

## Bore alignment

Straightness measurement of bore and bearing journals

# E950

# STRAIGHTNESS THE EASY WAY

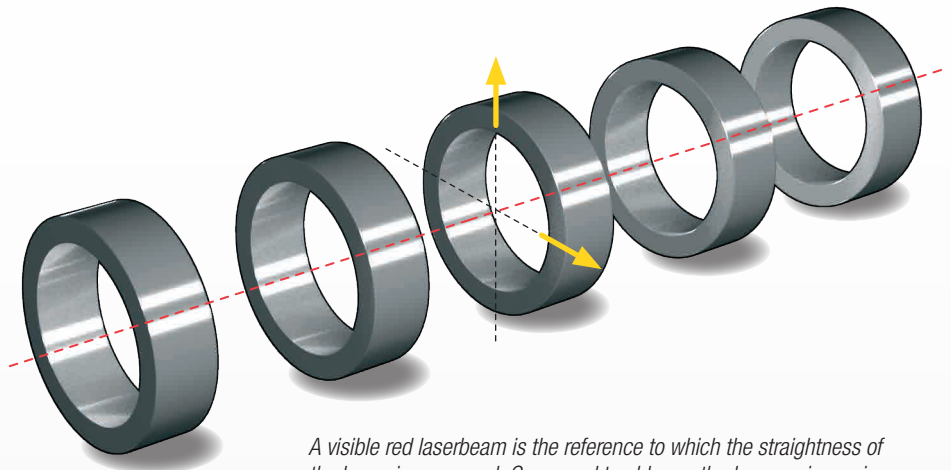
## RELIABILITY AND PRECISION

Easy-Laser® E950 makes the control and adjustment work of bearings easier thanks to the wireless detector unit and measurement programs that guides you through the measurement process. All of the parts included in the systems are designed and built for even the most demanding workplace and for easy setup on any machinery. The versatile design solves the straightness measurement problems quickly and with precision for any kind of application. Objects up to 40 m [132 feet] can be measured. The detector reads measurement values with a resolution of 0.001 mm [0.05 mils].

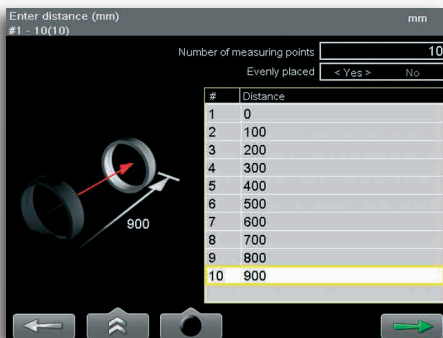
The system comes in four versions:

- Easy-Laser® E950-A
- Easy-Laser® E950-B
- Easy-Laser® E950-C
- Easy-Laser® E950-D

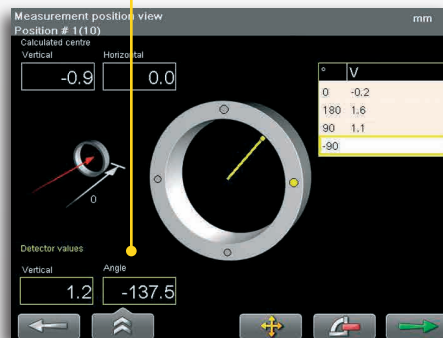
Please see last page for more information.



A visible red laserbeam is the reference to which the straightness of the bores is measured. Compared to older methods, e.g. piano wire, the work is done much faster, easier and more accurately.



1. You set the number of measurement points and the distance between them in advance, or as the measurement continues. The distances can be equal or individual.



2. The graphics shows the detector direction. Markings on the circle shows active measurement point. Measurement value, and angular position for the detector (A).



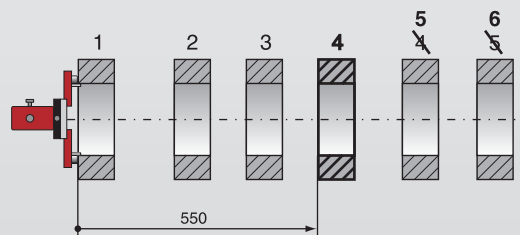
3. "Live" adjustment of the measurement object. Vertical and horizontal value for the object (B). Markings on the circle shows zone for adjustment with live values (C).

