

**Definitely Tested!**



**Instruments, Sensors and Systems for Non-Destructive Material Testing**  
Ultrasonic, Magnetic Particle and Penetrant Testing  
Wall and Coating Thickness Gauges, Crack Depth Gauges

**KARL DEUTSCH**

# Company Profile

## Product Groups



The three generations (f.l.t.r.): Wolfram Deutsch, Volker Deutsch and Karl Deutsch



Dr. (USA) Wolfram A. Karl Deutsch



Prof. Dr.-Ing. Volker Deutsch

The privately owned company KARL DEUTSCH was founded in 1949 and develops and produces instruments for non-destructive material testing.

Portable instruments, stationary testing systems, sensors and crack detection liquids are produced by 130 motivated employees in two works in Wuppertal. Additional 20 employees in international offices and a worldwide network of dealers support the export business which accounts for more than 50% of the turnover.

Our customers are metal producing and processing industries, e.g. steel works, automotive companies and bearing manufacturers.

Typical test tasks are ultrasonic weld testing, detection of shrink holes in castings, crack detection in forgings with magnetic particles and dye penetrants, safety components for railway and aerospace as well as the wall and coating thickness measurement.





Characterized by continuous innovation and product reliability, the trade marks ECHOGRAPH, ECHOMETER, DEUTROFLUX®, LEPTOSKOP®, FLUXA®, KD-Check® and RMG are well-recognized.

Application experience, theoretical knowledge and manufacturing know-how spanning more than six decades as well as the standard compliant quality management guarantee state-of-the-art instruments and accessories and a leading position with regard to quality, reliability and economy also for the future.

### Our Customers

- Metal industry
- Automotive
- Railway
- Aerospace
- Ship building
- Power (e.g. wind energy)

### Ultrasonic Testing

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### Surface Crack Detection

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# Ultrasonic Testing

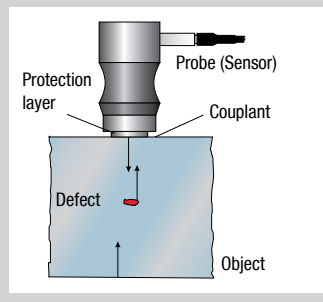
## ECHOGRAPH - Ultrasonic Testing Instruments

### Testing Principle

The main application of ultrasonic testing is the flaw detection inside a component.

The principle is based on the fact that an ultrasonic pulse is reflected at interfaces between different materials, e.g. steel-air, thus enabling a reliable detection of inclusions and cracks.

The reflected echo pulse contains information about the defect position and size.



### Ultrasonic Testing Instruments

For the detection of cavities, inclusions, segregation or lack of fusion in steel, castings, nonferrous metals, ceramics, plastics and further sound conducting materials.

Test objects are e.g. welded seams, castings, tubes, bars, billets and plates.



The ECHOGRAPH 1090/1095 are ideally suited for manual ultrasonic testing. They are reliable and robust and almost indestructible even in harsh and outdoor environments.



ECHOGRAPH 1095



Portable phased array test instrument with phased array probe and weld sample



ECHOGRAPH 1093 - Digital ultrasonic instrument with up to 8 channels

The ultrasonic instrument ECHOGRAPH 1093 is highly flexible due to its modular design of standard plug-in boards. The channels work independently and can be adjusted separately.

Therefore it is well suited for smaller automated systems and different testing tasks, as for example testing of automotive components.



ECHOGRAPH 1094 - Digital ultrasonic multiplex instrument with up to 8 channels

The multi-channel ultrasonic instrument ECHOGRAPH 1094 is based on the technique and user friendliness of the well approved instrument ECHOGRAPH 1090. It is a portable instrument for simple and not time-critical automated testing.

8 probs can be controlled with the multiplex technology.

# Ultrasonic Testing

## ECHOGRAPH - Ultrasonic Testing Systems

### Ultrasonic Testing Systems

Test mechanics and electronics „Made in Germany“ for e.g. tubes, billets, bars, strips, welds, gas bottles, truck axles, turbine blades, aircraft components, bearing rings, balls, cylinders.

