SKF TKBA 21 & 31

Instructions for use

Table of contents

Original instructions

Safety recommendations

- Always turn off the power of the driven machine before you start working on.
- Always read and follow the operating instructions.
- Never stare directly into the laser beams.
- Never aim the laser beams into another person's eyes.
- Opening the housing of the laser unit may result in hazardous light exposure and void the warranty.
- Take care not to pinch your fingers when mounting the units on pulleys or sprockets.
- The equipment should not be used in areas where there is a risk of explosion.
- Never expose the equipment to high humidity or direct contact with water.
- Have all repair work performed by an SKF repair shop.

EU Declaration of Conformity TKBA 21 & 31

We, SKF Maintenance Products, Meidoornkade 14, 3992 AE Houten,
The Netherlands herewith declare under our sole responsibility that the products described in these instructions for use, are in accordance with the conditions of the following Directive(s):
EMC DIRECTIVE 2014/30/EU
RoHS DIRECTIVE (EU) 2015/863
and are in conformity with the following standards:

Immunity:
EN 61000-6-2:2005 - Immunity for Industrial Environments,
IEC 61000-4-2:2001, IEC 61000-4-3:2008

Emission:
EN 61000-6-3:2007 - Emission Standard for Residential, Commercial and light Industrial Environments,
EN 55011:2016

The laser is classified in accordance with the USA FDA Standard 21 CFR, Ch 1, Part 1040.10 and 1040.11

Houten, The Netherlands, May 2023

Guillaume Dubois
Manager Quality and Compliance

CE

UK Declaration of Conformity TKBA 21 & 31

We, SKF Maintenance Products, Meidoornkade 14, 3992 AE Houten,
The Netherlands herewith declare under our sole responsibility that the products described in these instructions for use, are in accordance with the conditions of the following Directive(s):
Electromagnetic Compatibility Regulations 2016 (2016 No. 1091)
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (2012 No. 3032)
and are in conformity with the following standards:

Immunity:
EN 61000-6-2:2005 - Immunity for Industrial Environments,
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The laser is classified in accordance with the USA FDA Standard 21 CFR, Ch 1, Part 1040.10 and 1040.11

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Houten, The Netherlands, May 2023

Guillaume Dubois
Manager Quality and Compliance

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1. Introduction

Precise alignment of belt / pulley driven machinery, chain / sprocket, or any other power transmission like timing belts for example, is essential to reduce both pulley or chain and belt or sprocket wear. It can help reduce machinery vibration, which in turn leads to improved machine performance.
Good pulley or chain alignment can help reduce unscheduled downtime, and can improve the reliability of your equipment.
The SKF Belt Alignment Tools TKBA 21 and 31 offer an easy and accurate method to adjust the machinery so that pulleys or sprockets are accurately aligned.

2. Principle of operation

The TKBA 21 and 31 consist of two laser emitting units that attach magnetically to the side of the driving and driven pulley or sprocket.
The transmitter units emit both a laser line, red for TKBA 21 and green for TKBA 31, that is projected onto the opposite unit. On the front of each unit is a target area with reference lines.

Depending on the laser pattern projected on the target area, it is possible to determine the type of misalignment and how to correct it. Belt or sprocket alignment is easily performed by adjusting the moveable machine(s) until the laser lines coincide with the reference lines on both units.

