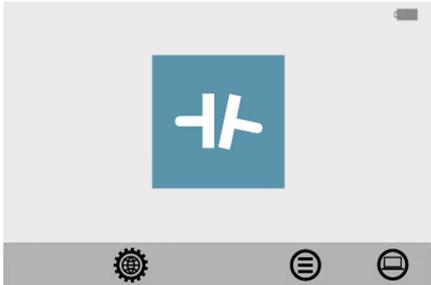
When saving a measurement, both a text file and a picture file (bmp) are created.

TRANSFER FILES TO A PC

1. Turn on the display unit and stay in the Main Menu and attach the display unit to the PC with the USB cable.

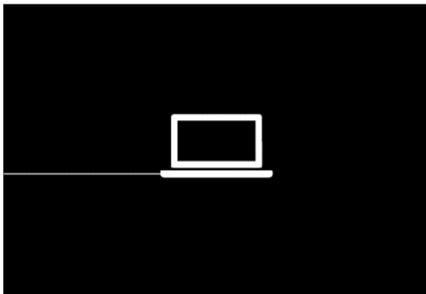
2.

A new icon will appear in the lower right corner of the main menu. Select the new PC connection icon and the display unit will be automatically detected and will appear as a mass storage device on the PC.



3.

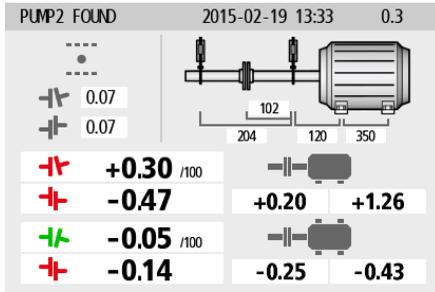
The screen will change into a black background with an image of a PC in it when connected. The files in the display unit can be transferred to the PC using the ordinary functions in Windows Explorer (i.e. cut, copy or drag and drop).



In the PC there will be two files for each measurement; a picture file (.bmp) and a text file (.txt). The picture file shows the same picture as in the memory. The text file shows just the measurement data.

It is recommended that you delete the files from the display unit after they have been safely transferred in order to avoid full memory.

SHAFT ALIGNMENT



The screen displays measurement results, dimensions, target values if any, file name, date and time, serial number of the display unit, program, program version, calibration date and tolerances.



Exits the measurement file.



Scrolls to measurement saved after the one displayed.

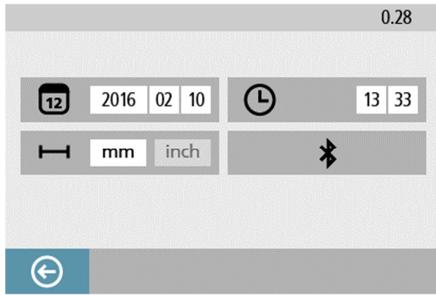


Scrolls to measurement saved prior to the one displayed.



Deletes the measurement file.

GLOBAL SETTINGS



The global settings menu includes settings that are universal for all applications.

For most of the settings, the current selection is shown in the icon.

The program version number is also shown on this screen.

Date



Date settings

To change date, select the date icon and press OK. Enter year and press OK. Enter month and press OK. Enter day and press OK.

Time



Time settings

To change time, select the time icon and press OK. Enter hour and press OK. Enter minute and press OK.

Measurement unit



Changes between mm mode and inch mode

To change measurement unit, select the measurement unit icon and press OK. Select mm or inch with the left/right buttons and press OK.

Bluetooth settings



Bluetooth settings

Open the Bluetooth settings by selecting the Bluetooth settings icon and press OK.

Exit



Exits the global settings.

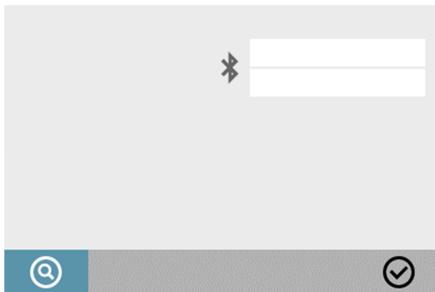
BLUETOOTH SETTINGS

Communication



Information on which units are paired to the display unit is displayed. The display unit will only communicate with units that are paired.

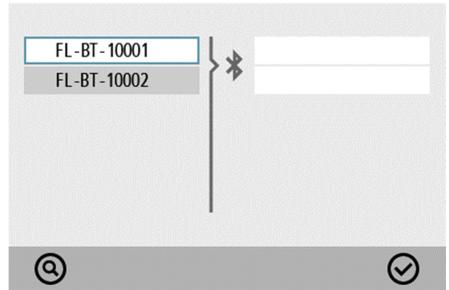
Pairing Bluetooth units



Select the search icon and press OK, to search for units that are pair able.