#### Test principle

The test principle is the same as for the ECHOGRAPH instruments for manual testing.

With testing systems the ultrasonic test is carried out automatically by means of multiple channels.

Besides integration into the production line, the advantages comprise higher test speeds, reliability and objectiveness.



Testing portal for seamless tubes with 6 probe holders containing 30 probes



Phased array test system for welded pipes (ERW)



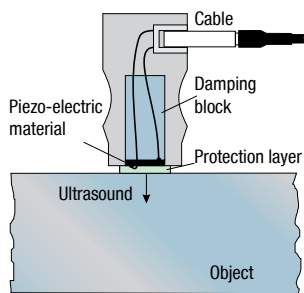
Testing system for bars with diameters up to 130 mm with 9 probes

# Ultrasonic Testing

## ECHOGRAPH - Ultrasonic Probes

### Principle

#### Cross-sectional view of a probe



#### Generation of Ultrasound

The ultrasound is generated using the inverse piezo-electric effect. On applying an electric voltage the thickness of the piezo-electric material inside a probe changes. By means of a short electric pulse the piezo-electric material starts oscillating. If the probe is coupled to a specimen, these high-frequency oscillations propagate through the material as ultrasound waves.

#### Reception of Ultrasound

In most cases the same probe also receives the echoes of ultrasonic waves, which are reflected from a backwall or a defect. The piezo-electric ceramic converts the mechanical pulse into an electrical pulse (direct piezo-electric effect).



Large variety of probes for manual and automated testing



Phased array probes for weld testing on tubes

#### Ultrasonic Probes

The probes are the core of every ultrasonic testing. They generate and receive the ultrasonic signals. Probes for manual testing, immersion testing, mechanized testing, and also customized probes are available for different applications. Here, cutting edge technology and variety are in demand.



Line focused probes in different sizes for the inspection of bars and tubes

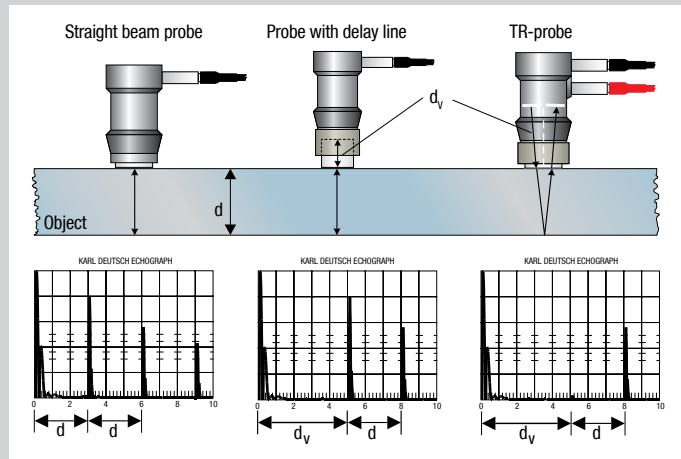
# Ultrasonic Testing

## ECHOMETER - Wall Thickness and Sound Velocity Gauges

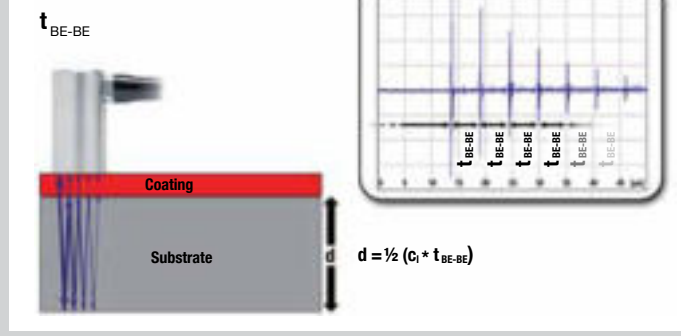
### Test principle

The wall thickness is determined by means of a precise time of flight measurement and the knowledge of the sound velocity  $c_f$ .