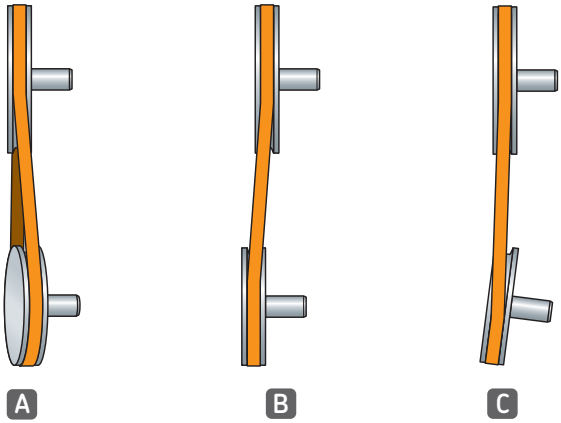
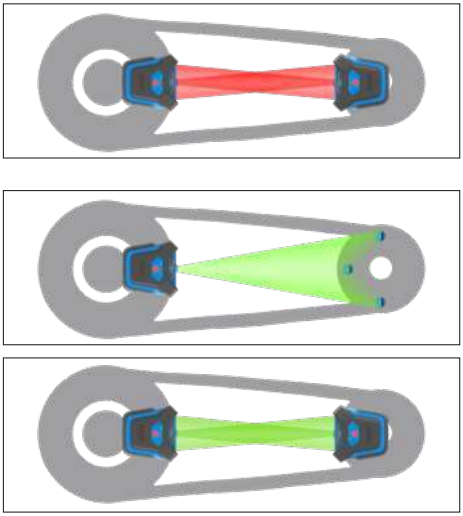


Fig. 1 – *Different types of pulley misalignment*

A	Vertical angle misalignment
B	Parallel misalignment
C	Horizontal angle misalignment



3. Battery installation

The TKBA 21 & 31 are powered with 3 × AAA alkaline batteries.

To insert the new batteries:

- Locate the back of the unit on the round end of the emitting unit.
- Remove the slotted head screw (**→ fig. 2**).
- Carefully insert three new batteries in the holder taking care to observe polarity. Replace the cover back onto the unit and refit the screw

Fig.2 – *Battery door*

NOTE:
Remove the batteries if the transmitter unit is to remain unused for an extended period.

4. Mounting the units

The TKBA 21 and 31 are equipped with powerful magnets, allowing the operator to mount the system on almost any pulley or sprocket face.

Mount the units on the pulley or bracket faces to be aligned.

- One unit should be mounted onto the pulley or sprocket to be moved or adjusted, facing the other unit, so that the lasers can be projected on each other reference lines.
- The other laser emitting unit should be mounted on the stationary pulley or sprocket, also facing the reference lines of the first unit.

The user must determine which pulley is movable and which is stationary.
The movable pulley or sprocket is often the smallest one, and is often mounted on the motor shaft. In some cases both pulleys or sprockets and shafts may need to be adjusted to achieve the desired alignment.
For non-ferrous pulleys or sprocket, it is possible to use a small bar clamp (G clamp).

5. Power on

To turn the laser lines on, use the main red switches located on the front of the transmitter units.

6. Alignment condition check

The laser lines on the both units' reference lines show the vertical angle misalignment, parallel misalignment or offset. Horizontal angle misalignment is indicated by the offset position of the laser line on one side only with a constant distance.

Before aligning the pulleys or sprockets, it is important that the pulleys or sprockets are mounted correctly on the shafts and that the shafts are straight. Buckled pulleys will have a detrimental effect on the alignment quality. Adjust one (or both) pulley machine(s) step by step until both laser lines hit the reference line of the opposite laser unit.

The laser line emitted from each laser unit will now appear on the opposite unit. The pattern will vary depending on the type of misalignment.

