FAG

FAG Alignment Tools
Top-Laser: SMARTY2 · TRUMMY2 · INLINE · SHIM

Technical Product Information

SCHAEFFLER GROUP
INDUSTRIAL

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The designation system of the INA and FAG brands has been harmonised. This catalogue contains the new ordering designations, which are currently only valid for Europe. Customers outside Europe are requested to continue using the old ordering designations (please see the comparison on page 15).

Tools for belt and chain drives

Belt pulley alignment device FAG Top-Laser SMARTY2

FAG Top-Laser SMARTY2

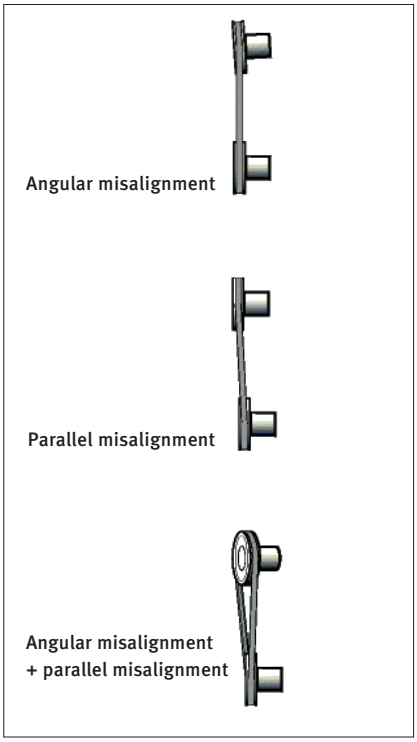
Top-Laser SMARTY2 is an economical measuring device for the alignment of belt pulleys and chain sprockets.
Through the use of this device, the wear of belts, belt pulleys, bearings and seals is reduced. Less vibration is generated and the running time and reliability of the machinery is increased.

Alignment of belt pulleys

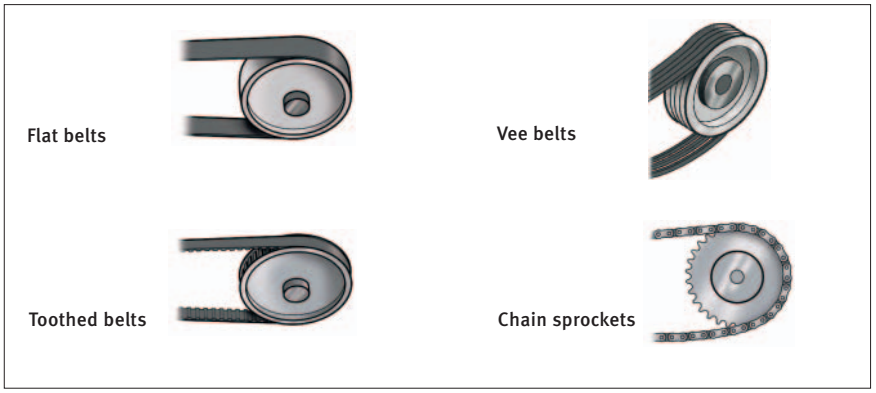
Features and advantages

- Display of parallelism and misalignment of both pulleys
- Significantly quicker and more precise than other, conventional methods
- Suitable for both horizontally and vertically mounted machinery
- Only one person required for alignment
- System can also be used on non-magnetic sprockets or pulleys