Vice versa, the sound velocity can be evaluated if the wall thickness is known.



### Measurement:

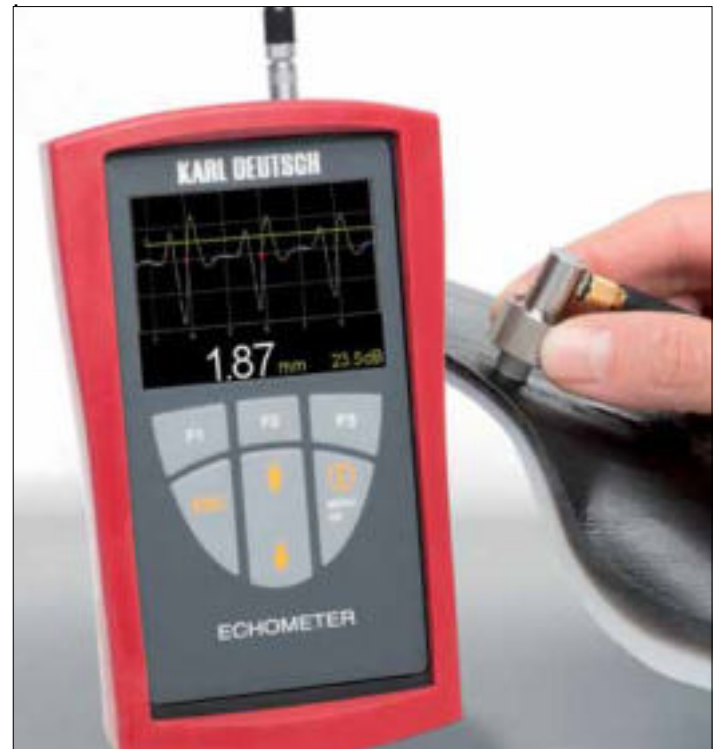


### ECHOMETER

#### Wall Thickness and Sound Velocity Gauges

Characterizing features of these small and handy instruments comprise a precise indication of wall thickness, an easy determination of sound velocity and a simple check of the quality of castings - even through coatings.

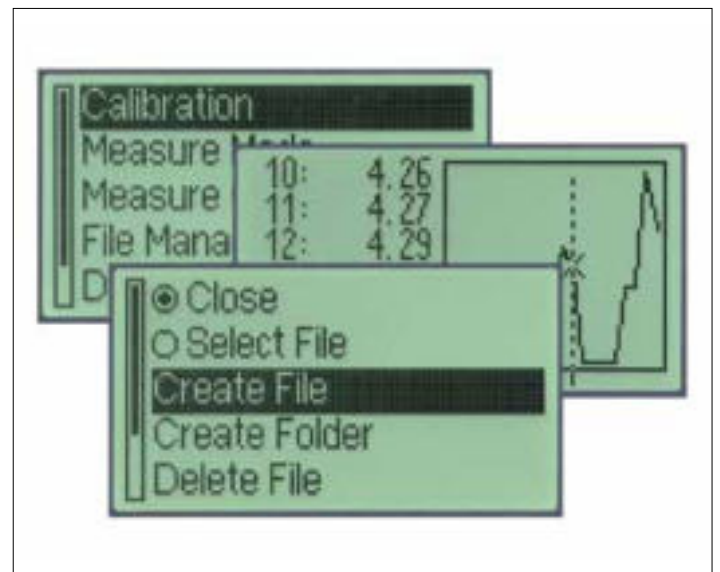
The technique allows wall thickness measurements of all sound conducting materials.