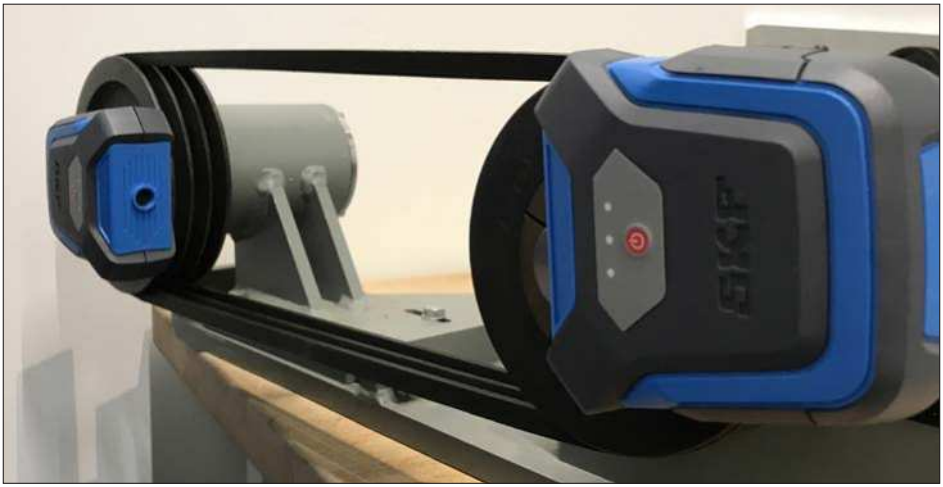
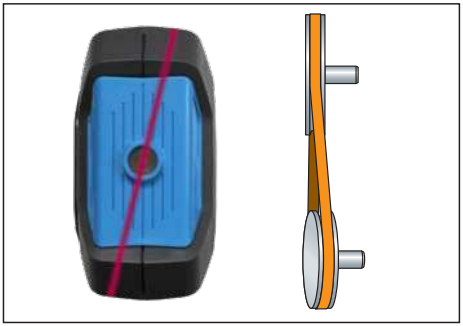
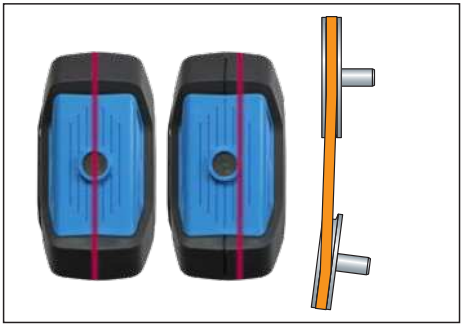


Fig.3 – *Units mounted on pulleys*

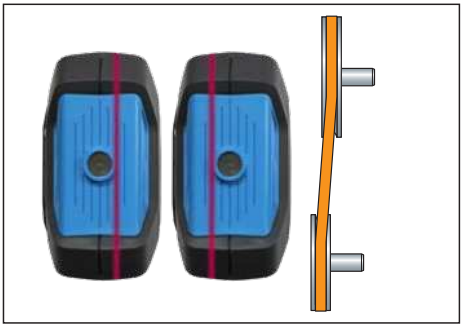
7. Correcting misalignment



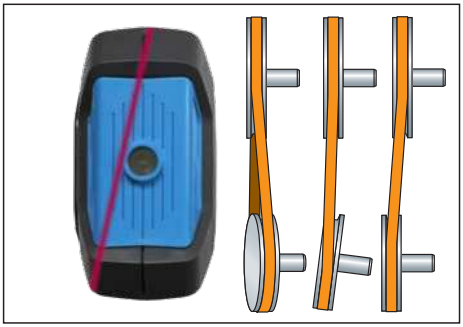
Display of vertical angle misalignment



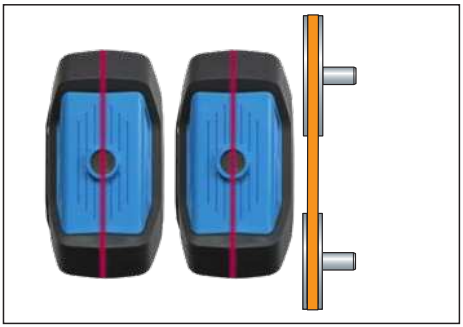
Display of horizontal angle misalignment



