Soft foot

for TKSA 51

Instructions for use

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Original instructions

1. Introduction

1.1 Soft foot overview

Soft foot is the common term used for the improper contact between a machine housing, and the baseplate used to support it. It is a major cause of repeatability problems in shaft alignment measurements. Causes of soft foot conditions:

- Twisted machinery foundations or baseplates. Twisted or damaged machinery feet.
- Improper amount of shims under machine feet or bent or deformed shim.
- Dirt or other unwanted materials under machine feet.

1.2 Principle of operation

The TKSA 51 is a Line Laser Shaft Alignment System and it has two measuring units that are mounted on each shaft, or on each side of the coupling.
While loosening and tightening each of the four bolts, the movements will be registered and shown in the displaying device. Corrections of the machine feet can be made instantly and by performing a remeasure it is straightforward to confirm the adjustments.

Movement information from the measuring units is wirelessly communicated through bluetooth low energy to the displaying device, which calculates and advises corrective adjustments of the machine feet.

1.3 Case content

The TKSA 51 case contains:

1. 2 × Measuring units	7. 1 × Micro USB to USB split charging cable
2. 2 × Shaft brackets with chains	8. 1 × 3m metric and imperial measuring tape
3. 2 × Extension chains	9. 1 × Certificate of calibration and conformance
4. 4 × Extension rods	10. 1 × Quick start guide (English)
5. 8 × Magnets	11. 1 × Warranty card
6. 1 × Plastic box with bolts for four magnets	

The carrying case is prepared with space for an iPad mini, including its charger.

1.4 Pre-measurement

Ensure that all precautions are taken to prevent the machine from accidentally being started. Lock out / tag out all machines before use.

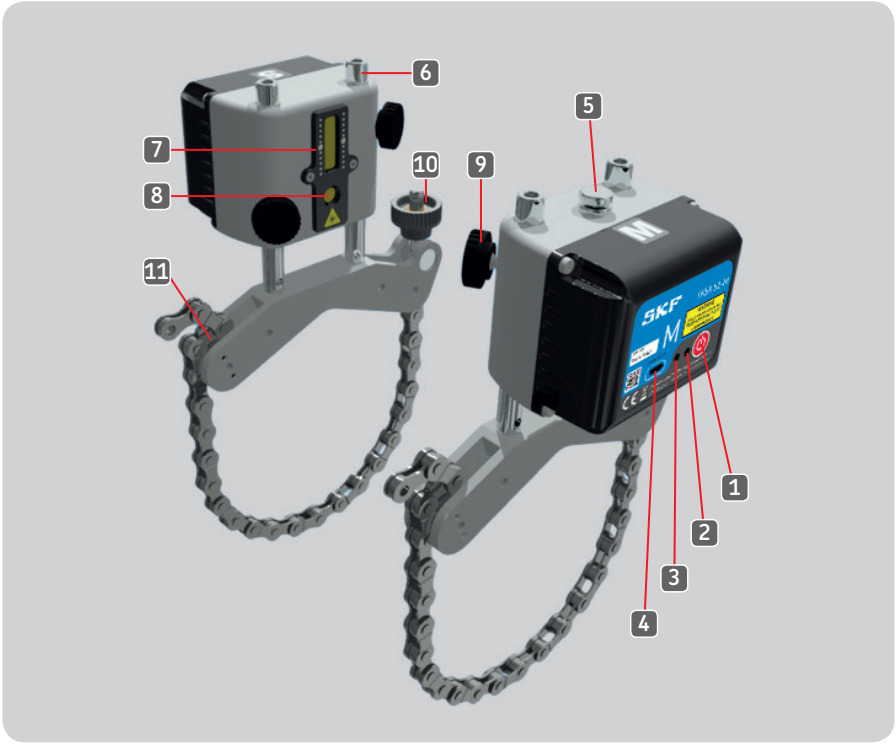
Check:

- Shim size
- Required tolerances
- Coupling play
- Pipe strain
- Mechanical looseness

2. The measuring units

2.1 Description

The measuring unit marked S (stationary) should be mounted on the stationary machine and the unit marked M (movable) on the movable machine.