ECHOMETER 1077: Wall thickness gauge with A-Scan of complex objects



ECHOMETER 1076: Sound velocity measurement on a camshaft



Convenient data processing with tables and graphs

# Coating Thickness Measurement

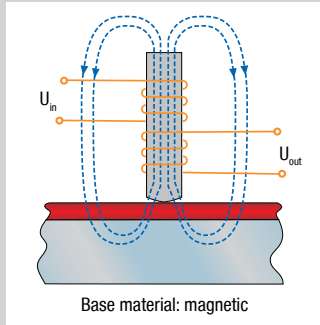
## LEPTOSKOP® - Coating Thickness Gauges

### Test principle

The sensor is positioned on the coated material.

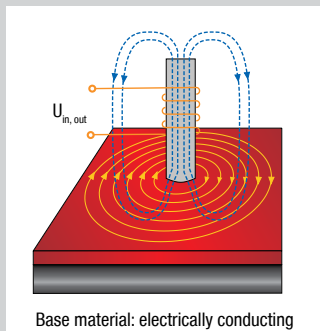
#### Magnetic base material:

The change of a coating thickness changes the magnetic flux in a coil.



#### Metallic base material:

A coil induces eddy currents in the electrically conducting base material which weakens the primary field. This inductive feedback depends on the coating thickness.



Paint thickness measurement

### LEPTOSKOP®

#### Coating Thickness Gauges

Measurement of coating thickness on metallic base materials: For all non-magnetic coatings on magnetic base materials and all non-conductive coatings on conducting base materials. A large variety of sensors and a considerable instrument family solve most testing tasks.

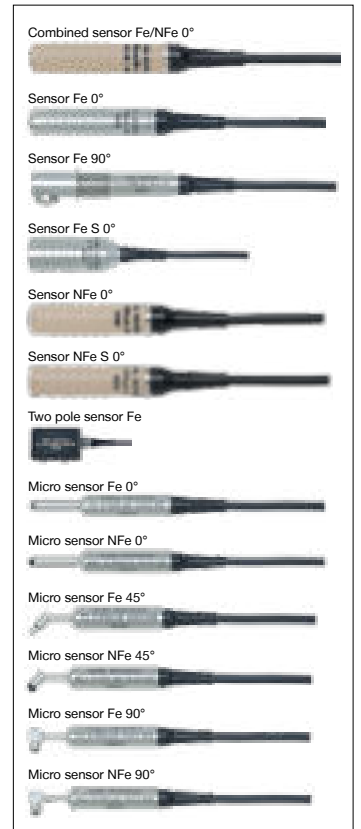


Gauge with external sensor for highest demands and for nearly every testing task

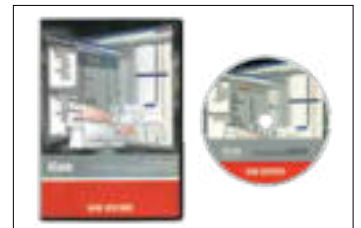


Compact gauge with integrated sensor (Pocket-LEPTOSKOP® 2026)

### Accessories



Variety of sensors



PC-Software: iCom



PC-Software: EasyExport



Calibration foils and reference block

# Surface Crack Detection

## DEUTROPULS, DEUTROMETER, UV-Lamps, RMG

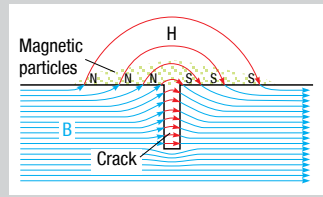
### Test principle

A magnetic field is generated by means of a coil or a current flow directly through the object. If a crack disturbs the magnetic field lines, these field lines exit at the object surface (magnetic leakage H).

The exit points form magnetic poles which accumulate fine iron powder (part of the test medium).

Normally the test medium is pigmented. In case of fluorescent pigments UV-lamps are used for the visualization of cracks.

As the pole areas are larger than the crack width, the accumulation of the test medium can be recognized better than the crack itself.



Berthold and FLUXA® test blocks

**Mobile Magnetic Particle Test Instruments and Accessories** for the detection of surface cracks on iron, castings and ferromagnetic steel objects, especially safety relevant components in the automotive industry and machine construction.