Display of parallel misalignment

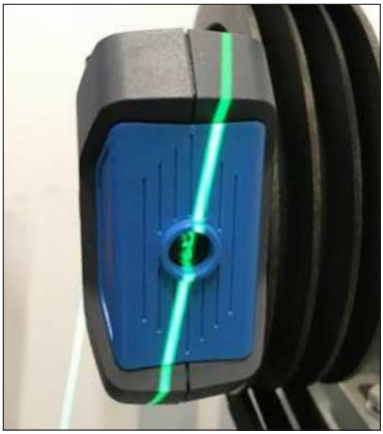


Display of all three misalignments combined



Display of correct alignment

Fig.4 – *Correction misalignment using TKBA 21 as an example (laser lines in green are for TKBA 31)*



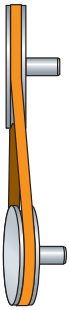


Fig.5 – *Display of vertical angle misalignment*

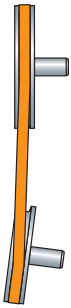


Fig.6 – *Display of horizontal angle misalignment*

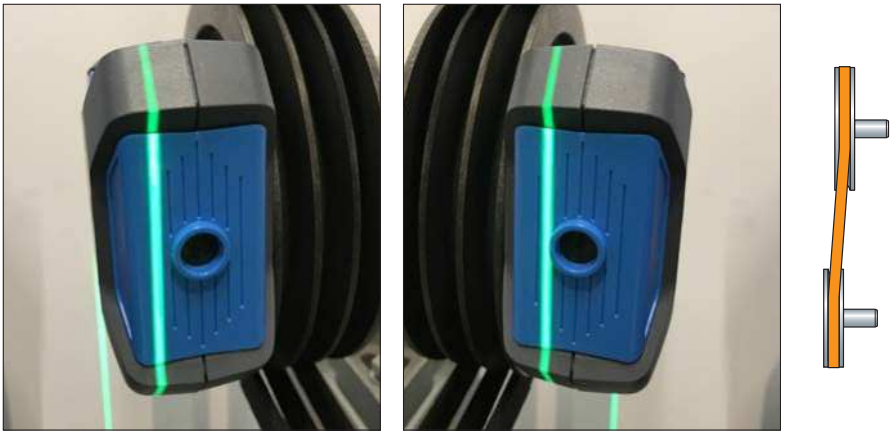


Fig.7 – *Display of parallel misalignment (offset)*

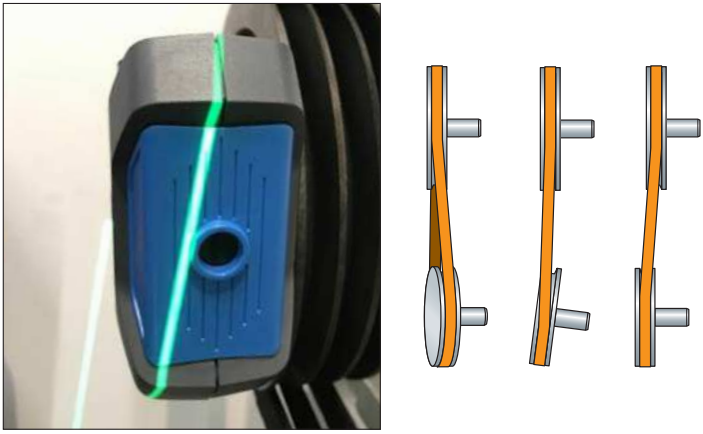


Fig.8 – *Misalignment patterns: all of them combined*

Step 1:
From a typical pattern as per → **fig. 8**:
correct vertical angle misalignment by shimming the moveable machine using stainless steel shims such as SKF TMAS shims. Place shims beneath the front or rear feet of the moveable machine (as per → **fig. 9**) until both laser lines are parallel to their respective reference lines (as per → **fig. 10**).

