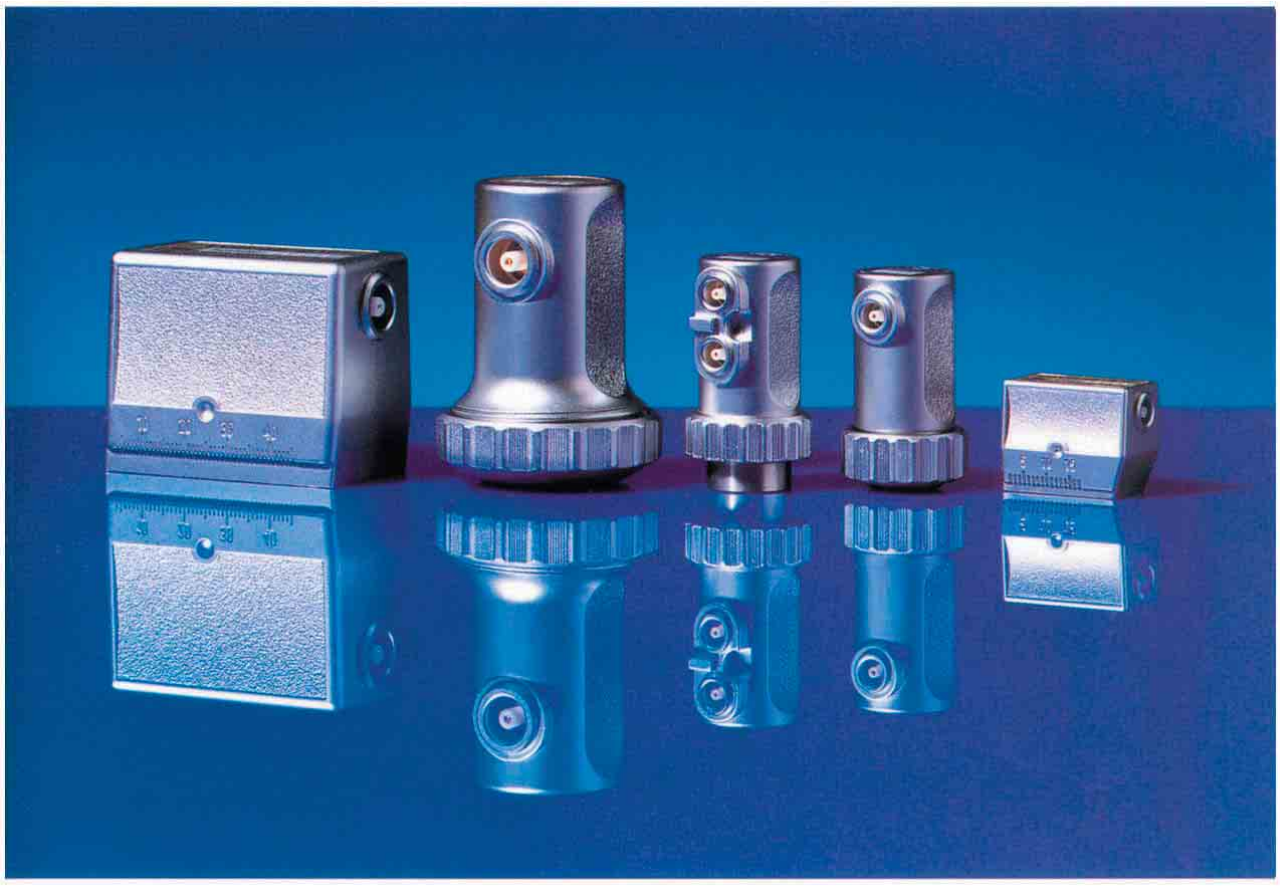
The total probe range for your ultrasonic equipment



Contents

PROBE QUALITY

Nice illusion:

Ultrasonic probes belong to the group of products with regard to which a nice outward appearance may obscure the inward lack of technical quality.

This invisible quality is a crucial factor for the reliability of probes.

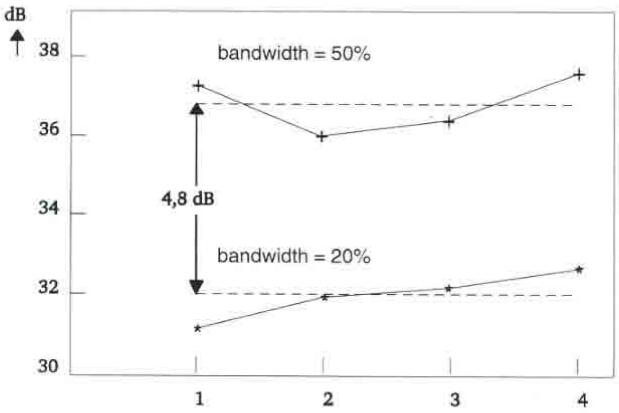
That is why we want to state here briefly and clearly on how we take care of our probes so that they are as good as the user requires them to be.

Harmful influence:

In addition to precise location, there is also a need for reliable sizing of flaws which are just within acceptable limits. In order to evaluate them, the highest echo received by the probe is used.

This echo is not only dependent on the structure of the flaw but also quite decisively on certain technical data of the applied probe:

Frequency, bandwidth, effective element diameter and impedance must be kept within narrow tolerances so that the signals generated by two probes of the same type from the same reflector are identical.



Measurements taken by 4 operators on the same natural flaw using a probe with a bandwidth of 50%, and the same type with a bandwidth of 20%. Result: The change of bandwidth from 35% + 15% to 35% - 15% causes a difference in the signals of 4.8dB.

Hard facts:

In order to be quite certain that our probes meet the high requirements of ultrasonic testing, all relevant data for each individual probe is precisely specified with tight tolerances, determined in costly measurement systems and automatically evaluated.

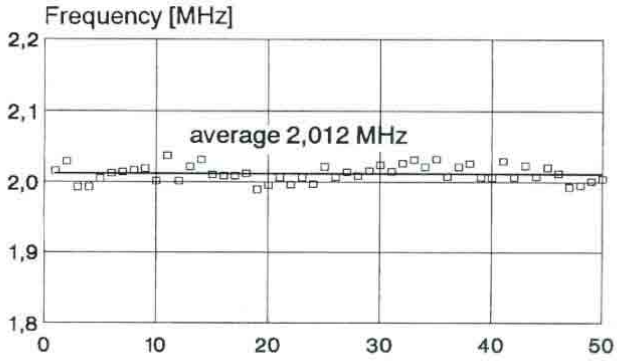
The results are stored and available as a basis for the production of data sheets and probe certificates.

The certificates include all important data for each individual probe which can also be obtained at any later time under its special probe number.

Radical selection:

Every probe produced by Krautkrämer is subjected to the stated measurement and evaluation procedure.

Only probes whose measured data are within the prespecified narrow tolerances, laid down in our acceptance specifications, pass the test and are released for sale.