1. Power button	7. 20 mm (0.8 inch) Detector aperture and target
2. Red and green Light Emitting Diode (LED)	8. Laser aperture
3. Blue LED	9. Locking knob
4. Connector for charging (micro USB)	10. Chain tensioning knob
5. Laser adjustment knob at the M unit	11. Anchor
6. Rod	

The color functions of the Light Emitting Diodes:

- Green: Power on
- Red: Charging
- Blue: Connected

2.2 Handling the measuring units

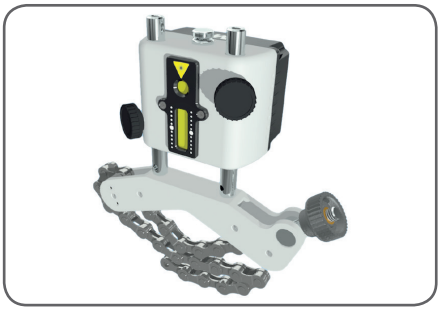
- Switch on the units by pressing the power button shortly at the back of each unit.
- Press the power button until the LED switches off to turn a unit off.
- The Status LED will turn green when a unit is switched on.
- The Connection LED will turn blue when a unit is connected via Bluetooth to the app.

Charge the measuring units when the app indicates low battery:

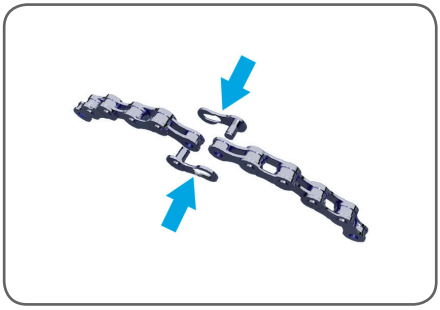
- Plug the charger cable in the connector at the back of each unit, and the other end to a standard USB charger or a computer USB port.
- The red LED will indicate charging when the unit is off.
- The LED will go off when the battery is completely charged (about 4 hours for an empty battery).

2.3 Setup techniques

Measuring unit M on its shaft bracket.
The chain is hooked from the inside for shafts with diameter < Ø40 mm (< Ø1.5 inch).



Use the extension chain for shafts > Ø150 mm (> Ø6.0 inch).
Press both halves of the link connector together and lock in place by pulling the chain taut.



Mount the four neodymium magnets and the shaft bracket can be used as a magnetic bracket.

Align both fixtures tangentially on the coupling by using the shaft brackets, or the magnetic surface of the magnets.

2.4 Setup

The measuring unit marked S should be mounted on the stationary machine and the unit marked M on the movable machine.

Remove the slack of the chains, let the units face each other and tighten them firmly with the tensioning knobs.

Turn on each measuring unit by pressing the power button and start a new measurement in the app according to section 3.3 *(Main menu)*. This will activate the laser beams.
Now adjust the position of measuring unit S, on the rods, until its laser line hits the center of the M target. Tighten the measuring units and brackets in place with the four locking knobs.

The laser of the M unit can be adjusted with the adjustment knob at the top of the unit, to the center of the S target.

3. Using the App

3.1 App installation

The TKSA 51 system is used together with apps for the iOS platform and supports iPads, iPhones and iPods as display units. Find the app on the App Store under the name:

“Soft Foot for TKSA 51” by SKF.

3.2 App language & date format

The app will adapt to the language and date format currently used by the iOS device.
To change these settings, tap:

Settings --> General --> Language & Region

3.3 Main menu

Start the app by tapping on the Soft Foot app icon, found on the home screen of the device. This will take you to the main menu.
Make sure that you have completed the instructions from section 3.1 *(App installation)*.

a. Current measurement
If you have an ongoing measurement you will find it to the left in the main menu, named as the Current measurement.

b. New measurement
Tap on the plus sign (“+”) to start a new measurement. If a current measurement is in progress you will be asked if you want to start a new measurement or resume the current one.

c. Settings
Access the editable settings.

d. Help
Access help videos and the Instructions For Use document.

e. Edit

The reports can be deleted via Edit, which is located in the upper right corner of the view. Delete reports by tapping on Edit, then tap the reports to be deleted and finish by tapping the trash can symbol in the upper left corner of the view.