Handheld yoke for weld inspection (DEUTROPULS 3446)



High-current generator (3,000 A / 2,000 A) for mobile crack detection



DEUTROMETER field strength gauge



UV-LED handheld lamp



UV-large area lamp 3848



UV-LED large area lamp 3846

### RMG 4015

#### Crack depth Gauge

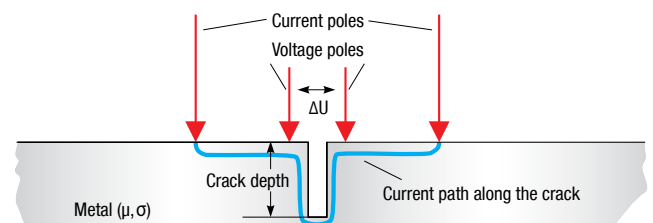
For the determination of surface crack depths in electrically conducting objects with the alternating current potential probe method.

A useful extension of magnetic particle and penetrant testing. For crack depths up to 100 mm.



### Test principle

The current flows through the object along the surface and around the crack from one current pole to the other. The voltage  $\Delta U$  across the crack is proportional to the crack depth and is measured by the voltage poles.





# Surface Crack Detection DEUTROFLUX® / DEUTROMAT

## Test principle

With stationary magnetic particle systems the testing procedure is automated for high throughput rates: Clamping of the work piece, magnetization during the application of the detection media (magnetic particles) and post-magnetization to produce a stable crack indication during drip-off of excess detection media. Sometimes, also loading and unloading of the machine is automated.

**DEUTROFLUX® - Standard Magnetic Particle Testing Systems**  
with two magnetization circuits to detect every crack in ferromagnetic materials (iron, castings) independent of its orientation.



DEUTROFLUX® UWE 600 with Memory II test parameter storage



**DEUTROFLUX® UWE Concept**  
Stationary test benches with testpiece lengths up to 900 mm

**DEUTROFLUX® UWS Concept**  
Stationary test system with moving coil for testpiece lengths above 900 mm

Test of a crankshaft with moving coil (DEUTROFLUX® UWS 2500)

## DEUTROMAT - Customized Magnetic Particle Testing Systems



DEUTROMAT with chain conveyor, 8 components per cycle



DEUTROMAT with 5 contacts and magnetization bar, universally adjustable

# Surface Crack Detection KD-Check® Systems



KD-Check® Testing System with multiple stations for serial inspection

## KD-Check® Stationary Systems for Penetrant Testing

Stationary workplaces are designed for manual and semi-automated liquid penetrant testing of small and medium-sized components.

Each of the steps like pre-cleaning, penetrant dwell, penetrant removal, developing and evaluation can be done here. It is suitable for both single component and small series testing.

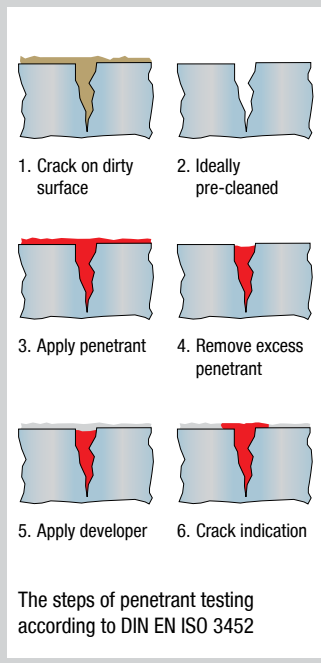
## Chemical Products

### FLUXA® Magnetic Particles, KD-Check® Penetrants

#### Principle of Penetrant Testing

After pre-cleaning of the surface a coloured penetrant is applied to the surface. It penetrates into the open crack (capillary effect).