Statistical distribution of the echo frequency within a production batch. Result: the frequencies of all probes are very near the nominal frequency of 2 MHz, i. e. each probe generates the same signal from a reflector.

Forseeing advantages

The extensive measurements and the automatic evaluations produce a further advantage:

They show the data trend over a large number of production batches. If the control data of the components are included then the tolerances can be continually narrowed.

The result:

Krautkrämer probes are precision tools!

Criteria for selecting the probes

Division into main groups and sub-groups:

The probes in this catalog are divided into main groups which enable primary selection:

1. Direct contact probes
   Using a couplant, the probes are directly placed onto the surface of the test object.

2. Immersion probes
   The transmission of sound between probe and test object is made through a liquid delay path.

3. Probes for special applications.

Further differences in characteristics come before the sub-group (main characteristics and main applications). They are illustrated by typical application examples. More detailed differences can be found in the tables.

Selection criteria on the table pages and in the tables:

Above the tables, characteristics are mentioned about the following probes. The pulse shape and the frequency spectrum of the more usual probes in the corresponding group, give further information, especially for the expert.

The characteristic bandwidth is an important and ever increasing selection criterion. It is allocated to each individual sub-group.

The values in the tables finally give precise information about the specific characteristics of each individual probe.

All descriptions used in the tables are described below. Please take into account that all data represent standard values. This form was chosen to make handling easier for experienced personnel.
A full range of information about all probe data is contained in our data sheets which are available for all normal probes.

Description	Explanation
Element size D o r a x b	Diameter D or length x width a x b of the transducer element. The size of the element strongly effects the shape of the transmitted sound field. Slight deviations, e.g. imperfect shape or positions with reduced radiation due to poor bonding, cause considerable evaluation errors, even when calibrated to a reference flaw!
Nominal frequency f	The mean frequency of all probes of the same type. The frequency has a great influence on the evaluation of reflectors. Even the shape of the sound field and the reflection behaviour of angled reflectors are strongly dependent on the frequency. With increasing frequency, the echo height from non-vertically positioned reflectors to the sound beam decreases. This is why each probe is checked by our Quality Control to see if its frequency coincides with the nominal frequency, according to the identification label, within very narrow tolerances. This is entered into the probe data sheet.
Bandwidth B	The range of frequencies in the echo pulse whose amplitude, at the most, is 6 dB less than the maximum amplitude. $B = \frac{f_o - f_u}{f} \times 100\ \%$ f_o = upper, f_u = lower frequency limit for a 6 dB drop in amplitude. With B = 100%, a 4 MHz probe for example has an f_o of 6 MHz and an f_u of 2 MHz. Large bandwidths mean shorter echo pulses, which mean high resolution and a good penetration power, because the lower frequencies of the pulse become less attenuated than the nominal frequency. At high attenuation, the frequency of reflected signals decreases, compared to the nominal frequency, as the distance increases. This must be taken into account with flaw evaluation. The bandwidth of each probe is therefore checked and must, within narrow tolerances, coincide with the mean value of all probes.

Description	Explanation
Operating range AB and AB6/1	AB: Distance range in which the echo of a flat bottom hole, having a diameter of 2 mm in steel with low sound attenuation, can be clearly detected. AB6/1: Distance range in which the echo of a 1 mm flat bottom hole, in the immersion technique, drops to half the height of the maximum indication.
Focal distance F Near field length N	F: The distance of a small reflector from the probe producing the highest possible echo. Probes are focused in order to detect small reflectors and produce a high echo amplitude. Focusing is only possible within the near field of the probe. The near field length N is the focal distance of the unfocused probe which constitutes the sound pressure maximum at the largest distance from the probe. N is determined by D, c and f. For $D >> \lambda$ is: $N = \frac{D_{eff}^2}{4\lambda} = \frac{D_{eff}^2 \cdot f}{4c}$ λ = wave length c = sound velocity D_{eff} = effective element diameter Focal point and near field length are the distances with the best sound concentration and reflector recognition. Therefore when a probe is selected for a critical test, the flaw expectancy range must be in the focal area or near field length. The data in the tables refer to steel with the exception of immersion testing in water.
Echo width EB	Practical measure for the far resolution of a probe. EB is the width of a backwall echo with a screen height of 80 %, at a near field length or focus, read off at a screen height of 20 %.
Focal diameter FD_6	Diameter of the sound field in the focal distance or near field length with a 6 dB drop of the echo indication. For $D >> \lambda$ is: $FD_6 = \frac{F \cdot c}{f \cdot D_{eff}} = \frac{1}{4} k \cdot D_{eff}$ with $k = \frac{F}{N}$
Near resolution FBB and ZYB	Detectability of a flat bottom hole (FBB) or cylindrical bore hole (ZYB) with specified diameter (... Ø) under the surface (in ... mm). With the immersion technique, the surface of the test object is positioned in the near field length or in the focal point. For example FBB 0.4 Ø in 1.0 means, that a flat bottom hole of 0.4 mm diameter is resolved at a depth of 1 mm.
Beam shape	The shape of the probe sound field for a 6 dB drop of echo height. The corresponding numbers in the tables relate to the forms shown in the pages 37 to 39.
Pulse shape	The presentation of signals, as they are at the instrument input coming from plane reflectors.
Spectrum	Display of all the frequencies in the echo pulse. The frequency amplitudes are shown over the frequency.
Beam angle β	The angle between the main beam and the normal axis of the test surface.
Gain reserve Vr	Possible gain increase from a backwall echo within the near field up to the noise generated in the system instrument/probe. The higher the gain reserve, the greater the sound penetration depth, and the smaller the reflectors detectable.

CONTACT TECHNIQUE PROBES
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Contact probes are mainly used for manual testing. In doing this, the operator places the probe directly on the surface of the test object. However before doing this, a thin layer of couplant is applied to the measurement area or a number of measurement areas.

The couplant (a special paste from our delivery program, oil, glycerine etc.) is applied in the air gap between the probe and the surface of the test object, and conducts the transmitted sound into the test object.
The test is either made from measurement point to measurement point by placing and raising the probe onto these points, or by continuous probe movement over the surface of the test object.

Larger surfaces are scanned in a grid pattern in which process the width of the grid is dependent on the expansion of the flaw being searched, or on the test specification.

If couplant is not allowed to be applied, we supply coupling caps, made of soft plastic, for some probes.

There are two types of probes available for testing: the single element probe (fig. 1) and the TR probe (fig. 2). Both probes transmit and receive the pulse vertically to the surface of the test object (straight beam probes) or at an angle to the surface (angle beam probes, fig. 3).