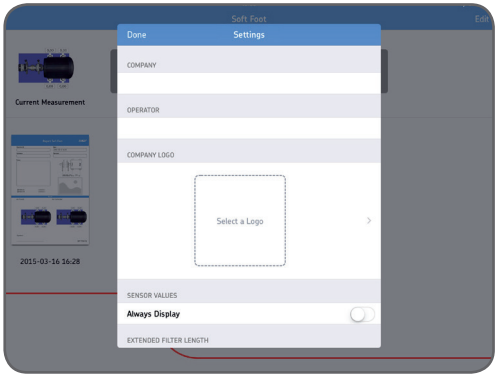
f. Reports

Previously created reports are shown as miniatures below the main menu buttons. Tapping a report will open it for viewing, editing, printing and e-mailing.

3.4 Settings

a. Company, operator and logo

Company, operator and logo is additional information that is included in generated reports.



b. Sensor values

Sensor values is an option to display the detector readings and rotational angles during the measurement.

c. Extended filter length

Measurement values are filtered over time, allowing accurate measurements in the presence of external disturbances, for instance vibration. The extended filter length option enables the sample time to be increased up to 20 seconds.

d. Hardware

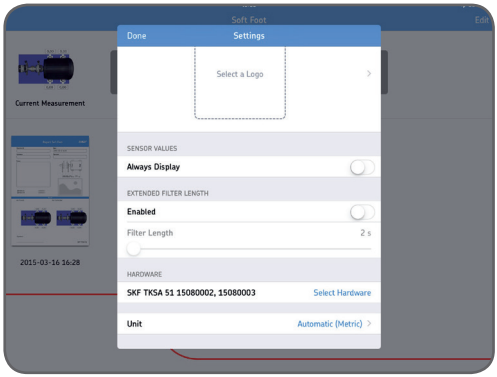
The connected measuring units. Tap Select Hardware if you want to select other units.

e. Unit

For the ability to change between metric and imperial measuring units. The displayed unit is normally based on the system unit, but you can override this and change between metric and imperial units.

f. Done

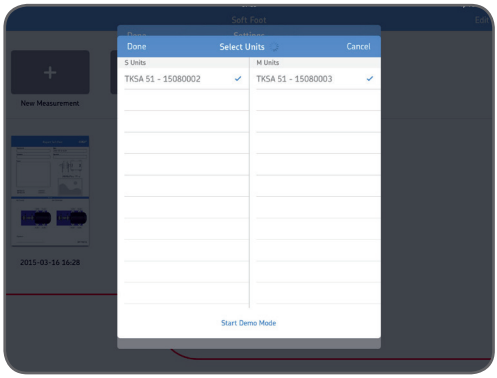
Complete any changes in Settings by tapping Done.



3.5 Select units

The Bluetooth wireless communication will establish a connection between the device and the two measuring units. You will be informed if there is a need to turn on Bluetooth on the device. Note that the first time, you have to select the measuring units that you want to use in the system.
Connect to the measuring units by tapping one S (stationary) unit and one M (movable) unit in the lists. The app will remember your chosen measuring units and will attempt to connect to these units at your next measurement.

The app features a Demo mode which allows most functionalities to be tested without having physical measuring units available.
The Demo Mode option is found at the bottom of the Select units view.



3.6 Machine information

The Machine information view is displayed when a new measurement has been initiated. The view is also reachable from the upper right corner of the screen while recording data in the three measurement positions.

a. Distances

Enter the four distances for the machine to be measured. Center of coupling is where the offset will be measured. If you want the angle expressed as the coupling gap, you also need to specify the diameter of the coupling (see the *Settings* section). Tap on the measurement to select and specify new distance measurements using the appearing keypad.
The distances entered from the previous measurement will be the default values.

1. Measure and enter the distance between the center of the rods on the stationary side and the center of the coupling.
2. Measure and enter the distance between the center of the coupling and the center of the rods on the movable side.
3. Measure and enter the distance between the rods of the movable side and the front feet (center of feet).
4. Measure and enter the distance between the front and back feet (center of feet).

b. Machine ID

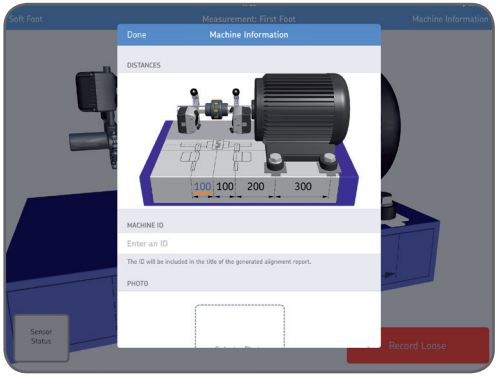
Enter a machine name that will be shown in the report (optional).

c. Photo

Add a photo of your machine for the report (optional).

d. Done

Complete any changes in Settings by tapping Done.