## VERSATILE PROGRAMS

The straightness programs of system E950 are very versatile, and let you work in the way that suits every job best. You can add, remove and remeasure measurement points at any time during the measurement. Up to 999 points can be handled by the program. You can include both full bores and half bores in any possible combination in one measurement, the program will calculate the correct centre line in all cases.



The measurement program includes many different methods for straightness measurement: A: 1-point measurement, B: 2-point measurement (Note: not available in the USA), C: 4-point measurement, D: Multipoint measurement (also ovality measurement), E: 3-point measurement, F: 3-point measurement with arbitrary angles, G: Multipoint measurement

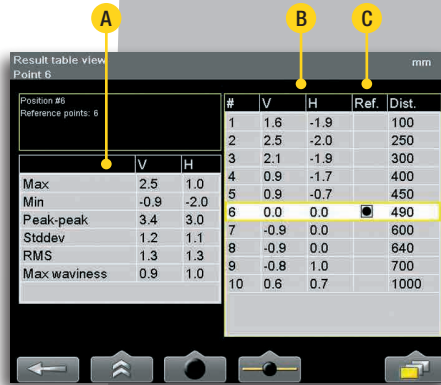


It's easy to add measurement points anywhere on the object in an existing measurement. The following points will be renumbered automatically. If you remove a point the following will be renumbered according to the same principle. If you remeasure a point, the old values will be saved in a history data base for possible later comparison. All this you can do at any time during the measurement!

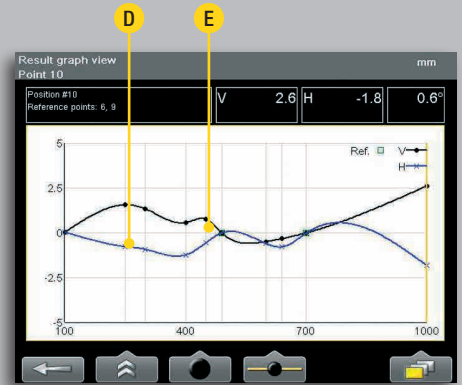


## THE MEASUREMENT RESULT

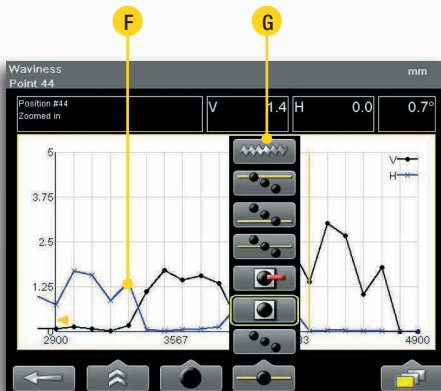
Thanks to the large colour display with clear graphs and measurement data you can evaluate the result directly on site. Any point can be set as reference and you can set an offset to which the centre line will be recalculated. You can also calculate waviness (short and long) and best-fit for the points. If you want, the result can also be checked against a tolerance value. The measurement system takes care of all these complicated calculations for you.



Result display with statistics to the left (A) and table with values to the right (B). The reference points are clearly marked (C).



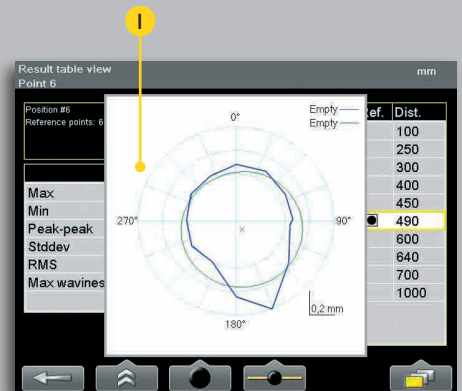
The result can also be shown as a graph (sharp or interpolated). You can zoom in or show the whole graph. Horizontal values (D) and vertical values (E).



You can quickly change what the graph shows (G) for different calculation settings, for example Best fit and Waviness as shown here (F).



The result displayed as "Best fit around 0" (H), and with sharp graph.



By using the Multipoint method you can get a clear view of possible bore ovality (I).

# DOCUMENTATION

## SAVE TO USB MEMORY

You can easily save desired measurements on your USB memory. This enables you to take it to your computer to print reports whilst leaving the measurement system in place to continue measuring.

## SAVING IN THE BUILT-IN MEMORY

You can, of course, save all measurements in the display unit's internal memory. You can then open an old measurement and remeasure those points you adjusted.

## CONNECT TO PRINTER

Connect a thermal printer (accessory) and print locally. Good for example when you want to see the values before and after adjustment, or want to leave a documentation of the measurement on site.

