FAG

FAG Alignment Tools
Top-Laser: SMARTY2 · TRUMMY2 · INLINE2 · SHIM

SCHAEFFLER GROUP
INDUSTRIAL

Contents

This Technical Product Information contains the current ordering designations of Schaeffler Group Industrial. Different designations may be used as appropriate in some countries (please see the comparison on page 17).

Tools for belt and chain drives

Belt pulley alignment device FAG Top-Laser SMARTY2

FAG Top-Laser SMARTY2

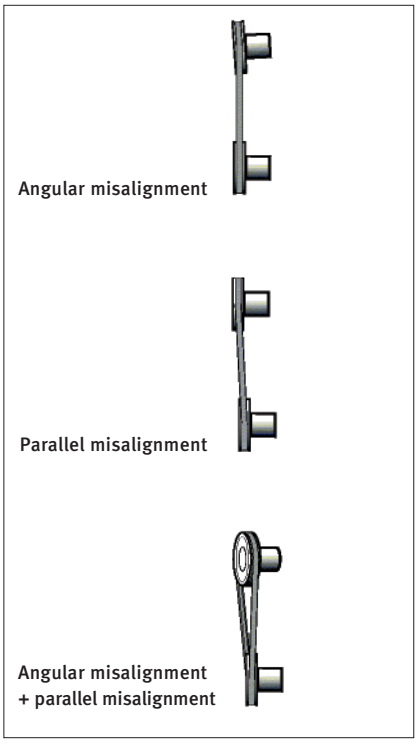
The FAG Top-Laser SMARTY2 is an economical measuring device for the alignment of belt pulleys and chain sprockets.
Through the use of this device, the wear of belts, belt pulleys, bearings and seals is reduced. Less vibration is generated and the running time and reliability of the machinery is increased.

Alignment of belt pulleys

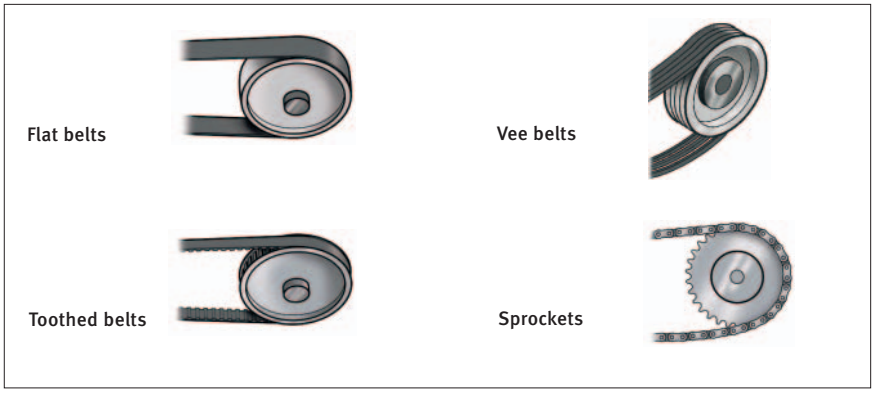
Features and advantages

- Parallelism and misalignment of both pulleys displayed
- 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.

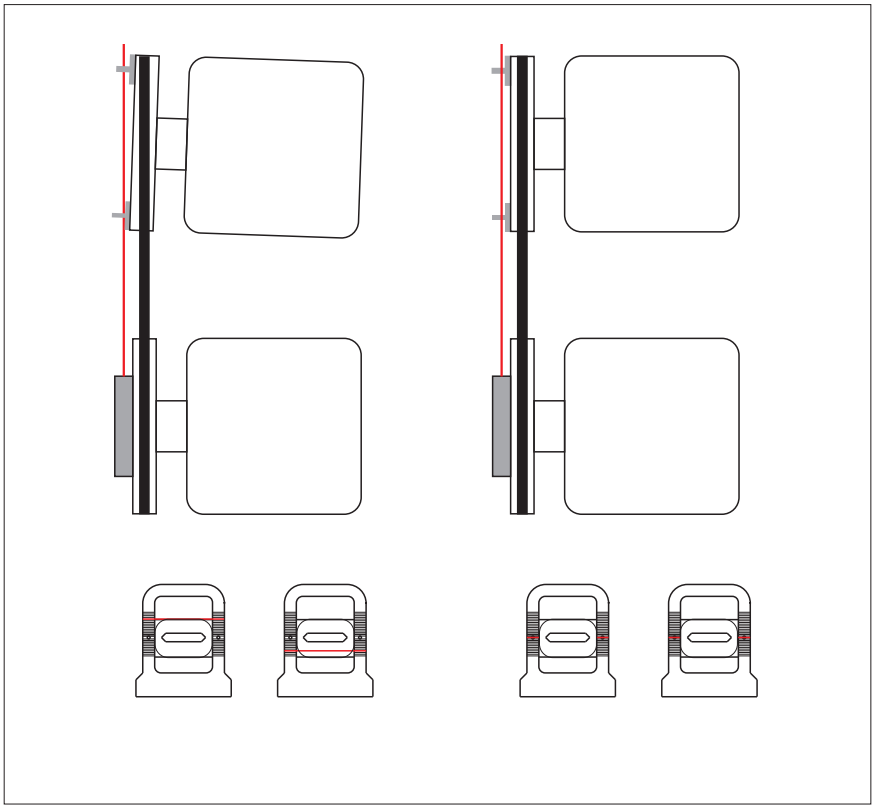
Target marks
The target marks are available in optical and digital form. In the case of the digital target mark, adjustment values are shown in real time in the display. Angular misalignments are presented in degrees and the parallel misalignment in mm.

