

Krautkramer Special probes for special applications



 **TOTAL CONTROL**

If you have a test problem to be solved for which there is no standard probe available you should read this brochure. It describes field-proven, customized special probes which have been successfully applied in many fields of ultrasonic testing. It certainly includes a probe to solve your test problem.

The extensive range compelled us to combine probes of the same type, this is indicated by using dots in the product identification (e.g. B2S-0A...). In this case it is necessary to have a detailed knowledge of your test task in order to select a suitable probe. The best solution is to send us a drawing of the test object with probe position, flaw position, possible frequency etc.

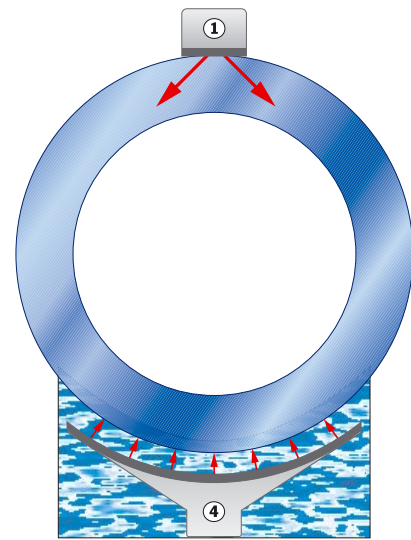
The same applies if you do not find any information to your test problem in this brochure. Our probe and application specialists will willingly work out a solution and offer you the suitable probe for your application. The list of contents on the opposite page will enable you to quickly find the corresponding special probe.

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Photo:
Rheinische
Bahngesellschaft
Duesseldorf



... on tubes and bars



① Type RB... , MRB...

Angle-beam probes for tube testing. Scanning in both circumferential directions of a tube. Lemo 00 socket. Special Print SD 246.

② Type IR...

Inside tube probe for flaw testing or thickness measurement.

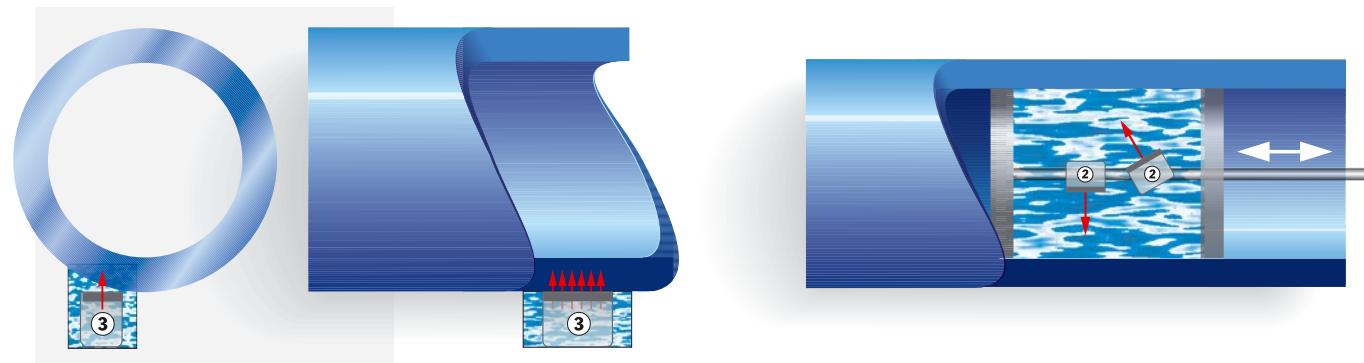
③ Type Z4R6x6/6x

Multi-element (array) – immersion technique probe with 4 MHz, 6 elements with dimensions of 6 mm x 6 mm and a 2.5 m cable with nized testing.

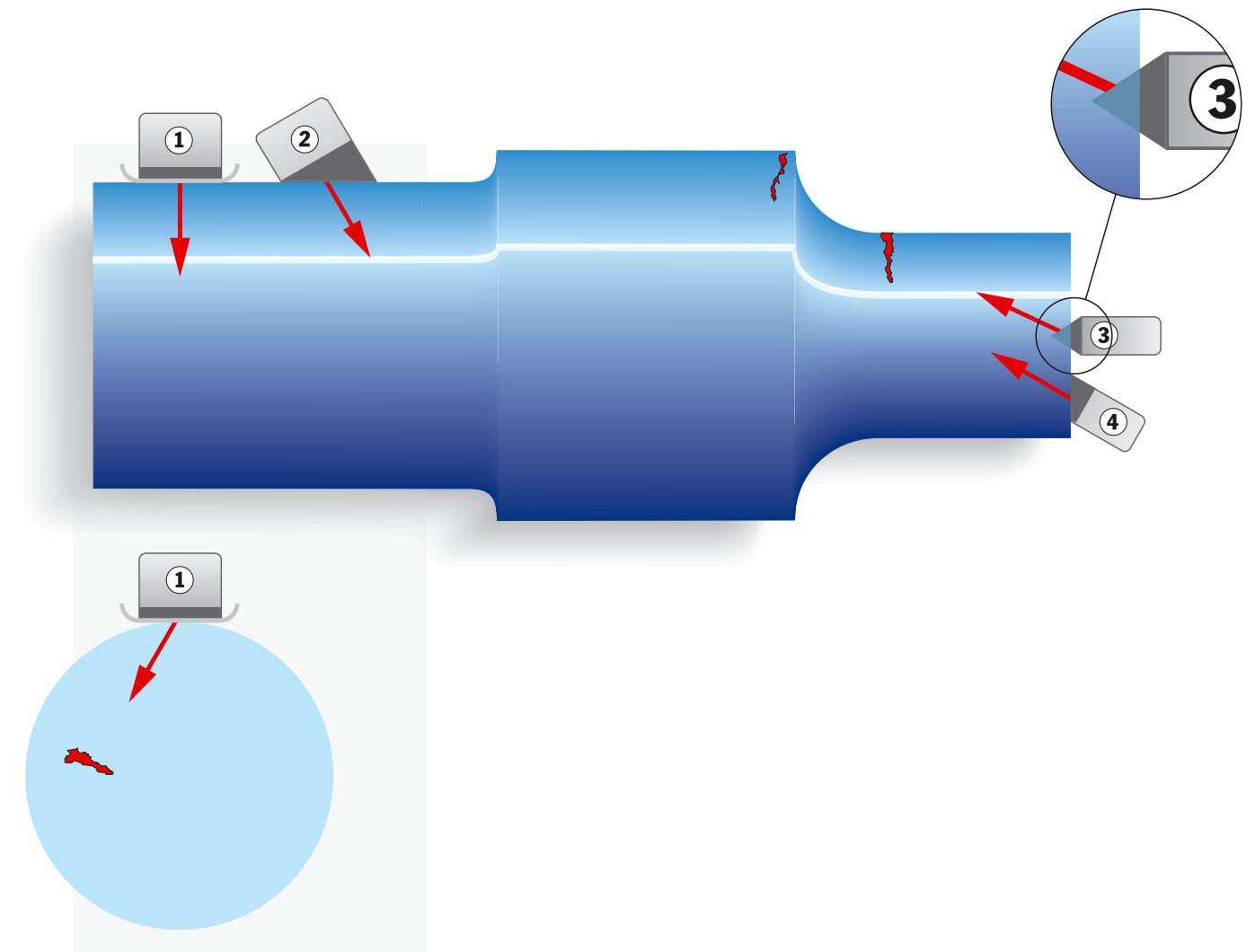
Versions can be supplied with other frequencies, element diameters or amounts. Corresponding array angle-beam probes can be used for the detection of transverse flaws.