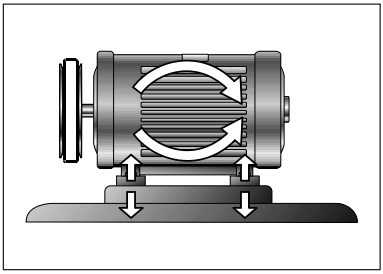


Fig.9 – *Vertical angle alignment*

Fig.10 – *Pulleys with combined horizontal angle and parallel misalignments:*

Step 2:
From a typical pattern as per → **fig. 10** now, correct horizontal angle misalignment by adjusting the moveable machine laterally. Move the machine (as per → **fig. 11** until the laser lines are symmetrically positioned in relation to the reference lines (as per → **fig. 12**).

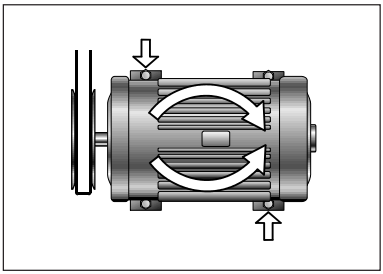


Fig.11 – *Horizontal angle alignment*

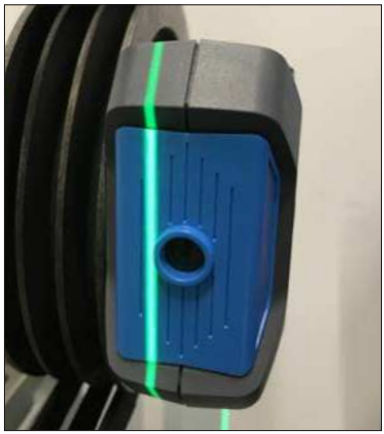


Fig.12 – *Pulley with parallel misalignment*

Step 3:
From a typical pattern as per → **fig. 12** now: correct parallel misalignment (Offset) by adjusting the moveable pulley or machine axially. Move one of the pulleys on its shaft (as per → **fig. 13**) until the laser lines exactly match the same centered reference lines (as per → **fig. 14**).

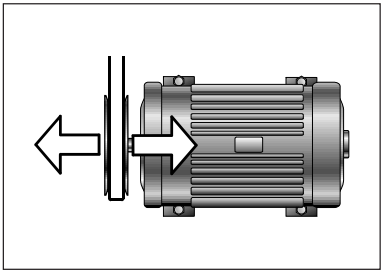


Fig.13 – *Parallel alignment*

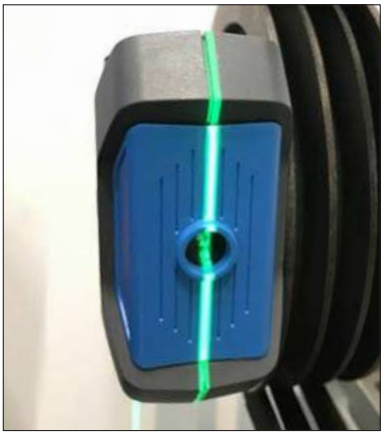


Fig.14 – *Pulley perfectly aligned*

If Steps 1, 2 and 3 are followed then the alignment of the belt drives should be completed quickly. However, one alignment correction may affect other alignment conditions. Steps 1, 2 and 3 may need to be repeated until the system is completely aligned.

Good alignment is achieved when the laser lines on both units coincide with the same reference line in the center.