This allows simple documentation of the alignment process.

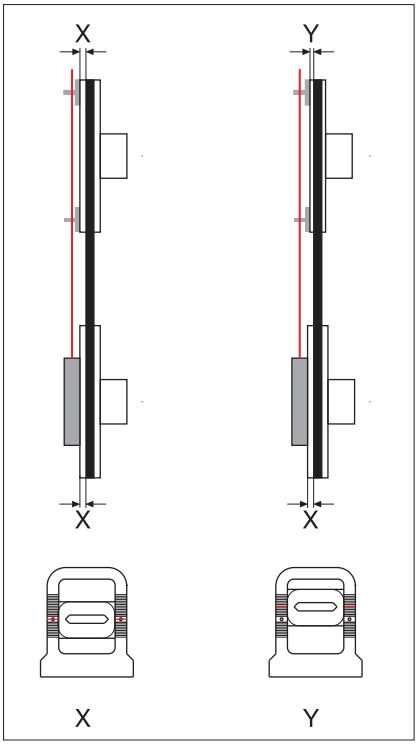
Aluminium pulleys
Since the measuring instrument is so light, the emitter and target marks can be easily attached to non-magnetic drive pulleys using a strong, double-sided adhesive tape.

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.

FAGTop-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
Laser beam angle	78°
Laser class	2
Measurement distance	10 m
Batteries	1 × R6 (AA) 1,5 V
Battery life	8 h continuous
Output power	< 1 mW
Laser wavelength	635...670 nm
Housing	ABS plastic, aluminium
Device dimensions	
W × H × D	145 × 86 × 30 mm
Mass	270 g
Targets	2 magnetic target marks
Measurement accuracy	better than 0,5 mm 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

Calibration:
It is recommended that the FAG Top-Laser SMARTY2 should be calibrated every two years (to ISO 9001-2000)
LASER-SMARTY.CALI-CHECK

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

Digital magnetic target mark (accessory)

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 FAG Top-Laser TRUMMY2 can be used in many locations and comprises a cableless measurement probe, a measurement probe with a cable for difficult to access locations and a handheld device 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 FAG Top-Laser 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 FAG TRUMMY2 before measurement. The device 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
Housing	ABS plastic
Device dimensions	80 × 126 × 37 mm
Mass	300 g
Display	2 lines LCD, 16 characters
Input limits	
Free strand length	up to 9,990 m
Belt mass	up to 9,999 kg/m
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

Calibration:
It is recommended that the FAG Top-Laser TRUMMY2 should be calibrated every two years (to ISO 9001-2000)
LASER-TRUMMY.CALI-CHECK

FAG Top-Laser TRUMMY2

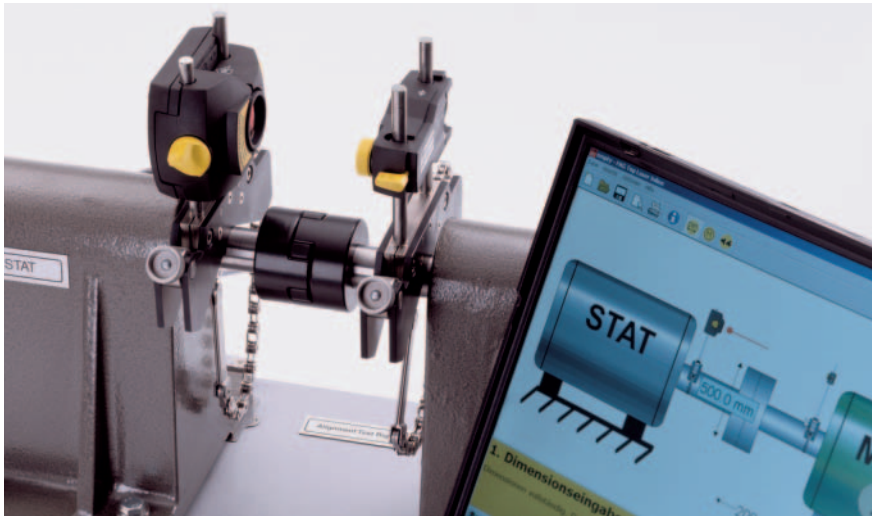
Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE2