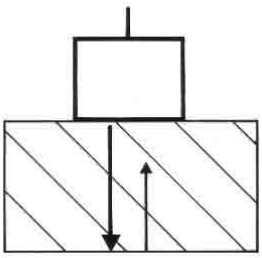


Fig. 1

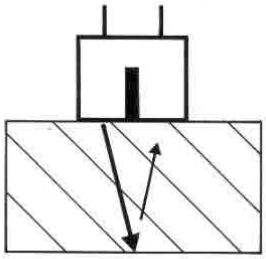


Fig. 2

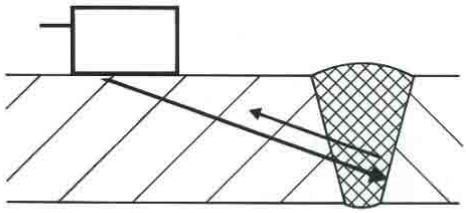


Fig. 3

Selection criteria for contact probes

If there are no fixed concepts concerning a suitable probe, it is recommended that the criteria be considered in a certain sequence:
Firstly, a decision should be made between single element probes and TR probes. If near-to-surface flaws are to be detected then TR probes are more suitable.
Secondly, a decision must then be made to either use a straight beam probe or an angle beam probe, depending on the expected flaw position.

Due to specular sound reflection from larger reflectors the sound beam should vertically hit the reflector surface. More attention should be given to this point as the frequency increases.
Thirdly, a decision about far resolution (echo width) is to be considered.
Finally, with the help of the table values, given for the selected probe group, the most suitable probe can be selected from the dimensions, frequency spectrum and the operation range.

Probe B0.5SL,
identical in shape to coarse grain probes K0.5S and K1S.

Probe B2S
identical in design to K..SC

Probe MB4S
identical in design to MK..S

Probe B2S-0
identical in shape to K 0.5SM and K1SM.

Main features:

* Single element for transmission and reception of the sound pulses
* Vertical transmitting of longitudinal waves
* Constant coupling, even on rough or slightly curved surfaces, due to a flexible, abrasion-resistant protective membrane
* Minimum probe wear if protective membranes are changed in good time
* Special coarse grain probes, with short sound pulses for large signal-to-noise ratios, when testing strong sound scattering materials
* Stable die-cast housing with a practical shape

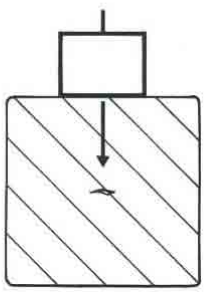
Main areas of application

General: Detection and evaluation of flaws which extend over the volume or are parallel to the surface. The exchangeable, abrasion-resistant protective membrane enables the best possible coupling on rough or slightly curved surfaces and protects the probe from damage.

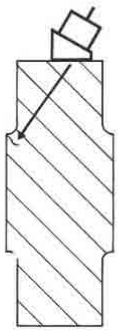
B..SL
Used for testing middle sized and large objects which cause distinct sound attenuation due to the long sound path (e.g. large forgings or nodular cast iron). They are also suitable for testing strong sound absorbing plastics (e.g. Nylon, Teflon, polyproylene) whereby the protective membrane can be removed in order to increase the sensitivity and resolution.

K..S, K..SM, K..SC, MK..S
(coarse grain probes)
Used for testing middle sized and large objects whose material causes a high sound attenuation by sound scattering (e.g. objects made of gray cast iron, nonferrous heavy metal or plastic composite materials).
They can also be used for testing the physical characteristics of materials (e.g. building materials, drill cores and semi-conductor material).

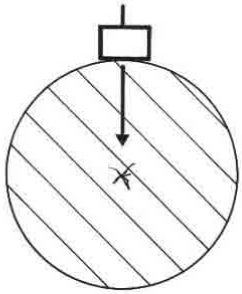
B..S and MB..S:
These are very narrow tolerance series probes of highest precision for most existing test tasks (e.g. testing of plates, bars, square profiles, and also for testing containers and machine components such as screws, bolts and shells) and for testing simply shaped parts made of many types of material (e.g. all types of metal, glass, porcelain, ceramics and plastics).



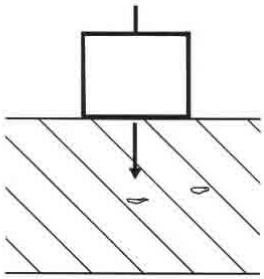
Testing square profiles with the probe B4S.



Testing of wheel set axles for cracks with the probe MB4S and plastic wedge.



Testing for production flaws on large plastic rods with the probe B1SL.



Testing melting tank blocks for cavities with the probe K0.5S.

Probe K2G identical to probes G....N

Probe K4N identical to probes G...KB

Probe K5K identical to G...K and probe G10 MN

Fingertip probes B2F and MB4F

Main features:

* Single ultrasonic element for transmission and reception of ultrasonic pulses
* Vertical scanning by longitudinal waves
* High gain reserve and a very good resolution on smooth surfaces
* High abrasive resistance of probes with ceramic contact surface
* Special flat fingertip probes
* Excellent near resolution of the probes with exchangeable delay lines

Main applications:

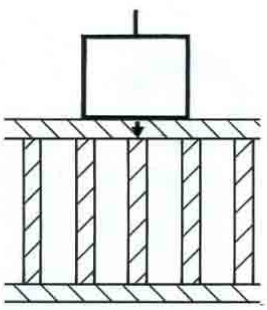
General: Detection and evaluation of flaws which extend over the volume or run parallel to the surface of all types of parts. Testing can be carried out on sharp-edged objects for which the protective membrane probe is not suitable.

K..G and K..N:
Regularly used standard probes for testing small, middle sized and large objects made of different materials (e.g. steel, metal, glass, porcelain, ceramic). The universal application due to good resolution is combined with a very good gain reserve.

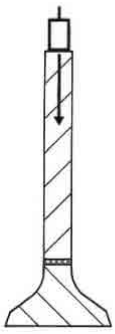
G..N, G..K, G..KB and G..MN:
Extremely highly damped and wide band shockware probes which produce a very short sound pulse. They enable good differentiation between compact individual flaws and flawed areas, they also have a good penetration capability in inhomogeneous material (cast structures, composite materials).

K..K:
Small probes for detection of very small reflectors on small objects or positions which are not easily accessible on larger objects. The range of frequencies which are offered enables selecting a probe with the most favourable beam shape (positioning of the near field length into the flaw expectancy area).

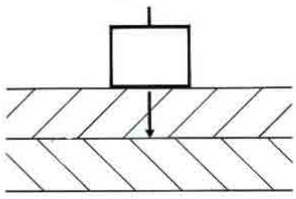
Fingertip probes B..F and MB..F:
Comparable with probes K..G and K..N, but due to their flat design they are best suited for testing on positions which are not easily accessible. Frequently used as a "search probe".