④ Type IALF10...

Immersion probes with 10 MHz and cylindrically curved, 30 mm wide elements made of PVDF and a 1.5 m cable with a Lemo 1 plug. Other frequencies and element sizes can also be supplied.



... on shafts and axles



... on profiles (e.g. rails)

① Type SESZS...

TR straight-beam probes with 4 MHz, 0.95 m cable and Lemo plugs.

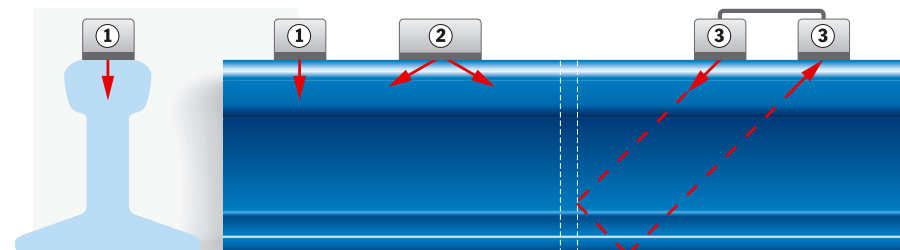
② Type SESZW...

TR probes with a 70° angle of incidence, forwards and backwards beaming, 2 MHz, 0.75 m cable and Lemo 1 plugs.

③ Type WB45-01

Angle-beam probes with a 45° angle of incidence, 1 MHz and a Lemo 1 socket positioned on the top; for testing rails in the tandem holder.

Remark:
Types SESZS... and SESZW... are suitable for mechanized testing in connection with our rail tester. Refer to page 6, Plates and Billets, for billet testing. Please contact our specialists with regard to test applications on other profiles.



① Typ B2S-OA...

Angle-beam probes with 1 MHz, 2 MHz or 4 MHz, element diameter 24 mm, exchangeable protection membrane, integrated delay wedge for angled beaming of longitudinal waves at angles of 7°, 14°, 21° or 28° and having a Lemo 1 socket on the top side; especially suited for the detection of off-center flaws oriented radially in large shafts.

② Typ AW...

Angle-beam probes with exchangeable delay wedge, 2 MHz, an element diameter of 24 mm and a Lemo 1 socket; for angle beaming of transverse

waves, contact surface is matched to the curvature of the part to be tested.

③ Typ ASW...

Angle-beam probes for axle testing with transverse waves from the center bore hole, having a 2 m cable with a Lemo 1 plug.

④ Typ B...S, MB...S

Straight-beam probes with various frequencies and element diameters of 10 mm and 24 mm, can be fitted with a delay wedge, the B...S has a Lemo 1 socket and the MB...S has a Lemo 00 socket.

④ Typ Z2GB1, Z4NB5

Probes with a delay wedge specially designed for the testing of elevator shafts using longitudinal waves, fitted with a Lemo 00 socket.

Remark:
With coarse grain (high noise level due to grain backscatter), refer to "Materials with coarse structures" on Page 15. Refer to Page 6, under "Large components", regarding very large shafts.

...on plates and billets

① Type SEZ4R10...

TR probes with 4 MHz, sound beam approximately 50 mm wide, a non-divided transmitter element and three receiver elements, one connection cable with four Lemo 1 plugs.

① Type 5Z6X27ND

TR probe with 5 MHz, sound beam approximately 25 mm, connection cable with Lemo 1 plugs; suited especially for plate edge testing.