FAG Top-Laser INLINE2

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 INLINE2 is a PC-based system for aligning coupled shafts which can be used to significantly increase the availability of machinery.



FAG Top-Laser INLINE2 in operation

Scope of delivery of FAG Top-Laser INLINE2

Application

The FAG Top-Laser INLINE2 is suitable for aligning coupled shafts in motors, pumps, ventilators and gearboxes (with rolling bearings).

Features and advantages

- Easy to fit
- 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 measurement mode; at least 70° rotary motion is adequate for measurement (any position and direction of rotation)
- Optimised for commonly available netbook or laptop with USB interface
- Optional wireless connection for user-friendly handling without troublesome tangle of cables
- Reduced vibration and friction losses
- Increased productivity through longer machine running times
- Significantly lower energy consumption.

Scope of delivery:
1. 1 transceiver (incl. 3 m cable)
2. 1 reflector
3. 2 brackets
4. 2 chains (300 mm)
5. 4 posts (115 mm)
6. Software (manual, help CD)
7. Case
8. USB adapter

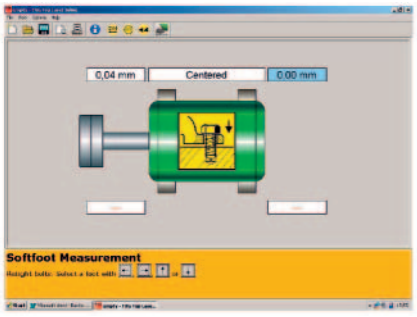
Ordering designation:
FAG Top-Laser INLINE2 complete:
LASER-INLINE2

Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE2

Actions before alignment

Before any alignment operation, any soft foot (machine foot that lifts off the floor when slackened) should be removed in order to avoid faulty measurements due to housing distortion.
The FAG Top-Laser INLINE2 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 soft foot can then be eliminated using shims (see page 13).



Software with soft foot

Accessories

The possible applications of the 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 INLINE2	Scope of delivery	Ordering designation
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 incl. 4 posts, 150 mm long	1 piece	**LASER-INLINE.MAGNET**
Accessory set, complete	1 piece	**LASER-INLINE.ACCESS-SET** Contains all the items named above
Wireless upgrade	1 piece	**LASER-INLINE2.UPG-WI**

Chains

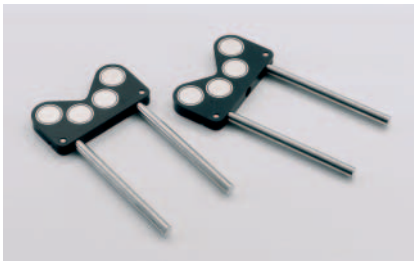
For mounting of brackets on shafts
- 600 mm long
  for max. shaft diameter of 200 mm
- 1500 mm long
  for max. shaft diameter of 500 mm

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 of shafts with a diameter of more than 500 mm.



Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE2

Transceiver

Compact, robust transceiver as source and recipient 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-INLINE2.USB-ADAP-CABLE

USB adapter

Adapter for connecting
FAG Top-Laser INLINE2 to the
USB port on the netbook

Ordering designation:
LASER-INLINE2.USB-ADAP

Reflector

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

Ordering designation:
LASER-INLINE.REFLECT

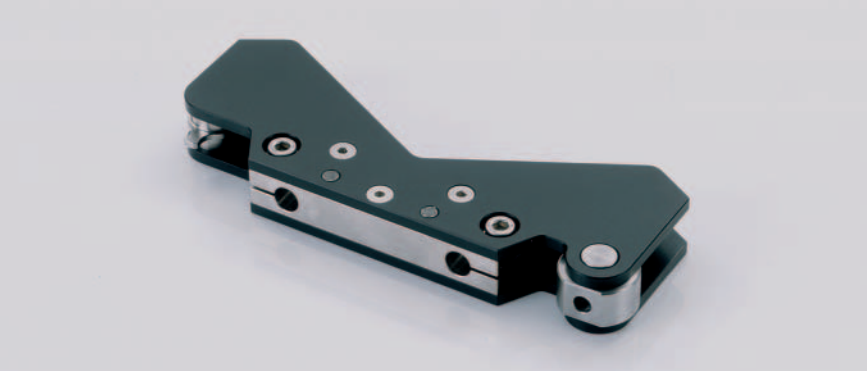
Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE2