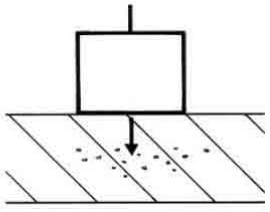
Testing the adhesive bonding between the outside skin and the honeycomb structure of a composite material (honeycomb part) with probes G1N or G2N



Testing of friction welds on valves with probe K4N



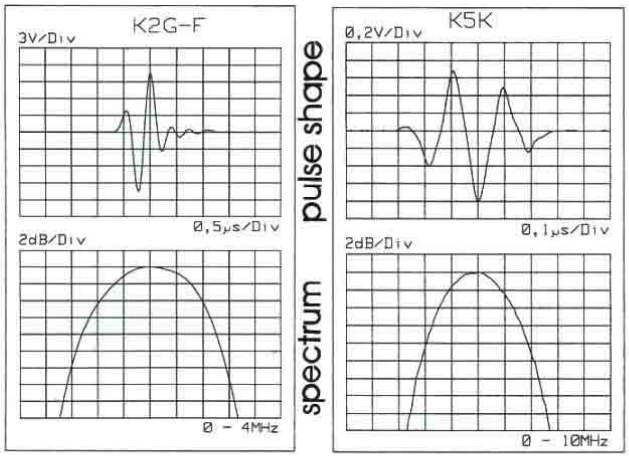
Bond testing between white metal and steel with probe K2K or K5K



Detection of pore clusters in ceramic plates with probe MB4F

Straight beam probes with hard ceramic contact surface

Special features: Very good penetration/high far resolution/very abrasion resistant



Note

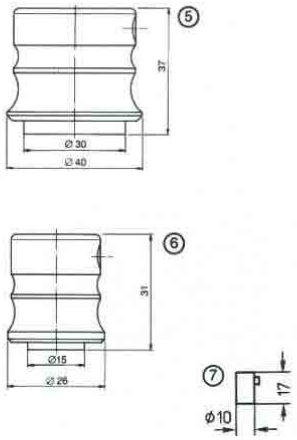
Bold = *preferred probe, delivered at short notice*

O = *probe data sheets are available*

[] = *DGS scales are available*

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes
Refer to the beam shape no. on page 37.



Type [Order code]	D [mm]	f [MHz]	AB* [mm]	N [mm]	EB [mm]	Beam shape no.	Remark	Sketch
Characteristic bandwidth: 70%								
K1G	24	1	15-2300	23	7	1 - 24	o	Type 5
K2G	24	2	10-4000	45	3.5	2 - 24	o	
K4G	24	4	7-8000	88	1.8	4 - 24	o	
Characteristic bandwidth: 70%								
K1N	10	1	15-420	4	8	1 - 10		Type 6
K2N	10	2	7-2500	8	3.5	2 - 10	o [ ]	
K4N	10	4	5-5000	16	1.8	4 - 10	o [ ]	
K5N	10	5	4-6300	20	1.5	5 - 10	o	
K6N	10	6	3-7600	23	1.2	6 - 10	o	
Characteristic bandwidth: 60%								
K2K	5	2	7-300	2.0	2.5	2 - 5		Type 7
K5K	5	5	5-2100	5.0	1.5	5 - 5		
K10K	5	10	2-3000	10	1	10 - 5		
K15K	5	15	2-3800	15	0.7	15 - 5		

*) The specified upper limit of the operation range applies to attenuation-free material. In practice, if the frequency increases there will be a strong decrease in the upper limit.
Probes with other frequencies, element diameters, bandwidths or design on request..

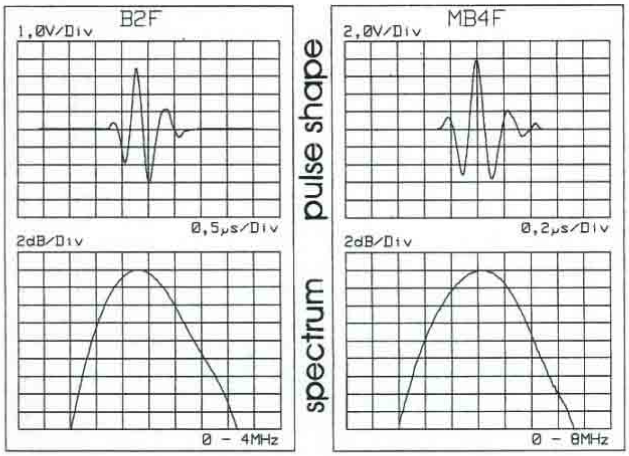
Probe cable PKLL2 with two Lemo 1 plugs as well as MPKM2 with Lemo 1 and Microdot connector.

ACCESSORIES Description	Type	Remark
Probe cable (2m)	MPKL2 MPKM2	*for K..G and K..N* *for K..K*
Couplant	ZG-F	*see page 36*

Probe cable MPKL2 with Lemo 1 and Lemo 00 connectors

Fingertip straight beam probes with hard ceramic contact surface

Special features: Very good penetration/very abrasion resistant/flat design



Note

Bold = *preferred probe, delivered at short notice*

O = *probe data sheets are available*

[] = *DGS scales are available*

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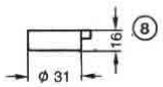
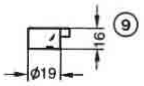
Beam shapes
Refer to the beam shape no. on page 37.



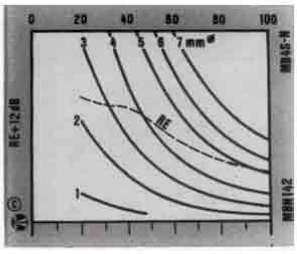


Type [Order code]	D [mm]	f [MHz]	AB* [mm]	N [mm]	EB [mm]	Beam shape no.	Remark	Sketch
Characteristic bandwidth: 70%								
B1F	20	1	20-1300	16	8	1 - 20	o	Type 8
B2F	20	2	10-4000	31	4	2 - 20	o	
B4F	20	4	6-7500	62	3	4 - 20	o	
B5F	20	5	6-10000	76	2.5	5 - 20	o	
Characteristic bandwidth: 60%								
MB2F	10	2	13-2500	8	4	2 - 10	o [ ] same as MB2S	Type 9
MB4F	10	4	6-5000	16	3	4 - 10	o [ ] same as MB4S	
MB5F	10	5	5-6200	19	2.5	5 -- 10	o	
MB10F	10	10	3-12000	36	2	10 - 10	o	

*) The specified upper limit of the operation range applies to attenuation-free material. In practice, if the frequency increases there will be a strong decrease in the upper limit.
Probes with other frequencies, element diameters, bandwidths or design on request..

