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ROTALIGN® PRO

System

Operating Instructions

Overview:

Part 1
ROTALIGN® PRO
System operating instructions

Part 2
ROTALIGN® PRO
Shaft alignment
operating instructions

Part 3
ROTALIGN® PRO
Straightness & flatness
operating instructions

Part 4
BORALIGN®
Operating instructions

Dear Customer,

If you have any suggestions for improvement or corrections (not only to this manual, but also to software or hardware), please drop us a line! We would be glad to make improvements wherever possible. We look forward to hearing from you!

CE

Edition May 2003
ALI 9.645G

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Foreword

Congratulations! And thank you for your decision to entrust the progressive, professional ROTALIGN PRO system with your precision shaft alignment.

Progressive: Well over a decade of leadership in laser-optical shaft alignment has given PRÜFTECHNIK AG the know-how to provide you with the very latest technological advantages in easy-to-use form.

Professional: Field-tested functionality is the result of continuous improvement thanks to input from thousands of alignment specialists worldwide. ROTALIGN PRO is designed to give you the practical features you need for everyday alignment, yet lets you handle special situations with ease.

ROTALIGN PRO builds upon the successful ROTALIGN alignment system with many powerful new features:

- Machine train alignment of up to six elements
- Enhanced soft foot diagnostic function
- Machine templates, including dimensions, alignment targets, coupling type, etc.
- Straightness measurement (optional)
- Enhanced alignment history function provides step-by-step traceability of alignment job
- Cardan shaft alignment with special mounting bracket
- High-capacity 4 MB data storage card
- Computation of thermal growth based upon material coefficient of expansion and machine geometry
- Two-level tolerance tables

Of course, the new ROTALIGN PRO also includes the proven advantages of ROTALIGN:

- Convenient operation thanks to user guidance in display, graphic operating elements and on-screen softkey labels
- Rugged industrial components (IP65/67)
- Connections for printer and PC
- Ability to handle special machine characteristics such as flange-mounted machines, V-shaped foundations, coupling types, etc.
- Hard-copy alignment reports
- Power-saving functions for automatic 'sleep' and shutoff
- Different measurement procedures for different tasks, such as uncoupled shafts or entry of dial indicator values
- Compensation for thermal growth values entered either directly at the coupling or as expected growth at machine feet
- Alignment of vertical machines

Please let us know of your ideas and suggestions for development – by mail, fax or over the Internet at www.pruftechnik.com. As always, we will be more than happy to include them in future product versions!

PRÜFTECHNIK Alignment October 2000
Ismaning, Germany

Contents

This manual covers all general aspects of ROTALIGN PRO system hardware, including basic operating procedures for the computer. All application-specific instructions and hardware descriptions can be found the manuals for shaft alignment (ALI 9.646G) and straightness measurement (ALI 9.648G).

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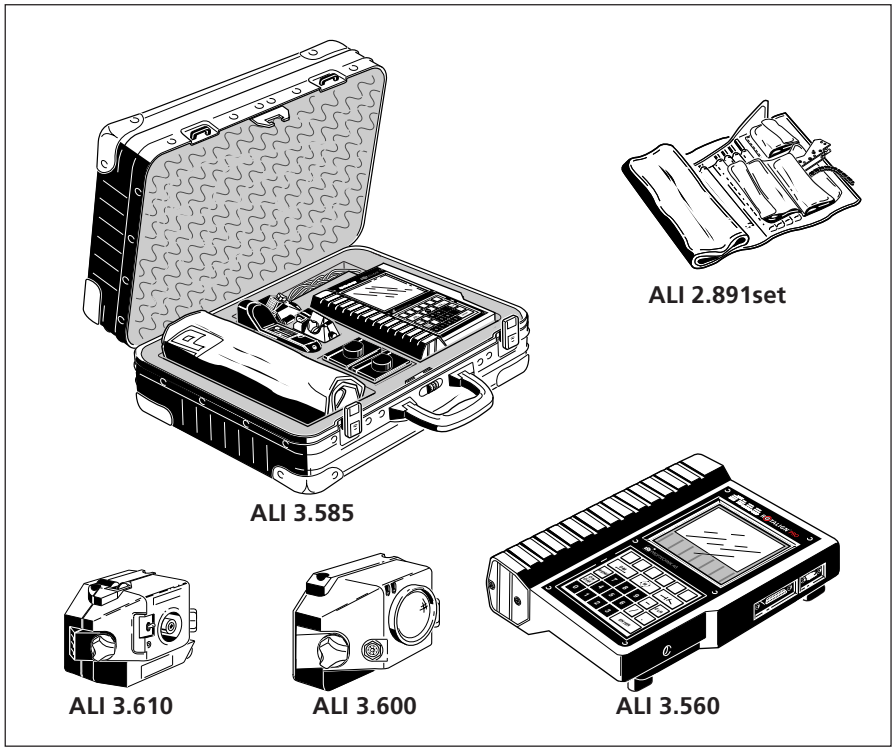
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Chapter 1: Introduction

The ROTALIGN PRO package ALI 3.501

ALI 3.501EX*

*Intrinsically safe version (see also page 1-10)



The ROTALIGN package contains the following items:

ALI 3.585 ROTALIGN Case (ABS, black)
with key and combination locks (page 4-4).

ALI 3.560 ROTALIGN PRO Computer
Processes alignment measurements and displays results. Battery or mains operated (page 2-2).

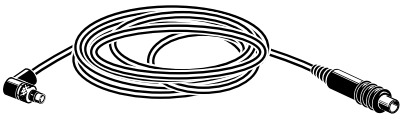
ALI 3.610 ROTALIGN Laser
incl. dust cap, incl. 9 V battery; mounted on left side of machine coupling (page 2-12)

.

ALI 3.600 ROTALIGN Receiver
incl. dust cap Mounted on right side of coupling and connected to computer (page 2-14).

ALI 2.891set Compact chain-type bracket set in pouch
Mounts the components on the shafts (page 2-16).

The ROTALIGN PRO package



ALI 3.581-2



ALI 3.592



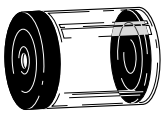
ALI 9.644G



ALI 9.645G
ALI 9.646G



ALI 3.588



ALI 3.608

Not shown:

ALI 2.800	1.5V battery (6 pcs.)
90109	9V battery
ALI 2.905	Optics cleaning cloth,
0 0739 1055	Allen wrench, 2.5 mm, for battery compartment

ALI 3.581-2 **ROTALIGN Receiver cable 2 m (6½ ft.)**
Connects receiver to computer (page 2-11).

ALI 9.644G **ROTALIGN PRO Getting Started**
short instructions

ALI 9.645G **ROTALIGN PRO system instructions (Part 1)**
system components and basic operation

ALI 9.646G **ROTALIGN PRO**
shaft alignment instructions (Part 2)

ALI 3.592 **ROTALIGN PRO Commander**
demonstration version (without license)

ALI 3.608 **Adjustment tube**
for centering laser beam (page 2-15)

ALI 3.588 **Tape measure, mm/inch**

More accessories can be found on pages 4-5 to 4-14. Contact your PRÜFTECHNIK AG distributor for pricing and further details.

Before you start!

About this manual

This first portion of the ROTALIGN PRO manual is complemented by the shaft alignment instruction manual (Part 2, ALI 9.646G) and the straightness measurement instruction manual (Part 3, ALI 9.648G). This manual contains a complete description of the ROTALIGN PRO alignment system:

1. Introduction (safety and operating notes)
2. Description of main components
3. Configuration and data handling procedures
4. Appendix (technical data, troubleshooting, accessories, etc.)

Details on operating the different measurement programs can be found in the corresponding manuals, Parts 2 and 3 mentioned above.

Everyone

Please acquaint yourself first with the operating and safety notes given on page 1-9.

Beginners

Read through the sections on the ROTALIGN PRO components (Chapter 2) and on alignment theory and practice (Part 2, page 5-1). Then try an actual alignment by following the shaft alignment instruction manual (Part 2, ALI 9.646G).

Experts

Observe the new procedures described in the system configuration and data handling sections (Chapter 3). Follow the guidance messages that appear on screen.

Safety and operating information

This section contains the most important information regarding the safe operation of the ROTALIGN PRO alignment system. Before using the system, you must first familiarize yourself with this section, in particular, the safety information.

Symbols

The following symbols are used in this handbook to call your attention to important sections of text. The sections of text point out possible dangers or provide useful information for operating the ROTALIGN PRO.



WARNING!

This symbol warns of potential hazards.



ATTENTION

This symbol denotes information which must be followed in order to avoid damage to equipment.



Note

This symbol denotes general information and tips regarding operation of the ROTALIGN PRO.

Intended use

ROTALIGN PRO to be used exclusively for aligning shafts in industrial environments. The device and its accessories must be operated only by specially trained personnel.

PRÜFTECHNIK AG assumes no liability when components or operating procedures as described in this manual are altered without permission of the manufacturer.

CE conformity

All versions of ROTALIGN PRO fulfill the EC Guidelines for electric devices (73/23/EWG) and electromagnetic compatibility (EMC) (89/336/EWG), provided that data transmission from the receiver to the computer occurs by means of cable ALI 3.581-2 or wireless IR interface ALI 4.608. ROTALIGN PRO has been tested in accordance with the following harmonized EU standards for electromagnetic compatibility.
- EN 55011 Group 1, Class A
- EN 50082-2

Safety notes

The following information must be observed to ensure the safe operation of the ROTALIGN PRO.

General



WARNING!

- Before starting up the machines, all ROTALIGN PRO components must be removed from the shaft (or coupling). Otherwise, serious bodily injury may result from flying parts!
- The device must not be operated with the housing open or removed.
- The receiver, laser and computer housing must not be opened. Water and dust seals cannot otherwise be guaranteed.
- The device must only be operated and serviced by trained personnel.
- Ensure that the laser and receiver brackets fit solidly onto their mounting surfaces.
- The specified system accuracy is applicable when the components are mounted with PRÜFTECHNIK-supplied brackets. Do not use self-constructed mounting brackets or modify the original bracket configuration.
- Repairs of the ROTALIGN PRO system must only be carried out by an authorized technician.
- Only original spare parts and accessories must be used.
- Any unauthorized modifications to the ROTALIGN PRO, its components and the operating procedures described herein shall render all warranty coverage void.



ATTENTION

Intrinsically safe version

ROTALIGN PRO is also available in an intrinsically safe version which fulfills the following specification: ATEX directive 94/9/EC, EEx ib IIC T4; approx. U.S. equivalent: NEC Article 500-4, Class 1, Division 1, groups D,C,B,A and special safeguards T4.



Notes for intrinsically safe models

In addition to the general notes described on page 1-9, the following notes must strictly be observed when working in explosive atmospheres.





WARNING!

When equipment to be aligned is located in an explosive environment, the intrinsically safe ROTALIGN PRO EX (ALI 3.501 EX) must be used. This portable alignment instrument comprises of the ROTALIGN PRO computer (ALI 3.560 EX), the laser (ALI 3.610 EX) and the receiver (ALI 3.600 EX), and is used in the preventive maintenance of rotating machines.

ROTALIGN PRO has been developed and manufactured in accordance with the following appropriate standards: EN 58160/196/197/390 (optical), EN 40050 (enclosure), EN 60825 (laser beam safety), EN 50014 1997 and EN 50020 1994 (potentially explosive atmospheres) as contained in the directive 94/9/EC, EN 50081/82 (electromagnetic compatibility) and EN 29001 (quality assurance).

Batteries must be changed only outside the explosive area! Note that only alkali-manganese batteries can be used in explosive atmospheres. As main supply for the ROTALIGN PRO EX version, use six 1.5V C size IEC LR14 alkali-manganese batteries or six AccuCell AC 3000 rechargeable batteries. The AccuCell batteries must always be recharged using an AccuCell charger. If the batteries leak, they must not be used again. The AccuCell battery and charger care guidelines must be followed exactly. As auxilliary supply, use 9V block batteries from Varta, Duracell or Panasonic.

The ROTALIGN PRO plastic case (ALI 3.585) must not be taken into the hazardous area. Should it be taken into an explosive atmosphere, appropriate measures must be taken to prevent static electrification.

The circuit parameters meet the intrinsic safety requirements EEx ib IIC.

The maximum cable length between the ROTALIGN PRO computer socket and the receiver must not exceed 10 m.

The installation and operation of ROTALIGN PRO must be in accordance with the regulations in ElexV and equipment safety law as well as the general recognised rules of the technology. The instructions in this manual must also be observed.

The most current regulations regarding servicing, maintenance and testing, as they appear in ElexV § 13, EN 60079-14 and EN 60079-17 must be observed. The rules of the manufacturer as they appear in this manual must also be observed.



Typical equipment marking include the symbols shown on the left column.

Laser safety

The ROTALIGN PRO system uses a Ga-Al-As semiconductor laser, classified as a Class II laser. These lasers comply with the requirements outlined in the USA's FDA specification 21 CFR Ch. 1, Parts 1040.10 and 1040.11 as well as the ANSI standard. ROTALIGN PRO also fulfills British standard BS 4803 (Part 1 to Part 3) and European Industrial Standard IEC 825. The ROTALIGN PRO Class II laser operates at a wavelength of 675 nm, with a maximum pulse duration of $<400\,\mu$sec., maximum radiant power of <1 mW and maximum radiant energy per pulse of 0.4 μJ. No maintenance is necessary to keep this product in compliance with the above specifications.