Types of misalignment



Main applications



Tools for belt and chain drives

Belt pulley alignment device FAG Top-Laser SMARTY2

Easy to use

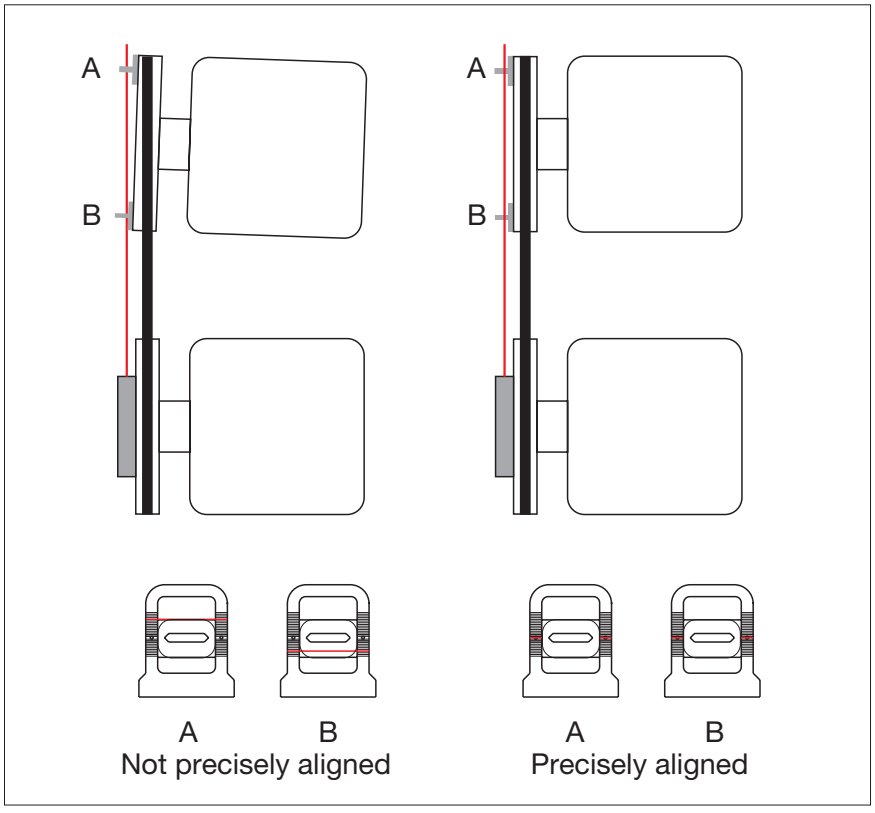
The FAG Top-Laser SMARTY2 can be mounted in just a few seconds. The laser beam can be clearly seen on the target marks. Once the laser beam is adjusted to coincide with the slots in the target marks, the machine is correctly aligned. Nothing could be simpler.

Target marks
The target marks are available in optical and digital form. In the case of the digital target mark, adjustment values are shown in real time in the display. Angular misalignments are presented in degrees and the parallelism offset in mm. This allows simple documentation of the alignment process.

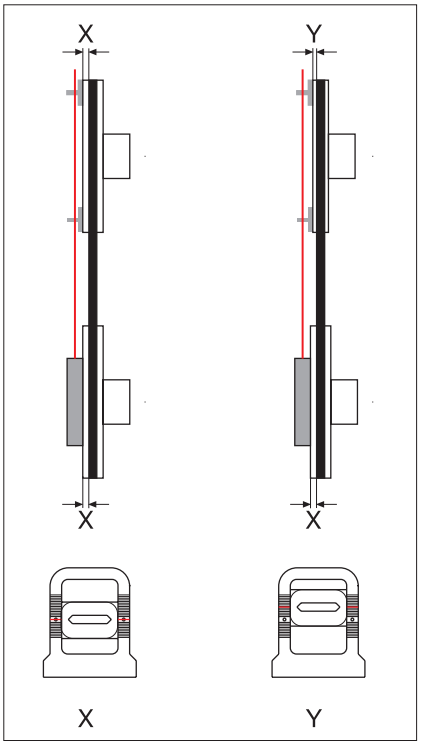
Aluminium pulleys
Since the measuring instrument is so light, the emitter and target marks can be easily attached to non-magnetic drive pulleys using a strong, double-sided adhesive tape.

Laser beam adjustment
The laser beam emitted by the measuring instrument is adjusted parallel to the magnetic holders of the measuring instrument. If a deviation is found, this can be checked locally on a flat surface by the operator and readjustment carried out if necessary.

FAG Top-Laser SMARTY2 in operation



Alignment example using a belt drive



For drives with pulleys of different widths, the marks should be moved within the target marks

Tools for belt and chain drives

Belt pulley alignment device FAG Top-Laser SMARTY2

Technical data

Laser emitter		
Belt pulleys	≥ 60 mm ø	≥ 2,36 in ø
Laser beam angle	78°	
Laser class	2	
Measurement distance	10 m	32,81 feet
Batteries	1 × R6 (AA) 1,5 V	
Battery life	8 h continuous	
Output power	< 1 mW	
Laser wavelength	635...670 nm	
Housings	ABS plastic, aluminium	
Dimensions W × H × D	145 × 86 × 30 mm	5,71 × 3,39 × 1,18 in
Mass	270 g	0,59 lbs
Targets	2 magnetic target marks	
Measurement accuracy	better than 0,5 mm / 0,02 in or 0,2° *)	