## CONNECT TO YOUR COMPUTER

The display unit is connected to the computer via the USB port. It then appears on the desktop as a "Mass Storage Device" which you can easily transfer files to and from.

## CREATE A PDF REPORT DIRECTLY

When measurement is complete it is possible to generate a PDF report containing graphs and measurement data directly in the measurement system's display unit. All the information about the measurement object is documented, and you can add your company's logo and address details if you so wish.

## EASYLINK™ PC SOFTWARE

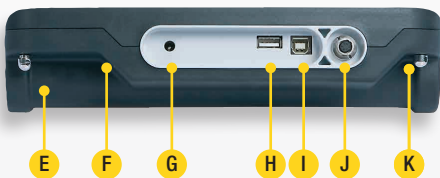
With the EasyLink™ database program you can save and organise all your measurements in one place, produce reports with both data and images and export to your maintenance systems. You can customise what your Excel reports should look like and what data should be visible and where it should be positioned. The program has a clear folder structure, where you drag and drop files from the display unit to the database. Create your own structure with folders for manufacturer, department or machine type for example. The database can also be located on a common server and shared with other users. For extra safety you can use EasyLink™ to make backups of what you have saved in the display unit.



# THE PARTS OF THE SYSTEM



- A. Two Enter buttons, for left and right-handed users
- B. Large, easy to read colour display
- C. Proper buttons for clear feedback
- D. Thin profile gives a perfect grip for your hands



- E. Battery compartment
  - F. Robust, rubber coated design
  - G. Connection for charger
  - H. USB A
  - I. USB B
  - J. Easy-Laser® measurement equipment
  - K. Mounting for shoulder strap
- Note: Dust and splash guards for connectors removed on picture.

## DISPLAY UNIT

The display unit for the E series enables you to work more efficiently and for longer than ever before thanks to several innovative solutions. It is also ergonomically designed with easy-to-grip rubber cladding and robust construction.

### NEVER LOSE POWER!

The display unit is equipped with our Endurio™ Power management system. This ensures that you never have to stop in the middle of a measurement because the battery has run out.

### PERSONAL SETTINGS

You can create a user profile where you can save your personal settings. You can also have different settings for different types of measurements, and save them as Favorites, for quick access from the main menu.

### LANGUAGE SELECTION

You can choose the language you want to appear on the screen: English, German, French, Spanish, Portuguese, Swedish, Finnish, Russian, Polish, Dutch, Italian, Japanese, Korean and Chinese are available.

## ERGONOMIC

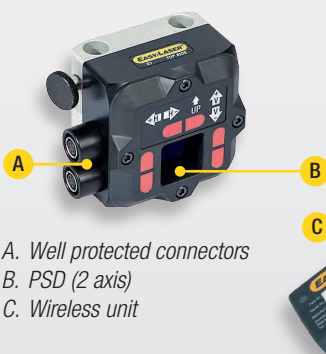
The display unit has a thin, easy-to-grip and rubber coated profile that ensures a secure grip. It has large well-spaced buttons that give clear feedback when pushed. In addition, the two Enter buttons make the system suitable for both right and left-handed users. The display screen has clear graphics that guide you through the measurement process.

## VALUES PROGRAM

All our measurement systems come with the universal Values program. It works like digital dial indicators. With this, you can, in principle, measure any type of geometry. Many Easy-Laser® users therefore end up using the measurement system in many more places in their operation, than they first intended!

## UPGRADING

If you wish to expand functionality in the future, the software in the display unit can be upgraded via the internet or by connecting a USB memory containing the new software.



**E950-A**  
**E950-B**  
**E950-D**

## DETECTOR E7

Detector E7 connects to the display unit via cable or wireless. The unit for wireless communication is easily inserted into one of the connectors on the detector. The substantial and rigid design guarantees stable measurement values and reliable alignment with the greatest precision in even the toughest of environments. The detector is also water and dust proof to classes IP66 and IP67. With built-in electronic inclinometer the

system knows exactly how the detector is positioned. It has a large 20 mm [0.78" sq] 2 axis detector (PSD for the greatest accuracy).