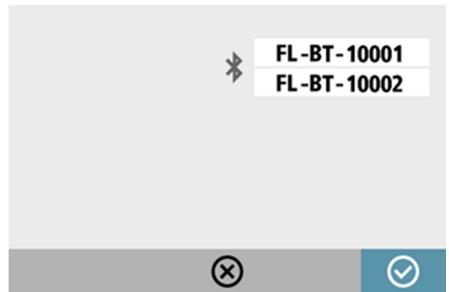
Pair able units will appear in the search list to the left.

Bluetooth units must be switched on for the display unit to discover them. The display unit will only discover suitable measurement units.



Select the units to pair in the search list and press OK.
(Maximum two units.)

Paired units will be moved to the boxes below the blue B.



Units that are paired to the display unit are shown in the boxes below the blue B.

The display unit will only communicate with units that are paired and displayed in the boxes.

Select the OK icon and press OK to confirm Bluetooth settings.

Unpairing Bluetooth units

If there are units paired to the display unit, they have to be unpaired before it is possible to pair new units.

Select the delete icon and press OK, to unpair units.

DISPLAY UNIT



1. Alfa-numeric keyboard
2. LED indicator
3. On/Off button
4. Navigation buttons
5. USB slave

OPERATING MODES

The display unit has two operating modes: On and Off.

The display unit is turned on by a short press on the On/Off button.



To turn off the unit, while in the main menu press the On/Off button on the front.

In case the system fails to respond, long press the On/Off button to switch the unit off.

CONNECTIONS

- USB slave; for attaching the DU to a PC.

POWER SUPPLY

The Display Unit is powered by a high-capacity rechargeable Li-Ion cell, or by the external power unit.

The operating time of the batteries is approximately 8 hours when the system is used for a typical alignment work (continuously on).

The Display Unit can be charged with the supplied combined charger or any 5V USB charger or battery life extender.

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.

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.

When used in typical conditions the batteries will sustain good capacity for approximately 3-5 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 with the system. Improper replacement of batteries can cause damage and risk for personal injury. Please refer to the chapter on safety for further instructions.

BACKLIGHT

If no button is pressed within 15 minutes the backlight will turn off automatically.

Press one of the navigation buttons to turn the backlight on again.

AUTO-OFF

If no button is pressed within 60 minutes the system will turn off automatically.

RESUME FUNCTION

If the system is turned off due to low power or auto-off, the resume function will save the data.



When the system is turned on again after auto-off, you will be prompted to choose whether to return to the stage when the system was turned off (i.e. resuming operation without loss of data) or start the main menu.

UPGRADING THE SOFTWARE

Any upgrades of the software will be distributed or made available for download on our website.

1. Turn on the display unit and stay in the Main Menu and attach the display unit to the PC with the USB cable.

2. A new icon will appear in the lower right corner of the main menu. Select the new PC connection icon and the display unit will be automatically detected and will appear as a mass storage device on the PC.

NOTE: The display unit must be turned on and in the Main Menu before it is connected to the PC in order for the display unit to appear on the PC.

3. Copy the file containing the new software to the display unit.

NOTE: A zipped file must be unzipped before copying it to the display unit.

4. Disconnect the display unit from the PC and wait until the display unit turns itself off (this can take several minutes).

5. Turn on the display unit. The upgrade file will be automatically detected and installed. This can take approximately one minute. Wait until the Main Menu is displayed, and the DU is then ready to be used again.

Settings and stored measurements will not be affected by an upgrade.

The upgrade file will be automatically deleted from the display unit when the upgrade is completed.

SENSORS M AND S



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

OPERATING MODES

M4 and S4 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 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.

POWER SUPPLY

The M and S units are powered by a high-capacity rechargeable Li-Ion cell, or by the external power unit.

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

The M4 and S4 units can be charged with the supplied combined charger or any 5V USB charger or battery life extender.

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.

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.

When used in typical conditions the batteries will sustain good capacity for approximately 3-5 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 with the system. Improper replacement of batteries can cause damage and risk for personal injury. Please refer to the chapter on safety for further instructions.

FAQ

1. The measurement units don't fire up the lasers and I don't get any values from them?

- Make sure the measurement units are turned on and paired with the display unit.

2. The measurements doesn't repeat/ repeated adjustments doesn't get the machines within tolerance.

- Make sure there are no loose parts in the coupling or machines

- Make sure that the movable machine isn't suffering from soft foot.

- Make sure there isn't excessive backlash in the coupling, and if so eliminate it.

- Make sure the measuring units are clean and the laser window of detector opening are covered with grease or dirt.