Do not look into the laser beam at any time, including during setup, adjustment or operation!*

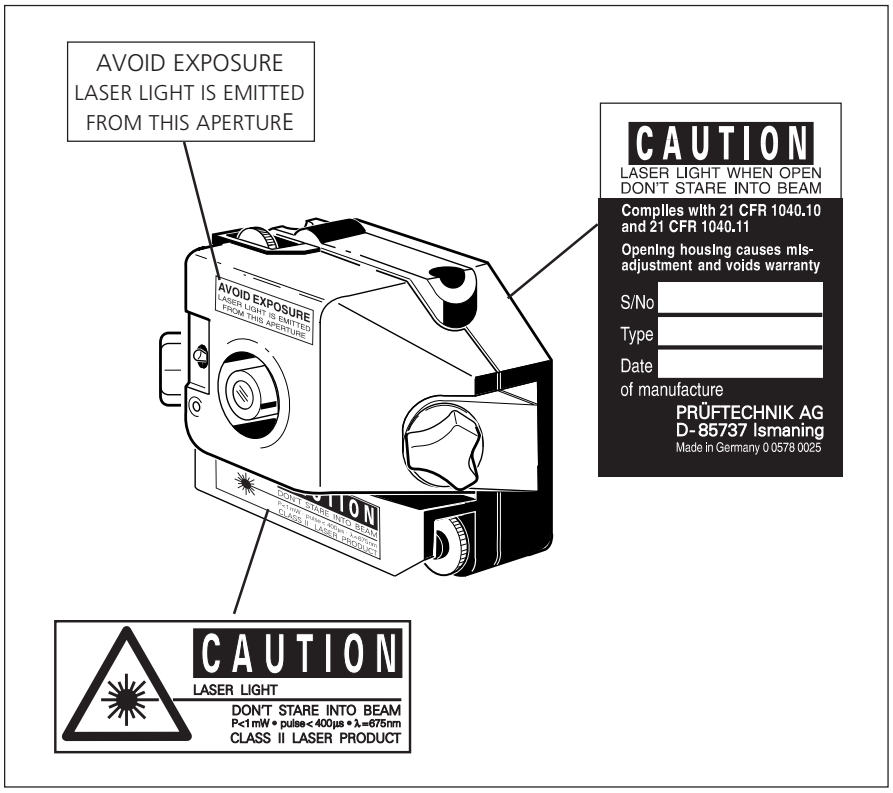
*Since the FDA specification allows maximum exposure of 0.25 seconds, the natural blink reaction of the human eye is normally sufficient to avert any danger, provided that no optical instruments other than ordinary eyeglasses or contact lenses are used. Do not insert any other optical devices into the beam path.

Caution: use of controls or adjustment or performance of procedures other than those specified herein or failure to follow these instructions may result in hazardous radiation exposure.



WARNING!

The diagram below shows all locations of laser safety labels on the ROTALIGN PRO laser housing.

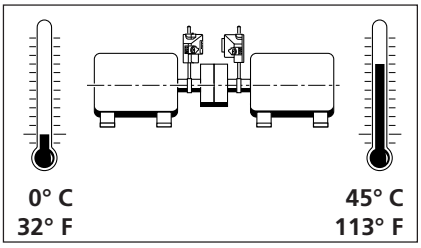


Operating information

In order to ensure proper operation of the ROTALIGN PRO system, observe the following information:

Temperature range

The ROTALIGN PRO system must be used at temperatures between 0° C and 45° C / 32° F to 113° F. Outside of this range, the specified accuracy may not be maintained.



Store your ROTALIGN PRO equipment at temperatures between -25° C and 60° C / -13° F to 140° F. Remember that on a hot day, the temperature inside a locked car can easily surpass 80° C / 176° F!



Sudden changes in temperature and humidity (for example, when ROTALIGN PRO is stored in an office but used in hot or cold work areas) can cause the optics to fog over with condensation: the computer displays "LASER OFF" and stops measurement. In that case, give the equipment about 10 minutes to reach the work area temperature. If the sensor temperature drops below 0° C / 32° F or rises above 60° C / 140° F, the computer displays "TEMPERATURE" and measurement stops.

Temperature effects and fluctuations

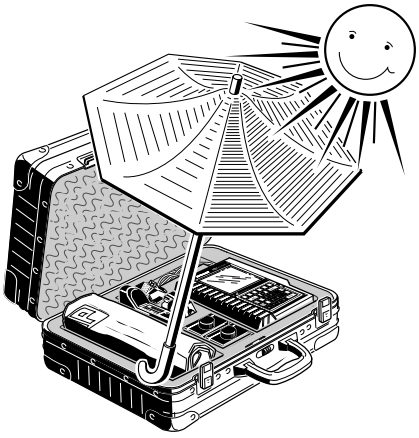
Powerful heat sources or steam located near the laser beam could influence the accuracy of measurements as a result of beam deflection. In practice, however, this effect occurs seldom at distances up to 1 m. If in doubt, the effect can be eliminated by shielding the system from the heat/steam source during measurement and adjustment.

As with all precision optical measurement devices, sudden temperatures fluctuations (e.g. resulting from sunlight), could result in erroneous measurements.


Note

Allow adequate time for the ROTALIGN PRO and the components to reach the ambient temperature before use.

Incident light and other sources of interference



Avoid exposing the ROTALIGN PRO computer to strong, hot light such as direct sunlight: the pixel display can act as a solar collector (at a rate of 10 watts!) and turn dark (reversibly) if overheated.

Mobile radio communication equipment (cellular telephones, for example) should not be used near the system, as it may interfere with measurements.

If the system should ever seem to be malfunctioning, check the cable connection between receiver and computer first for signs of damage.

Installing the measurement components

Ensure that the mounting brackets for the laser and receiver are securely mounted to the shaft or coupling. Inadequate surface contact, in particular, due to edge surfaces, misaligned installation, dust or inadequate tension on straps, chains or other components may result in loosening of the brackets and, as a result, faulty measurements. These faulty measurements may even be reproducible and falsely indicate acceptable shaft alignment. Therefore, do not use self-constructed mounting brackets or extensions and do not modify the mounting brackets supplied by PRÜFTECHNIK AG. Use only the support post lengths recommended for the application at hand.

Measurement distance

As no mechanical connecting parts are necessary for work with the ROTALIGN PRO system, the system can be used to align over distance of up to 10 m / 33 ft.

Dust and water seals

The ROTALIGN PRO computer is water spray resistant and dustproof (IP65). The laser and receiver are waterproof and dustproof to specification IP67. This specification requires that each component be able to withstand a water jet spray from any direction (the components are NOT guaranteed to withstand a full submersion). Note that, as with most water-resistant products, seals must be periodically checked and renewed if necessary. This can be carried out during ROTALIGN PRO service and recalibration which should be carried out every two years. During this service, the water-absorbent chemicals inside the component housings, which reduce possible condensation on the optics and the electronics, are also replaced.

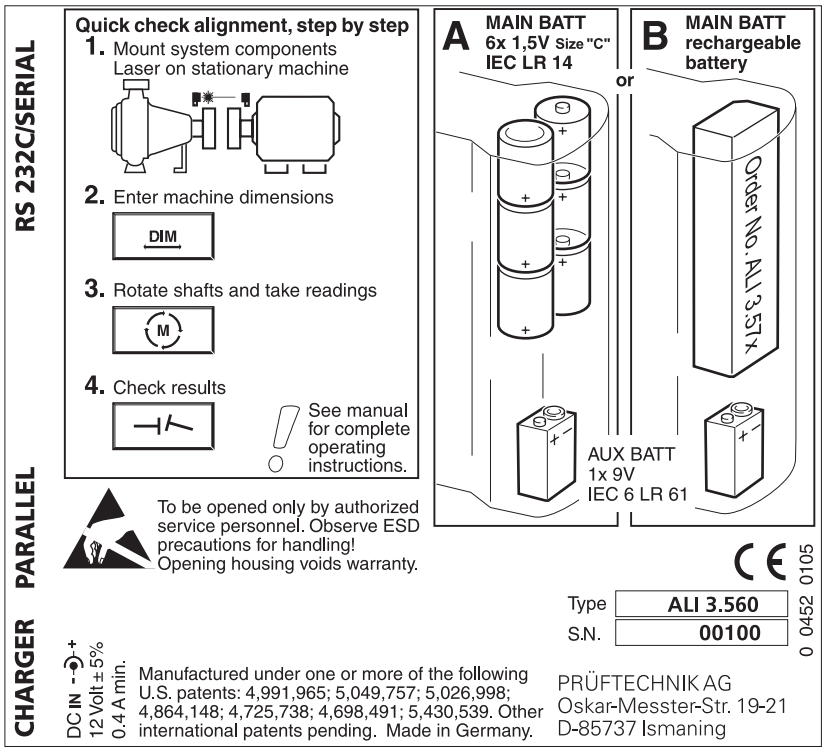
Interfaces

The ROTALIGN PRO unit is fitted with a serial and a parallel interface for data exchange with a PC or connection to a printer. An interface for the receiver as well as a connection for the mains supply are also located on the unit. Additional information is included in the device description on page 2-7.

Battery disposal

Please dispose of used batteries in an environmentally acceptable manner.

Nameplate and quick reference (rear view)

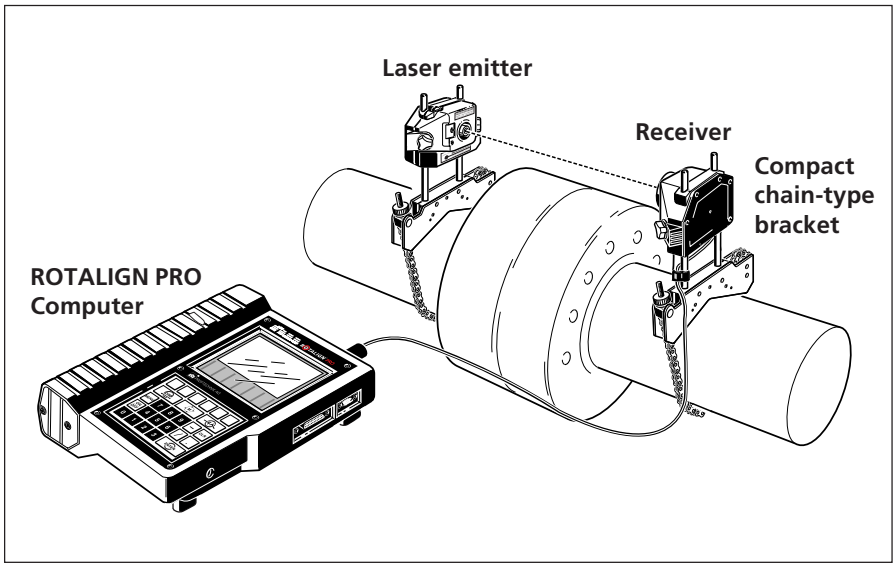


Note

The computer serial number (S/N) must not be confused with the firmware ID number which appears upon startup (page 3-1) and is used for firmware registration.

Chapter 2: Description

Overview



The ROTALIGN PRO laser alignment system:

BRACKETS

Used to mount the laser and receiver securely on the shaft on either side of the machine coupling.

LASER EMITTER

Fitted to the machine shaft on one side of the machine coupling, sends a beam across the coupling. The beam has no sag and is extremely straight.

RECEIVER

Fitted to the shaft on the other side of the coupling; contains two sensors to detect the precise position and angle of the incident laser beam.

COMPUTER

Connects to the receiver; calculates the machine alignment from data collected from the receiver during shaft rotation. The machines can then be aligned with aid of a "live" graphical display. The ROTALIGN PRO computer can also be connected to a PC with the ROTALIGN PRO Commander software (page 4-6).

The ROTALIGN PRO Computer ALI 3.560

The heart of the ROTALIGN PRO system is the ROTALIGN PRO computer, built to rugged industrial standards of shock and water resistance. It contains a complete desktop computer with LCD display and numeric-function keypad. Names and letters can be entered where necessary with a special on-screen character table.

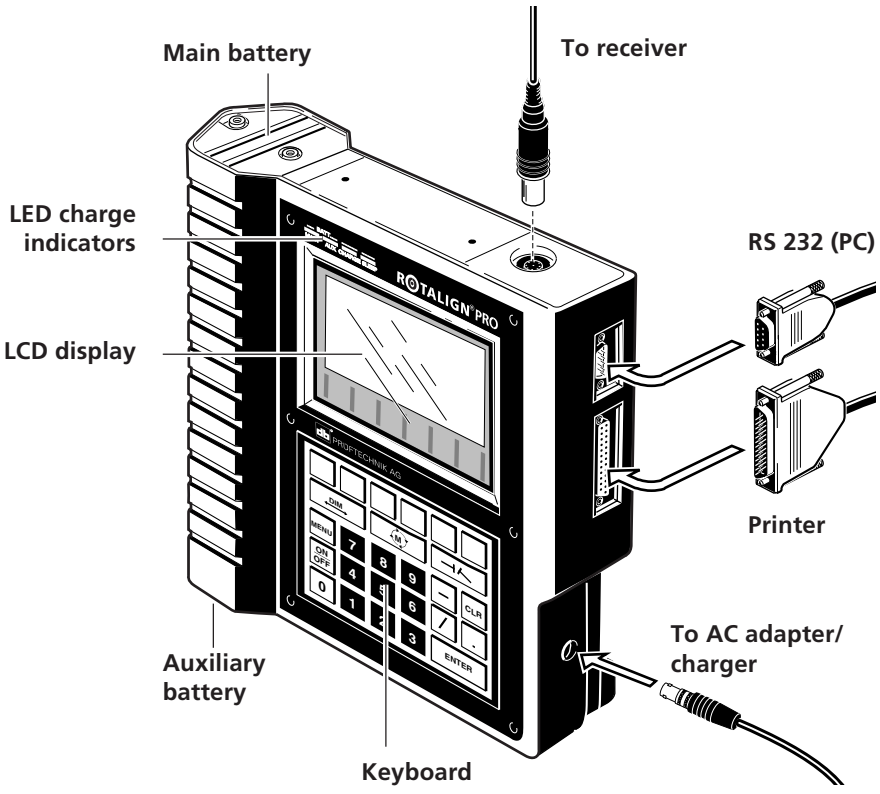
Measurement data pass directly via cable (or IR link, see page 4-9) from the receiver to the ROTALIGN PRO computer and are then used to calculate the alignment diagram. Numerous software functions allow the computer to handle a wide range of alignment situations.