② Type B...S-0

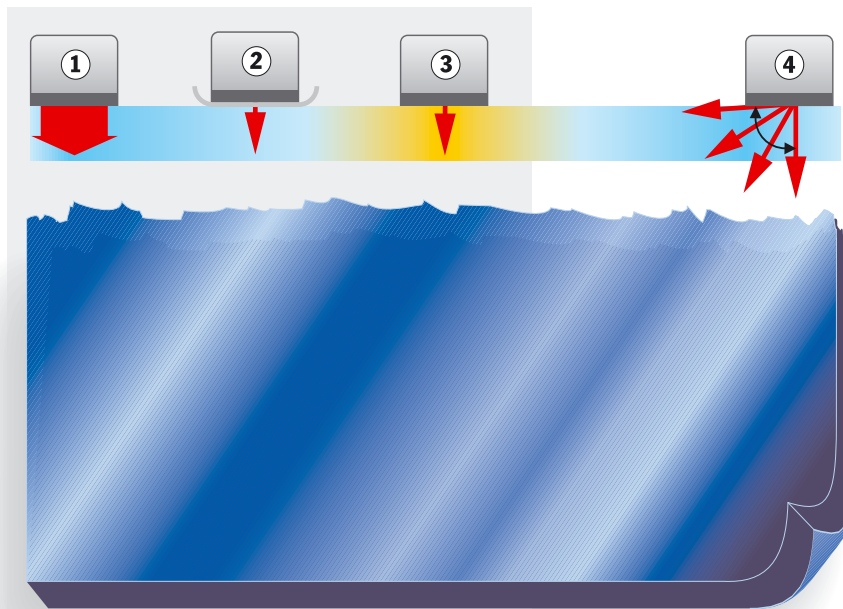
Straight-beam probe with various frequencies, exchangeable protection membrane and Lemo 1 socket positioned on the top side; e.g. for plate roller.

③ Type SEZ4N30V, SEB4TV

TR probe with 4 MHz, a 2.5 m cable with Lemo 1 plugs; e.g. for application in plate rollers, even at increased temperatures.

④ Type UWB...

Angle-beam probes with 1 MHz, 2 MHz or 4 MHz, adjustable angle of incidence for longitudinal and transverse waves, equipped with Lemo 1 socket; used for the generation of Lamb waves.



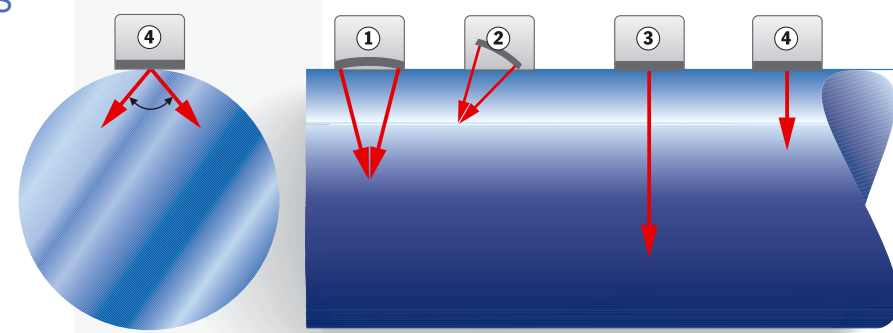
...on large components

① Type NQP...

Focused straight-beam probes for direct contact, 2 MHz, element diameter of 34 mm, 50 mm or 75 mm, small focus diameters at large depths, Lemo 1 socket. Especially suited for individual detection of close adjacent flaws.

② Type WQP...

Focused angle-beam probes, 2 MHz, element diameters of 34 mm, 50 mm or 75 mm, small focus diameters at large depths, Lemo 1 socket.



③ Type SEB...G...

TR probe with 1 MHz or 2 MHz, large element, focus at large depths, Lemo 00 sockets.

④ Type GRST...

Phase controlled multi-element probe (phased array) with swinging sound beam for operation in automatic testing devices.

...on special shaped parts

e.g. aircraft parts

① Type G...MN, G...KS

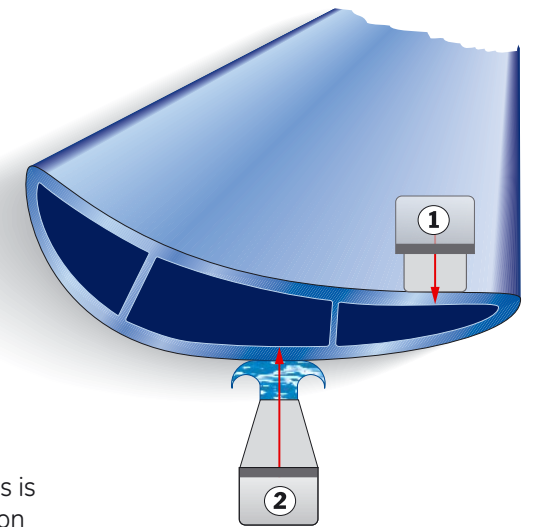
High resolution straight-beam probes with various frequencies, exchangeable delay lines and Microdot sockets resp. Lemo 00 socket with G...KS; e.g. for distance measurement of the cooling channel walls on turbine blades. The delay line can be designed so that tests can be made directly underneath the surface when testing plastics ("Zero Interface" probe).

② Type H..MN..F

High resolution immersion technique probes with various frequencies and element diameters, attachment nozzle for water jet coupling and waterproof Lemo 03 socket; e.g. for thickness measurement on turbine blades.

③ Type SMWB...

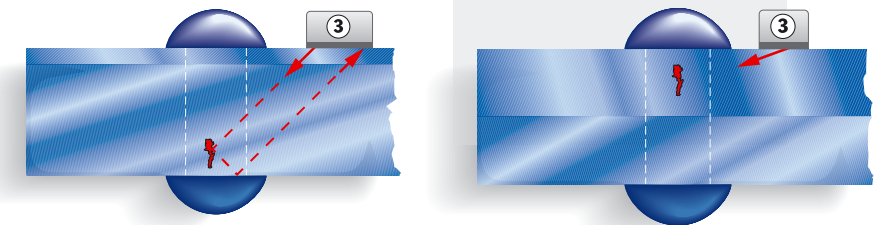
Angle-beam probes with very small dimensions, 4 MHz, 5 MHz or 6 MHz, element size 3 mm x 4 mm and Microdot socket; e.g. for testing rivet hole cracks. Versions for testing in the tandem technique are also available.



e.g. automobile parts

The testing of automobile parts is mostly mechanized. Information about the testing of pistons, valves, axles, gears etc. as well as the corresponding probes can be found in the special publication SD 263.