**E950-C**

## DETECTOR E9

The E9 detector connects to the display unit via cable or wireless (built-in). It is manufactured from a solid aluminium billet for the highest rigidity and measurement stability even in the toughest of environments. Threads on both ends makes the detector very versatile when mounting it for different applications. Rod adapter is included (see

next page). The detector is water and dust proof to class IP67. With built-in electronic inclinometer the system knows exactly how the detector is positioned. It has a large 20 mm [0.78" sq] 2 axis detector (PSD for the greatest accuracy).

- A. Built-in wireless unit
- B. Threads on both ends (4+4)
- C. PSD (2 axis)

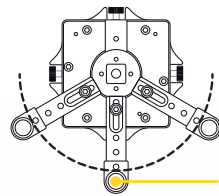
## LASER TRANSMITTER BRACKETS

The laser transmitter's rigid design assures highest measurement accuracy. The bracket comes in two different versions.

1: One has three sets of adjustable arms with magnets to fit different diameters.

2: The other spans over the sterntube with a bracket with two or three magnet bases. Fine adjustment of the laser beam in horizontal and vertical direction is made very easy with the offset hub.

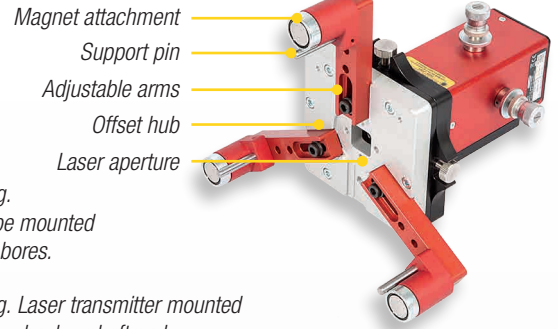
### E950-A/E950-C/E950-D: LASER TRANSMITTER WITH ARMS



Alternative mounting.  
All three arms can be mounted downwards for half bores.

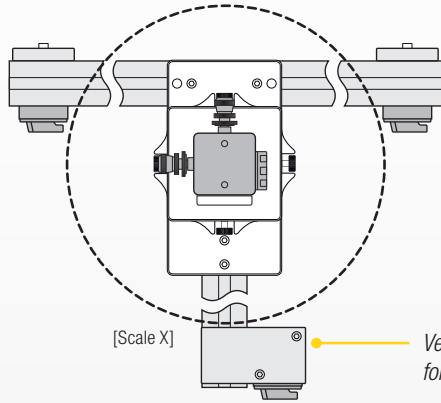


Alternative mounting. Laser transmitter mounted to point from e.g. fly wheel or shaft end.



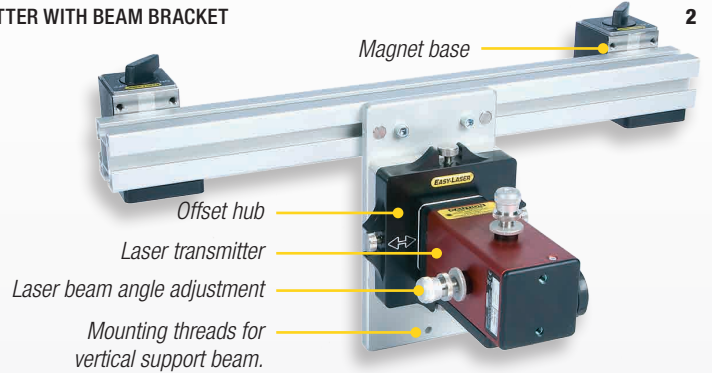
Magnet attachment  
Support pin  
Adjustable arms  
Offset hub  
Laser aperture

1



[Scale X] Vertical support beam mounted for large diameters

### E950-B: LASER TRANSMITTER WITH BEAM BRACKET



Magnet base  
Offset hub  
Laser transmitter  
Laser beam angle adjustment  
Mounting threads for vertical support beam.

2

## DETECTOR BRACKETS

The detector bracket comes in three versions/sets depending on system.

1: Set of three slide brackets with extendable rods for different bore diameters.

2: Bracket with magnet bases. Comes with extension beams for large diameters and extension rods for the measuring probe. The detector is rotated and moved with the detector slide.

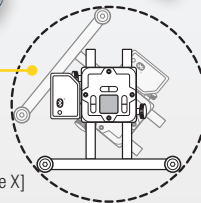
3: Slide bracket with a width of 25 mm [0.99"]. Allows for measurement of bores down to diameter 80 mm [3.15"] when used with detector E9. This set also includes the brackets of set 1.