Notes on ROTALIGN PRO operation

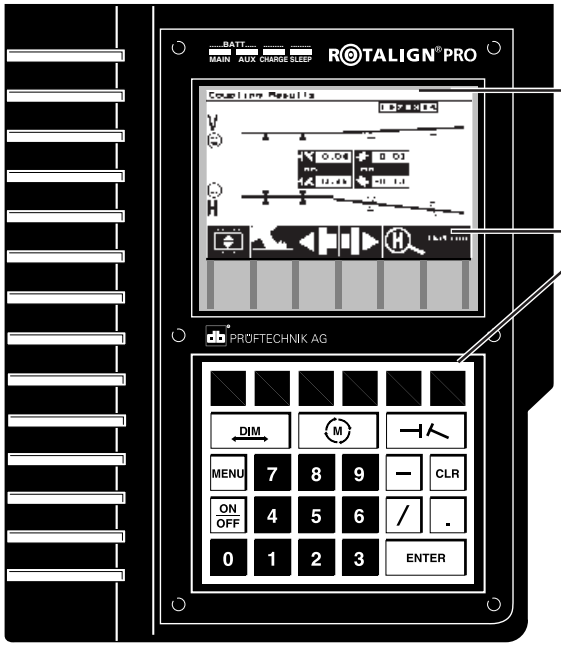
To ensure proper and safe operation of the ROTALIGN PRO system, there are a few operating rules which must be observed:

- The ROTALIGN PRO must not be operated with the housing open or removed.
- Only original spare parts and accessories must be used.
- The ROTALIGN PRO must only be operated by trained personnel.
- Any unauthorized modifications to the ROTALIGN PRO and its components shall render all warranty coverage null and void.
- When using the ROTALIGN PRO laser, adhere to all safety information regarding its safe operation (see page 1-9).

Connections and operating elements



The ROTALIGN PRO keyboard and screen



Status line
Gives a short explanation of the current screen or instructs the user what to do next.

Function softkeys
Labelled at the bottom of the display, these keys are defined by the program according to the screen context.

DIM

DIMension key
Use this key to enter machine dimensions directly into the screen

M

M = Measure
This key is used to enter the alignment measurement mode.

Results key
Calls alignment result diagram into the display.

ENTER

Enter key
Confirms displayed value and proceeds to next value

ON OFF

ON/OFF key
(See page 3-1)

MENU

Menu key
Offers a choice of procedures for setting up the computer and proceeding with different alignment situations
(See pages 2-5, 3-1).

−

Minus key
For entry of negative values

CLR

Clear key
Deletes characters or numbers in a displayed value, deactivates a selected measurement point or deletes a machine

/

Slash key
For entry of fractions and for a printed copy of the screen

.

Decimal point key
For entry of decimal fractions

START

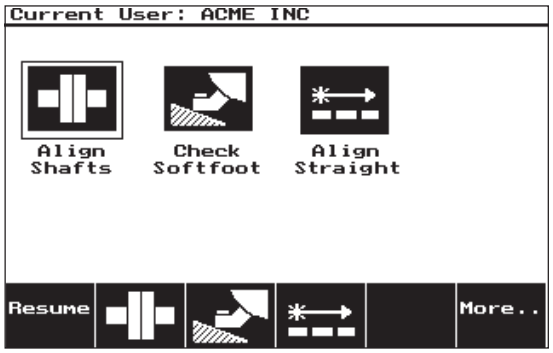
In this manual, all instructions regarding softkeys are denoted by symbols such as the one shown here.

Basic operation

Program overview



Switch on



Program manager
- Applications
- Configuration
- Data handling

(page 3-1)

(Straightness measurement optional)



* **Select application**
Press the softkey corresponding to the icon for the desired task.
(Part 2, page 2-9)

* Option: Straightness alignment



Set up machines and enter dimensions
(Part 2, page 2-10)



Adjust laser and start measurement
(Part 2, page 2-15)



Display results and align machines
(Part 2, page 2-18)

General

The three main function keys 'DIM', 'M' and 'Results' are always active and can be pressed to reach the corresponding function from every step of the alignment procedure.



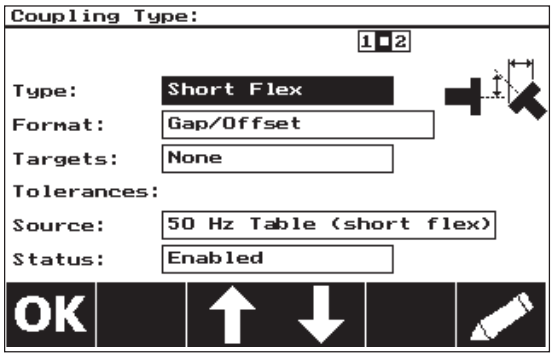
The 'MENU' key lets you return to the main menu:
From the program manager (page 3-1), this takes you to the opening application selection screen. From an application already started, it takes you to a specific selection menu (Part 2, page 3-1).



If the program should ever fail to respond to the keyboard (e.g. if it 'crashes' due to external factors), it can be reset by pressing the following three keys at the same time:



Entering information (example):



1. Select the desired parameter using the softkeys  and  ;

2. Open the selection/data entry window using the softkey  ;

3. Select the entry and change it as desired using the softkey  or  or the regular keyboard;

4. Confirm the changes and return to the previous screen by pressing ENTER or OK .

At any time, you may return to the previous screen without making any changes by pressing the softkey Esc.

Batteries and power supply

Three different types of power supply may be used:

Alkali-manganese batteries (6 pieces, page 2-7)
Six standard "C"-size (IEC LR 14) alkali-manganese batteries is the standard option as main battery power supply. These run for up to 50 hours.

Mains power supply (page 4-7)
Optional AC adapter can be connected in situations where cordless operation is not needed (e.g. when downloading measurement data to an office PC) in order to save battery power.

Lithium -Ion rechargeable battery (ALI 3.571)
Optional Li-Ion rechargeable battery can alternatively be used as main battery instead of the six "C"-size batteries. The battery can be left in place or removed from the instrument for charging. The battery requires 8-9 hours to fully charge. It is recommended to charge overnight. The operating time is typically 15 hours (25% active measurement, 25% standby, 50% 'sleep' mode). See page 4-7 for further details.





WARNING!

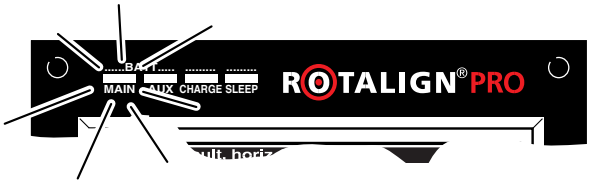
The Lithium-Ion battery is not certified for use in explosive environments. In such cases use only alkali-manganese batterries and these must only be changed outside the hazardous zone.

In explosive enviroments, the AUXILIARY BATTERY must be an alkali-maganese battery.

An auxiliary battery (9V, IEC 6LR61) backs up the main battery pack whenever its output voltage drops below 6V.

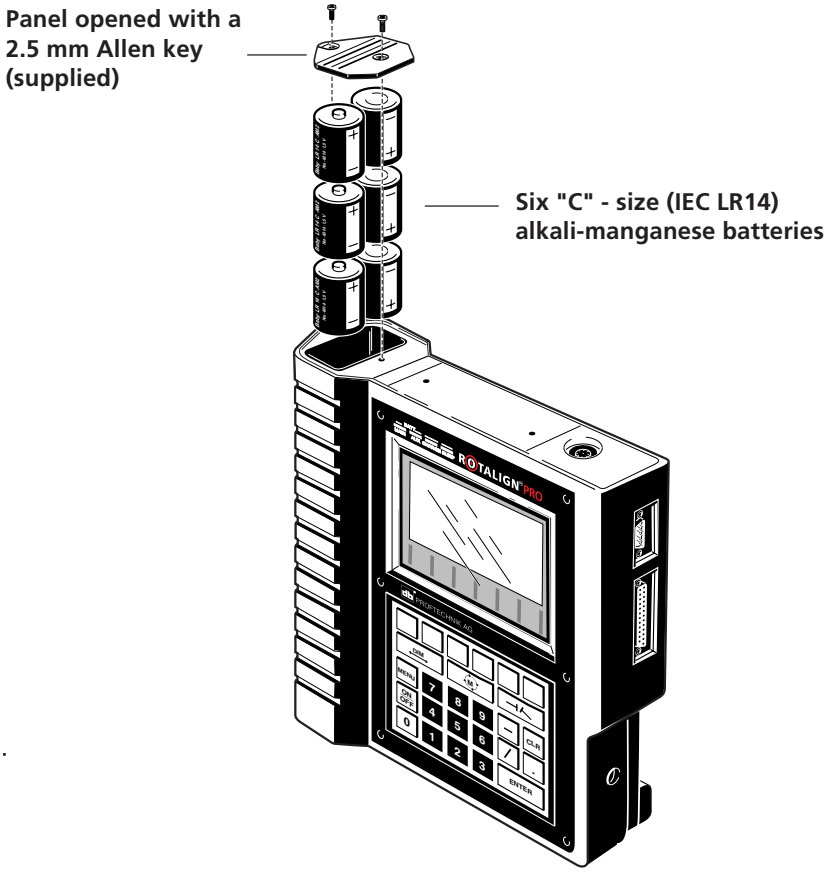
Main battery

When the main battery becomes depleted, the red "MAIN" LED in the upper-left corner of the ROTALIGN PRO illuminates. The ROTALIGN PRO then begins drawing power from its auxiliary battery (page 2-8) and can operate for several more minutes to allow completion of the current alignment job with all measurement values being retained.



Changing main batteries

Switch off the computer and open the main battery compartment. If replacing the "C" size batteries, replace all of them with new ones. Battery leakage is prevented by replacing the batteries as soon as they become depleted, or should the computer not be in use for an extended period of time then the batteries should be stored away.



- Damaged batteries must be removed from service.
- Rechargeable batteries contain corrosive alkali!
  If alkali leaks from a damaged battery onto skin or into the eyes, rinse immediately with plenty of water and consult a doctor.
- Keep batteries below 60°C / 140°F.
- Do not open or incinerate batteries.
- Do not short circuit the battery terminals.
- Recharging must occur at temperatures below 40°C / 104°F.
- Dispose of batteries only at authorized recycling facilities.

WARNING!

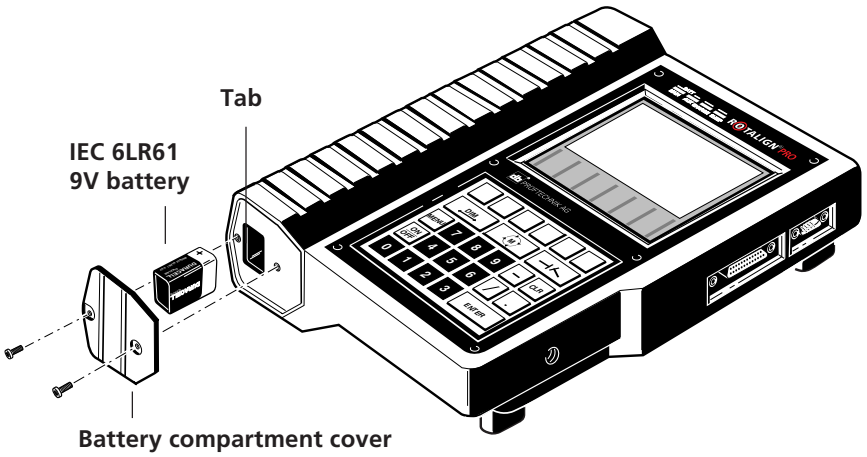
Attention!

Auxiliary battery (AUX)

The auxiliary battery activates and stores current measurements whenever the main battery pack voltage drops below 6V and the 'MAIN' LED illuminates.

Auxiliary battery replacement

1. Switch off the instrument.
2. Open the bottom battery compartment:
   Loosen screws with 2.5 mm hex key.
3. Pull out the black tab and remove auxiliary battery.
4. Insert new battery and close compartment.



INFO

The instrument switches itself off completely when neither the main battery nor the auxiliary battery can deliver sufficient voltage (in this case >6V).

The system clock and resume file back-up are maintained by a lithium battery when both main and auxiliary batteries are removed. The service life of the lithium battery is approximately five years with both main and auxilliary batteries removed.

Used batteries should be disposed of properly!

Battery condition

The amount of remaining charge in the main and auxiliary batteries is shown by the red MAIN and AUX LEDs:

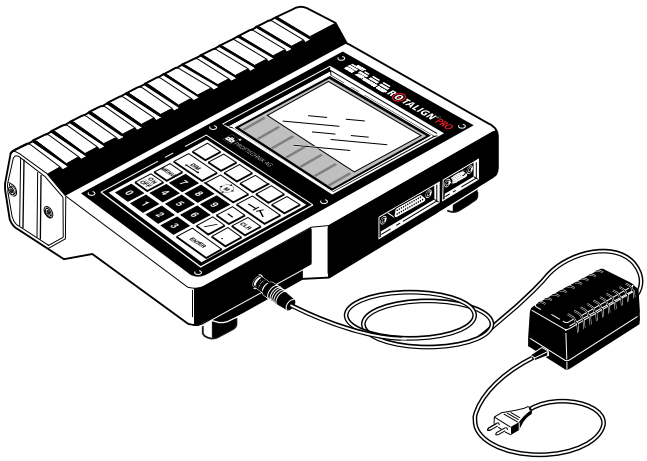
MAIN	AUX	Main battery	Auxiliary battery
■	■	Fully charged	Fully charged
☐	■	Depleted	Backup operation
■	☐	Fully charged	Weak
☐	☐	Depleted	Depleted

AC operation and battery charging

The ALI 3.576 AC power supply/charger can be used to run the ROTALIGN PRO computer, a useful alternative, for example, to save battery power when transferring data to a PC in an office setting. If a rechargeable battery is used, the AC power supply/charger can be used for recharging, which takes a maximum of about 5 hours and is indicated by the 'CHARGE' LED.

Please note that the voltage of rechargeable batteries tends to drop rapidly when depleted - and so the effective warning time (LED indication) is correspondingly short. Therefore, a charged spare battery should be held in reserve at all times.





Power-saving function ('sleep mode')

If no keys are pressed for a specified duration (known here as 'minutes before sleep'), the instrument automatically deactivates its display to conserve battery power and the 'SLEEP' LED illuminates above the display. The display reactivates when any key is pressed.

If, however, no keys are pressed during the specified 'sleep' period (the 'minutes before auto-off' duration), the instrument shuts down completely and can be 'reawakened' by pressing the ON/OFF key, then pressing the 'RESUME' softkey to continue measurement from the previous status.

RESUME

The CONFIG menu (page 3-5) allows you to set these 'runtime' and 'sleeptime' intervals.