Probe cable MPKL2 with Lemo 1 and Lemo 00 connectors

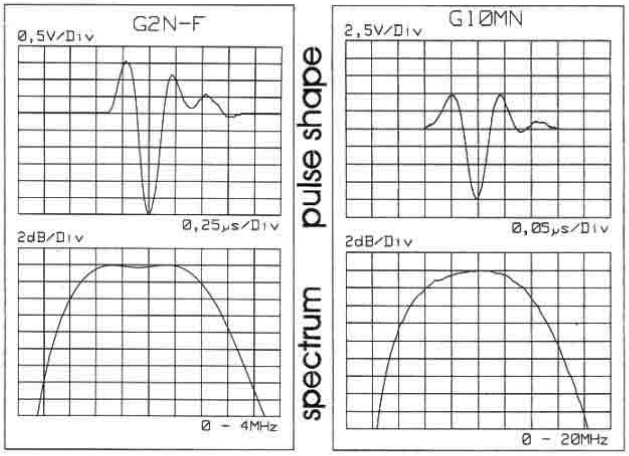
ACCESSORIES Description	Type	Remark
Probe cable (2m)	MPKL2	*für B..F und MB..F*
DGS scales		*see page 35*
Couplant	ZG-F	*see page 36*



DGS scale MBN142 for probe MB4F and the ultrasonic flaw detector USK 7

Straight beam probes with hard ceramic contact surface or delay line

Special features: Shockwave probes with very short sound pulses



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O = *probe data sheets are available*

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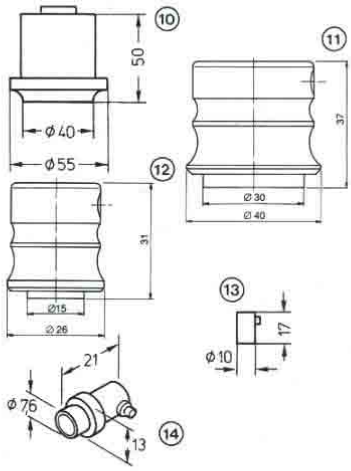
For explanations to the table data, refer to selection criteria on page 4.

Beam shapes Refer to the beam shape no. on page 37.



Type [Order code]	D [mm]	f [MHz]	AB** [mm]	N [mm]	EB [mm]	Beam shape no.	Remark	Sketch
Wear-resistant ceramic protective face; characteristic bandwidth: 100%								
G1N	24	1	12-2300	23	5	1 - 24	o	Type 11
G2N	24	2	10-2500	45	2.5	2 - 24	o	
G4N	24	4	7-5000	88	1.2	4 - 24	o	
Wear-resistant ceramic protective face; characteristic bandwidth: 100%								
G2KB	10	2	7-1300	8	2.5	2 - 10	o	Type 12
G5KB	10	5	3-3400	20	1.0	5 - 10	o	
G5K	5	5	2-130	5	1.5	5 - 5		Type 13
G10K	5	10	1.2-200	10	0.8	10 - 5		
Exchangeable plastic or quartz delay line at 50 MHz; characteristic bandwidth: 100%								
G5MN	5	5	2-20	5	1.5	5 - 5 ★		Type 14
G10MN	5	10	1-30	10	0.2	10 - 5 ★		
G15MN	5	15	0.6-40	15	0.5	15 - 5 ★		
ND23	5	23	0.4-30	23	0.4		bandwidth 50%	
ND50	3	50	0.2-10	17	0.2		with fixed delay	

**) The specified upper limit of the operation range applies to attenuation-free material. In practice, if the frequency increases there will be a strong decrease in the upper limit.
Probes with other frequencies, element diameters, bandwidths or design on request.

Probe cable PKLL2 with two Lemo 1 connectors as well as MPKL 2 with Lemo 1 and Lemo 00 connectors

ACCESSORIES Description	Type	Remark
Probe cable (2m)	MPKL2	*for G..N and G..KB*
	MPKM2	*for G..K, G..MN and ND 23, ND 50*
Delay line (exchangeable)	CLFV1 CLFV3	*9.5 mm for G.MN* *12.5 mm for G.MN* *other lengths on request*
Couplant	ZG-F	*see page 36*

Probe cable MPKM2 with Lemo 1 and Microdot connectors as well as delay line CLFV 1 for probe G...MN

TR probe SEB4 similar to probe DA 0,8G and SEK2C

TR probe MSEB4, identical in shape to MSEK4

TR probe SEB4KF8

TR-Fingertip probe SEZ5M5

Main features:

* Separate transmitter and receiver elements
* Vertical scanning by longitudinal waves
* Very good near resolution of the probes with a small focal distance
* Good coupling even on rough or curved surfaces due to grindable plastic delay line
* Delay line protected by a metal ring against wear
* Especially suited for remaining wall thickness measurement within the focal area
* With special delay line (special production) suitable for measurements on hot surfaces

Main areas of application

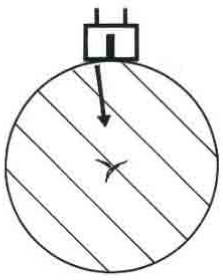
General: Detection and evaluation of small near-to-surface flaws. Scanning of larger flaws which are preferably in the focal area and which extend parallel to the surface. Remaining wall thickness measurement (even at increased temperature).

SEB.. and SEB..0°:
Standard probes for detection of core flaws in bars, billets, axles and shafts. Often used for detection of small flaws (e.g. pores, micro-cavities and heat cracks) within limited flaw expectancy ranges of middle-sized and large objects (e.g. objects which are forged or cast). Well suited for determination of the precise extension of defective areas in plane parallel objects (e.g. laminar defects, slag inclusions, lines of segregation in heavy plates).

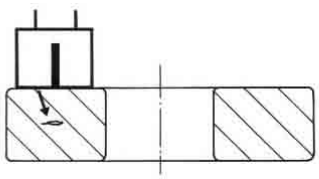
MSEB.. and MSEB..0°:
Much used probes for evaluation of all types of small parts (e.g. screws, bolts, nuts, pins, bearing rings, bearings, and assembly material).
They are also used for wall and remaining thickness measurements (e.g. eroded and corroded tubes, containers and machine parts).

SEB..KF, SEZ5M5:
Special probes having a low height and small element diameter, for the detection of small and smallest flaws near the surface. The compact shape enables this type of probe to be used in critical positions and ones where access is limited.

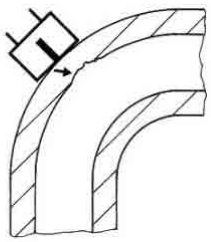
Note:
For measurements at high temperatures, refer to page 28 and 29.



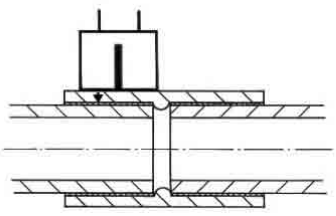
Testing brass rods for core flaws with probes SEB1 oder SEB2-0°



Testing sintered metal rings for concentric cracks with the probe MSEB4



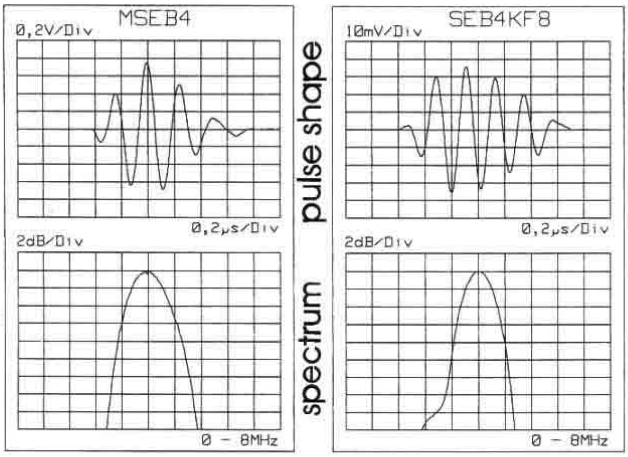
Remaining wall thickness measurement on tube bends with probe MSEB5



Testing the soldered joint between faucet and tube with probe SEB10KF3

TR-straight beam probes with integrated delay line

Special feature: Very good near resolution



Note

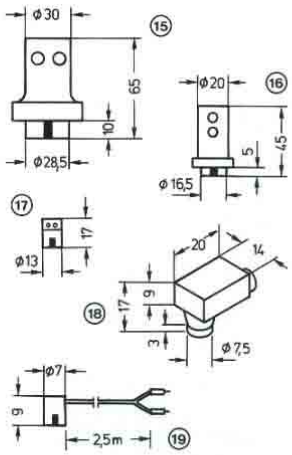
Bold = *preferred probe, delivered at short notice*

O = *probe data sheets are available*

[] = *DGS scales are available*

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes
Refer to the beam shape no. on page 37.