*) General rule for deviations (depending on belt type):
less than 0,25° [4,4 mm/m]

FAG Top-Laser SMARTY2

Ordering designation and scope of delivery:

Laser measuring instrument, complete, including 2 target marks, 2 batteries and user manual in padded case:
LASER-SMARTY2

Replacement part:
1 optical magnetic target mark
LASER-SMARTY2.TARGET

Accessories:
1 digital magnetic target mark incl. 1 case for digital magnetic target mark and FAG Top-Laser SMARTY2
LASER-SMARTY2.TARGET-DIGITAL

Digital magnetic target mark (accessory)

Safety advice
Do not look into the laser beam.
Do not point the laser beam into other persons' eyes.

Tools for belt and chain drives

Belt tension measuring device FAG Top-Laser TRUMMY2

FAG Top-Laser TRUMMY2

The robust, handy Top-Laser TRUMMY2 is an optical-electronic instrument for measuring and setting optimum belt tension (strand force). Through the use of this device, the maximum output and and optimum life of belt drives, bearings and seals can be achieved.

Easy to use

The user-friendly Top-Laser TRUMMY2 can be used in many locations and comprises a cableless measurement probe, a measurement probe with cable for difficult to access locations and a microprocessor that indicates relevant measurables for belt tension either as frequency [Hz] or force [N]. By means of an impulse (for example by striking the stationary belt), the tensioned belt is excited to natural vibration. The individual static natural frequency thus generated is measured within seconds by the TRUMMY2 sensor using clock pulse light and displayed. In order to calculate the strand force of the belt drive, the belt mass and length are entered in the microcomputer before measurement. TRUMMY2 uses these to calculate the strand force, which is then compared with the specified nominal value.

Features and advantages

- Maximum life of belt drives can be ensured
- Reduced wear of drive components
- Reduced energy costs and increased cost-efficiency
- Absolutely reliable results due to new measurement method (clock pulse light)
- Simple and easy to use
- Multilingual operator interface

Measurement using cableless measurement probe

Tools for belt and chain drives

Belt tension measuring device FAG Top-Laser TRUMMY2

Technical data

Measurement range	10 Hz to 800 Hz	
Digital sampling error	‹ 1%	
Total error	‹ 5%	
Operating temperature	+10 °C to +50 °C	50 to 122 °F
Housing	ABS plastic	
Device dimensions	80 × 126 × 37 mm	3,15 × 4,96 × 1,46 in
Mass	300 g	
Display	2 lines LCD, 16 characters	
Input limits		
Free strand length	up to 9,990 m	up to 32,7752 feet
Belt mass	up to 9,999 kg/m	up to 6,7190 lbs/feet
Power supply	9 Volt battery	

Ordering designation and scope of delivery:
Laser measuring device in plastic case
incl. 1 cableless measurement probe and 1 measurement probe with cable:
LASER-TRUMMY2

FAG Top-Laser TRUMMY2

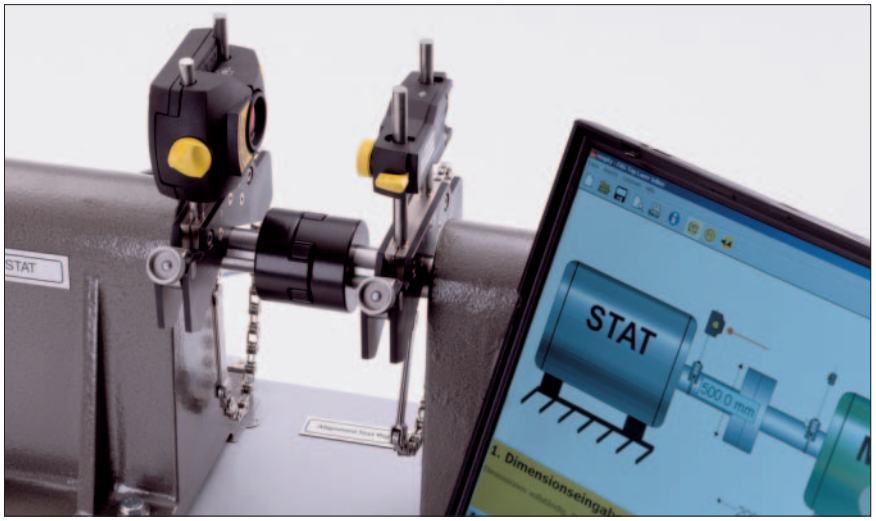
Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE

