



# Next generation precision



The new

# GEPARD M4



new



proven



efficient

- \* **NEW:** The GEPARD™ M4 is also available in a cylindrical casing
- \* Secure, convenient and fast transmission using Bluetooth
- \* The highest precision in a robust design, easy to operate



# The new GEPARD™ M4 – proven quality and more possibilities thanks to the cylindrical



## Laser alignment systems

are the optoelectronic solution for the measurement of:

- \* Straightness
- \* Parallelism
- \* Perpendicularity
- \* Alignment
- \* Angular measurement
- \* Planarity
- \* Centricity and run-out

## Applications

- \* Straightness measurements and adjustment of guides, machine bases, straight edges
- \* Alignment of steel and framework constructions
- \* Planarity measurements of pedestals and surface plates
- \* Parallelism measurement and adjustment of tracks, guides, rollers, shafts
- \* Alignment measurement and adjustment of bearing seats and bores, spindles and shafts
- \* Perpendicularity measurement and adjustment of all kinds
- \* Positioning of workpieces, machines, equipment
- \* Long-term monitoring of deformations, deflections, movements
- \* Analysis of the surroundings to improve measuring accuracy

**GEPARD™, the powerful complete solution for precision measurements with the familiar cubic components, is now complemented by a new generation with a cylindrical shape. Functionally to 100% compatible, the cylindrical casing opens completely new application areas and for the first time also allows absolute measurements.**

The M4, the new generation of GEPARD™, is a completely new development and therefore represents the current state of the technology. The components could not only be made smaller (which was enabled by the compact cylindrical housing among other things), but also on board as standard there are powerful NiMH rechargeable batteries and Bluetooth wireless data transmission.



For this reason, the GEPARD™ M4 continues to be the first choice when easy and fast alignment and measurement work is involved and the highest precision is demanded. Using the real-time measurement display, objects can be aligned, adjusted and measured on-line. The user-friendly WIN-GEPARD application software

automatically recognises GEPARD™ measuring devices in the vicinity and logs the results of the measuring task.

## Now it's going round!

As well as adjustment measurements, the GEPARD™ M4 with the new cylindrical casing can now take absolute measurements for the first time and is thus especially suitable for use in rotatory systems. In this area therefore, the rotation, run-out or alignment of gears, shafts or drives can also be measured and regulated. For greater robustness and better temperature coefficients, the standard cylindrical casings are made of stainless steel (INOX™) but are also available in aluminium as an option.

The complete package can be conveniently stored in its own space-saving case – including



the charger, infra-red remote control and fibre-optic receiver module. With reliable and interference-proof Bluetooth data transmission and powerful rechargeable batteries, the GEPARD™ can also be used in harsh environments.



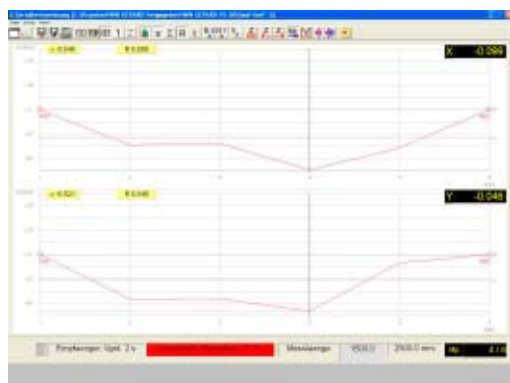
# and even casing

## THE WIN-GEARD™ APPLICATION SOFTWARE

The measurement data capture and evaluation software for the GEPARD™ system runs on standard PCs under Microsoft® Windows®. This allows measurements of

- \* straightness
- \* parallelism
- \* perpendicularity
- \* alignment
- \* position

to be performed quickly and professionally. Setup tolerances between the transmitter and the receiver are automatically corrected by the software.



By the use of „adaptive measuring methods“ the measurement accuracy can be increased by a factor of 2 to 3 compared with the standard modes. The measurements are displayed graphically and numerically on the PC screen while the measurements are being recorded. A special large digit display allows the data to be read even from a large distance.

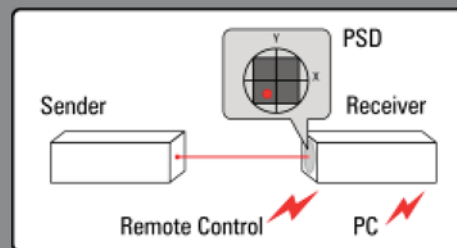
After completing a sequence of measurements, additional functions are available, for example scaling with freely-selectable reference points (alignment line methods) or display of the measurements using a straight-line regression according to ISO 1101, as well as comprehensive statistical calculations.

As a standard feature, sequences of measurements and the settings can be printed out on a measurement log and also saved for further use. Because the saved measurement data files are in ASCII format, they can be used further in popular spreadsheet or database programs without any problems.

## How a laser measuring system works

A laser beam collimated to infinity with very small beam divergence operates inside the GEPARD™ transmitter. This means that the laser beam diameter also remains constant over large distances. The laser beam is used as a highly stable straightness reference (similar to an alignment line). In this capacity, the laser beam is set up in parallel alignment to the test object.