Information about spot weld testing can be found on page 10.



...on other test objects

The testing possibilities with ultrasonics are very considerable. We always receive enquires concerning the testing of objects to which there was no method of testing up until now. Therefore a large library for ultrasonic applications has been collected. Here are just a few examples: Fat and muscle measurements on pigs, skin thickness measurements, eye length measurements, determination of the lens thickness on the human eye, thickness measurements of eggshells,

determination of solids in foods, inspection of gold ingots and coins, monitoring the healing process on bones, monitoring the progress of phase transitions, solidifications or separation of liquids, the maturity of beer, cheese or fruits, the testing of miniature electronic components, e.g. ICs.

Every application possibility in the field of ultrasonics is of interest to us. Therefore please contact us – we certainly have the answer to your test application.

...on concrete, stone and wood

① Type B0,05N, B0,05U...

Straight-beam probes with 50 kHz, a contact surface diameter of 30 mm and 55 mm, weakly damped signal and Lemo 1 socket; only suitable for through-transmission operation. Can be supplied with higher frequencies.

② Type B0,05NN

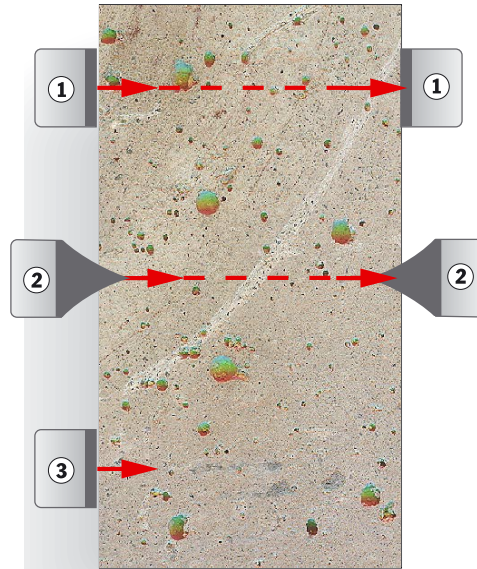
Straight-beam probe with 50 kHz, an exponential horn with steel tip for increased intensity and sound propagation with a large aperture, Lemo 1 socket; only suitable for through-transmission operation on soft materials (e.g. wood).

③ Type K0,1G, K0,25G

A probe with 100 kHz and 250 kHz, a contact surface diameter of 45 mm, good damping, i.e. short pulse duration and waterproof Lemo 1 socket; suitable for accurate time of flight measurement in the pulse echo mode.

③ Type B...SL, G0,5G

Probes with 250 kHz, 500 kHz, 1 MHz, various element sizes and Lemo 1 socket.



...on ceramics (e.g. insulators)

① Type K...G, K...N

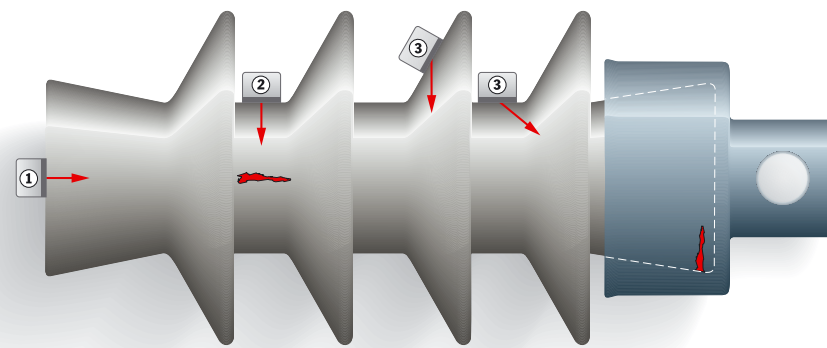
High resolution straight-beam probes with various frequencies, element diameters of 24 mm and 10 mm, wear resisting contact surface and Lemo 00 socket.

② Type IB...

Straight-beam probe with 2 MHz or 4 MHz, Lemo 00 socket and a very narrow design in order to obtain access between the umbrella-type insulators.

③ Type IW...B...

Angle-beam probes with 4 MHz and a Lemo 00 socket. The angle of incidence is dependent on the flaw position and the coupling point of the probe.



Remark: Standard probes can be mostly used for testing large insulators.

Shaped parts made of industrial ceramics are tested with high frequency standard probes (e.g. IAP-FM 50.3.1) using the immersion technique.

...on simple or fiber reinforced plastics

① Type G...NS, G...KS

Shockwave straight-beam probes with various frequencies and element sizes, a threaded ring for fixing a protection membrane or a delay line and a Lemo 00 socket. The delay line material can be designed enabling test to be made very close to the surface of the test object ("Zero Interface" probe); suitable also for thickness measurements on covered or painted parts.

② Type CA212, CA214

High resolution straight-beam probes with 2 MHz and 5 MHz, element diameters 10 mm and 24 mm, Microdot socket and threaded ring for fixing a protective membrane or delay line; suitable for thickness measurements on covered or painted parts.