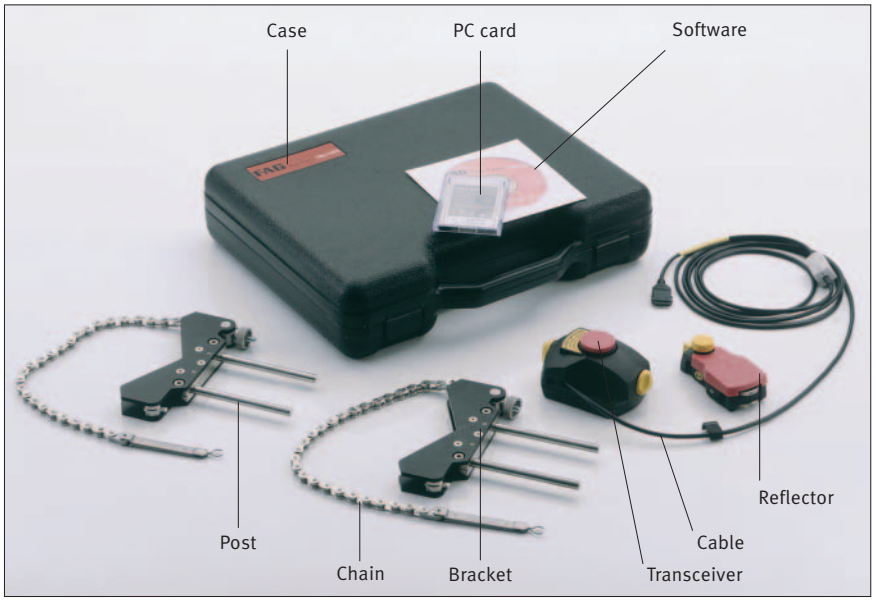
FAG Top-Laser INLINE

More than half of all unplanned machine downtime can be attributed to misalignment and imbalance. These problems can also arise in the use of flexible couplings.

The FAG Top-Laser INLINE is a PC-based system for aligning coupled shafts which can be used to significantly increase the availability of machinery.



FAG Top-Laser INLINE in operation



Scope of delivery of FAG Top-Laser INLINE

Application

The FAG Top-Laser INLINE is suitable for aligning coupled shafts in motors, pumps, ventilators and gearboxes (with rolling bearings).

Features and advantages

- Simple to mount
- Error-free handling even by untrained personnel due to automatic measurement and positioning process
- More precise alignment than with conventional methods (dial gauge and straight edge)
- Rapid measurement by “Continuous Sweep” (continuous rotary motion/patented method); 70° rotary motion is adequate for measurement (any position and rotary motion)
- Optimised measurement by “Single Beam Technology” (double laser travel distance through reflection)
- Reduced vibration and friction losses
- Increased productivity through longer machine running times
- Significantly lower energy consumption
- Suitable for use with standard laptop via PCMCIA interface

Scope of delivery:
1 transceiver (incl. 3 m cable)
1 reflector
2 brackets
2 chains (300 mm)
4 posts (115 mm)
1 software (manual, help CD)
1 case
1 serial PC card

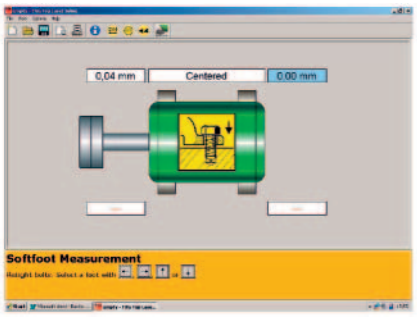
Ordering designation:
Complete FAG Top-Laser INLINE:
LASER-INLINE

Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE

Actions before alignment

Before any alignment operation, any tilting foot (machine foot that lifts off the floor when slackened) should be removed in order to prevent increased vibration tendency and bearing damage due to housing distortion.
The Top-Laser INLINE helps to quickly identify and eliminate the so-called soft foot. It is only necessary to loosen each individual screw foot connection. The computer determines any foot movement.
The foot tilt can then be eliminated using shims (see page 13).