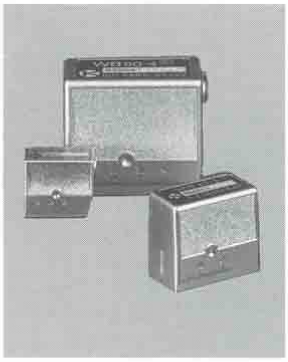
Type [Order code]	D/axb [mm]	f [MHz]	AB*) [mml]	F [mm]	EB [Mm]	Beam shape no.	Remark	Sketch
characteristic bandwidth: 65 %								
DA0,8G	20 Ø	0.8	3-400	35	8	0.8 - 20 / 2	for strongly attenuative materials	Type 15
characteristic bandwidth: 40 %								
SEB1	21 Ø	1	3-400	20	10	1-21 / 2	O 0° means that the common angle of inclination of both elements is 0°	Type 15
SEB2	7 x 18	2	2-1000	15	5	2-7 x 18	O	
SEB2-0°	7 x 18	2	4.5-2000	30	5	2-7 x 18-0	O	
SEB4	6 x 20	4	1.5-2000	12	2.5	4-6 x 20	O	
SEB4-0°	6 x 20	4	4-4000	25	2.5	4-6 x 20-0	O	
MSEB2	11 Ø	2	2-400	8	5	2-11 / 2	O	Type 16
MSEB4	3.5 x 10	4	1-1500	10	2.5	4-3.5 x 10	O	
MSEB4-0°	3.5 x 10	4	1.5-2000	18	2.5	4-3.5 x 10-0	O	
MSEB5	9 Ø	5	0.5-200	10	1	5-9 / 2	O bandwidth 100 %	
SEB2KF5	8 Ø	2	1.5-350	6	4	2-8 / 2	O	Type 17
SEB4KF8	8 Ø	4	0.8-400	6	2	4-8 / 2	O	
SEB5KF3	8 Ø	5	0.5-80	3	1	5-8 / 2	O	
SEB10KF3	5 Ø	10	0.3-140	3	0.6	10-5 / 2	O	Type 18
SEZ5M5	3 Ø	5	0.6-50	3	1	5-3 / 2	fixed cabel (2m)	Type 19
With composite element, characteristic bandwidth: 70 %								
SEK2C	7 x 18	2	1.5-1500	15	4	2-7 x 18		Type 15
MSEK2	11 Ø	2	1.5-450	8	4	2-11 / 2		Type 16
MSEK4	3.5 x 10	4	1-2000	10	2	4-3.5 x 10		

*) The specified upper limit of the operation range applies to attenuation-free material. In practice, if the frequency increases there will be a strong decrease in the upper limit.
Probes with other frequencies, element diameters, bandwidths or design will be supplied on request.
We also have a large range of special probes for measurements on hot surfaces (see page 28 and 29).

Probe cable SEKG2
with two Lemo1-connectors and
Lemo 00 -double connector

ACCESSORIES Description	Type	Remark
Probe cable (2m)	SEKG2	*for SEB.., SEK.. MSEB.., MSEK.. DA0,8G*
	SEKM2	*for SEB.KF.*
Couplant	ZG-F	*see page 36*

Probe cable SEKM2
with two Lemo 1 connectors
and two Microdot connectors



Angle beam probes SWB60-5, MWB60-2 and WB60-4

Miniature angle beam probes MWB45-4, MWB45-04, MSWQC with QC-X and SMWB70-6

Coarse grain angle beam probes K0,5S with wedge KSY45, WRY45 and WSY70

Universal angle beam probes UWB.. in 1, 2 and 4 MHz with element size of 20x30 mm² and MUWB..

Main features:

* Single ultrasonic element for transmission and reception of sound pulses
* Standard probes for angle scanning with transverse waves
* Special coarse grain probes for angle scanning of longitudinal waves with very short sound pulses in order to obtain a favourable signal-to-noise ratio with strongly attenuative materials
* Very small probes with exchangeable wedge (favourable with often changing angles of incidence or exceptional wear)
* Universal probes with adjustable angles of incidence
* For most types there are spare soles for resoling the contact face in cases of wear
* Special probes can be provided for measurements on hot surface (see page 29).

Main applications:

General: Detection and evaluation of flaws which are not reached by straight beam probes or extend at an angle or vertically to the surface.

WB.. und WK.. :
Used for testing of large objects made of non-alloyed and low-alloyed steels (e.g. thick walled containers, axle shafts, all types of thick welds). WK.. probes generate very short echo pulses.

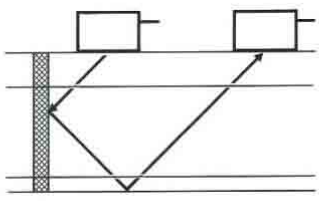
SWB.. :
These probes are very versatile testing tools due to their good near resolution power and narrow beam spread. They enable to test small parts as well as large objects. The case dimensions are ideal for manual testing.

MWB.. :
Used for testing small objects. Much used for weld testing in the container and boiler sector, especially for the detection of cracks on screws, bolts and highly stressed machine parts. Another application: corrosion detection (e.g. on the inside of gas bottles) and for testing assembly weld seams on pipelines.

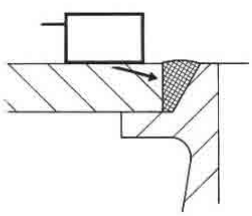
MSW-QC.. :
For the detection of small flaws in complicatedly shaped parts (e.g. pumps and valve housings, gear wheels, spindles and ball bearings turbine blades).

WRY.., WSY.. und K..S+KSY.. :
For testing materials with increased sound scatter (e.g. austenitic welds, nodular graphite castings). Probes with 70° angle of incidence, suitable for the excitation of creep waves in mild steel.

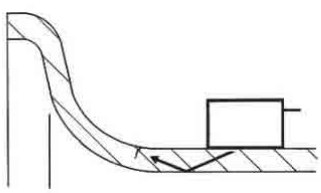
MUWB.. und UWB.. :
Used for empiric determination of suitable angle of incidence and also for generation of Lamb waves.