### E950-A/E950-C: SLIDE BRACKETS (3 SIZES)



The magnetic feet holds the bracket perfectly in any position around the bore

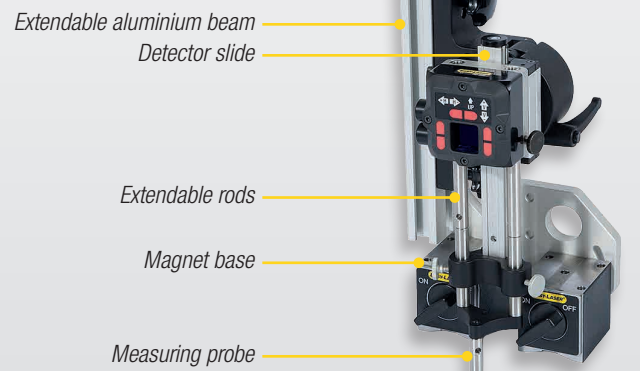
[Scale X]



Extendable rods  
Magnetic feet

1

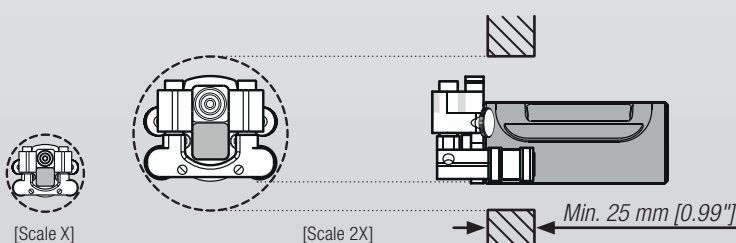
### E950-B/E950-D: SELF CENTERING BRACKET



Extendable aluminium beam  
Detector slide  
Extendable rods  
Magnet base  
Measuring probe

2

### E950-C: SLIDE BRACKET WIDTH 25 MM



[Scale X]

[Scale 2X]

Min. 25 mm [0.99"]



Extendable rods  
Slidable target  
Rod adapter  
Magnetic feet  
Positioning guide

3

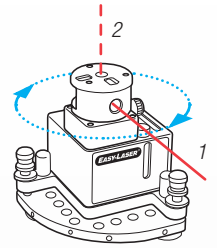
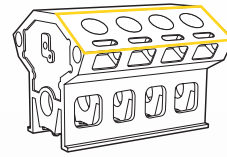


# EXPANDABILITY / ACCESSORIES



## LASER TRANSMITTER D22

Laser transmitter D22 can be used to measure flatness, straightness, squareness and parallelism. For example flatness of parting surfaces. The laser beam can sweep 360° with a measurement distance of up to 40 metres [130'] in radius. The laser beam can be angled 90° to the sweep, within 0.005mm/m [0.005mils/INCH]. Part No. 12-0022



Option 1: the laser beam is used for a 360° sweep.  
Option 2: the laser beam is angled at 90° to the sweep.



## LASER TRANSMITTER E30 LONG RANGE

This transmitter makes it possible to measure straightness on very long distances. Up to approximately 100 m [328'] with a 20 mm PSD (like in the E7 and E9), and >200 m [656'] with a 30 mm PSD. Offset hub and arms also needed.

## SHAFT ALIGNMENT MEASURING UNITS

Align shafts and couplings with these combined laser-/detector units that are mounted on each side of the coupling. The shaft alignment software is included as standard in the system. Add the S- and M-units, V-brackets with rods and chains, as well as cables or wireless units.



## LASER TRANSMITTER D25

For straightness measurement up to 40 m [130'], and measurement of parallelism between two or more shafts in gearboxes. Can also be used for rudder bearings where the axial surface is the reference. The laser beam can be angled 90° to the centre line. Part No. 12-0706

## ADJUSTABLE MAGNET



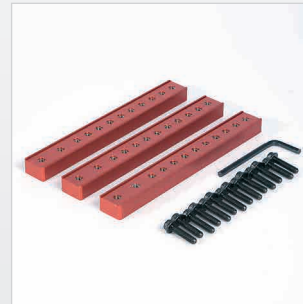
Adjustable 0–14mm [0–0.55"] compared to standard magnet level. Part No. 12-0990. Included as standard with E950-A/C/D.