Software with soft foot

Accessories

The possible applications of the LASER-INLINE basic device can be expanded with the aid of a comprehensive range of accessories.
The accessories can be ordered as a set in a handy, robust case or – individually compiled – as individual parts.

Accessories

Accessories for FAG Top-Laser INLINE	Scope of delivery	Ordering designation
Accessory set, complete	1 piece	**LASER-INLINE.ACCESS-SET**
Chain, 600 mm long	2 pieces	**LASER-INLINE.CHAIN600**
Chain, 1500 mm long	2 pieces	**LASER-INLINE.CHAIN1500**
Post, 150 mm long	4 pieces	**LASER-INLINE.POST150**
Post, 200 mm long	4 pieces	**LASER-INLINE.POST200**
Post, 250 mm long	4 pieces	**LASER-INLINE.POST250**
Post, 300 mm long	4 pieces	**LASER-INLINE.POST300**
Magnetic holders	2 pieces	**LASER-INLINE.MAGNET**
Accessory case, empty	1 piece	**LASER-INLINE.CASE-ACCESSORIES**

Chains

For mounting of brackets on shafts
- 600 mm long for max. shaft diameter of 200 mm
- 1500 mm long for max. shaft diameter of 500 mm

Posts

For mounting of measuring components on clamping device
- 150 mm long
- 200 mm long
- 250 mm long
- 300 mm long

Magnetic holders

For rapid mounting and fine adjustment of measuring components on narrow coupling flanges

Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE

Transceiver

Compact, robust transceiver for visible laser beam (red)

Ordering designation:
LASER-INLINE.TRANS

Cable

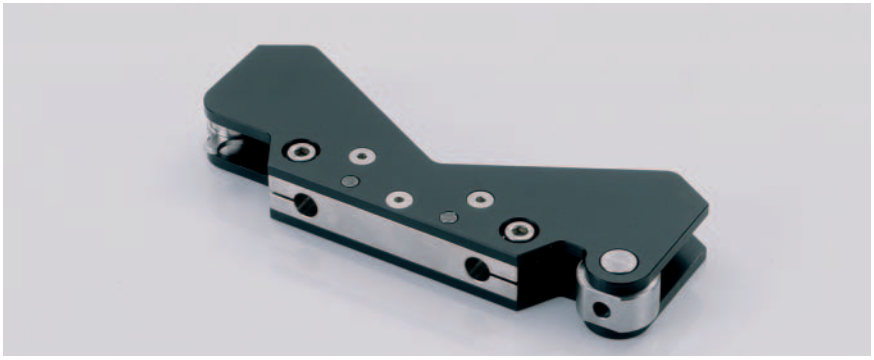
For supplying power to transceiver and exchanging data with control unit

Ordering designation:
LASER-INLINE.CABLE

Reflector

Roof prism with compact housing, mounted on clamping device by means of lever

Ordering designation:
LASER-INLINE.REFLECT



Bracket

Basic element of compact chain clamping device

Ordering designation:
LASER-INLINE.BRACKET

2 chains, available in lengths 300, 600, 1500 mm

For max. shaft diameters 100 mm, 200 mm, 500 mm for mounting of brackets on shafts

Ordering designations:
LASER-INLINE.CHAIN300
LASER-INLINE.CHAIN600
LASER-INLINE.CHAIN1500

Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE

4 posts, available in lengths 115 mm, 150 mm, 200 mm, 250 mm, 300 mm

For mounting of measuring components on clamping device

Ordering designations:
LASER-INLINE.POST115
LASER-INLINE.POST150
LASER-INLINE.POST200
LASER-INLINE.POST250
LASER-INLINE.POST300

Software

Windows-compatible PC program for storage of machine dimensions and alignment conditions, evaluation and printing of results

Ordering designation:
LASER-INLINE.SOFTW

Case

Black plastic case with foam insert for safe transport of the device

Ordering designation:
LASER-INLINE.CASE

PC card (type II)