Electronic memory

The ROTALIGN PRO computer contains an electronic memory for long-term storage of measurements and results, even when the computer is switched off.

This memory is maintained by a lithium backup battery soldered to the memory board itself which holds the data for approx. 5 years.

The backup battery is not user accessible and must be replaced at an authorized service center (for example, during regular calibration checking).

In addition, make sure that the auxiliary battery (page 2-8) is in good operating condition at all times: the ROTALIGN PRO computer automatically uses its auxiliary battery power to store the current measurement data whenever the main battery becomes depleted. Of course, this automatic storage can take place only if the auxiliary battery still has sufficient power.



Note

As with all electronic memory products of this nature, data can be lost or altered under certain circumstances.

PRÜFTECHNIK AG strongly recommends that you keep separate written or printed records of all important data.

PRÜFTECHNIK AG assumes no responsibility for data lost or alteredas a result of improper use, repairs, defects, battery replacement/failures or any other cause.

PRÜFTECHNIK AG assumes no responsibility, directly or indirectly, for financial losses or claims from third parties resulting from the use of this product and any of its functions, such as loss or alteration of stored data, etc.

The ROTALIGN PRO COMMANDER software program can be used to back up data to a PC. See page 4-6 for details.

Receiver cable

The receiver is connected via cable ALI 3.581-2 to the socket on the top end of the ROTALIGN PRO computer as shown below and on page 2-2. The cable serves as a data and power conduit for the receiver. (An infrared data transfer module is also available optionally; see page 4-9 for details.)

Never twist the plug in its socket, as that can damage the contact pins.

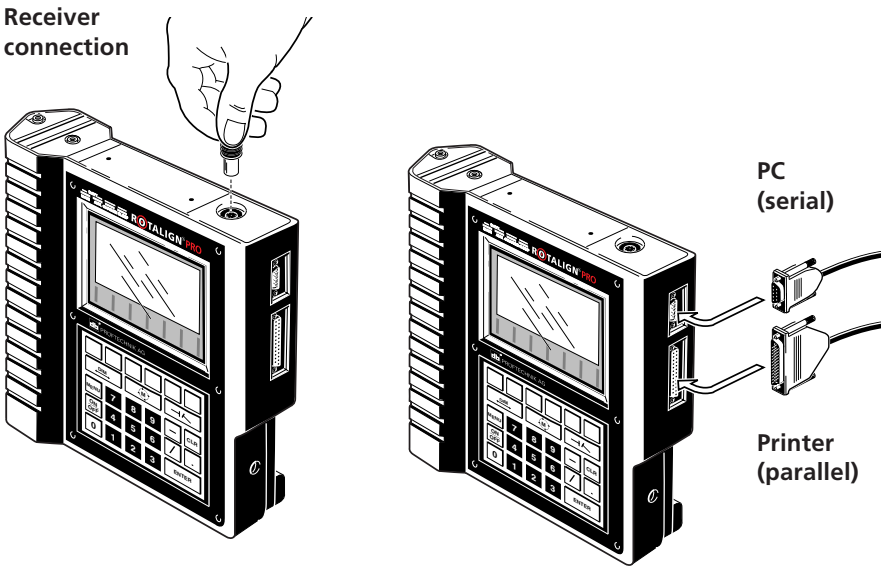
Observe the correct plug orientation as indicated by the guide groove on the plug and the socket. When correctly inserted, a positive click should be felt.

Remove the plug by grasping the plug firmly on its ribbed rubber surface and pulling it straight out.

ATTENTION

PC and printer connection

The ROTALIGN PRO computer has a serial interface (RS-232C, 9 pin) for connection to a PC. This allows you to use the Windows-compatile ROTALIGN PRO Commander program to transfer measurement results to a PC, analyze and store them and issue printed reports. The parallel interface (Centronics, 25 pin) lets you print screen contents (Part 2, page 3-18) or alignment reports (Part 2, page 3-18) directly from the ROTALIGN PRO computer. The interface parameters (page 3-5) can be set in the program manager or the main menu of the application program ('MENU' key).



ROTALIGN PRO sensors

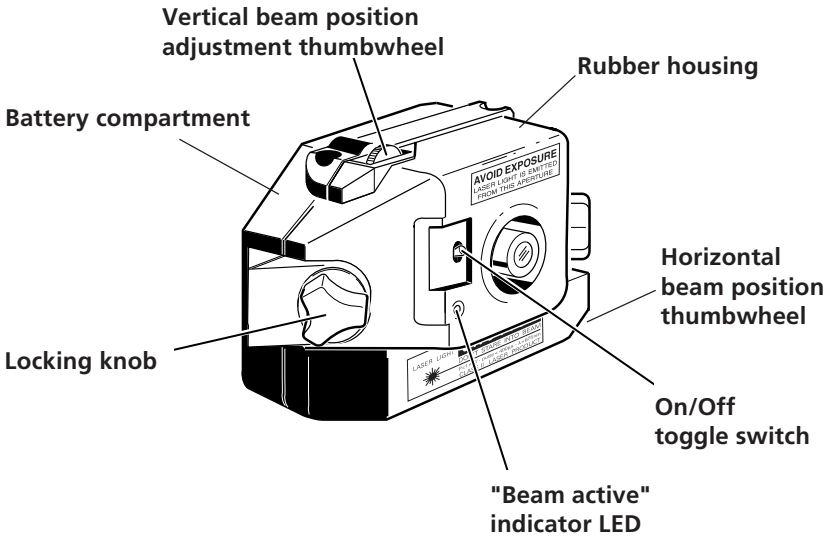
Laser ALI 3.610

The semiconductor laser diode emits a ray of red light (wavelength 675 nm) which is visible where it strikes a surface. The beam is emitted with a diameter of approx. 5 mm (3/16"). Because the laser is operated in short pulses and not as a continuous beam, its power is low enough to qualify for Class 2 safety (see page 1-11 for details).



WARNING!

Do not stare into the laser beam!



The beam is adjusted during setup by changing its vertical and horizontal angles with thumbwheels so that the beam strikes the receiver lens straight on.

As with all the ROTALIGN PRO components, the laser is water and dust resistant. The internal optics and electronics are internally sealed, preventing possible contamination, e.g. via the two thumbwheel slots.



ATTENTION!

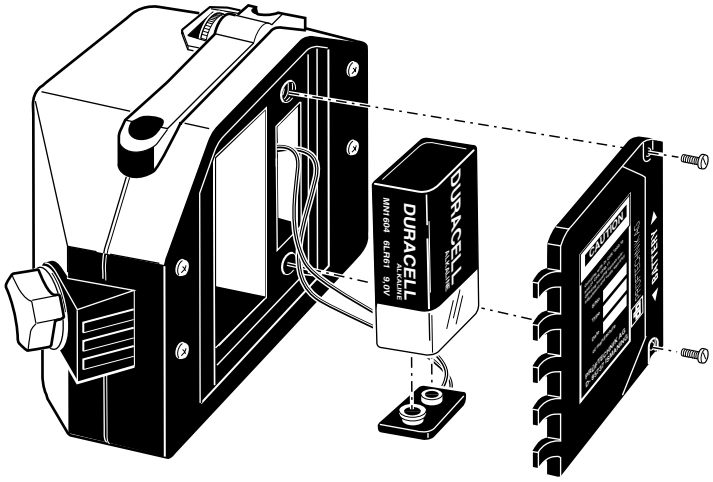
Note: the battery compartment is not watertight. If water enters this compartment, open it and dry it out. The battery should then be replaced.

Laser battery

The laser is powered by a single 9 V battery (type IEC 6LR61) which, depending on battery make and operating patterns, provides a typical operating duration of 80 hours. Note: Lithium batteries of this size can also be used, increasing operation up to 150 hours. NiCad rechargeables may also be used, but not with the intrinsically safe version (see page 2-6).

As the battery becomes depleted, the color of the 'laser active' indicator LED (see previous page) changes from red to yellow (or, for older models, from red to green). When this occurs, the battery should be replaced as follows:

Note



The battery is replaced by removing both screws from the battery compartment cover of the laser housing as shown above.

Under no circumstances may the four smaller housing screws be removed, as that would result in misadjustment and would void all warranty coverage.

ATTENTION

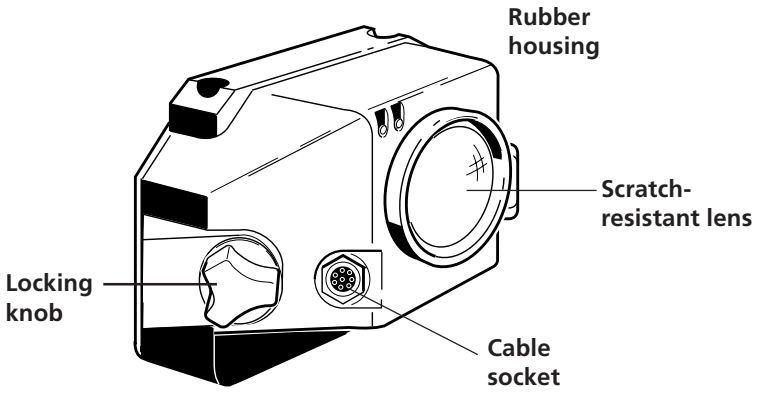
Be aware that when NiCad rechargeable batteries are used as replacements, their voltage tends to drop quite rapidly as they become depleted. This may limit the effective warning time (see note above), so a fully-charged spare should be held in reserve.

Note

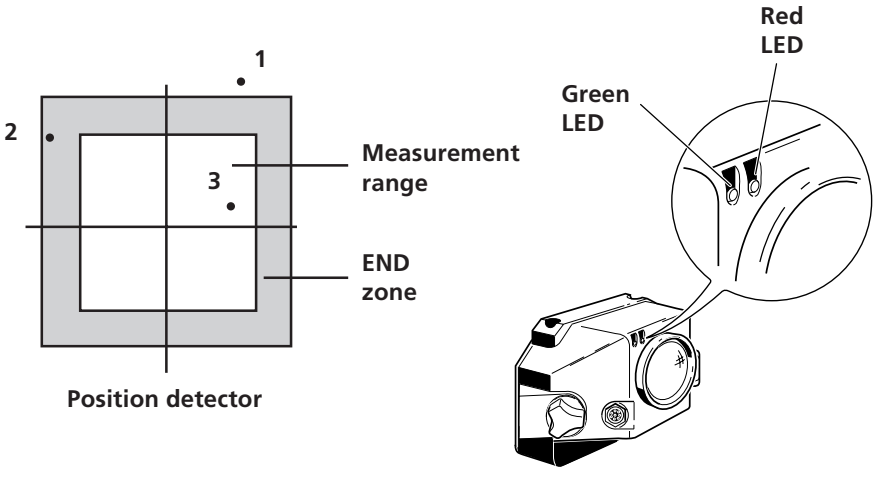
Used batteries should be disposed of in an environmentally-sound manner!

Receiver **ALI 3.600**

The receiver contains two position detectors, located one behind the other, which measure the exact position of the laser beam as the shafts are rotated. The detectors are biaxial, analog, photoelectric semiconductor position detectors with a resolution of better than 1 μm / 1/1000 mm (or 0.04 mils) and an area of 18 mm x 18 mm / 0.7" x 0.7". The receiver also contains an electronic inclinometer with resolution better than 2° for shaft rotation measurements.



The receiver has two indicator LEDs on its front side, one green and the other red, to indicate beam adjustment:



Laser in	red LED	green LED	computer displ.
1. Out of range	lit	off	'LASER OFF'
2. Edge	blinking fast	blinking fast	'LASER END'
3. Meas. range	off	blinking slow	'Sensor OK'

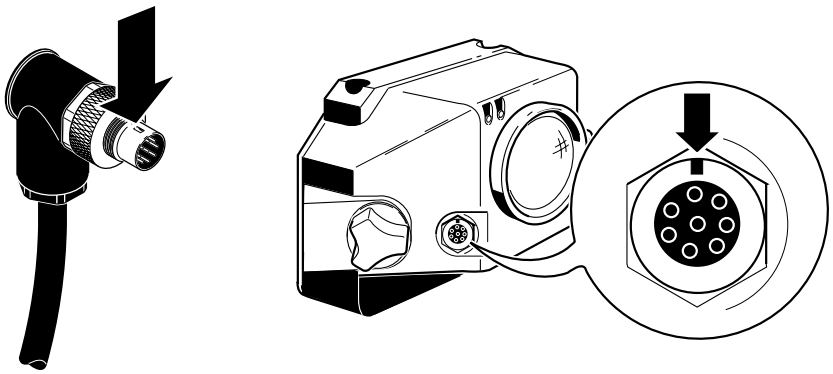
The receiver is powered by the ROTALIGN PRO computer via a cable (ALI 3.581-2) through which measurement data also pass. An infrared link is also available. See page 4-9 for details.

Cable connection

Insert the angled plug into the receiver socket as shown; note the keyway indicating proper plug orientation. Screw down the cable fitting to tighten the connection. The angled plug should be left permanently connected to the receiver, even when storing the system in its case, as this will help avoid damage to cable pins, plugs and sockets.

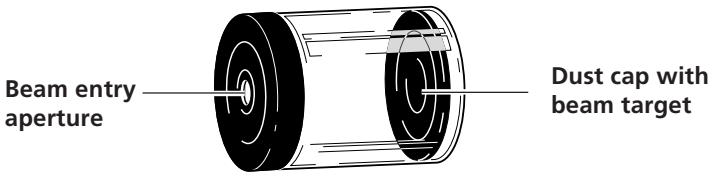
> Never turn the plug itself, as that can damage the cable pins!
>
> Note correct plug orientation indicated by the markings on the plug and the socket.





Adjustment tube ALI 3.608

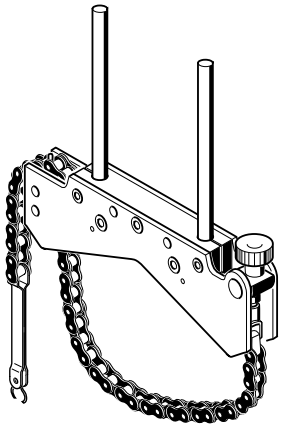
This tube fits onto the receiver to help align the laser beam with the receiver. The beam passes through the front aperture and hits the inner target. The beam can then be aligned simultaneously with the aperture and the target (see Part 2, page 3-9).