② Type G...N, G...KB

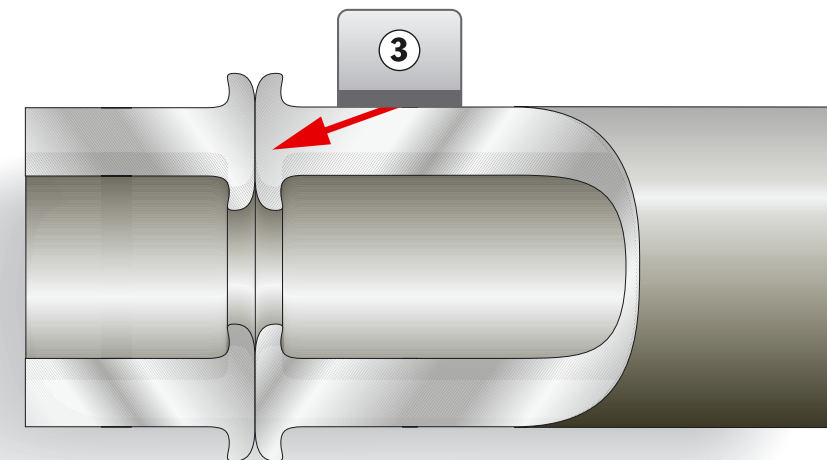
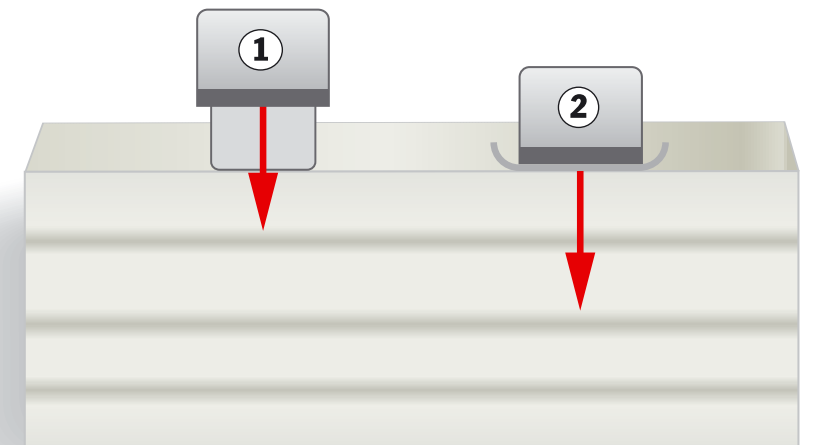
Shockwave straight-beam probe with various frequencies and element sizes, Lemo 00 socket and wear resistant contact surface.

③ Type W70B2GT

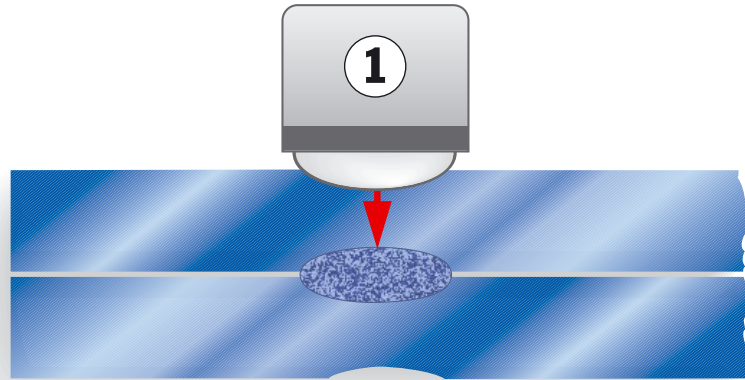
Angle-beam probe with 70° angle of incidence, 2 MHz and a Lemo 00 socket; suitable for testing PE (hard) and PVC. A 65° version can be supplied for testing greater material thicknesses and the WB70-1 for very large thicknesses.

Remark:

Refer to the special publication SD 277 for information about testing thermoplastics. See page 14 for information about testing without couplant (dry coupling).



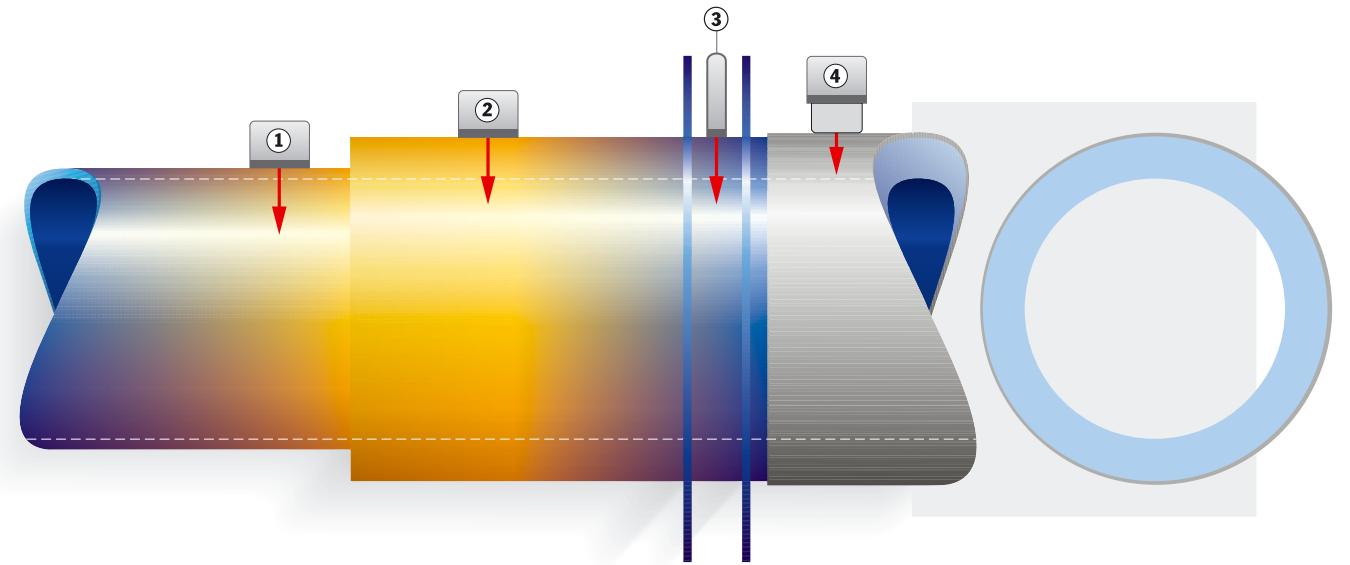
...when testing spot welds



① Type G20MN...