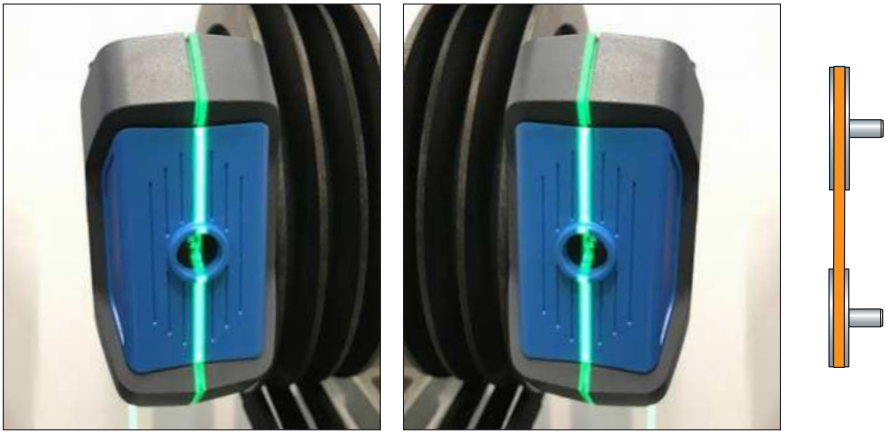


Fig.15 – *Pulleys perfectly aligned*

NOTE:
When tightening the belt, check the horizontal angle alignment and adjust if necessary.

Acceptable horizontal angle misalignment
As a general rule, the horizontal angular error should not exceed 0.25° - 0.5°, which corresponds to 4 - 8 mm per meter (4 - 8 mils/1 in).
As a means of measuring this, the target area is provided with a scale of 4 mm between each reference lines.

⚠ WARNING:
Switch OFF the transmitter unit and remove all units BEFORE starting machinery.

8. Troubleshooting and maintenance

No laser line

- Check that the batteries are inserted correctly in the transmitter unit.
- Replace the batteries.
- Ensure that the laser window in the transmitter unit is not obstructed by dirt. If necessary, clean with cotton cloth.

Lost calibration

If the tool loses its calibration, return the complete tool to SKF for repair.

Heavy impacts

The transmitter unit is equipped with sensitive optical components. Heavy impacts can affect the function and accuracy of the unit. Handle with care and ensure that the laser window is kept clean and free from dirt.

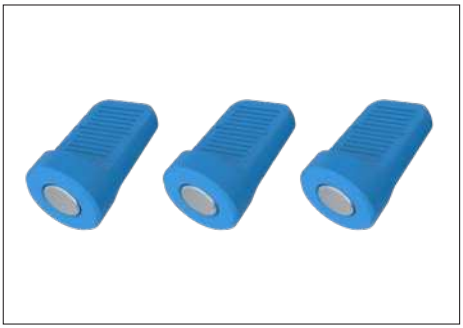
9. Technical data

Designation	**TKBA 21**	**TKBA 31**
Transmitter unit		
Type of laser	Red laser diode	Green laser diode
Laser	1x Built-in class 2 laser, <1mW, 635nm	1x Built-in class 2 laser, <1mW, 520nm
Laser line length:	2.4 m at 2 m *(7.9 ft at 6.6 ft)*	2.4 m at 2 m *(7.9 ft at 6.6 ft)*
Measurement Accuracy Angular	Better than 0.02° at 2 m *(6.6 ft)*	Better than 0.02° at 2 m *(6.6 ft)*
Measurement Accuracy Offset	Better than 0.5 mm *(1/50" in)*	Better than 0.5 mm *(1/50" in)*
Measurement distance	50 mm to 3 m *(2 in to 10 ft)*	50 mm to 6 m *(2 in to 20 ft)*
Control	Laser ON/OFF button	Laser ON/OFF button
Housing Material	ABS polymer and Aluminium base powder coat finish	ABS polymer and Aluminium base powder coat finish
Receiver unit		
Housing material	ABS + 2K and Aluminium base powder coat finish	ABS + 2K and Aluminium base powder coat finish
Fixtures		
Mounting	Magnetic, side mounted	Magnetic, side mounted
Battery and power		
Battery	3 × AAA Alkaline type (Rechargeable too)	3 × AAA Alkaline type (Rechargeable too)
Operation time	Emitting unit: 32h (continuous operation)	Emitting unit: 6h (continuous operation)