Compact chain-type bracket ALI 2.891set

Compact and lightweight, this bracket (included in the standard ROTALIGN PRO package ALI 3.501) is designed to provide extremely rigid support for the measurement components with a minimum of mounting time and effort. The compact chain-type bracket fits onto shafts and couplings ranging from 15 to 500 mm (1/2" to 20") in diameter. Longer chains are also available. All parts (frame, posts, chains and hooks) store in a rollable cloth pouch. Mounting instructions can be found on page 2-4 of the shaft alignment instruction manual ALI 9.646G.

Compact chain-type bracket
ALI 2.891set



Other accessories

Further popular ROTALIGN PRO accessories can be found starting on page 4-5.

The Laser Alignment Product Catalog (ALI 9.300) describes additional accessories and other alignment systems as well.



Product catalog
ALI 9.300

Chapter 3: configuration and data handling

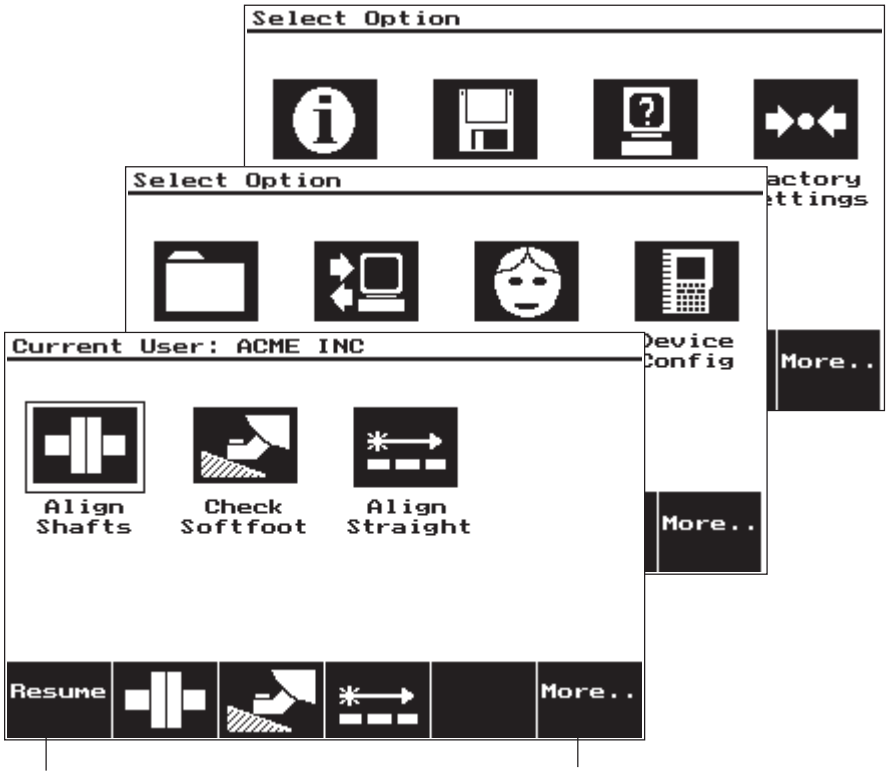
Program manager

The program manager appears when the computer is first switched on. It is used to select and start the desired individual application. It also allows instrument setting adjustments and performance of maintenance functions.

ON/OFF

The MENU key: From the program manager, this key takes you to the initial screen. From within any application, this key calls up a context-sensitive selection menu.

MENU



Opens the most recently used application

Proceeds to the next screen

Applications (initial screen)

Shaft alignment
of horizontal and vertically-mounted rotating machines

Soft foot measurement
on machines with two pairs of feet

Straightness alignment*
of machine beds

*** Option**

Details on the respective application programs can be found in their own separate instruction manuals:

Shaft alignment	**ALI 9.646G**
Straightness measurement	**ALI 9.648G**

Screen 2: Data management and basic configuration



File functions
Find and open a file; set file search criteria; file information (page 3-3)



PC communication
Activate PC mode for data transfer with a PC (page 3-3)



User name and address
These general user information settings are stored along with each set of measurement data (page 3-4)



Device configuration
Units, time, date, printer, interfaces etc. (page 3-5)

Screen 3: Service functions



ROTALIGN information
Software and hardware version numbers; receiver version number; all information can be printed directly (page 3-6).



Update / upgrade
Load the latest program version into the computer (page 3-3)



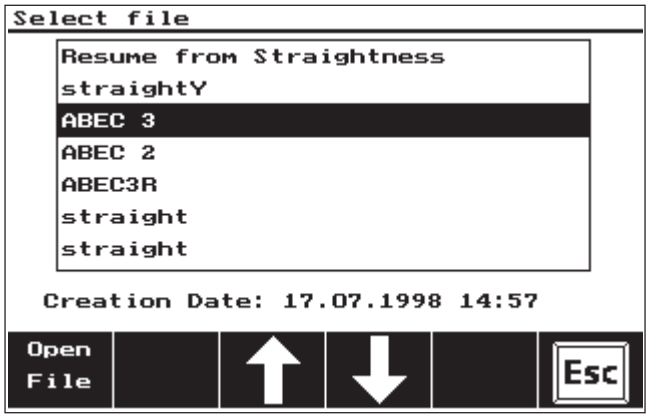
System test functions
Test hardware functions (page 3-7)



Factory settings
Reset all user-defined adjustments back to factory default settings (page 3-8)

Find and open file

1. Press the softkey marked FIND FILE:



2. Use the arrow softkeys to mark the desired file, then press OK to start the corresponding application and load the file into it.

FILE INFO displays further information stored with the file (file name, application, user, creation/measurement date, measurement location).

SEARCH OPTION can be used to speed up the file search by defining search parameters (such as file name by first letters, application, user or earliest file creation date/time).

PC communication

1. Connect ROTALIGN to the PC (page 2-11).
2. Press the PCCOMM softkey or
   if you are bringing ROTALIGN up to the date with the latest software version, press the UPDATE/UPGRADE key.

In both cases the unit enters its PC communication mode and waits on a control signal from the PC program. All further actions are controlled by the PC.

User name and address

Each time a set of measurements is stored, certain information regarding the operator is stored along with it. Before beginning measurement, check this user information and correct it if necessary. Once information on several different operators is entered, the corresponding name may be selected from a list for quicker setup.



- Checking information: press the USER NAME & ADDRESS softkey. The information regarding the current user setting is displayed.



- Changing users: press the CHANGE USER key, then select the corresponding name from the list that appears.

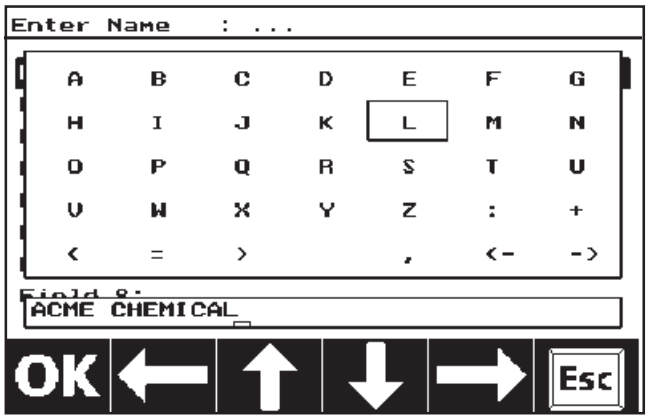


- Deleting users: select the desired name from the list, then press the CLR key.



- Entering a new user: press the NEW USER softkey, then EDIT (pencil symbol). The text editor then appears:

Text editor

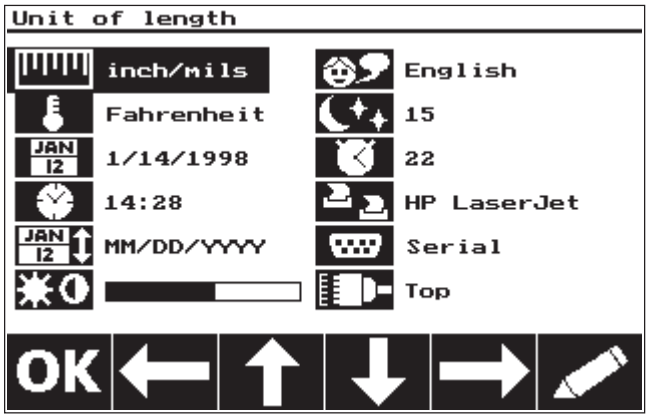


- Entering text: Use the arrow keys to select desired characters, pressing the ENTER key on the keypad to confirm each in turn.
- Entering numbers: Use the ROTALIGN keypad to enter numbers directly.
- The CLR key deletes the last character.
- Select the characters <- and -> to move the cursor to the left and right along the line of entered text.
- The ESC softkey may be pressed to cancel the operation at any time; the OK softkey confirms and stores the entire entry.

Device configuration



1. Press the DEVICE CONFIG softkey:



2. Use the arrow keys to select the desired menu option for editing, then press EDIT softkey.





Length units
mm; inch/mils; inch/thou



Temperature units
°Celsius; °Fahrenheit



Date



Time of day, time zone



Date format: dd.mm.yyyy;
mm/dd/yyyy; yyyy-mm-dd



Screen contrast



Language
English, German



Sleep time: display shuts
down after X minutes



Auto shutoff time:
Unit shuts off after
X minutes in 'sleep' mode



Printer selection; set the
interface on the ROTALIGN
computer (LPT, COM)



Interface parameters (RS232)



Sensor connection on *top* for
data transmission via cable;
on *side* for wireless infrared
communication



ROTALIGN information

- Press the ROTALIGN INFO softkey to display the following:

Card:	Storage capacity in MB / card type
Hardware:	SYSTEM1 followed by version number
ID number:	IDxxxxxxxx (this number is required for software registration)
Board version:	0 (hardware version, for service use)
Sensor status:	OK
Sensor version:	Version numbers of application program (e.g. 'ROTA_4') and operating system ('ROTA_BOOT') with date and time

Sensor Info

The last two entries appear only when a sensor is connected. Press the READ SENSOR softkey to collect this information again.

SW Info

- Press the SW-INFO softkey to display the following:

Installed software

Program manager:	version no.
PC Comm:	version no.
Shaft Alignment:	version no.
Soft foot:	version no.
Straightness (optional)	version no.



All these entries can be printed by pressing the PRINT softkey indicated by the printer symbol (see page 3-5 for printer configuration).

System test functions

The computer features a range of self-diagnostic functions for checking the proper function of all important system components.



Press the SYSTEM TEST softkey.
If the data medium is to be checked, then press the DOS softkey.

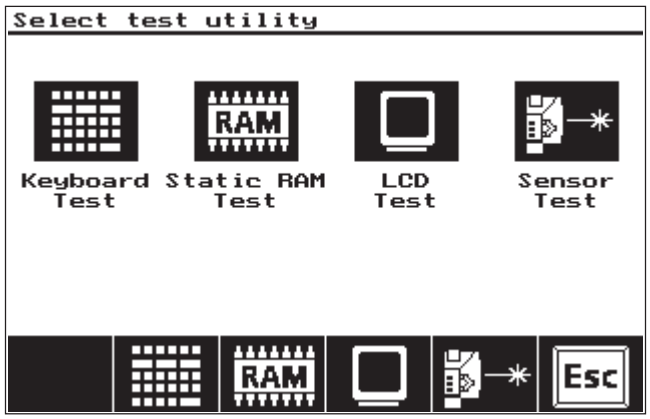


CHKDSK checks the data storage card.
CHKDSK_F checks the data storage card and repairs any errors automatically (this check is always performed when the computer is switched on).
RS232TST tests the 9-pin serial interface using a 'loopback plug' as described in the display.

Further test functions can be started using the softkeys TEST PART I and TEST PART II.

Test part I







Keyboard test
Press any key. If it is working properly, the corresponding element is activated in the display. To end the test, press the MENU key, then the CLR key.



Static RAM test
- Clear SRAM: deletes the contents of unused memory.
- Read/write test: tests the function of unused memory.



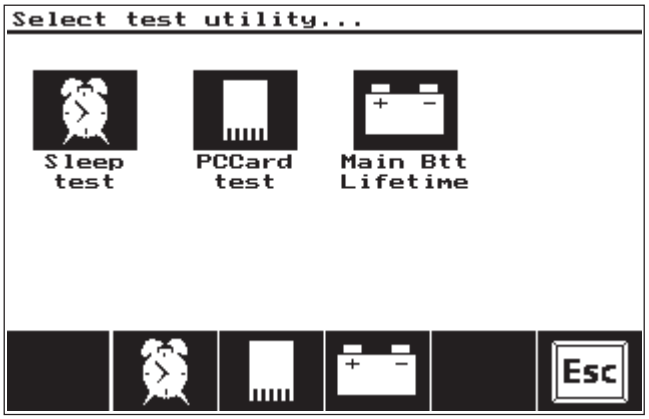
LCD test:
- Reverse b/w display (return to normal with ENTER or SELECT)
- Contrast: adjust screen contrast by individual steps (+1/-1) or continuously (+...+...+...)
- Pattern 1 / 2: displays a coarse (1) or fine (2) screen pattern. Press any key to end the test.
- LCD off: screen shuts down for 5 sec. while SLEEP LED illuminates.



Connect the sensor to the ROTALIGN computer for the
Sensor test
- Sensor OFF -> red 'ready' LED on sensor goes out
- Sensor ON -> red 'ready' LED on sensor illuminates



Test part II





Sleep test
Checks power-saving functions by shutting down the display ('sleeping') or by shutting off the entire computer. The display can be reactivated by pressing any key; the ON/OFF key must be used to restart the computer.



PC card test
- Recursive dir: lists all file names on the PC card
- List INI files: displays contents of all initialization files
- Check flash: checks all sectors of flash card memory for faults



Main batt lifetime
Checks charge status of batteries/rechargeables. Press any key to end the test.



Factory settings

All user-defined changes in the configuration settings can be returned to their default values by pressing the FACTORY SETTINGS softkey.