High resolution straight-beam probes with PVDF elements, 20 MHz, Microdot socket and water delay line, closed by an elastic protection membrane which is exchangeable; used for testing spot welds. The element diameter is dependent on the size of the weld nugget. Probes with 15 MHz can be supplied for testing welded parts having greater thicknesses. Special publication SD 272.

...for thickness measurement



...when testing precision parts

① Type G...MN

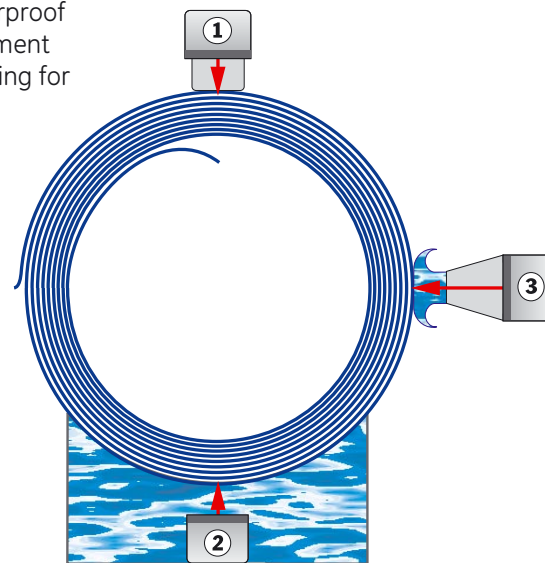
Shockwave probe with various frequencies, 5 mm element diameter, Microdot socket and exchangeable delay line; especially suited for thickness measurement.

② Type H...NA, H...KA, H...MA

Immersion shockwave probes with various frequencies and element diameters, a 2.5 m cable with H...N... and H...K..., and a 1.5 m cable with H...M..., Lemo 00 plug; especially suited for thickness measurement.

③ Type H...KP...F, H...MP...F

High resolution immersion probes with various frequencies, element sizes and focal distances, waterproof Lemo 03 socket and an attachment nozzle enabling water jet coupling for mechanized testing.



...for bonding tests

E.g. on slide bearings (white metal on iron or aluminium on iron), soldered joints (iron with iron or copper with copper, silver plated Cu contacts), cladding welds, clutch disks or brake linings (friction lining on an iron or aluminium support). A detailed list of applications in the field of bond testing would be too extensive and versatile for this brochure.

However, testing can be mostly carried out with a probe from the standard program.

Please contact us – we will offer you the suitable probe and submit our special publication SD 288.

...on corroded or eroded parts

① Type DA312

TR probes for thickness measurement above approximately 0.6 mm.

DA412

The same as DA312 but with dialog electronics.

DA311

Corresponds to the standard probe DA301 but has a socket on the top side.

DA303

TR probe with 2 MHz; for measurement on sound absorbent or sound scattering materials.

DA0,8G

TR probe for highly sound attenuative or sound scattering materials (e.g. castings or plastics).

DA408

The same as DA0, 8G, but with dialog electronics.

② Type DA317

TR probe for small thicknesses and surface temperatures of max. 300°C. The probe offers excellent coupling stability.

DA319

The same as DA312 but used for surface temperatures up to 250°C.

HT400

A TR probe for surface temperatures up to approximately 550°C. The smallest measureable thickness is about 0.8 mm at room temperature.

DA305

A TR probe with quartz glass delay; especially suitable for very high temperatures.

DA315

The same as DA303 but for surface temperatures up to 250°C.

③ Type DA...

A very small, pen shaped TR probe with Microdot socket; e.g. for measurement between cooling fins or pins.

④ Type CA212, CA214

High resolution straight-beam probes with 2 MHz and 5 MHz, Microdot socket and threaded ring for fastening protective membranes or delay lines; suitable for the thickness measurement on painted or covered parts with thickness gauges having A-Scan displays.

...when measuring material characteristics

e.g. determination of the elastic modulus by measurement of the longitudinal and transverse wave velocity.

Type G...N, G...KB, G...K

Shockwave straight-beam probes with various frequencies and element sizes, wear resistant contact surface, Lemo 00 socket resp. Microdot socket for G...K; suitable for measurement of longitudinal wave velocity.

Type SM-P...

High resolution straight-beam probes with various frequencies and element sizes, Microdot socket and a ring magnet for fixing onto magnetic materials; especially suited for the measurement of bolt tension.

Type K...NY, K...KY

A transverse wave, straight-beam probe with high resolution having various frequencies and element sizes, Microdot socket; suitable for the measurement of transverse wave velocity; suitable for operation on precision thickness gauges.

Remark:

A longitudinal and a transverse wave element can be integrated into a common housing on request.

e.g. determination of case hardening depth and the degree of purity

Type Z20M

Immersion probe with 20 MHz, narrow band pulses, 5 mm element diameter, 1.5 m cable and a Lemo 1 plug; suitable for determination of the case hardening depth by ultrasonic backscatter.