Insertion in PC for connection to FAG Top-Laser INLINE

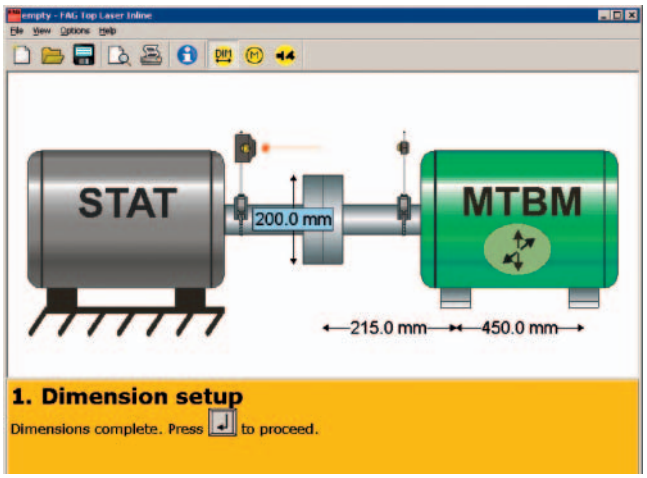
Ordering designation:
LASER-INLINE.PCCARD

Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE

Easy to use

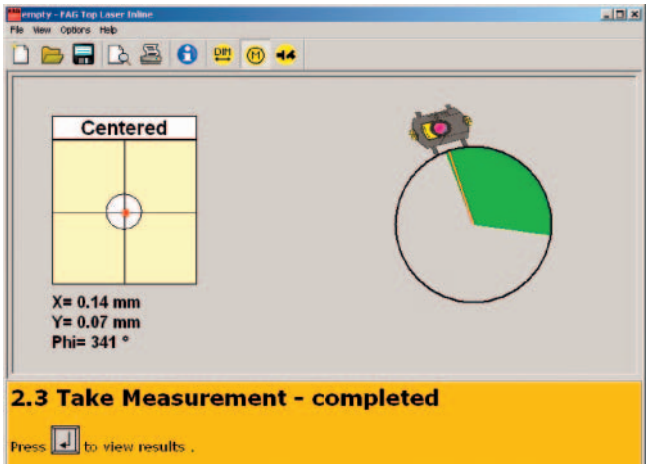
Before alignment, eliminate any foot tilt (see page 8).
Mount the chain clamping device at the same angle on both sides of the shaft coupling.
Mount the transceiver on the side of the shaft coupling defined as stationary (pump, ventilator).
Mount the reflector on the side of the shaft coupling defined as movable (motor).
Connect the transceiver to the PC card, insert the card in the laptop. The FAG Top-Laser INLINE software will start.
DIM – Enter three machine dimensions, see example “Input data for coupling”.



Input data for coupling

M – Enter position of transceiver and reflector relative to the coupling.
The laser beam is centred on the screen in accordance with the instructions, see example “Scan”.

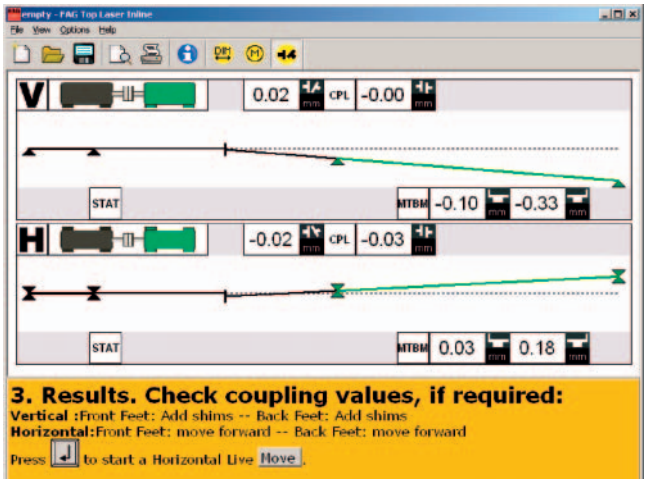
The deviations in the horizontal and vertical directions are measured by rotating the coupled shaft by at least 70° (in any direction).



Scan

ERG – The result is given as the amounts in mm (inch), by which the front or rear foot must be adjusted up or down (by inserting or removing the shims Top-Laser SHIM, see page 13). For horizontal alignment, the feet are moved (see animation).

Finally, correct alignment is checked by means of a verification measurement.