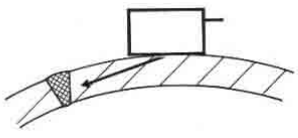
Thermit weld testing on rails with probe WB45-1 in the tandem technique



Testing a 12 mm thick flange weld with the angle beam probe MWB80-4



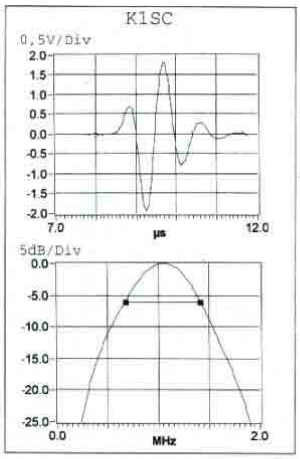
Testing an aluminum wheel rim for cracks with the angle beam probe MSW-QC5 and QC-X45



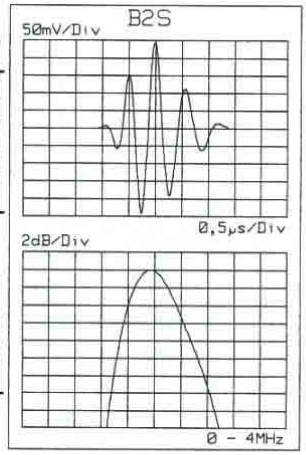
Weld testing of a Ni pipeline with probe WRY70

Straight beam probes with exchangeable protective membrane

Special feature: Very good constant coupling on rough surfaces



pulse shape / spectrum



Note

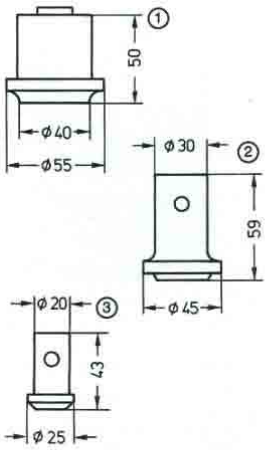
Bold = *preferred probe, delivered at short notice*

O = *probe data sheets are available*

[] = *DGS scales are available*

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes
Refer to the beam shape no. on page 37.



Type [Order code]	D [mm]	f [MHz]	AB [mm]	N [mm]	EB [mm]	Beam shape no.	Remark	Sketch
Characteristic bandwidth: 25 %								
B0,5 SL	34	0.5	175-480	23	10	0.5 - 34		Type 1
B1 SL	34	1	80-1600	46	8	1 - 34		
B2 SL	30	2	40-3100	71	5	2 - 30		
B1 S	24	1	70-1200	23	6	1 - 24	O	Type 2
B2 S	24	2	23-3000	45	5	2 - 24	O[] also supplied with connector	
B4 S	24	4	15-3000	88	3	4 - 24	O[] on top type: B.S-O	
B5 S	24	5	15-6000	110	3	5 - 24	O	
MB2 S	10	2	30-800	8	4	2 - 10	O[] also supplied with connector	Type 3
MB4 S	10	4	15-1500	16	3	4 - 10	O[] on top type: (MBS-O)	
MB5 S	10	5	10-2000	20	3	5 - 10	O	
characteristic bandwidth: 60 %								
K0,5 S	34	0.5	100-250	23	10	0.5 - 34	Coarse-grain probes for testing strongly sound attenuating materials	Type 1
K1 S	34	1	50-1350	46	6	1 - 34		Type 1
K0,5 SM	28	0.5	80-145	15	8	0.5 - 28		Type 2
K1 SM	28	1	40-780	31	6	1 - 28	O	Type 2
With composite element, characteristic bandwidth: 80 %								
K1 SC	24	1	35-1200	23	6	1 - 24	Coarse-grain probes, also specially suited for testing plastics in ZIP technique	Type 2
K2 SC	24	2	18-3000	45	3	2 - 24		
MK1 S	10	1	30-350	4	6	1 - 10		Type 3
MK2 S	10	2	15-700	8	3	2 - 10		
MK4 S	10	4	10-1300	16	2	4 - 10		

Probes with other damping values (bandwidth), connection sockets, frequency or element size are available on request.

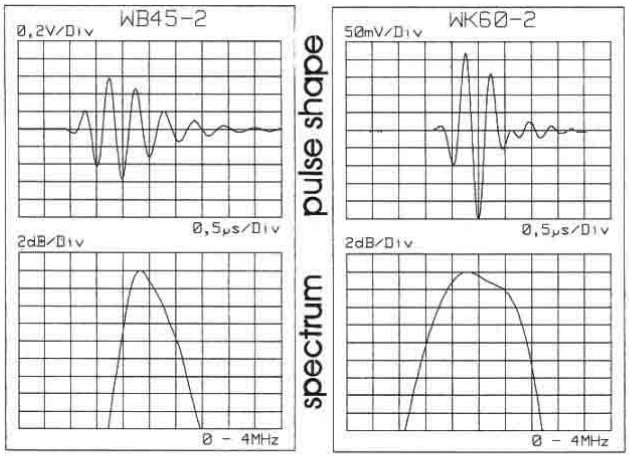
Probe cable PKLL2, protective membranes ES 57 and ES 45

ACCESSORIES Description	Type	Remark
Protective membrane (1 set = 10 pcs)	ES57 ES45 ES24	*for B..SL; K..S* *for B..S; K..SM; K..SC;* *for MB..S; MK..S*
Delay line or delay wedges	on request	e. g. *for testing at high temperatures.*
Probe cable (2m)	PKLL2 MPKL2	*for B... und K..,* *for MB..S; MK..S*
Couplant	ZG-F	*See page 36*
DGS scales		*See page 35*

Probe cable MPKL2, DGS scale NBN 122 for USK 7 and probe MB2S

Angel beam probes with integrated plastic wedges for transverse waves

Special features: large shape, narrow sound field at large depths



Note

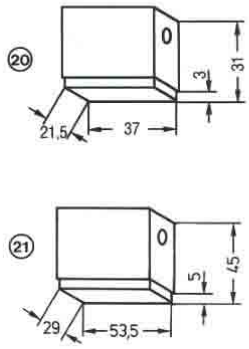
Bold *= preferred probe, delivered at short notice*

O = probe data sheets are available

[] = DGS scales are available

For explanations to the table data, refer to selection criteria on page 4.

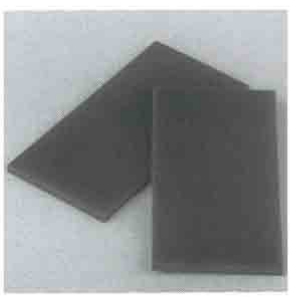
Beam shapes
Refer to the beam shape no. on page 37.



