

SKF



SKF TKSA 71 & TKSA 71/PRO

Instructions for use

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Original instructions

EC Declaration of conformity

We,
SKF Maintenance Products
Kelvinbaan 16
3439 MT Nieuwegein
The Netherlands

herewith declare that the following product:

SKF Shaft Alignment Tool TKSA 71

has been designed and manufactured in accordance with:
EMC DIRECTIVE 2014/30/EU as outlined in the harmonized norm
EN 61326-1:2013
EN 55011:2009 +A1:2010
IEC 61000-4-2:2009
IEC 61000-4-3:2006 +A1:2008 +A2:2010

EUROPEAN ROHS DIRECTIVE 2011/65/EU

The laser is classified in accordance with the EN 60825-1:2007.
The laser complies with 21 CFR 1040.10 and 1040.11 except for
deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

The enclosed device complies with Part 15 of the FCC Rules.
47CFR: 2011 Part 15 Sub Part B Unintentional Radiators
Contains FCC ID: QOQBLE112. Certification Number: IC: 5123A-BGTBLE112
Manufacturer's Name, Trade Name or Brand Name: bluegiga
Model Name: BLE112-A

Nieuwegein, The Netherlands,
July 2016

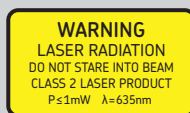


Sébastien David
Manager Product Development and Quality



Safety recommendations

- The complete instructions for use are available on SKF.com and within the SKF TKSA 71 app.
- Read and follow all warnings in this document before handling and operating the equipment. You can be seriously injured, equipment and data can be damaged if you do not follow the safety warnings.
- Always read and follow the operating instructions.
- The equipment should not be used in areas where there is a risk for explosion.
- The tool uses two laser diodes with an output power below 1mW. Still, never stare directly into the laser transmitter.
- Never aim the laser line into someone's eyes.
- The Measuring Units contains Lithium Polymer battery. Do not expose the device to extreme heat.
- Do not charge the Measuring units below +4 °C (+40 °F) or above +45 °C (+113 °F).
- Dress properly. Do not wear loose clothing or jewellery. Keep your hair, clothing, and gloves away from moving parts.
- Do not overreach. Keep proper footing and balance at all times to enable better control of the device during unexpected situations.
- Use safety equipment. Non-skid safety shoes, hard hat or hearing protection must be used for appropriate conditions.
- Never work on energized equipment unless authorized by a responsible authority. Always turn off the power of the machine before you start.
- Do not expose the equipment to rough handling or impacts this will void the warranty.
- Avoid direct contact with water, wet surfaces, or condensing humidity.
- Do not attempt to open the device.
- Use only accessories that are recommended by SKF.
- Device service must be performed only by qualified SKF repair personnel.
- We recommend calibrating the tool every 2 years.



1. Introduction

1.1 Shaft alignment overview

Shaft misalignment is one of the most significant and most preventable contributors to premature machine failure. When a machine is placed in service with less than optimal shaft alignment, the following conditions are likely:

- Poor machine performance
- Increased power consumption
- Increased noise and vibration
- Premature bearing wear
- Accelerated deterioration of gaskets, packing, and mechanical seals
- Higher coupling wear rates
- Increased unplanned downtime

Proper alignment is achieved when the centerlines of each shaft are co-linear when the machine is under load and at normal operating temperatures. This is often referred to as shaft-to-shaft alignment. If the shafts of a machine train are not colinear, when the machine is in operation, they are misaligned.

In essence, the objective is to have a straight line through the centers of all of the shafts of the machines.

The SKF Shaft Alignment for TKSA 71 is a wireless shaft alignment tool that allows an easy and accurate method for aligning the shafts of a driving machine (e.g. electric motor) and a driven machine (e.g. pump).



1.2 Principle of operation

The TKSA 71 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. After rotating the shafts into different measuring positions, the system calculates offset and angular misalignment values between the shafts. The values are compared with user defined tolerance limits and adjustments of the machine can be made instantly.

During the measuring procedure, measurements are taken in three positions, each separated by at least 20°. As the shafts are rotated through an arc, any parallel misalignment or angular misalignment causes the detectors to measure the difference in their positions relative to each other.

Positioning information from the measuring units is wirelessly communicated through Bluetooth Low Energy to the displaying device, which calculates the amount of shaft misalignment and advises corrective adjustments of the machine feet.