Measurement results

Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE

Technical data

Transceiver		
Measurement method:	coaxial, reflected laser beam	
Protection class:	IP67 (dustproof, water proof under temporary immersion)	
Protection against ambient light:	yes	
Storage:	–20 to +80 °C	–4 to +176 °F
Operation:	0 to 55 °C	32 to 131 °F
Dimensions (W × H × D):	approx. 107 × 70 × 49 mm	approx. 4,213 × 2,756 × 1,929 in
Mass:	approx. 177 g	approx. 0,39 lbs

Laser (Ga-Al-As semiconductor laser)		
Wavelength (typical):	670 nm (red, visible)	
Laser class:	2; FDA 21CFR 1000 & 1040	
Beam power:	< 1 mW	
Interface:	Serial I/0 PCMCIA card, type II	
Max. distance:	3m	9,84 feet

Detector		
Measurement range:	± 4 mm	± 0,157 in
Resolution:	1 µm	
Accuracy:	better than 2 %	

Inclinometer	
Measurement range:	0 to 360°
Resolution:	less than 1°

Reflector		
Type:	90° roof prism	
Protection class:	IP67 (dustproof, waterproof under temporary immersion)	
Accuracy:	better than 1 %	
Storage:	–20 to +80 °C	–4 to +176 °F
Operation:	–20 to +60 °C	–4 to +140 °F
Dimensions (W × H × D):	approx. 100 × 41 × 35 mm	approx. 3,937 × 1,614 × 1,378 in
Mass:	approx. 65 g	approx. 0,143 lbs

Carry case		
Material:	standard ABS, black, drop tested (2 m)	
Dimensions (W × H × D):	approx. 470 × 400 × 195 mm	approx. 18,503 × 15,748 × 7,677 in
Mass with standard components:	approx. 6,8 kg	approx. 15 lbs

Range of application		
Shaft diameter:	min. 12 mm, max. 500 mm (with accessories)	min. 0,472 in, max. 19,685 in

Accessories for alignment

Shims FAG Top-Laser SHIM

FAG Top-Laser SHIM

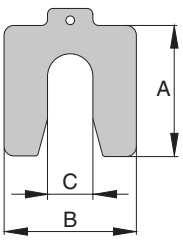
Any vertical misalignment detected by the FAG Top-Laser can be eliminated using FAG Top-Laser SHIM. These shims are available in seven thickness values (0,05; 0,10; 0,20; 0,50; 0,70; 1,00 and 2,00 mm) and four sizes (dimension C = 15, 23, 32 or 44 mm).

Contents of a set (basic version):

The handy case contains **20** shims in each of 3 sizes C = 15, 23 and 32 mm) and 6 thicknesses (0,05 to 1,00 mm), i.e. a total of **360** shims plus 1 extraction hook

Ordering designation:
LASER.SHIM-SET

Scope of delivery of Top-Laser SHIM



FAG Top-Laser SHIM Set

Ordering designation Set	Dimensions A	B	C	Thickness	Total quantity Shims	Mass
	mm					kg
LASER.SHIM-SET	55	50	15	0,05–1,0	360	6,7
	75	70	23	0,05–1,0		
	90	80	32	0,05–1,0		

Accessories for alignment

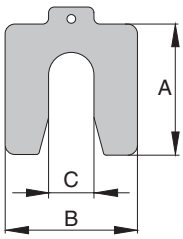
Shims FAG Top-Laser SHIM

Individual or spare parts

As individual or spare parts, we supply **10** shims each in one of the four sizes stated above (dimension C = 15, 23, 32 or 44 mm) and one of the seven thicknesses.

Ordering examples:

- 10 shims each of dimension C = 15 mm and 0,20 mm thickness: **LASER.SHIM15X0,20**
- 10 shims each of dimension C = 44 mm and 0,10 mm thickness: **LASER.SHIM44X0,10**
- 10 shims each of dimension C = 23 mm and 2,00 mm thickness: **LASER.SHIM23X2,00**