## MAGNETIC BRACKET



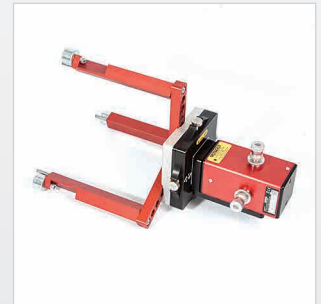
With three super magnets. For laser transmitter D75. To use on shaft ends, flywheels, etc. Part No. 12-0187

## EXTENSION ARMS



Extension arms 500–1000 mm [19.68"–39.36"]. Set for D75 with offset hub. Part No. 12-0282

## AXIAL EXTENSION ARMS



Making it possible to reach the Linebore detector from the same side of the bore as the transmitter. Part No. 12-0580

## EXTENSION CABLES



5 m [16.4'], Part No. 12-0108  
10 m [32.8'], Part No. 12-0180

## TUBE ADAPTERS



Adapters mainly for detector E9 and used e.g. for extruder measurements. Part No. 01-0777

## PIN FOR HUB



With this pin the hub can be mounted in a machine spindle or similar. Pin is hollow. Part No. 12-1039

## ALU EXTENSION BEAMS



0.5 m [19.68"], Part No.03-0769  
0.6 m [23.62"], Part No.03-0770  
1.1 m [43.31"], Part No.03-0771

# TECHNICAL DATA

System	
Relative humidity	10–95%
E950-A: Weight	14.0 kg [30.8 lbs] (complete system)
E950-A: Carrying case	WxHxD: 550x450x210 mm [21.6x17.7x8.3"]
E950-B: Weight	27.0 kg [59.5 lbs] (complete system)
E950-B: Carrying case	WxHxD: 1220x460x170 mm [48.0x18.1x6.7"]
E950-C: Weight	14.3 kg [31.5 lbs] (complete system)
E950-C: Carrying case	WxHxD: 550x450x210 mm [21.6x17.7x8.3"]
E950-D: Weight	18.3 kg [40.3 lbs] (complete system)
E950-D: Carrying case	WxHxD: 550x450x210 mm [21.6x17.7x8.3"]

Laser transmitter D75 with offset hub	
Type of laser	Diode laser
Laser wavelength	630–680 nm, visible red light
Laser Safety Class	Class 2
Output	< 1 mW
Beam diameter	6 mm [1/4"] at aperture
Working distance	40-metre [130']
Type of battery	1 x R14 (C)
Operating time/battery	approx. 15 hours
Operating temperature	0–50 °C
Laser adjustment	D75: 2 ways ±2° (± 35 mm/m), Hub: ±5 mm in two axes
Housing material	Anodized aluminium
Dimensions D75	WxHxD: 60x60x120 mm [2.36x2.36x4.72"]
Dimensions D75 with Hub	WxHxD: 135x135x167 mm [5.31x5.31x6.57"]
Weight	2385 g [84.13 lbs]

Laser transmitter arm set (included in system E950-A and E950-C)	
Measurement diameters	∅ 100–500 mm [3.93"–19.68"]

Laser transmitter beam bracket (included in system E950-B)	
Measurement diameters	∅ 250–1000 mm [9.84"–39.37"] Up to 4000 mm with extension beams (accessories)
Magnet bases	3 pcs, holding power 800 N/each

Detector E9 (included in system E950-C)	
Type of detector	2 axis PSD 20x20 mm [0.78" sq]
Wireless communication	BT Wireless Technology
Resolution	0.001 mm [0.05 mils]
Measurement accuracy	± 1 µm ± 1%
Inclinometers	0.1° resolution
Thermal sensors	± 1° C accuracy
Environmental protection	IP Class 67
Operating temperature	-10–50 °C
Internal battery	Li-Ion
Housing material	Anodized aluminium
Dimensions	∅ 45 mm, L=100 mm [∅ 1.77", L=3.94"]
Weight (excl. rod adapter)	180 g [6.3 oz]

Detector E7 (included in system E950-A, E950-B and E950-D)	
Type of detector	2 axis PSD 20x20 mm [0.78" sq]
Resolution	0.001 mm [0.05 mils]
Measurement accuracy	± 1 µm ± 1%
Inclinometers	0.1° resolution
Thermal sensors	± 1° C accuracy
Environmental protection	IP Class 66 and 67
Operating temperature	-10–50 °C
Internal battery	Li-Ion
Housing material	Anodized aluminium
Dimensions	WxHxD: 60x60x42 mm [2.36x2.36x1.65"]
Weight	186 g [6.6 oz]