Chapter 4: Appendix

This section offers a list of possible errors along with their corresponding notification messages and remedies. This manual then concludes with popular accessories for ROTALIGN PRO and technical data.

Troubleshooting

Computer does not switch on:

Replace main batteries (page 2-7) or connect charger (pages 2-9, 4-7). If there is still no response and you are quite certain that the replacement batteries are new, contact your local PRÜFTECHNIK distributor.

Computer fails to respond:

Reset the computer by pressing the ON/OFF, CLR and ENTER keys at the same time.

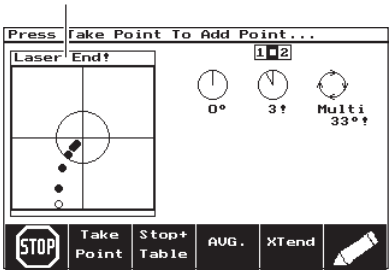
Screen goes blank:

In sleep mode: press any key to reawaken (page 2-9)
OR auto-shut off: press ON/OFF to reactivate, then press RESUME.

Screen is too dark or too light:

Switch on the computer. From the main opening screen, adjust screen contrast by pressing and holding the 0 or 1 key: contrast will cycle from dark to light and back again while you hold down the key. Release the key when the desired screen contrast setting is reached. From any other screen, you must first press the 'Menu' key, then select 'Device Config' (page 3-5) to access this contrast adjustment function.

Sensor status line



ROTALIGN PRO error messages

The following error messages may appear in the sensor status line (Part 2, page 2-16):

- *Sensor...*: The measurement program is attempting to address the receiver sensor and to begin measurement. This message appears even when the receiver is not connected.
- *Laser Off*: The laser beam is not striking the receiver detector: readjust the beam and make sure the receiver cap is removed.
- *Laser End*: The laser beam is striking the edge of the detector: readjust the beam; during measurement: extend the measurement range (Part 2, page 3-14).
- *Sensor OK*: The laser beam is in the outer measurement range; measurement can be started.
- *Centered*: The laser beam is centered in the inner measurement range. Start measurement.
- *Inclinometer*: The electronic inclinometer built into the receiver has failed. Return the receiver to an authorized PRÜFTECHNIK AG service center for repair.
- *Temperature:* If the receiver temperature rises above 60°C / 140°F or falls below 0°C / 32°F, then this message appears and measurement stops.
- *Ambient Light* or *Laser bright*: The position detector is overloaded by excessive ambient light or the more intense laser beam emitted just after switching on (in order to facilitate beam location). Shade the receiver or wait for the beam to switch to normal power.

Missing dimensions

Results cannot be calculated without entering the machine dimensions.

Out of paper, Printer error, Printer timed out!

Check the printer and connections.

Chkdsk return ...

Upon startup, the flash memory card (containing the measurement program) is checked by the 'chkdsk' program, which can return the following error messages:

system check	
verifying file system ...	
chkdsk return 0	→ 'OK'
chkdsk return 1	→ 'Error found and repaired'
Computer 'hangs'	→ Use emergency diskette (page 4-16); if no change, then error is irreparable: return the computer and flash memory card to an authorized PRÜFTECHNIK AG service center.

Not ready reading drive A: ...Abort, Retry, Fail

If the program stops in the middle of its startup sequence, the flash memory card is either damaged or corrupted.

Press the ON/OFF key for 15 seconds in order to shut down the computer.

Now use the emergency diskette ALI 3.496 (page 4-16) included in the ROTALIGN PRO package to reformat the flash card and reload it with a PC communication program (PCCOMM).

The ROTALIGN PRO program manager and applications can then be loaded from a PC using the ROTALIGN PRO Upgrade Manager (ALI 3.491).

If this procedure fails to resolve the problem, then the flash card must be replaced. Please contact your PRÜFTECHNIK AG distributor for assistance.

Wrong licence code!

This message appears when ROTALIGN PRO is switched on for the first time ever or following an update of its operating firmware from Version 3.03 to a later version. A registration password ('license code') must be entered before operation can be continued.

This password is supplied by PRÜFTECHNIK AG when the completed registration card is returned.

To enter the password:

- Press the OK softkey. The text editor appears (see page 3-4).
- Enter the password (press the ENTER key after each letter to confirm).
- Conclude the entry by pressing the OK softkey.

General

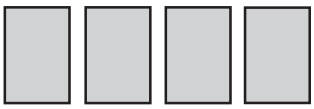
Erroneous entries are ignored by the program and no error messages appear.



Note

The ROTALIGN PRO case

Key:

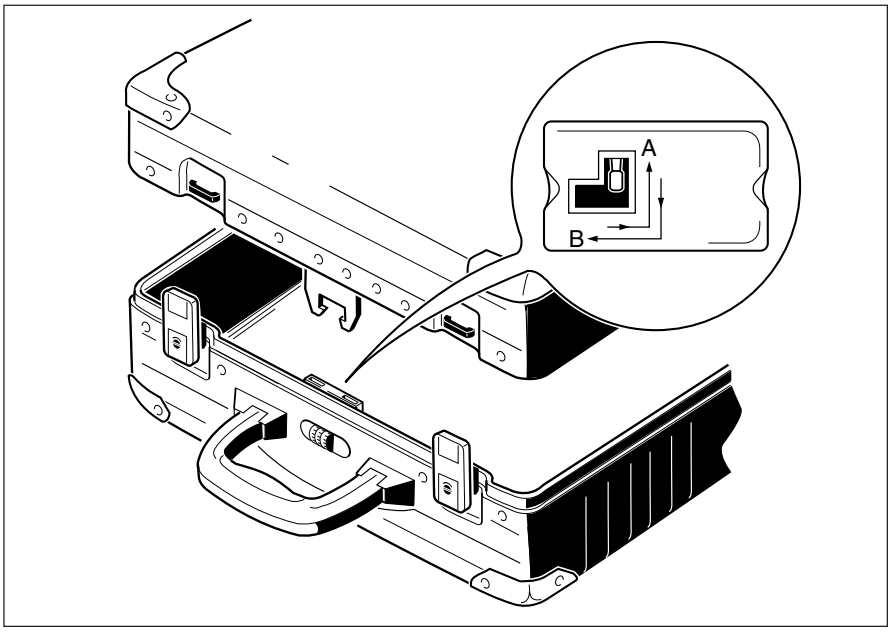


The keys are taped to the inside of the case lid.

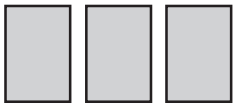
The ROTALIGN PRO case has two key locks and a 3-digit combination lock. Write down the key number in the boxes at left:

The combination lock is set when purchased in such a way that it can be opened when its three digits read "000." It may be left at this setting or set to a new combination on the three dials as follows:

1. Starting point (for example, "000.")
2. Look at the back of the lock inside the case to locate the combination locking lever. Now push this lever toward the center of the lock and raise it (see sketch below), allowing it to catch in this raised position.



Combination:



3. Now set the three dials to your own secret code. Note this new combination in the boxes at left and keep this combination in a secure location in case you should ever forget it.
4. Without changing the setting of the dials, push the combination locking lever back to its original position.

Before closing the case and using the lock, make sure that the above instructions have been correctly followed.

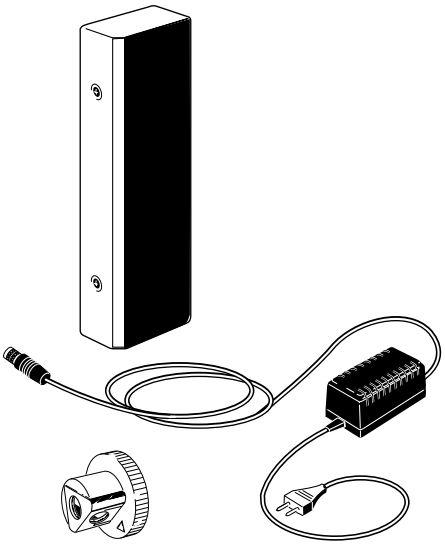
To lock the case, turn the dials from the combination just set. The lock can then be opened only when set to the new combination. If the key locks on the case latches are used, they should be locked first and unlocked last so as not to place any load on the combination lock. If the case is packed very full, push the two halves of the case together snugly to assure proper functioning of the combination lock.



Note

Depending upon local market requirements, the ROTALIGN PRO case may also be supplied without a combination lock.

ROTALIGN PRO accessories



ALI 3.492 Firmware upgrade 'straightness measurement' (page 4-6)

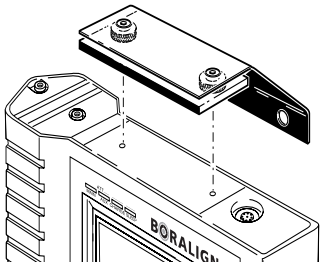
ALI 3.496 ROTALIGN PRO Emergency Diskette (page 4-16)

ALI 3.571 Lithium-Ion rechargeable block battery (MAIN BATT) (page 4-7)

ALI 3.576 110V/220V Mains adapter (page 4-7)

ALI 3.580set External charger incl. spare battery

ALI 3.581-5 Receiver cable 5 m



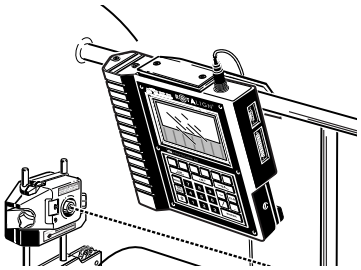
ALI 3.579 ROTALIGN PRO Beam Deflector (page 4-8)

ALI 3.606 Receiver dust cap (spare)

ALI 3.607 Laser dust cap (spare)

ALI 3.573 Computer stand

ALI 3.574 2 Hex screws for computer stand
The stand angles the computer on a table at a conve nient reading position, or lets it hang from a pipe etc.



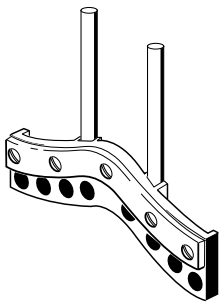
ALI 3.595 ROTALIGN PRO case (aluminium), complete

ALI 3.592set ROTALIGN PRO EXPLORER (page 4-6)

ALI 4.609set ROTALIGN infrared interface (page 4-9)

Accessory mounting brackets, bracket parts

(see following pages and the Laser Alignment Product Catalog ALI 9.300 available free of charge.)



ALI 2.230 Magnetic sliding bracket, individual

ALI 2.109set Extra-thin bracket, two pairs in different sizes

ALI 2.112set Compact magnetic bracket, set of 2

ALI 2.106set Coupling bolt hole bracket, set of 2

ALI 2.893set Cardan shaft bracket set

ROTALIGN PRO Explorer ALI 3.592SET

The ROTALIGN PRO Explorer is a suite of Windows™-compatible programs which includes the Alignment Explorer, the Shaft Alignment Editor and the Straightness Editor.

The Alignment Explorer can be used to transfer measurement files from ROTALIGN PRO to a PC for secure storage and download new alignment job setups to ROTALIGN PRO. The File Commander also lets you prepare and print reports from the PC.

The Editors are used for entering and editing machine dimensions and parameters, for reviewing results as well as preparing and printing reports. The Shaft Alignment Editor can be used to join together up to six machines into a train, then download them to the ROTALIGN PRO computer to save time and effort during alignment preparation.

The ROTALIGN PRO Explorer ALI 3.592SET includes:

The communication certificate	ALI 3.531
Editor registration certificate	ALI 3.535

The program CDs are included in the respective standard packages, but full functionality requires entry of a licence code which is obtained from PRÜFTECHNIK Alignment Systems after filling out and sending back a purchase order form to PRÜFTECHNIK Alignment or your local representative. This form is generated using the Licence Manager.

System requirements	
Operating system	Windows 98 / Me / NT / 2000 / XP
Processor	Pentium 300 MHz or faster
Memory	64 MB RAM
Disk drive	Hard drive with 100 MB free
Monitor	VGA Color
Mouse	Required
Serial interface	One free

'Straightness' add-on package ALI 3.630SET

This application program lets you use your ROTALIGN PRO system for convenient and highly accurate straightness measurement, e.g. of machine beds, foundations, guide rails, etc. This package includes the following parts:

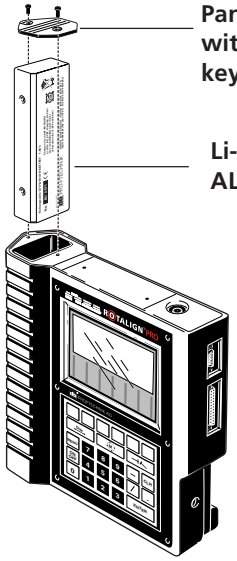
CD for straightness and flatness measurement	ALI 3.474 CD
Registration card for straightness firmware	ALI 9.552
Magnetic foot for laser	ALI 4.501
Magnetic sliding bracket for receiver	ALI 3.198
Operating instructions	ALI 9.648G
Storage case	ALI 3.197
Allen key, 6 mm	0 0739 1059

ROTALIGN PRO emergency diskette ALI 3.496

In the unlikely event that the operating program cannot be started, this emergency diskette lets you reformat the flash memory card in the ROTALIGN PRO computer and reestablish communication with a PC (see page 4-16).

Li-Ion rechargeable battery ALI 3.571

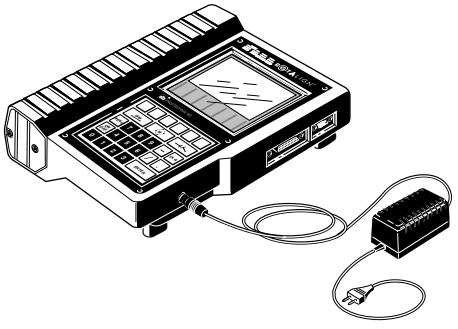
Six 'C'-size alkali-magnesium batteries (IEC LR 14) serve as the standard ROTALIGN PRO power supply. The six batteries can be replaced with a 7.2 volt Li-Ion rechargeable battery. The battery has a capacity of 1.35 Ah (which, under normal operating conditions, is adequate for 15 hours - exact duration will vary depending on usage pattern). The battery is charged by connecting the computer to the AC power supply (see "AC adapter/charger" below). Alternatively, the battery can be charged externally using the optional battery charger ALI 3.580 set. Note that maximum battery life can be ensured by keeping the battery fully charged whenever possible. To fully charge the battery takes 8-9 hours.