If the shafts of a machine train are not co-linear when the machine is in operation, they are by definition misaligned. While the actual shaft positions can be illustrated in three-dimensional space and the centerlines can be defined mathematically, it is easier to relate the relationship between shafts at the coupling as an offset, an angle, or any combination of the two in the vertical and horizontal axes.

1.3 Case content

The TKSA 71 case contains:



1. 2 × TKSA 71 Measuring units	8. 2 × Wireless charging pads
2. 2 × Shaft brackets with chains	9. 1 × 3 m metric and imperial measuring tape
3. 2 × Extension chains	10. 1 × Certificate of calibration and conformance
4. 4 × Extension rods	11. 1 × Quick start guide (English)
5. 8 × Magnets	12. TKSA DISPLAY (TKSA 71D only)
6. 1 × Plastic box with bolts for four magnets	13. 1 × Rugged IP 67 Carrying case
7. 1 × Micro USB to USB split charging cable	

The carrying case is prepared with space for the TKSA DISPLAY or other compatible tablets.

The TKSA 71/PRO case contains:



1. 2 × TKSA 71 Measuring units	9. 1 × 5 m metric and imperial measuring tape
2. 2 × Shaft brackets with chains	10. 1 × Certificate of calibration and conformance
3. 2 × Extension chains	11. 1 × Quick start guide (English)
4. 8 × Extension rods	12. TKSA DISPLAY (TKSA 71D/PRO only)
5. 8 × Magnets	13. 2 × Magnetic base
6. 1 × Plastic box with bolts for magnets	14. 2 × Sliding brackets
7. 1 × Micro USB to USB split charging cable	15. 2 × Offset brackets
8. 2 × Wireless charging pads	16. 1 × Industrial Rugged Trolley Carrying Case IP 67

The carrying case is prepared with space for the TKSA DISPLAY or other compatible tablets.

1.4 Pre-alignment

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
- Soft foot



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. Measuring unit S	5. Laser pitch
2. Connection blue LED	6. Power button
3. Charging red LED	7. Measuring unit M
4. Power on green LED	8. Serial number

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.

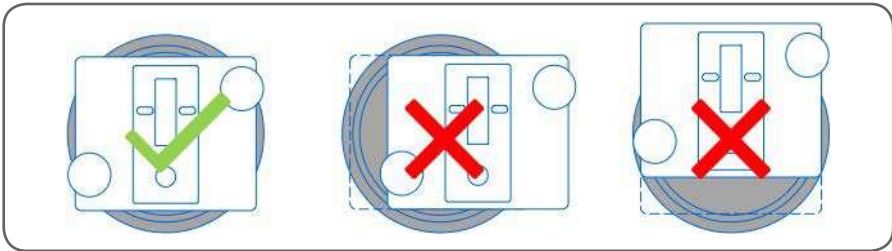


2.3 Charging the measuring units

- Plug the charging pods into a standard USB charger or a computer USB port (slower).
- A Red LED shows the charging pod is connected and operational.



- Place each measuring unit in the center of a charging pod.



The red LED on a Measuring unit indicates:

- ON = Charging correctly
- OFF = Measuring Unit battery is fully charged

The LED on the charging pod indicates:

- Red = Connected and receiving USB power
- Blue = Connected ready to charge
- Blue Slow Flashing = Charging



- Leave charging until the Red LED on the measuring unit turns OFF (about 3 hours for an empty battery).
- Quick charging the measuring units during 10 minutes will allow for 1 hour usage.
- When batteries are completely empty, do not use a PC USB2 port as it does not deliver enough current to fully charge a completely discharged battery. Use a minimum 20W/2A current capacity to charge two discharged measuring units at the same time.



2.4 Setup techniques

Measuring unit M on its shaft bracket.
The chain is hooked from the inside for shafts with diameter $< \varnothing 40$ mm ($< \varnothing 1.5$ inch).



Use the extension chain for shafts $> \varnothing 150$ mm ($> \varnothing 6.0$ 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.