The laser beam is received by a laser-sensitive position sensing device (PSD), integrated into the task-optimised GEPARD™ receiver casing (cubic or cylindrical), and converted into position-dependent electrical signals. If a two-dimensional PSD is used, the x and y co-ordinates of a test object can be measured simultaneously.



In the receiver, these signals are then converted into digital signals using a microprocessor and processed through various filter algorithms. The processed signals can then be digitally transmitted to an evaluation system. By moving the GEPARD receiver in the z direction along the test object, two 2-dimensional graphs for the x and y planes of the test object are generated.

### GEPARD™ Sender S4<sub>k</sub> (cubic)

The GEPARD laser transmitters are the reference for an exact measurement. They therefore use a highly stable fibre-coupled semiconductor laser which emits in the visible range. Because of the ingenious calibration mechanism inside the casing, fast and precise alignment of the laser beam for measurement is ensured and the WIN-GEARD user software makes it very easy to adjust the laser. The cubic GEPARD laser systems are extremely well



sued for the measurement of planar systems (guides, surface plates etc.)

### GEPARD™ transmitter S4<sub>r</sub> (cylindrical)

The new cylindrical GEPARD laser transmitter is distinguished by the high-precision alignment of its optical-mechanical longitudinal axis. This alignment allows precise absolute measurements in relation to the laser focal point for example, the alignment of rotation systems or the machining axes of milling cutters, lathes, boring machines etc. Using suitable mountings, the cylindrical transmitter is also suitable for measurement and alignment work on flat test objects.

### GEPARD™ receiver E4<sub>k</sub> (cubic)

In the receiver, an optoelectronic position sensor detects the position of the focal point of the laser beam with the highest precision (1ppm resolution). Because of the use of digital signal processing, most disturbance variables from the measurement environment can be eliminated through optimum processing of the measurement data. The measurements detected in this way are transmitted to the data evaluation computer over a serial interface (using Bluetooth or fibre optics).

### GEPARD™ receiver E4<sub>r</sub> (cylindrical)

In addition to the features of the E4<sub>k</sub>, the cylindrical receiver also has high-precision alignment of the optical-mechanical longitudinal axis, which, together with the matching



transmitter (S4<sub>k</sub>), permits absolute measurements to be performed. Like the E4<sub>k</sub>, the GEPARD E4<sub>r</sub> transmits its measurement data wirelessly via Bluetooth to the evaluation PC. Because of its infra-red operation and the powerful NiMH rechargeable batteries, the receiver is completely wireless and is trouble-free in use.





# RAYTEC GEPARD™ M4

## measure, test, record

### Technical data

Transmitter	GEPARD5 S4 <sub>k</sub>	GEPARD5 S4 <sub>r</sub>
Laser power	≤ 1 mW	≤ 1 mW
Laser class	2	2
Laser wave length	approx. 650 nm (red)	approx. 650 nm (red)
Laser beam profile	circular optimised Gaussian distribution	circular optimised Gaussian distribution
Laser beam dia. in 20 m	approx. 6 mm	approx. 6 mm
Power supply	NiMH rechargeable battery 1.5 V type AA	NiMH rechargeable battery 1.5 V type AA
Dimensions L x H x W	141 x 50 x 50 mm	ø 50 mm, L: 70 mm
Weight	650 g incl. rechargeable battery	500 g incl. rechargeable battery
Micro-fine adjustment	yes	–
Optical-mechanical alignment	–	yes

Receiver	GEPARD5 E4 <sub>k</sub>	GEPARD15 E4 <sub>k</sub>	GEPARD5 E4 <sub>r</sub>	GEPARD15 E4 <sub>r</sub>
Measuring range (x/y)	5 x 5 mm	15 x 15 mm	5 x 5 mm	15 x 15 mm
Measuring range resolution	0.1 µm	0,5 µm	0,1 µm	0,5 µm
Linearity 1) 2)	0.4 ‰	0,5 ‰	0,4 ‰	0,5 ‰
Reproducibility 1) 2)	± 0.25 µm	± 0,5 µm	± 0,25 µm	± 0,5 µm
Power supply 3)	NiMH 1.5 V type AA	NiMH 1,5 V type AA	NiMH 1,5 V type AA	NiMH 1,5 V type AA
Radio data transmission range	up to 100 m	up to 100 m	up to 100 m	up to 100 m
Dimensions L x W x H	141 x 50 x 50 mm	141 x 50 x 50 mm	ø 50 mm, L: 70 mm	ø 50 mm, L: 70 mm
Weight	570 g incl. rechargeable battery		500 g incl. rechargeable battery	
Measuring distance	0–15 m	0–30 m	0–15 m	0–30 m
Optical-mechanical alignment	–	–	yes	yes

### Evaluation

Software	RAYTEC WIN-GEPARD with unique adaptive measuring. Measurement of straightness, parallelism, perpendicularity, position, alignment
System requirements	Windows, current PC generation (Windows XP, Vista)

### Accessories

Pentagonal prism	Max. angular error 3 arc sec.
Remote control	Infra-red remote control for activating measurement externally
Stand	Stable tripod (20 kg) with magnetic plate for secure attachment of the transmitter/receiver.

1) Data at 20°C 2) Within 80 % of the measurement range 3) From NiMH rechargeable battery or power supply unit



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**GEPARD™**