3.7 Sensor status

The Sensor status appears if you have a warning or stop issue during the setup.
It also appears if you tap the warning / stop sign or the Sensor status button in the lower left corner of the screen during a measurement. If a warning appears, setup assistance at the bottom of the view provides help to correct any issues. Warning signs can be ignored, but a stop sign is shown when it is not possible to read essential sensor values.

Warnings are shown when:

- Battery level is below 10% of full charge.
- Laser beam is more than 2 mm (80 mils) from the center target during the setup.
- Laser beam is too close to the edge of the detector.
- Rotational angle difference is more than 2° between measuring units.
  This is also called backlash.

Stops signs are shown when:

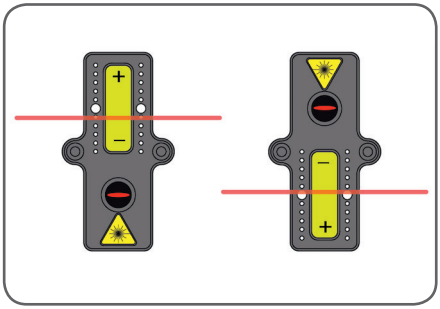
- There is no Bluetooth connection.
- No laser beam is detected.

Tip:
The Sensor status can be used to review temporary data, on the detector values and the rotation angles, during the measurement. When the results are shown, lasers are turned off and no detector values are available in this view.

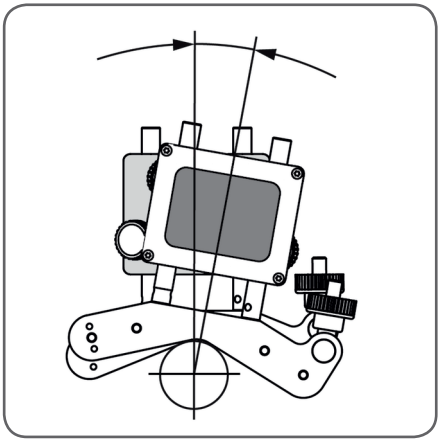
a. Serial number and connected status
Serial number and connected status indicate if any measuring units are connected. Serial numbers are shown when units are connected or when Demo mode is chosen.

b. Battery Level
Indicates the charge levels for the internal batteries.

c. Detector
The detector values show the distances between the center of the detectors and where the laser beams hit the detectors.



d. Rotational angle and angle difference
The rotational angles and angle differences can be used for precise positioning of the two facing measuring units.



e. Select hardware
Lists the connected measuring units. Tap select hardware if you want to select other units.

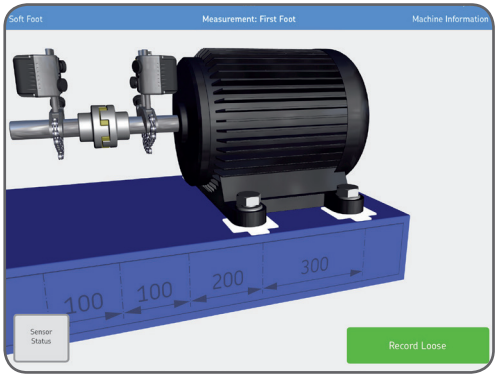
f. Done
When no warnings are displayed tap Done to proceed to the measurement.

3.8 Measuring procedure

Place the measuring units in the upright position (0° ±5°).

If a red arrow is shown, between the measuring units, this means that the axes have not been rotated to an optimal position, where the soft foot data will be recorded. Turn the shaft until the arrow disappears.

The software will automatically position the 3-dimensional view of the machine to focus on the current task at hand, but the user also has the possibility to rotate the modeled machine manually if preferred.



Record loose and tightened values for each foot. Tighten each bolt, using a bolt torque pattern like this one. This will minimize the effect of any remaining soft foot.
The app will follow this order and the screen will guide you to the correct foot.

The record button collects measurement data for the current foot.
These are the colors of the record button during a measurement:

- **Green:** The button is green when the measuring units are positioned within 0° ±5° and the bolt animation is complete.

- **Red:** The button is red when the measuring units are positioned outside the acceptable range (0° ±5°) or when the bolt animation has not completed yet. It is not possible to record any measurement values in this state.