Self centering detector bracket for E7 (included in system E950-B and E950-D)	
Measurement diameters	∅ 300–1200 mm [11.81"–47.24"] Up to 4000 mm with extension beams and rods (accessories)
Stroke	60 mm [2.36"]
Magnet bases	2 pcs, holding power 800 N/each
Material	Anodized aluminium
Weight	4400 g [9.7 lbs] (with magnets)

Slide brackets (included in system E950-A and E950-C)	
Measurement diameters	Small: ∅ 140**–250 mm [5.51"–9.84"] Medium: ∅ 200–350 mm [7.87"–13.78"] Large: ∅ 300–500 mm [11.81"–19.68"]
**For E7 with wireless unit mounted. E9: ∅ 120 mm [4.72"]	
Material	Anodized aluminium
Dimensions, WxHxD	S: 60x90x13 mm [2.36x3.54x0.51"] M: 80x157x13 mm [3.15x6.18x0.51"] L: 100x205x13 mm [3.94x8.07x0.51"]
Weight	S: 210 g [7.41 oz], M: 335 g [11.82 oz], L: 460 g [16.22 oz]

Slide bracket width 25 mm, for E9 (included in system E950-C)	
Measurable bore diameters	∅ 80–250 mm [3.15"–9.84"]
Measurable bore width	Min. 25 mm [0.99"]
Material	Anodized aluminium
Dimensions	WxHxD: 79x57x57 mm [3.11x2.24x2.24"]
Weight	204 g [7.2 oz]

Rods	
Length (extendable)	30/60/120/240 mm [1.18"/2.36"/4.72"/9.44"]
Rod set A includes	2x30, 4x60, 4x120, 2x240 mm
Rod set B includes	2x30, 2x60, 2x120, 2x240 mm
Rod set C includes	2x30, 4x60, 4x120, 2x240 mm
Rod set D includes	2x30, 2x60, 2x120, 2x240 mm

Cables	
Type	With Push/Pull connectors
System cable	Length 2 m [78.7"]
Extension system cable	Length 5 m [196.8"]
USB cable	Length 1.8 m [70.8"]

Display unit E51	
Type of display/size	VGA 5.7" colour
Displayed resolution	0.001 mm / 0.05 thou
Power management	Endurio™ system
Internal battery (stationary)	Li Ion
Battery compartment	For 4 pcs R 14 (C)
Operating time	Appr. 30 hours (Normal operating cycle)
Operating temperature	-10–50 °C
Connections	USB A, USB B, Easy-Laser® units
Wireless communication	BT Wireless Technology
Storage memory	>100,000 measurements
Help functions	Calculator, Unit converter
Environmental protection	IP Class 65
Housing material	PC/ABS + TPE
Dimensions	WxHxD: 250x175x63 [9.8x6.9x2.5"]
Weight (without batteries)	1030 g [2.3 lbs]

Wireless connection unit (included in system E950-A, E950-B and E950-D)	
Wireless communication	BT Wireless Technology
Operating temperature	-10–50 °C
Environmental protection	IP Class 66 and 67
Housing material	ABS
Dimensions	53x32x24 mm [2.1x1.2x0.9"]
Weight	25 g [0.9 oz]

EasyLink™ Data base software	
System requirements	Windows® XP, Vista, 7, 8, 10. For the export functions, Excel 2003 or newer must be installed on the PC.

## CUSTOM DESIGN

In addition to our already versatile standard system we can also specially adapt measurement systems to suit your needs. Using our own CNC machines we can quickly manufacture brackets just for you. This means for example that brackets for other diameters than mentioned on this page can be manufactured on request.

## WARRANTY AND SERVICE CONCEPT

The Easy-Laser® systems have evolved over more than 25 years, through field experience in solving measurement and alignment problems. The systems come with a 3 year limited warranty. The manufacturing and quality systems are ISO9001 approved. If an incident should occur, our service department normally handles repairs and calibrations within five working days. This combination makes Easy-Laser® a reliable partner for your business.



**EASY-LASER® E950-A**

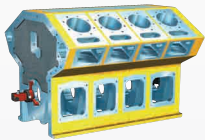
Mainly for diesel engines, compressors, gearboxes and similar applications. Measures bores  $\varnothing$  140–500 mm [5.51"–19.68"].\*



**A complete system contains**

- 1 Laser transmitter D75
- 1 Detector E7
- 1 Display unit E51
- 1 Wireless unit
- 1 Cable 2 m
- 1 Cable 5 m (extension)
- 1 Offset hub for D75
- 1 Set of offset hub arms, with magnets
- 1 Set of rods A
- 1 Slide bracket Small, Part No. 12-0455
- 1 Slide bracket Medium, Part No. 12-0543
- 1 Slide bracket Large, Part No. 12-0510
- 1 Magnet base
- 1 Large target
- 1 Carrying case. Drop tested. Water and dust tight.