Individual parts and spare parts for FAG Top-Laser SHIM

Ordering designation FAG	Dimensions A mm	B	C	Thickness	Number of shims	Mass g
LASER.SHIM15X0,05	55	50	15	0,05	10	11
LASER.SHIM15X0,10	55	50	15	0,10	10	22
LASER.SHIM15X0,20	55	50	15	0,20	10	44
LASER.SHIM15X0,50	55	50	15	0,50	10	110
LASER.SHIM15X0,70	55	50	15	0,70	10	155
LASER.SHIM15X1,00	55	50	15	1,00	10	220
LASER.SHIM15X2,00	55	50	15	2,00	10	440
LASER.SHIM23X0,05	75	70	23	0,05	10	21
LASER.SHIM23X0,10	75	70	23	0,10	10	42
LASER.SHIM23X0,20	75	70	23	0,20	10	84
LASER.SHIM23X0,50	75	70	23	0,50	10	210
LASER.SHIM23X0,70	75	70	23	0,70	10	295
LASER.SHIM23X1,00	75	70	23	1,00	10	420
LASER.SHIM23X2,00	75	70	23	2,00	10	840
LASER.SHIM32X0,05	90	80	32	0,05	10	29
LASER.SHIM32X0,10	90	80	32	0,10	10	58
LASER.SHIM32X0,20	90	80	32	0,20	10	115
LASER.SHIM32X0,50	90	80	32	0,50	10	290
LASER.SHIM32X0,70	90	80	32	0,70	10	410
LASER.SHIM32X1,00	90	80	32	1,00	10	580
LASER.SHIM32X2,00	90	80	32	2,00	10	1160
LASER.SHIM44X0,05	125	105	44	0,05	10	53
LASER.SHIM44X0,10	125	105	44	0,10	10	105
LASER.SHIM44X0,20	125	105	44	0,20	10	210
LASER.SHIM44X0,50	125	105	44	0,50	10	530
LASER.SHIM44X0,70	125	105	44	0,70	10	740
LASER.SHIM44X1,00	125	105	44	1,00	10	1050
LASER.SHIM44X2,00	125	105	44	2,00	10	2100

Comparison of ordering designations

Ordering designation for Europe	Ordering designation for countries outside Europe
LASER-INLINE	LASER.INLINE
LASER-INLINE.ACCESS-SET	LASER.INLINE.ACCESS.SET
LASER-INLINE.BRACKET	LASER.INLINE.BRACKET
LASER-INLINE.CABLE	LASER.INLINE.CABLE
LASER-INLINE.CASE	LASER.INLINE.SUITCASE
LASER-INLINE.CASE-ACCESSORIES	LASER.INLINE.ACCESS.SUITCASE
LASER-INLINE.CHAIN300 (~600; ~1500)	LASER.INLINE.CHAIN300 (~600; ~1500)
LASER-INLINE.MAGNET	LASER.INLINE.MAGNET
LASER-INLINE.PCCARD	LASER.INLINE.PCCARD
LASER-INLINE.POST115 (~150; ~200; ~250; ~300)	LASER.INLINE.POST115 (~150; ~200; ~250; ~300)
LASER-INLINE.REFLECT	LASER.INLINE.REFL
LASER-INLINE.SOFTW	LASER.INLINE.SOFTWARE
LASER-INLINE.TRANS	LASER.INLINE.TRANS
LASER.SHIM-SET	LASER.SHIMS.SET
LASER.SHIM15X0,05 (~0,10; ~0,20 ... ~2,00)	LASER.SHIMS15.0,05 (~0,10; ~0,20 ... ~2,00)
LASER.SHIM23X0,05 (~0,10; ~0,20 ... ~2,00)	LASER.SHIMS23.0,05 (~0,10; ~0,20 ... ~2,00)
LASER.SHIM32X0,05 (~0,10; ~0,20 ... ~2,00)	LASER.SHIMS32.0,05 (~0,10; ~0,20 ... ~2,00)
LASER.SHIM44X0,05 (~0,10; ~0,20 ... ~2,00)	LASER.SHIMS44.0,05 (~0,10; ~0,20 ... ~2,00)
LASER-SMARTY2	LASER.SMARTY2
LASER-SMARTY2.TARGET	LASER.SMARTY2.TARGET
LASER-SMARTY2.TARGET-DIGITAL	LASER.SMARTY2.TARGET.DIGITAL
LASER-TRUMMY2	LASER.TRUMMY2

F’IS products, services and training – everything from a single source

FAG Industrial Services (F’IS) is a full service supplier in the field of condition-based maintenance. With the sourcing of high quality F’IS products, the customer thus gains access to a range of product-oriented services relating to rolling bearings: from mounting, through maintenance to reconditioning of rolling bearings (see diagram).

In the field of alignment, F’IS offers not only service products but also professional alignment as a service. Where necessary, the F’IS service technician will take the necessary laser alignment system to the customer and carry out alignment of the machine in accordance with the manufacturer’s specifications. Successful completion of the work is then documented.

On the basis of product presentations, we will be pleased to instruct our customers where necessary in the use and handling of alignment devices so that they are then in a position to carry out such alignment work themselves. If you have any further questions on our services, please contact us direct or visit our website.

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