Bracket

Basic element of compact chain clamping device

Ordering designation:
LASER-INLINE.BRACKET



Chains, available in lengths 300 mm, 600 mm, 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
Minimum order quantity:
2 pieces each

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
Minimum order quantity:
4 pieces each

Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE2

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-INLINE2.CASE

Calibration

It is recommended to check the calibration of FAG Top-Laser INLINE2 every two years (to ISO 9001-2000)
LASER-INLINE.CALI-CHECK

If the measurement results are out of tolerance, relinearisation is necessary
LASER-INLINE.CALI-RELIN

Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE2

Easy to use

Before alignment, eliminate any soft foot (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 netbook using the USB adapter. The FAG Top-Laser INLINE2 software will start.

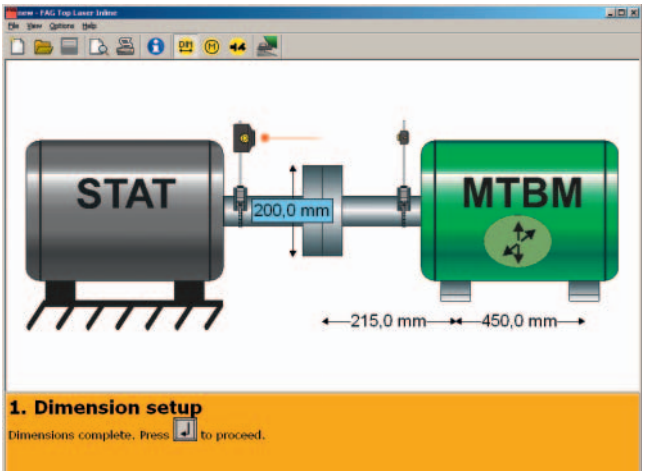
Enter three machine dimensions, see example “Input data for coupling”.

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”.

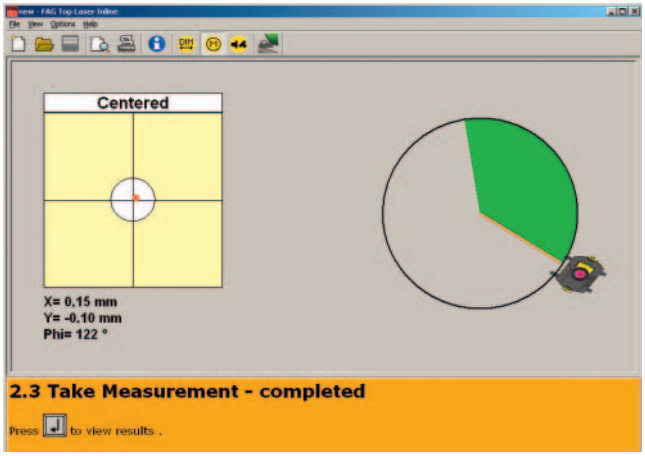
The deviations in the horizontal and vertical directions are measured by rotating the coupled shaft by at least 70° (in any direction).

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 FAG Top-Laser SHIM, see page 13). The horizontal alignment can be monitored and corrected in real time on the screen (live view).

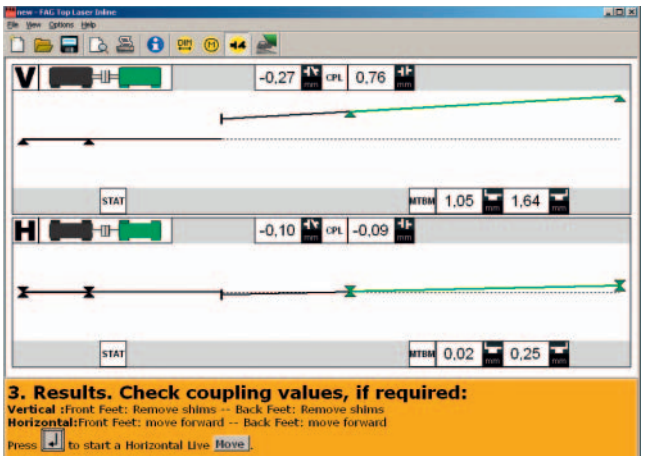
Finally, correct alignment is checked by means of a verification measurement.