3.9 “As found” measuring results

The movement that occurs when a loose machine is tightened will be registered by the measuring units. The app calculates how big this movement is at each foot and displays the result.

a. Correction
If needed, perform vertical corrections by tapping Correction.

b. Done
Accept the “As found” results by tapping Done. This creates a report which is placed below the main menu.
Note that it is possible to resume the measurement after Done has been selected.

3.10 Correction

In the example, two of the feet values are significantly larger than the other two.
This is a common soft foot issue, where two of the feet have better contact with the machine foundation than the other two.
Shim the feet with the highest values (1,02 and 0,76 in this case).

a. Assistance
Shows suggestions for correction.

In the example: add 1,02 mm under one of the feet and 0,76 mm under the other one.
The lasers are turned off during the correction so perform a remeasurement to update the values.

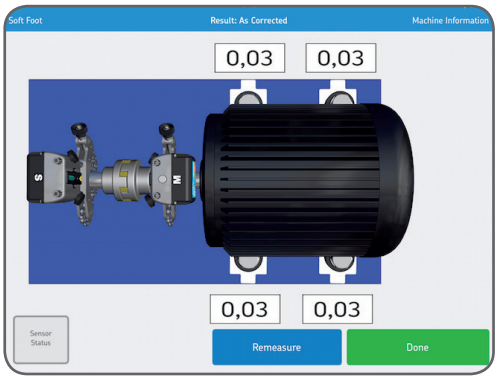
b. Remeasure
After the corrections: tap remeasure and perform a new measurement, which will record new soft foot values.

c. Done
Accept the “As found” results by tapping Done. This creates a report which is placed below the main menu.
Note that it is possible to resume the measurement after Done has been selected.

3.11 “As corrected” measuring results

a. Remeasure
Perform a remeasurement to display the current values after the correction.

b. Done
Accept the “As corrected” results by tapping Done.
This completes the report, which previously contained only the “As found” results.

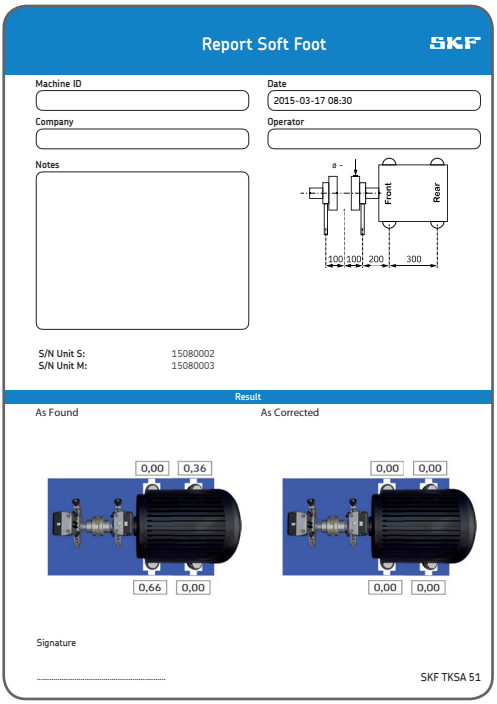


3.12 Report

The reports are automatically generated as PDF files and they are displayed on the main menu, with the most recent measurement in the upper left corner.
A report automatically contains measuring data for both the “As found” and “As corrected” results when a complete measurement has been performed.

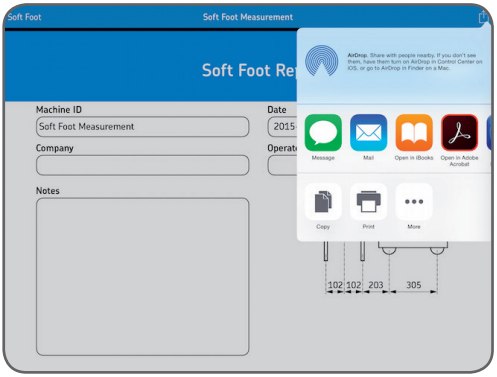
a. Edit report
The report contains information from the measurement and can be completed with additional information. Tap anywhere in the report to edit.

b. Signature
Tap the Signature field and write your signature in the opening Sign report view.
If a signed report is to be edited then the editor will be informed of a signature removal. The user will have to confirm this before editing is possible.



c. Share report

While viewing a report it is possible to share it through for instance email or by printing it. The sharing functionality is available in the upper right corner of the view.



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