

# PERMALIGN®

# ALI 3.001

## Continuous laser-optical monitoring of shaft alignment and displacement

Thermal growth, foundation settling, piping forces and overloading are the most common causes of machine displacement. This can in turn lead to machine inefficiency due to increased loading, shaft misalignment or even machine breakdown. The PERMALIGN® monitor lets you measure up to 16 mm of vertical and horizontal machine displacement during operation – without contact, over distances up to 10 m (32 ft). This sturdy, reliable unit can be mounted to any machine for continuous measurement over a few hours during warm-up or even for permanent monitoring over months at a time.



PERMALIGN® is also imminently suited to other types of long-term displacement measurement besides shaft alignment monitoring. Through use of suitable reflectors, the laser-optical principle has been successfully applied in application areas as diverse as measuring seal ring planarity, roller bending, deflection of overhead cranes and foundation settling, to name but a few.

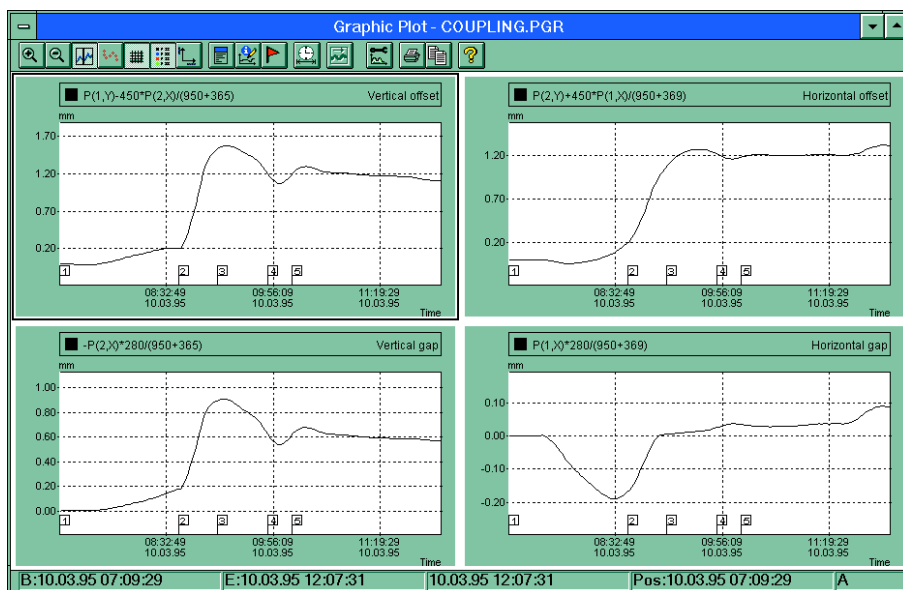
### Alignment condition at a glance

Although PERMALIGN® features a built-in LCD display for direct readout of position coordinates, it really shines when used in conjunction with a computer.

When used with a PC, WINPERMA® for Windows connects up to 16 PERMALIGN®s, continuously reading-in and storing mea-

surements for a comprehensive monitoring analysis. Detailed graphs of any PERMALIGN® parameter can be displayed, even incorporating measurements into formulae to calculate and display machine feet movement or coupling offset!

WINPERMA®'s flexibility lets you measure specialized displacement phenomena like outboard bearings, attached piping or loading deflection of cranes.



With a PC: The WINPERMA® trend graphs show how coupling alignment changes during warm-up and cooling

### A typical application

A classic application of PERMALIGN® is determination of thermal growth values for 'cold' alignment compensation. For example, when a gas turbine was started and brought up to operating speed by a steam turbine, with a gearbox installed between the two, excessive vibration levels were measured on the gas turbine.

In order to determine the role played by thermal growth in this vibration behavior, a PERMALIGN® system was mounted between the gearbox and the gas turbine in a manner similar to that shown on the previous page.

The WINPERMA® PC program clearly showed that the gas turbine begins to 'grow' when started and that vibration levels decrease as the turbine expands. This supports the assumption that thermal displacement was the cause of severe vibration. The measured growth values were then used to determine proper offsets for 'cold' alignment, and vibration levels fell drastically as a result.

### PERMALIGN® technical data

Detector measurement range	
Axis 1	± 8 mm / ± 5/16 in.
Axis 2 (⊥ to Axis 1)	± 8 mm / ± 5/16 in. (or $x^2 + y^2 = 64 \text{ mm}^2 / 0.1 \text{ in.}^2$ )
Maximum separation	10 m / 30 ft. (at full measurement range)
Resolution: Display	1/100 mm / 1/1000 inch; 1° C; 1° F
Internal	1/1000 mm / 0.00004 inch; 0.1° C; 0.2° F
Measurement rate	approx. 1 mean value/sec.
Intrinsic safety (optional)	Fulfills Zone 1 requirements EEx ib llc T4 Zone 1; Supply module is installed outside hazardous area.
Laser safety	Class I: IEC TC 76 (Europe) and 21 CFR 1040.10, 1040.11/ANSI Z.136.1(USA)
Operating temp. (w/o cooling/heating)	10° - 50° C / 50° - 122° F [0° - 70° C / 32° - 158° F available]
Protection class	IP65: dust- and spray-proof
Dimensions (W x H x D)	65 x 90 x 90 mm 2 9/16" x 3 9/16" x 3 9/16"
Weight	Approx. 750 g / 1 lb. 11 oz.

### Ordering information

PERMALIGN® alignment monitoring package for Windows PC contains the following:	ALI 3.001
Monitor (2 pcs.)	ALI 3.201
90° Prism (2 pcs.)	ALI 3.202
Mounting bracket (4 pcs.)	ALI 3.203
Beamfinder	ALI 2.250
Battery pack (incl. cable)	ALI 3.221
Module box	ALI 3.250-1
Monitor-monitor cable, 2m / 6½'	ALI 3.270
Cable adapter for IBM PC	ALI 3.264
WINPERMA® PC software for Windows (includes instruction manual ALI 9.527G for software and PERMALIGN® hardware)	ALI 3.305set
Traveller Case 2	ALI 4.832
Monitor cable, 2m / 6½'	ALI 3.260
PC cable, 2m / 6½'	ALI 3.262
Mains cable:	
Euro plug, 2m / 6½'	0 0336 0003

For detailed information on features and technical data, please consult the Alignment Product Catalog ALI 9.300 obtainable free of charge from your local PRÜFTECHNIK distributor or our web site at [www.pruftechnik.com](http://www.pruftechnik.com)