AC adapter/charger ALI 3.576

The AC adapter/charger can be used to power ROTALIGN PRO in order to conserve battery power, for example during office use or instrument firmware updating. The 110/220VAC (switchable) power supply is attached to the computer as shown below. When properly connected, the LED marked "CHARGE" above the computer display illuminates. The supply may be left connected to the computer indefinitely with no danger of damage.

It can also be used to charge two ALI 4.610 external receiver batteries. If the computer battery is depleted, however, the computer can be powered by the adapter/charger immediately only if no external batteries are connected (which would draw excessive current).



AC adapter/charger
ALI 3.576

ROTALIGN PRO Beam Deflector ALI 3.579

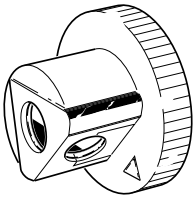
The beam deflector simplifies and improves accuracy of taking machine dimensions. This practical device attaches to the receiver and, by means of a mirror, directs the incident laser beam 90°. By positioning the device so that the beam is reflected downwards onto the floor, a precise point of reference is created for measuring the receiver to front distance.

When the beam deflector is used, 50 mm / 2" must be subtracted to compensate for the distance between the point of reflectance inside the deflector and the white marking on the receiver housing.

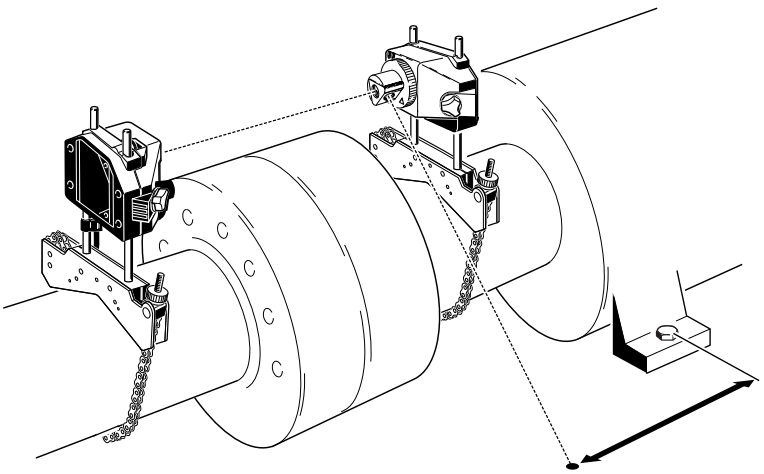


WARNING!

The deflected beam is to be used only for measuring machine dimensions.



Beam deflector ALI 3.579

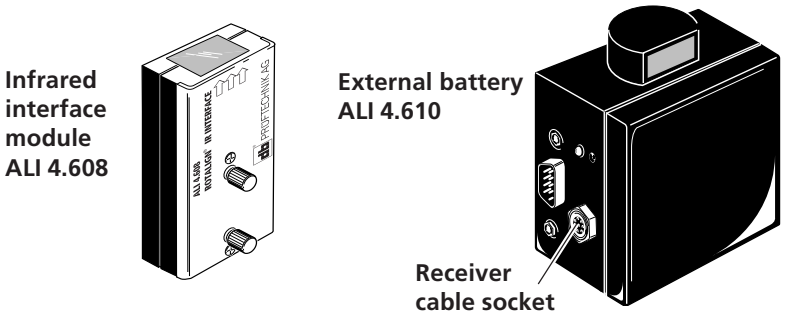


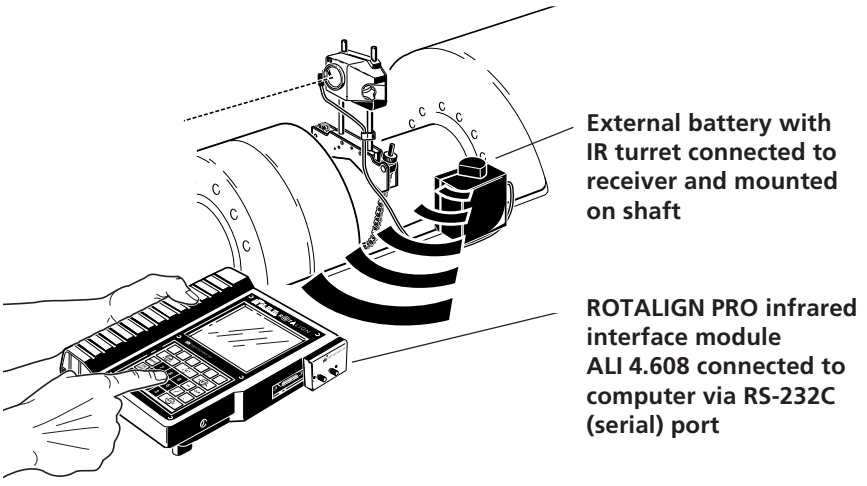
Wireless data transfer with the IR interface ALI 4.609set

The ROTALIGN PRO computer and receiver can be set up with an infrared link instead of a cable. This is useful for continuously rotating shafts, or where a cable could get caught during rotation. It is especially invaluable when large shafts require use of a turning gear and cannot be stopped readily.

The infrared interface package ALI 4.609set includes:

ALI 4.608	ROTALIGN PRO infrared interface module
ALI 4.610	External receiver battery with IR interface
ALI 4.701-2	Cable, 2 m / 6' 6" from receiver to external battery





The infrared interface module (ALI 4.608) connects to the serial (COM) interface of the ROTALIGN PRO computer. The module is then activated by entering the 'Device config' menu and setting the 'Sensorport' option to 'Side' (see page 3-5).

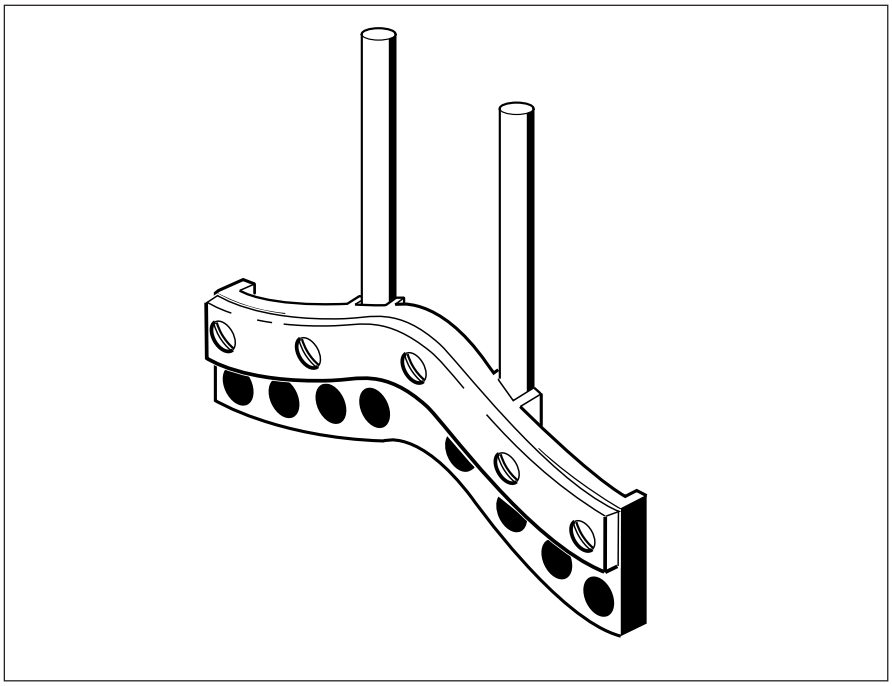
The external battery is equipped with two strong magnets which hold it securely on any ferromagnetic shaft or coupling surface.

Accessory brackets

Magnetic sliding bracket for non-rotatable shafts ALI 2.230

In order to accurately align two machines to one another, the position of their shafts must be determined by measuring radial displacement (such as ROTALIGN PRO does) while the shafts are rotated. Unfortunately, some machines do not fulfill this requirement as their shafts cannot be rotated slowly for measurement. Especially when long separations between machines are involved, this condition compromises alignment accuracy when conventional measurement methods are used.

However, the ALI 2.230 magnetic sliding bracket offers an elegant solution to this dilemma. The bracket fits onto the coupling flange as shown and simply slides around to the required measurement positions. Its powerful magnets ensure the mounting stability needed for accurate measurement. The magnetic sliding bracket for stationary shafts is suitable for all shaft of diameter 80 mm / 3 1/8" and greater.



Anytime shafts cannot be rotated during measurement (regardless what method is used), alignment accuracy becomes dependent on angular positioning accuracy and machining quality of the shaft and coupling:

- The flange and perimeter of the coupling or shaft must be surface-finished.
- The coupling or shaft must be made of ferrous material (steel) with a large magnetic contact area over which the magnets can guide the bracket.

- Before mounting the sliding bracket, the coupling or shaft should be cleaned, then lightly lubricated at the appropriate location to allow the bracket to slide around smoothly.

- The laser should always be mounted on the side with the highest-quality finish.

For best possible alignment accuracy, always try to rotate at least one shaft (with the coupling bolts removed). If at all possible, mount the laser on the shaft that can be rotated (any quick-fit bracket can be used on the rotating side).

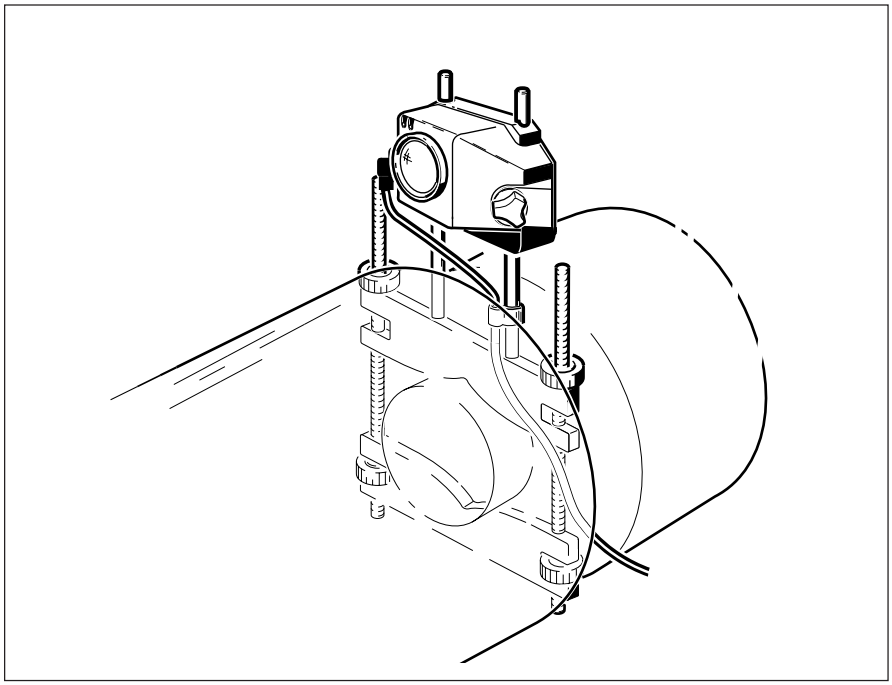
Note

Accuracy achieved from nonrotating shaft alignment methods is always less than that of the ROTALIGN PRO when both shafts are rotated and the usual chain-type brackets are used. Therefore, nonrotating measurement should be seen only as a method of last resort.

Extra-thin bracket

ALI 2.109set
ALI 2.109Lset

With a thickness of just 8 mm (less than 3/8"), the extra-thin bracket is perfect for handling 'tight squeezes' and comes in two sizes, one for shaft diameters up to 160 mm / 6 5/16" (ALI 2.109set), and a smaller version for shaft diameters up to 100 mm / 3 15/16" (ALI 2.109Lset). ALI 2.109set contains two pairs of brackets, one in each size; ALI 2.109Lset contains only one pair in the smaller size.

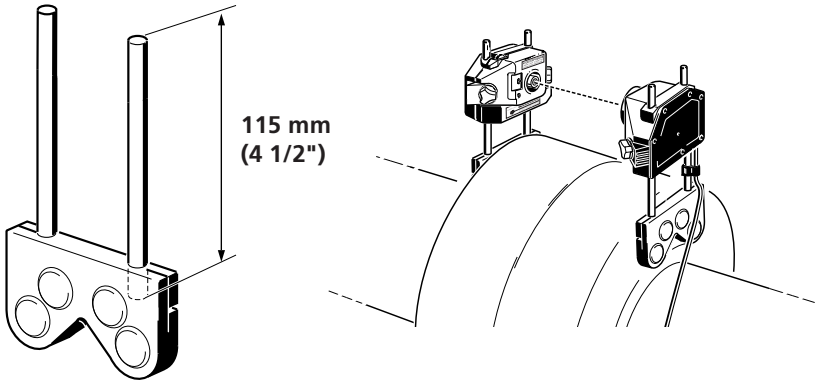


Compact magnetic bracket ALI 2.112set

Especially when large machines are to be aligned, the coupling flange may be the most advantageous surface for mounting the ROTALIGN PRO laser and receiver.

This compact bracket uses four powerful magnets to hold the standard bracket support posts against any flat, smooth ferromagnetic surface. This makes mounting extremely quick and convenient while maintaining the same high accuracy as that achieved with other ROTALIGN PRO brackets.

Compact magnetic bracket ALI 2.112set

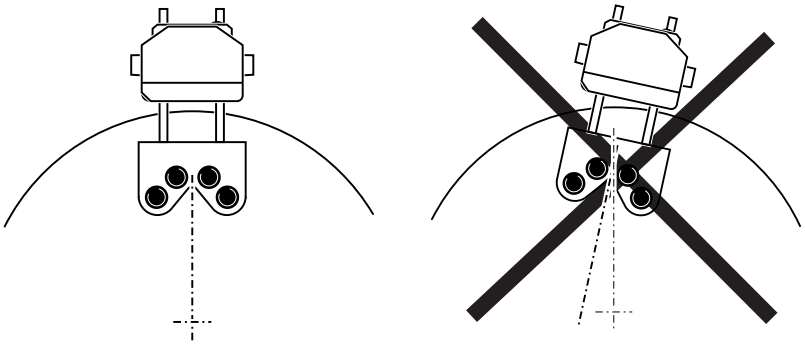


Wipe any traces of grease or oil from the mounting surface to avoid bracket slippage (which would reduce measurement accuracy).