2.5 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 alignment 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. Technical specifications

Technical data		
Designation	TKSA 71	TKSA 71/PRO
Description	SKF Shaft Alignment Tool TKSA 71	

Measuring unit(s)	TKSA 71	TKSA 71/PRO
Sensors & communication	20 mm (0.8 in) 2nd gen. PSD with line laser Class 2, Inclinator $\pm 0,1^\circ$; Bluetooth 4.0 LE	
System measuring distance	0,04 m to 10 m (0.13 ft to 32.8 ft)	
Measuring errors	< 1% +/- 10 μm	
Housing material	Anodized aluminum front and PC/ABS plastic back cover	
Operating time	~8 hours, rechargeable Li-ion battery, wireless charging 10 min. charging for 1 h usage	
Dimensions (H x W x D)	52 x 64 x 33 mm (2.1 x 2.5 x 1.3 in.)	
Weight	130 g (0.3 lbs)	

Operating device	TKSA 71	TKSA 71/PRO
Operating device	TKSA DISPLAY, Galaxy Tab Active and iPad Mini recommended, iPad 3rd generation, iPod Touch 5th generation, iPhone 4S, Galaxy S4 or above (all not included)	
Software/ App update	Apple AppStore or on Google Play Store	
Operating system requirements	Apple iOS 9 or Android OS 4.4.2 (and above)	

Complete System	TKSA 71	TKSA 71/PRO
Alignment method	Alignment of horizontal and vertical shafts, 3 position measurement 9–12–3, automatic measurement, measurement (with min. 40° rotation), soft foot, machine trains, values, spacer shafts	
Live correction values	Vertical and horizontal	
Extra features	Target values, Screen flip (plus portrait on tablets), automatic .pdf report	
Fixture	2 × V-brackets with chains, width 15 mm (0.6 in.)	
Shaft diameters	20 to 150 mm diameter (0.8 to 5.9 in.) (450 mm (17.7 in.) with extension chains supplied)	
Max. recom. coupling height	45 mm (1.8 in.) with standard rods plus 120 mm (4.7 in.) per set of extension rods	
Power adapter	Wireless charging via supplied charging pads, Micro USB to USB split charging cable supplied, compatible with 5V USB chargers (not included)	
Operating temperature	0 °C to +45 °C (32 °F to +113 °F)	
IP rating	IP 67	

Size and weight	TKSA 71	TKSA 71/PRO
Carrying case dimensions	365 × 295 × 170 mm (14.4 × 11.6 × 6.7 in)	610 × 430 × 265 mm (24 × 16.9 × 10.4 in.)
Total weight (incl. case)	3,9 kg (8.6 lbs)	12,5 kg (27.6 lbs)

Case contents	TKSA 71	TKSA 71/PRO
Calibration certificate	Supplied with 2 years validity	Supplied with 2 years validity
In the case	2 × TKSA 71 Measuring Units	2 × TKSA 71 Measuring Units
	2 × Shaft brackets with chains and magnets	2 × Shaft brackets with chains and magnets
	4 × 120 mm extension rods	8 × 120 mm extension rods
	-	2 × Magnetic Base TKSA MAGBASE
	-	2 × Sliding brackets TKSA 51-SLBK
	-	2 × Offset brackets TKSA 51-EXT50
	2 × Extension chains of 1 m for shaft up to 450 mm diameter	2 × Extension chains of 1 m for shaft up to 450 mm diameter
	1 × Micro USB to USB split charging cable	1 × Micro USB to USB split charging cable
	2 × Wireless charging pads	2 × Wireless charging pads
	1 × 5 m metric and imperial measuring tape	1 × 5 m metric and imperial measuring tape
	1 × Printed certificate of calibration and conformance	1 × Printed certificate of calibration and conformance
	1 × Printed Quick Start Guide (English)	1 × Printed Quick Start Guide (English)
	1 × Industrial Rugged Carrying Case IP 67	1 × Industrial Rugged Trolley Carrying Case IP 67

Spare parts and accessories

Designation	Description
TKSA 51-VBK	1 × Standard chain bracket incl. 80 mm (3.2 in.) threaded rods & 1 × standard chain 480 mm, incl. 4 × magnets
TKSA 51-EXTCH	2 × Extension chains of 1 m (3.3 ft) for shaft up to 450 mm (17.7 ft) diameter
TKSA 51-ROD120	4 × Threaded 120 mm (4.7 in.) extension rods
TKSA 51-ROD80	4 × Threaded 80 mm (3.2 in.) extension rods
TKSA 51-SLDBK	1 × Sliding adjustable bracket (no rods) for use with shaft > 30 mm or bore > 120 mm
TKSA 51-EXT50	1 × 50 mm (2 in.) offset bracket with 2 × rods 80 mm (3.2 in.)
TKSA 71-WPODS	2 × Wireless charging pods for TKSA 71 and 71/PRO incl. split USB cable
TKSA 71-M	1 × TKSA 71 M Measuring Unit (incl. Calib. Certif.)
TKSA 71-S	1 × TKSA 71 S Measuring Unit (incl. Calib. Certif.)

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