**System Easy-Laser® E950-A, Part No. 12-0676**

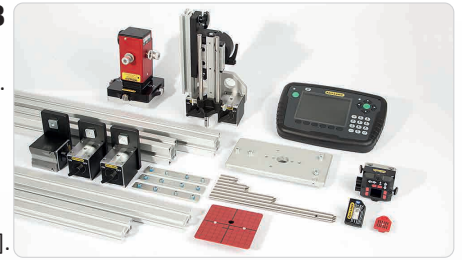


**EASY-LASER® E950-B**

Mainly for propeller shaft drive lines with sterntube. Align sterntube, support bearings, gearbox and engine.

Measures bores  $\varnothing$  300–1000 mm [11.81"–39.37"].

You can also add the slide brackets from system E950-A or E950-C to get a more versatile system.\*



**A complete system contains**

- 1 Laser transmitter D75
- 1 Detector E7
- 1 Display unit E51
- 1 Wireless unit
- 1 Cable 2 m
- 1 Cable 5 m (extension)
- 1 Offset hub for D75
- 1 Transmitter bracket, with 3 magnet bases
- 1 Set of rods B
- 1 Self centering detector bracket, with 2 magnet bases
- 1 Large target
- 1 Carrying case. Drop tested. Water and dust tight.

**System Easy-Laser® E950-B, Part No. 12-0677**



**EASY-LASER® E950-C**

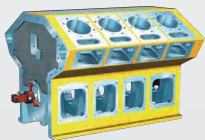
Mainly for diesel engines, compressors, gearboxes and similar applications. One of the brackets has a width of 25 mm [0.99"] to fit in narrow bearing journals. Measures bores  $\varnothing$  80–500 mm [3.15"–19.68"] as standard, and down to 50 mm [2.00"] with customized brackets. With additional accessories extruder machines can also be measured.\*



**A complete system contains**

- 1 Laser transmitter D75
- 1 Detector E9
- 1 Display unit E51
- 1 Cable 2 m
- 1 Cable 5 m (extension)
- 1 Offset hub for D75
- 1 Set of offset hub arms, with magnets
- 1 Set of rods C
- 1 Rod adapter for detector, with built in target
- 1 Slide bracket, width 25mm, Part No. 12-0768
- 1 Slide bracket Small, Part No. 12-0455
- 1 Slide bracket Medium, Part No. 12-0543
- 1 Slide bracket Large, Part No. 12-0510
- 1 Magnet base
- 1 Carrying case. Drop tested. Water and dust tight.

**System Easy-Laser® E950-C, Part No. 12-0772**



**EASY-LASER® E950-D**

Mainly for propeller shaft drive lines with sterntube. Align sterntube, support bearings, gearbox and engine.

Measures bores  $\varnothing$  300–1200 mm [11.81"–47.24"].

You can also add the slide brackets from system E950-A or E950-C to get a more versatile system.\*



**A complete system contains**

- 1 Laser transmitter D75
- 1 Detector E7
- 1 Display unit E51
- 1 Wireless unit
- 1 Cable 2 m
- 1 Cable 5 m (extension)
- 1 Offset hub for D75
- 1 Set of offset hub arms, with magnets
- 1 Set of rods D
- 1 Extension arms Linebore
- 1 Self centering detector bracket, with 2 magnet bases
- 1 Large target
- 1 Carrying case. Drop tested. Water and dust tight.

**System Easy-Laser® E950-D, Part No. 12-0954**



**All systems contain**

- |                                       |                                   |
|---------------------------------------|-----------------------------------|
| 1 Manual                              | 1 Battery charger (100–240 V AC)  |
| 1 Measuring tape 5 m                  | 1 Toolbox                         |
| 1 USB Memory stick with documentation | 1 Shoulder strap for Display unit |
| 1 USB Cable                           | 1 Cleaning cloth for optics       |

\*Note: exact measurable diameters also depends on the design of the object to be measured (e.g. where magnets can be placed). Custom designed brackets can extend the range. Ask us for more information.

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 05-0540 Rev7