Operating Requirements		
Operating temperature	0 to 40 °C *(32 to 104 °F)*	0 to 40 °C *(32 to 104 °F)*
Storage temperature	–20 to +60 °C *(–4 to +140 °F)*	–20 to +60 °C *(–4 to +140 °F)*
Relative Humidity	10 to 90% RH non-condensing	10 to 90% RH non-condensing
IP rating for indication	IP 40	IP 40
Dimensions		
Transmitter unit	98 × 97 × 52 mm *(3.9 × 3.8 × 2 in)*	98 × 97 × 52 mm *(3.9 × 3.8 × 2 in)*
Receiver unit	N/A	Passive targets: 40 × 25 mm *(1.6 × 0.99 in)*
Carrying case size B	360 × 110 × 260 mm *(14.2 × 4.3 × 10.2 in)*	360 × 110 × 260 mm *(14.2 × 4.3 × 10.2 in)*
Weight		
Transmitter unit	250 g *(0.55 lb)* with batteries	250 g *(0.55 lb)* with batteries
Receiver unit	250 g *(0.55 lb)* with batteries	250 g *(0.55 lb)* with batteries
Total weight (incl. case)	1.62 kg *(3.57 lb)*	1.88 kg *(4.14 lb)*
Case contents	**TKBA 21**	**TKBA 31**
	2 × TKBA 21 transmitter unit	2 × TKBA 31 transmitter unit
	6 × AAA batteries	6 × AAA batteries
	1 × Printed instructions for use	1 × Printed instructions for use
		3 × TKBA passive targets
		3 × Belt tension checkers of different loads
		1 × Pulley groove gauges

10.Spare parts

Designation	TKBA 21 & 31
TKBA TARGETS	3 x passive targets
PHP PT/C1 006	Groove profile check
PHG PT/C1 008	Tension tester I 15 kg – 70 kg *(30 lb – 150 lb)*
PHG PT/C1 009	Tension tester II 50 kg – 150 kgn *(100 lb – 300 lb)*
PHG PT/C1 010	Tension tester III 150 kg – 300 kg *(300 lb – 700 lb)*
TKBA 31-CB	Toolcase with inlay for TKBA 21 & 31

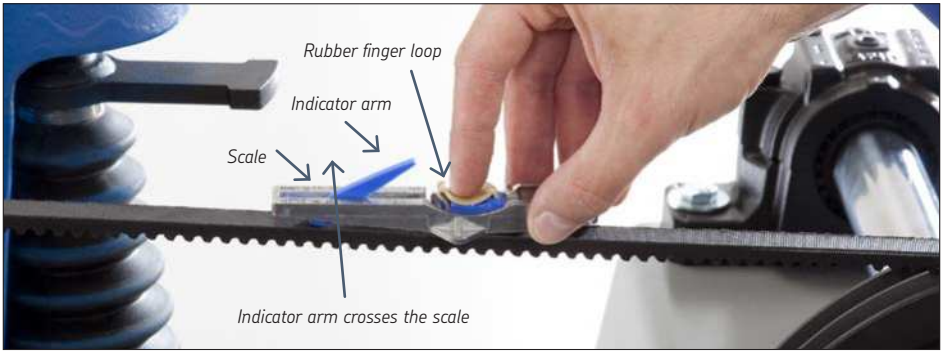


11.Belt tension tester

Designation	Description
PHG PT/C1 008	Tension tester I 15 kg – 70 kg *(30 lb – 150 lb)*
PHG PT/C1 009	Tension tester II 50 kg – 150 kgn *(100 lb – 300 lb)*
PHG PT/C1 010	Tension tester III 150 kg – 300 kg *(300 lb – 700 lb)*
TKBA 31-CB	Toolcase with inlay for TKBA 21 & 31

11.1 Instructions

1. Select the appropriate tester from the tables.
2. With the indicator arm down, place the tester parallel to the side of one belt along the midsection of the span length.
3. Holding the rubber finger loop, apply pressure directly downwards.
4. Stop when you feel and hear the “click”.
5. Remove the tester and read the belt tension by observing the point where the top surface of the indicator arm crosses the numbered scale on the tester body. (See picture)