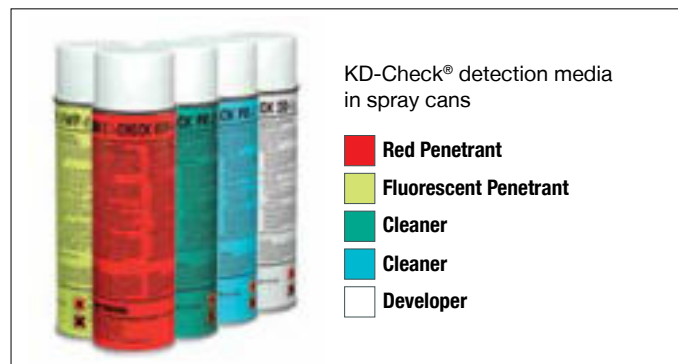
Afterwards, the penetrant is removed from the surface - but it remains in the crack. The application of a developer onto the surface sucks the remaining penetrant out of the crack. Since a white developer shows excellent contrast to a red penetrant, the crack indication is clearly visible.



Testing of a forged component with red penetrant

#### KD-Check® Penetrant Testing

for surface crack detection in almost every metallic and non-metallic material (steel, plastics, aluminium, brass...). This highly sensitive testing method is often used for aluminium components in the aerospace and automotive industry.



Magnetic particle crack detection media for every inspection task

#### FLUXA® Detection Medium for Magnetic Particle Testing

improves the performance of every magnetic particle instrument and system. Wet (water or oil based concentrates) or dry detection media (iron powder) are capable to detect smallest cracks. A large variety of products is available for every stationary and mobile test application. Colour, particle size, corrosion prevention, concentration and other features are important criteria of choice.



Reference block

# General

## Application Laboratory, Training Courses, QM, Service, Technical Literature



Your objects are tested by competent personnel - free of charge



Fast service and recertifications



Acceptance test of a crack depth gauge

### Application Laboratory

Benefit from our experience. In our application laboratory you are well advised, surely also for your testing problem.

### Training Courses

We provide training courses in ultrasonic, magnetic particle and penetrant testing several times per year.

The training complies with the requirements for personnel qualification and certification according to DIN 54161 as well as DIN ISO 9712.

### Quality Management

Already in 1993 the quality management system was certified according to ISO 9001. Since that date the company KARL DEUTSCH has been audited regularly by TÜV NORD.

### Service

Professional and fast service is one of the most important factors of our quality management system (DIN EN ISO 9001). Repairs and recurring inspections in compliance with international standards are carried out and documented in quality test certificates.

### Technical Literature

In many technical books we share our expert knowledge from development, application, practice and teaching.



Training according to ISO 9712



Final acceptance of Coating thickness gauge



Chemical laboratory for batch testing of crack detection media



Handover of the QM-certificate by TÜV NORD



Technical literature for NDT

# Company Location Wuppertal and Worldwide Presence



## Works 1 at Otto-Hausmann-Ring 101

Management, Administration, Development, Production of Portable Instruments, Sensors and Test Media



## Works 2 at Otto-Hausmann-Ring 201

Development, Construction and Production of Ultrasonic and Magnetic Particle and KD-Check® Testing Systems

### KARL DEUTSCH worldwide.

In addition to our company location in Wuppertal we support branch offices and agencies in Europe, Asia, America, Africa and Australia. Due to our worldwide presence we obtain an export rate above 50%. Thus we guarantee to our customers technical and innovative support in many countries and to meet customers requests directly.

Argentina	France	Columbia	Portugal	Sri Lanka
Australia	Greece	Korea	Romania	South Africa
Egypt	Great Britain	Malaysia	Russia	Taiwan
Belgium	India	Mexico	Saudi Arabia	Thailand
Brazil	Indonesia	Netherlands	Sweden	Czech Republic
Bulgaria	Iran	Austria	Switzerland	Turkey
China	Israel	Peru	Singapore	Hungary
Denmark	Italy	Philippines	Slovakia	USA
Finland	Japan	Poland	Spain	Vietnam

An overview of all agencies worldwide can be found on [www.karldeutsch.de](http://www.karldeutsch.de) ⇒ English ⇒ Contact

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DIN EN ISO  
9001  
certified

# KARL DEUTSCH