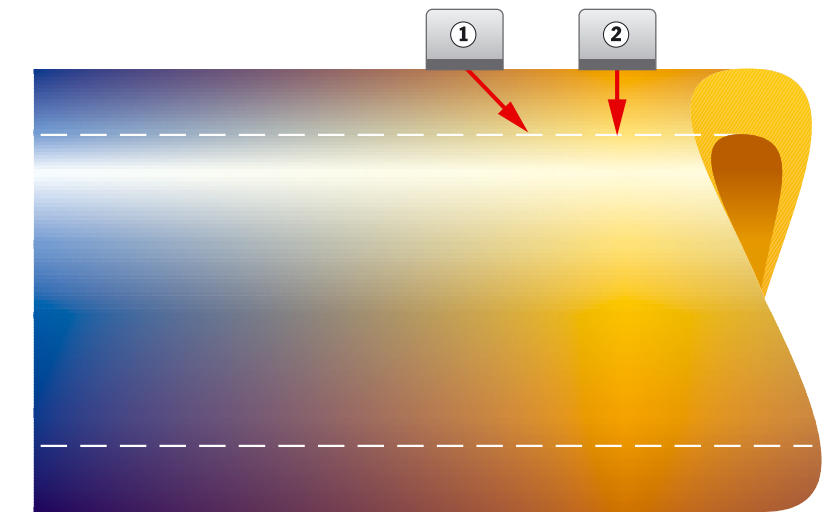
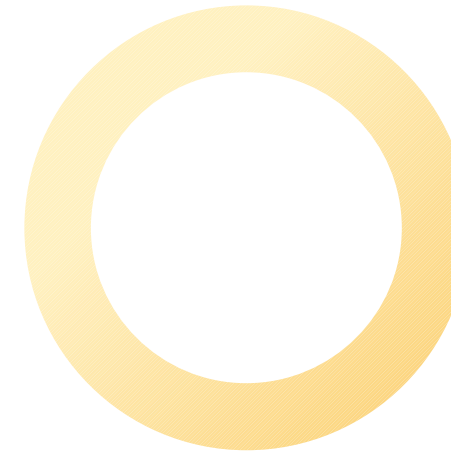
Remark:

An abrupt change of structure between the hardened and unhardened layers is the condition for measurement. Refer to SD 284.

Type Z10M

Immersion probe with 10 MHz, narrow band pulses, 5 mm element diameter, 1.5 m cable and Lemo 1 plug; suitable for determination of the degree of purity.

...at high temperature and high pressure in aggressive media or under radiation exposure



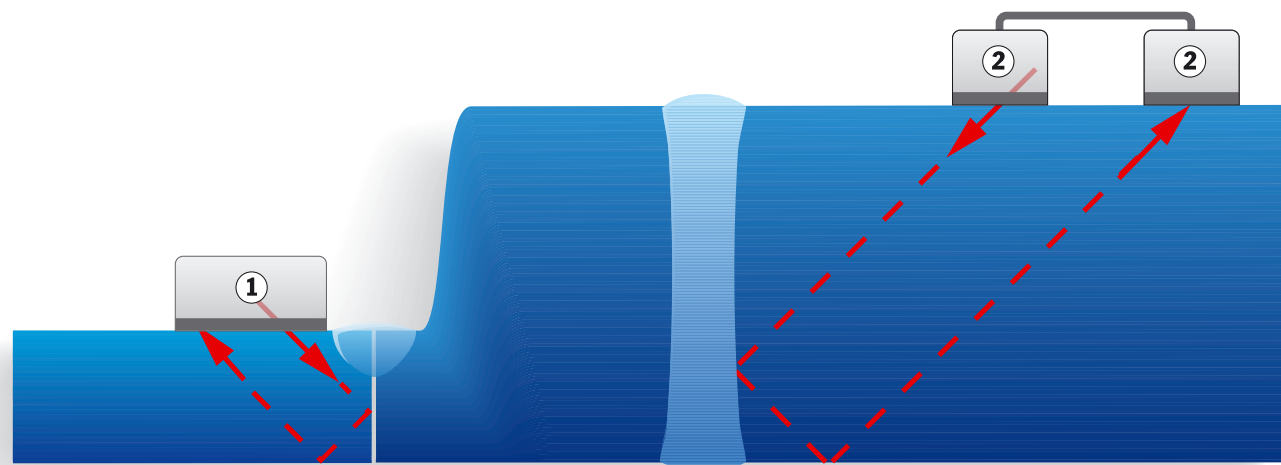
e.g. for weld testing using the tandem technique

① Type W45SEK2/...

A 45° angle-beam probe with two elements, whose sound beam axes meet in the center of the weld; suitable for testing through-weldings.

② Type D45N2...

Angle-beam probes with various angles, frequencies and element sizes; suitable for testing thick welds in the tandem technique. Clamped into holders for mechanized testing.



① Typ W...B2GV, W...B4GV

Angle-beam probes with angles of incidence of 45°, 60° or 70°, 2 MHz or 4 MHz and a Lemo 00 socket; suitable for ultrasonic testing at high temperatures.

② Typ SEB4KV

TR probes with 4 MHz as well as a Lemo 00 socket; suitable for thickness measurements at very high temperatures in connection with instruments having A-Scan displays.

Typ LWG854...

Radiation resistive probes; e.g. for testing fuel rods for water penetration.

③ Typ H5KV...

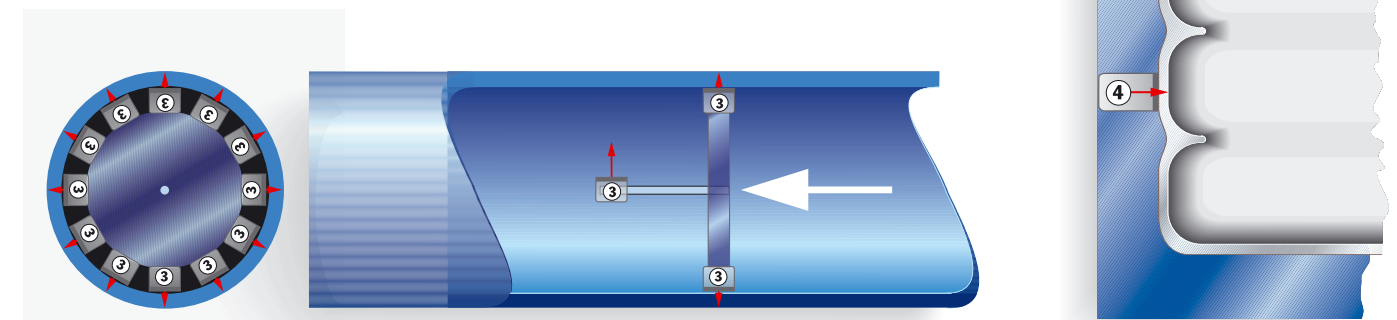
Immersion probes with 5 MHz and waterproof Lemo 03 socket for temperatures up to 125°C and pressures of up to 60 bar. Especially suited for continuous thickness measurement or flaw testing in oil pipelines. Can be used in aggressive media due to a special protective layer on the contact surface.