Mount the bracket on the coupling flange. Although the bracket fits onto even very small shaft/coupling configurations, all four magnets should contact the mounting surface completely for maximum holding power. Use only the 115 mm / 4½" support posts supplied.

Note

Use a leveling device (such as the ALI 2.207 inclinometer) if necessary to ensure that magnetic brackets are mounted perfectly square to the shaft radius. Otherwise, skewed mounting can result in measurement error.

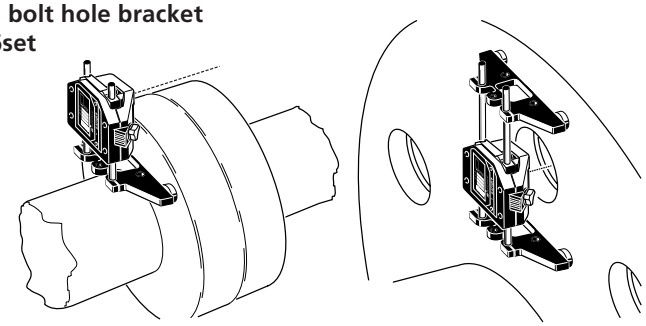


Coupling bolt hole bracket ALI 2.106set

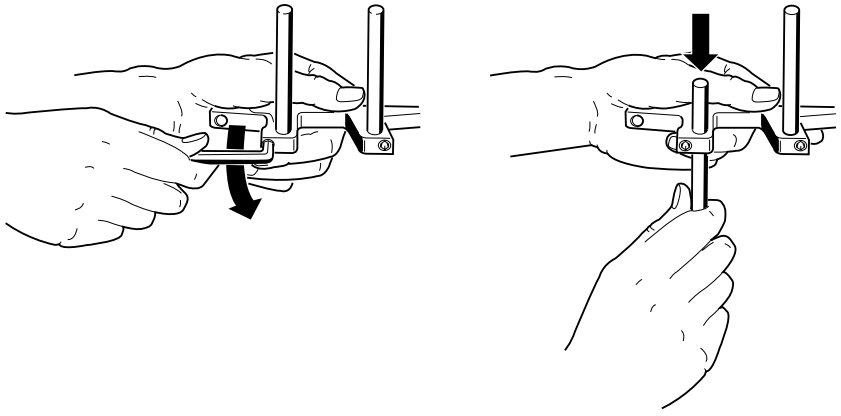
This magnetic bracket can serve as a useful substitute for the standard chain-type bracket when the system must be mounted on large couplings with large bolt holes. Thanks to its four powerful samarium-cobalt magnets, this bracket provides quick and sturdy mounting by straddling the bolt hole; no radial clearance is required beyond the coupling circumference. This space-saving design can save alignment time when space is tight around the coupling.

The basic principle remains the same as when other brackets are used. However, once the coupling bolt is removed, this bracket can be placed upon the coupling flanges as shown below. The ROTALIGN laser and receiver simply slide onto their support rods and are fixed into place by the upper bracket arm. The entire assembly is then positioned on the coupling so that the laser beam passes directly through the bolt hole. On smaller couplings, the beam can be directed above the coupling as shown below at left.

Coupling bolt hole bracket
ALI 2.106set



Use only the 115 mm (4½") support rods supplied with the bracket. The position of the support rods may be changed by loosening the hex screws that clamp them in the bracket.



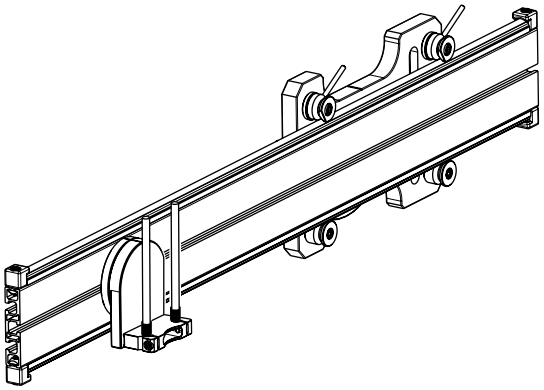
Avoid skewed mounting by using a leveling device (such as the ALI 2.207 inclinometer), see previous page.

Note

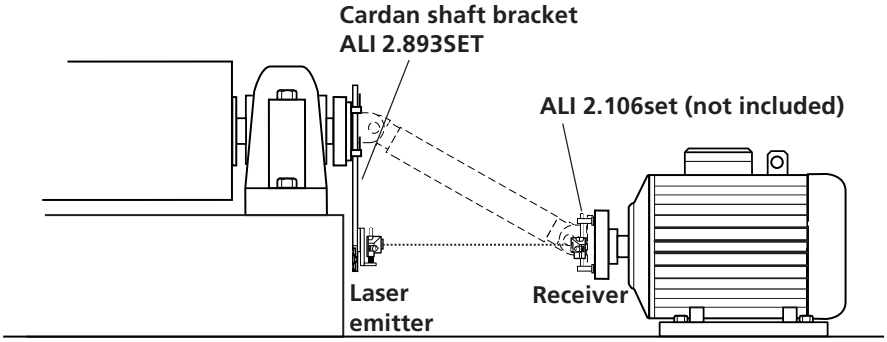
Cardan shaft bracket ALI 2.893SET

Machines joined by cardan shafts require use of this special bracket to mount the receiver onto the moveable machine. The bracket faceplate attaches onto the coupling face by either of two methods:

1) if the shaft end or coupling face has a threaded hole in its center, a center bolt can be used
   or
2) coupling bolt holes can be used for three-point mounting onto bolt circle diameters of 100 mm to 212 mm (3 15/16" to 8 5/16").



The Receiver mounts onto the movable machine using e.g. the coupling bolt hole bracket (ALI 2.106set, not included).



Typical cardan shaft alignment configuration (see Part 2, page 4-5).

This configuration allows convenient and highly accurate shaft alignment at shaft offsets of up to 810 mm (31 7/8") and separation distances up to 10 m (33 ft.).

The cardan shaft bracket set ALI 2.893SET includes:
Faceplate assembly
Slide, length 970 mm / 38"
Receiver holder assembly
Center bolts, M16 and M201
Center bolt thread adapters, M24 and M301
Center bolt wrench
Faceplate nuts and bolts, M10 (3 pcs.), with washers and spacers
Hex keys, 1.5 mm, 4 mm and 5 mm
Heavy-duty flight case w/contoured foam insert

Warranty, service and care

ROTALIGN PRO is a precision measurement instrument which should be handled as such. When not in use, it should always be stored in its protective carrying case.

Warranty

The ROTALIGN laser diode is guaranteed for two years. All other system components are covered by a one-year warranty. Please note that any attempt to service the components by unauthorized personnel will render all warranty coverage void.

Service and care

Although the ROTALIGN PRO system is essentially maintenance-free, the following points should be observed: The calibration accuracy of the system should be checked every two years as indicated by the colored label (shown at right) located on the back of the receiver housing. Please return ROTALIGN PRO to your authorized PRÜFTECHNIK AG distributor or service center for calibration checking.



All optical surfaces (laser aperture, receiver lens) must be kept clean. Use the ALI 2.905 cleaning set or a fine dusting brush such as that normally used to clean other optical devices; avoid vigorous polishing to preserve the anti-reflective coatings of the glass elements. The computer housing may be wiped clean using a soft cloth dampened with a mild, nonabrasive detergent.

If any problems are encountered during use, consult the troubleshooting guide on page 4-1 for help in locating and correcting the problem. If the problem still cannot be resolved, then contact your PRÜFTECHNIK AG representative for further assistance.

Only original PRÜFTECHNIK spare parts may be used.

Emergency rescue

The rescue program offers a means of quickly restoring the computer in the unlikely event that its flash memory card should fail, thereby preventing the program from starting. The program, which can be found in ROTALIGN PRO/BORALIGN Explorer CDs , lets you reformat the card and load a PC communication program onto it. The measurement firmware can then be re-installed from a PC using the ROTALIGN PRO Upgrade Manager program.

Procedure

1. Switch off the ROTALIGN PRO computer by pressing the ON/OFF key for 15 seconds (see page 4-3).
2. Install the Emergency program from the Explorer CD onto the PC by running the 'SETUP.EXE' file and following the standard installation instructions as they appear on the screen.
3. Connect the AC adapter/charger to the ROTALIGN PRO computer or make sure that the main battery supply has sufficient charge left for at least 10 minutes.
4. Connect the ROTALIGN PRO computer to the PC (see page 2-11) using only a fully-leaded serial cable such as the SYS 2.711-2 PC cable.
5. Start the 'ROTALIGN PRO Rescue' program on the PC.
6. In the first screen, select the 'Emergency boot' application and click on 'Next'.

   OR
   Select 'Backup' if you want to copy the entire contents of the card (with any errors) to the PC. Enter a name for the backup file and then click on 'Next'. This procedure takes about 30 minutes.
7. Select the COM port to which the ROTALIGN PRO computer is connected, then click on 'NEXT'.
8. Switch on the ROTALIGN PRO computer and follow the instruc tions in the display.
9. As soon as the message "Checking COM1 for access' appears, click on the 'Connect' button on the PC screen.

   (Be sure to watch the monitor closely for this message, because it appears for only about five seconds!) When the connection is made, the ID number appears; then click on 'Next'.
10. Click on 'Finish' and confirm your intent to launch the emergency salvage procedure.
11. Once the card has been reformatted and communication reesta blished, the ROTALIGN PRO computer starts automatically and loads the PCCOMM program. You may now use the ROTALIGN PRO Upgrade Manager to reload the program firmware.

Technical data

Laser emitter

Laser	GaAlAs semiconductor laser
Wavelength	675 nm (typical)
Beam diameter	5 mm
Beam divergence	<0.3 mrad
Beam power	<1 mW
Laser safety class	Class 2; FDA 21CFR 1000 and 1040
Power supply	9 V block battery, IEC 6LR61 (alkaline or lithium)
Operating time, continuous	80 hours, depending upon battery type
Temperature range	0°C - 60°C / 32°F -140°F
Weight	approx. 165 g / 5.8 oz.
Intrinsic safety (option)	EEx ib IIC T4
Certificate number	TÜV 02 ATEX 1864

Receiver

Directions of 5-axis detector measurement	2 planes (4 displacement axes) 1 inclination 360° (angle to plumb)
Two detector areas	18 mm x 18 mm / 0.7 x 0.7 in. each; 10 x 10 mm / 0.4 x 0.4 in. linearized
Resolution	1 µm / 0.04 mil, angular 10 µRad
Error	<2%
Rotation angle measurement accuracy	better than 2° (fully automatic)
Measurement rate	approx. 20 Hz
Temperature range	0°C - 60°C / 32°F -140°F
Weight	approx. 190 g / 6.7 oz.
Intrinsic safety (option)	EEx ib IIC T4
Certificate number	TÜV 02 ATEX 1974

Laser emitter/receiver

Max. separation, emitter to receiver	10 m / 33 ft.
Measurement stability	Ensured by temperature-stabilized light metal housing
Environmental protection	shockproof, waterproof, dustproof (IP 67)
Protection from ambient light	yes
Dimensions, W x H x D	approx. 105 x 67 x 47 mm 4 1/8" x 2 5/8" x 1 7/8"

Computer

LCD screen	60 x 95 mm / 2 3/8" x 3 3/4", 200 x 320 pixels, with contrast control
LED indicators	Main battery low, auxiliary battery low, battery charging, "sleep" mode
Power conservation	"Sleep" mode blanks screen, interrupts measurement after user-defined period of nonuse; automatic shutoff after a further defined period.
Keyboard	6 variable-function keys (softkeys) 20 fixed-function keys (hard keys)
External interface	Parallel printer interface (Centronics) and RS232C (serial)
Memory	Nonvolatile, 4MB for up to 250 measurement sets with labels, comments etc.
Power supply	6x 1.5 V (IEC LR 14) Size "C" (standard alkaline-magnesium)
Alternatively:	- ALI 3.576 AC adapter for 110V/220V (switchable), output 400 mA min. at 12 V ± 5% - Li-Ion battery rechargeable by computer Nominal voltage: 7.2 V Capacity: 1.35 Ah Charging duration: max 5 hours
Auxiliary battery	9V block (IEC 6LR61) for several minutes of emergency operation
Backup battery	Lithium (laser welded type), maintains memory for 5 years
Operating time, computer/receiver*	50 hours (alkaline batteries) 15 hours (Li-Ion battery)

*Based upon 25% measurement, 25% computation and 50% "sleep" mode.

Environmental protection	waterproof, dustproof, shockproof (IP 65)
Operating temperature	0° C - 45° C / 32° F - 113° F
Dimensions, W x H x D	Approx. 210 x 240 x 70 mm 8 1/4" x 9 1/2" x 2 3/4"
Weight with battery	Approx. 1.75 kg / 3.8 lb.
Intrinsic safety (option)	EEx ib IIC T4
Certificate number	TÜV 02 ATEX 1975

Carrying case

Standard	ABS, drop tested / 2 m / 6 1/2 ft.
Optional	Aluminum shell Both cases feature 2 key locks and 1 combination lock.
Case dimensions, W x H x D	Approx. 550 x 380 x 205 mm 21 5/8" x 15" x 8 1/8"
Weight, including all standard parts	Approx. 11.2 kg / 24 lb.

Options

- Noncontact IR data transmission from receiver to computer
  Max. range: Approx 8 m / 26 ft. depending upon surrounding conditions.
- Intrinsic safety: EEx ib IIC T4; approx. U.S. equivalent: NEC Article 500-4, Class 1, Division 1, groups D,C,B,A and special safeguards T4

- **ROTALIGN® PRO Explorer** PC software ALI 3.592SET:
- Back up and restore machine alignment files under Windows®
- Configure machine arrangements, enter dimensions and file information on a PC then upload the files to the ROTALIGN® PRO
- Issue alignment reports
- Display ROTALIGN® PRO screens
- View 5 alignment measurements as a 6-machine train

Includes PC software, manual, serial interface cable and adapter.

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