	WRAPPED belt tension					
	Initial new belt		Run in used belt		Smallest pulley diameter	
Belt type	kg	*lb*	kg	*lb*	mm	*in*
	15	*34*	11	*25*	≤ 80	*≤ 3.2*
A	20	*45*	15	*34*	80 – 100	*3.25 - 4.0*
	31	*67*	25	*56*	101 – 132	*4.1 - 5.25*
	31	*67*	25	*56*	≤ 125	*≤ 5.0*
B	41	*90*	31	*67*	126 – 160	*5.1 - 6.4*
	51	*112*	41	*90*	161 – 200	*6.5 - 8.0*
	71	*157*	51	*112*	≤ 200	*≤ 4.0*
C	82	*180*	61	*135*	201 – 250	*4.1 - 10.0*
	92	*202*	71	*157*	251 – 355	*10.1 - 14.0*
	20	*45*	15	*34*	≤ 71	*≤ 2.8*
SPZ, 3V	25	*56*	20	*45*	72 – 90	*2.9 - 3.5*
	36	*79*	25	*56*	91 – 125	*3.6 - 5.0*
	36	*79*	25	*56*	≤ 100	*≤ 4.0*
SPA	41	*90*	31	*67*	101 - 140	*4.1 - 5.5*
	51	*112*	41	*90*	141 - 200	*5.6 - 4.0*
	66	*146*	51	*112*	≤ 160	*≤ 6.4*
SPB, 5V	71	*157*	56	*124*	161 – 224	*6.5 - 8.9*
	92	*202*	71	*157*	225 – 355	*9.0 - 14.0*
	102	*225*	82	*180*	≤ 250	*≤ 10.0*
SPC	143	*315*	112	*247*	251 - 355	*10.1 - 14.0*
	183	*405*	143	*315*	356 - 560	*14.1 - 22.0*
	22	*50*	17	*37*	≤ 71	*≤ 2.8*
SPZ-XP, 3V-XP	28	*62*	22	*50*	72 – 90	*2.9 - 3.5*
	40	*87*	28	*62*	91 – 125	*3.6 - 5.0*
	40	*87*	28	*62*	≤ 100	*≤ 4.0*
SPA-XP	45	*99*	34	*74*	101 - 140	*4.1 - 5.5*
	56	*123*	45	*99*	141 - 200	*5.6 - 4.0*
	73	*161*	56	*123*	≤ 160	*≤ 6.4*
SPB-XP, 5V-XP	78	*173*	62	*136*	161 – 224	*6.5 - 8.9*
	101	*222*	78	*173*	225 – 355	*9.0 - 14.0*
	112	*248*	90	*198*	≤ 250	*≤ 10.0*
SPB-XP	157	*347*	123	*272*	251 - 355	*10.1 - 14.0*
	201	*446*	157	*347*	356 - 560	*14.1 - 22.0*

	COGGED belt tension					
	Initial new belt		Run in used belt			
Belt type	kg	*lb*	kg	*lb*		
	20	*45*	15	*34*		
AX	25	*56*	20	*45*		
	41	*90*	31	*67*		
	46	*101*	36	*79*		
BX	51	*112*	41	*90*		
	61	*135*	46	*101*		
	82	*180*	61	*135*		
CX	92	*202*	71	*157*		
	102	*225*	82	*180*		
	25	*56*	20	*45*		
XPZ, 3VX	31	*67*	25	*56*		
	41	*90*	31	*67*		
	41	*90*	31	*67*		
XPA	51	*112*	41	*90*		
	61	*135*	46	*101*		
	71	*157*	56	*124*		
XPB, 5VX	87	*191*	66	*146*		
	102	*225*	82	*180*		
	143	*315*	112	*270*		
XPC	163	*360*	122	*270*		
	194	*427*	153	*337*		

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