④ Typ K5KVB4

Straight-beam probe with 5 MHz and heat resistant delay. Is used for thickness measurement on plastic parts in blowing moulds during the blowing sequence, i.e. at high temperature and high pressure. With a special delay it is suitable for operation in aggressive media.

Remark:

Refer to page 11 for thickness measurement probes at high temperatures.



... where space is limited or test location inaccessible

① Type SMWB...

Angle-beam probes with very small dimensions, 4 MHz, 5 MHz or 6 MHz, element size 3 mm x 4 mm, various angles of incidence and Microdot socket.

② Type K...M...

Straight-beam probes with various frequencies, very small dimensions (outside diameter from about 2.5 mm and a height from 3 mm) and Microdot socket or fixed cable for very small dimensions. Can be supplied with a conical delay block having a contact surface diameter of 2 mm (pencil shaped).

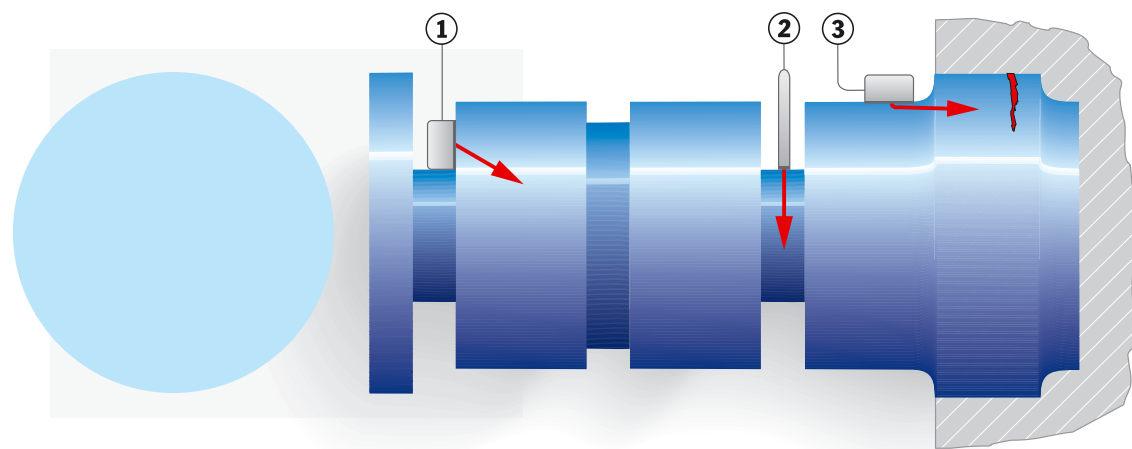
③ Type WSY...

Creep wave probe with a 90° angle of incidence and a Lemo 00 socket; for testing inaccessible positions.

Remark:

Creep waves occur under the surface of the test object and propagate in a straight line. They therefore do not follow the course of the surface like the surface waves. Flaw locations can be beamed with creep waves which would not otherwise be possible with other ultrasonic waves.

The probe must be exactly adjusted to the material in order to generate creep waves.

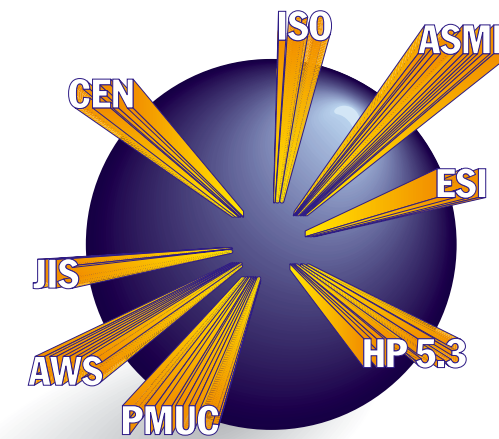


... when testing without couplant (dry coupling))

If a liquid is not to be applied to the surface of the test object, plastic can be used instead of a liquid couplant under certain conditions. To do this, a plastic foil or cap is attached onto the front of the probe and enables sound transmission between the probe and the test object. Roller probes, types B1KS and B1KE, with special contact

surfaces are used for continuous testing without couplant. In this case it is important that the surface of the test object and the contact surface of the probe are clean because dirt can deteriorate sound transmission or even interrupt it completely. The technique is especially suitable for testing plastics. Refer to special publication SD 261.

... when testing according to standards



In many countries there are specifications which stipulate certain probe data, determine the measurement and certification of probe data or regulate testing. The number and scope of these standards are quite considerable and cannot therefore be listed here for the corresponding probes.

Please contact us – we will offer probes meeting the standards. If you require the probe at short notice then we recommend that you inform us of the technical data stated in the standard.

... when testing coarse structured materials (e.g. castings or austenite)

Most probes for testing coarse grained materials have been so successful in practice that they have become standard probes. These are:

① Typ K...S, K...SM

High resolution straight-beam probes with various frequencies, element diameter 34 mm or 28 mm, Lemo 1 socket and threaded ring for fastening protective membranes, delay lines or angled wedges.

② Typ WRY..., WSY...

Longitudinal wave angle-beam probes with 45°, 60° or 70° plus a high resolution, 2 MHz, WSY... also with 4 MHz, and a Lemo 00 socket.

③ Typ VRY..., VSY...

Longitudinal wave, TR anglebeam probes with high resolution 45°, 60° or 70°, 2 MHz, VSY also with 4 MHz, and a Lemo 00 socket.

The special versions differ from the above standard probes in frequency, angle of incidence, position of the socket and, with TR versions, by matched focusing to the flaw position.