Entering machine dimensions



Rotating the shaft for measurement



Viewing measurement results

Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE2

Technical data

Transceiver	
Measurement method:	coaxial, reflected laser beam
Protection class:	IP67 (dustproof, immersion proof)
Protection against ambient light:	yes
Storage:	–20 °C to +80 °C
Operation:	0 °C to +55 °C
Dimensions (W × H × D):	approx. 107 mm × 70 mm × 49 mm
Mass:	approx. 177 g

Laser (Ga-Al-As semiconductor laser)	
Wavelength (typical):	670 nm (red, visible)
Laser class:	2; FDA 21CFR 1000 & 1040
Beam power:	< 1 mW
Interface:	USB 2.0 via adapter
Max. recommended distance:	3 m

Detector	
Measurement range:	± 4 mm
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, immersion proof)
Accuracy:	better than 1 %
Storage:	–20 °C to +80 °C
Operation:	–20 °C to +60 °C
Dimensions (W × H × D):	approx. 100 mm × 41 mm × 35 mm
Mass:	approx. 65 g

Tools for shaft couplings

Shaft alignment device FAG Top-Laser INLINE2

Carry case	
Material:	standard ABS, black
Dimensions (W × H × D):	approx. 460 mm × 380 mm × 170 mm
Mass of components:	approx. 3,7 kg

Range of application	
Shaft diameter:	min. 12 mm, max. 500 mm (with standard chains). Larger shaft diameters possible using magnetic holders.

USB adapter	
Connector:	USB 2.0

Wireless module (optional)	
Range:	10 m
Power supply:	2 × AA batteries (rechargeable batteries can be used)

Software	
Operating system:	Windows 2000/XP
System requirements:	Screen resolution optimised for 1024 × 576 Hardware: See minimum requirements for Windows 2000/XP

Accessories for alignment

Shims FAG Top-Laser SHIM

FAG Top-Laser SHIM

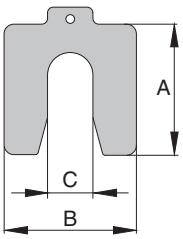
Any vertical misalignment detected by the FAG Top-Laser can be eliminated using shims FAG Top-Laser SHIM. These shims are available in seven thickness values (0,05; 0,10; 0,20; 0,50; 0,70; 1,00 and 2,00 mm) and four sizes (dimension C = 15, 23, 32 or 44 mm).

Scope of delivery 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 FAG 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

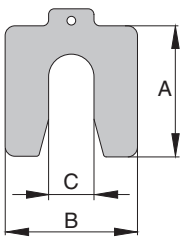
Shims FAG Top-Laser SHIM

Individual or replacement 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 of dimension C = 15 mm and 0,20 mm thickness: **LASER.SHIM15X0,20**
- 10 shims of dimension C = 44 mm and 0,10 mm thickness: **LASER.SHIMS44X0,10**
- 10 shims of dimension C = 23 mm and 2,00 mm thickness: **LASER.SHIMS23X2,00**



Individual parts and spare parts for FAG Top-Laser SHIM

Ordering designation FAG	Dimensions A	B	C	Thickness	Number of shims	Mass
	mm					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	1 160
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	1 050
LASER.SHIM44X2,00	125	105	44	2,00	10	2 100

Comparison of ordering designations

Current ordering designation (EP1)	Old ordering designation (Pxx)
LASER-INLINE2	LASER.INLINE2
LASER-INLINE.ACCESS-SET	LASER.INLINE.ACCESS.SET
LASER-INLINE.BRACKET	LASER.INLINE.BRACKET
LASER-INLINE2.USB-ADAP-CABLE	LASER.INLINE2.USB.ADAP.CABLE
LASER-INLINE2.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-INLINE2.USB-ADAP	LASER.INLINE2.USB.ADAP
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-INLINE.CALI-RELIN	LASER.INLINE.CALI.RELIN
LASER-INLINE2.UPG-USB	LASER.INLINE2.UPG.USB
LASER-INLINE2.UPG-WI	LASER.INLINE2.UPG.WI
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-SMARTY.CALI-CHECK	LASER.INLINE.CALI.CHECK
LASER-TRUMMY2	LASER.TRUMMY2
LASER-TRUMMY.CALI-CHECK	LASER.TRUMMY.CALI.CHECK

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.

Notes

Notes

MATNR 035582600-0000 / TPI 182 / GB-D / 200911 / pdf only

Schaeffler KG

Postfach 1260
97419 Schweinfurt (Germany)

Georg-Schäfer-Straße 30
97421 Schweinfurt (Germany)

Phone +49 2407 9149-66
Fax +49 2407 9149-59

E-Mail info@fis-services.com
Internet www.fis-services.com

TPI 182 GB-D