Type [Order code]	a x b [mm]	f [MHz]	β[1)] [Grad]	AB*) [mm]	N [mm]	EB [mm]	Beam shape no.	Remark	Sketch
characteristic bandwidth: 40 %									
WB45-1	20 x 22	1	45	20-1300	45	6	1-20 x 22	O 1) at 3255 m/s	Type 21
WB60-1		1	60	20-1200	45	6	1-20 x 22	O	
WB70-1		1	70	17-1000	45	6	1-20 x 22	O also supplied with connector on top as type:	
WB35-2		2	35	15-2700	90	4	2-20 x 22	O WB..-01	
WB45-2		2	45	10-2700	90	4	2-20 x 22	O [] -02	
WB60-2		2	60	06-2500	90	4	2-20 x 22	O [] -04	
WB70-2		2	70	05-2200	90	4	2-20 x 22	O []	
WB80-2		2	80	09-2000	90	4	–		
WB90-2		2	90	–	95	4	–	generates surfaces waves	
WB35-4		4	35	10-3500	180	2	4-20 x 22	O *) The specified upper	
WB45-4		4	45	06-5000	180	2	4-20 x 22	O limit of the operation	
WB60-4		4	60	05-4000	180	2	4-20 x 22	O range applies to	
WB70-4		4	70	03-3700	180	2	4-20 x 22	O attenuation-free material.	
SWB45-2	14 x 14	2	45	4-3500	39	4	2-14 x 14	O	Type 20
SWB60-2		2	60	4-3100	39	4	2-14 x 14	O	
SWB70-2		2	70	4-2600	39	4	2-14 x 14	O The probes can be certified according	
SWB45-5		5	45	2-5000	98	2	5-14 x 14	O to JIS	
SWB60-5		5	60	2-4900	98	2	5-14 x 14	O	
SWB70-5		5	70	2-4700	98	2	5-14 x 14	O	
With composite elements, characteristic bandwidth: 70 %									
WK45-1	20 x 22	1	45	10-1500	45	5	1-20 x 22		Type 21
WK60-1		1	60	10-1400	45	5	1-20 x 22		
WK70-1		1	70	9-1300	45	5	1-20 x 22		
WK45-2		2	45	8-3000	90	3	2-20 x 12		
WK60-2		2	60	5-2800	90	3	2-20 x 12		
WK70-2		2	70	4-2500	90	3	2-20 x 12		
SWK45-2	14 x 14	2	45	4-3500	39	3	2-14 x 14		Type 20
SWK60-2		2	60	4-3100	39	3	2-14 x 14		
SWK70-2		2	70	4-2600	39	3	2-14 x 14		

Probe cable PKLL 2 and spare sole WP(E), having the same shape as SWP

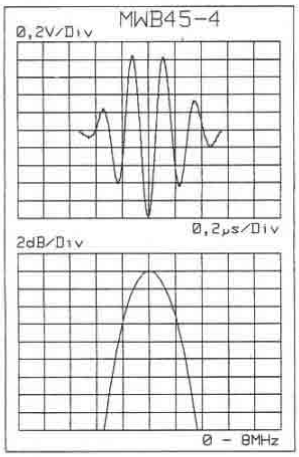
ACCESSORIES Description	Type	Remark
Probe cable (2m)	PKLL2 MPKL2	*for WB.., WK..* *for SWB.., SWK..*
Spare sole (1 set = 10 pcs)	WP(E) SWP	*for WB.., WK..* *for SWB.., SWK..*
Couplant DGS scales	ZG-F	*see page 36* *see page 35*



Spare soles WP 93 and WT 93 for UWB..

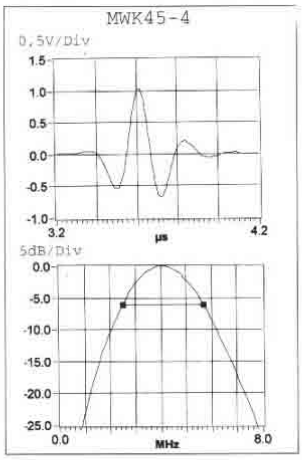
Angle beam probes
with integrated plastic wedges for transverse waves

Special features: small case, narrow sound field at small to middle depths



pulse shape

spectrum



Note

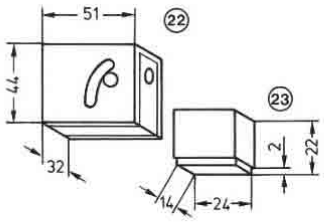
Bold *= preferred probe, delivered at short notice*

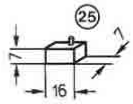
O = probe data sheets are available

[] = DGS scales are available

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes
Refer to the beam shape no. on page 37.

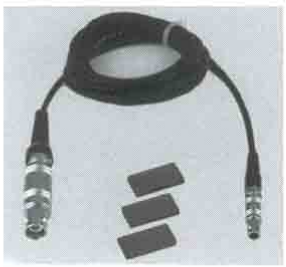




Type [Order code]	a x b [mm]	f [MHz]	β[1] [Grad]	AB*) [mm]	N [mm]	EB [mm]	Beam shape no.	Remark	Sketch
characteristic bandwidth: 40 %									
MUWB 2N	8 x 9	2	0-90	dependent from angle	15	4	2-8 x 9	for longitiudinal and transverse waves 20 x 30mm also available	Type 22
MUWB 4N		4	0-90		30	2	4-8 x 9		
MWB35-2	8 x 9	2	35	10-3300	15	4	2-8 x 9	O also supplied with connector	Type 23
MWB45-2		2	45	5-3300	15	4	2-8 x 9	O [] on top as type MWB..-02	
MWB60-2		2	60	4-2900	15	4	2-8 x 9		
MWB70-2		2	70	4-2400	15	4	2-8 x 9		
MWB80-2		2	80	9-2200	15	4	2-8 x 9		
MWB90-2		2	90	–	16	4	–	surface waves	
MWB35-4	8 x 9	4	35	7-5000	30	2	4-8 x 9	O also supplied with connector	Type 23
MWB45-4		4	45	3-4600	30	2	4-8 x 9		
MWB60-4		4	60	3-4600	30	2	4-8 x 9	O [] on top as type MWB..-04	
MWB70-4		4	70	3-4200	30	2	4-8 x 9		
MWB80-4		4	80	5-1700	30	2	4-8 x 9	O	
MWB90-4		4	90	–	32	2	–	surface waves	
With composite element; characteristic bandwidth: 70 %									
MWK45-2	8 x 9	2	45	4-3500	15	3	2-8 x 9		Type 23
MWK60-2		2	60	4-3100	15	3	2-8 x 9		
MWK70-2		2	70	4-2600	15	3	2-8 x 9		
MWK45-4		4	45	3-5000	30	2	2-8 x 9		
MWK60-4		4	60	3-5000	30	2	4-8 x 9		
MWK70-4		4	70	3-4700	30	2	4-8 x 9		
SMWK45-5	3 x 4	5	45	4-1500	7	1.5	–		Type 25
SMWK60-5		5	60	4-1500	7	1.5	–		
SMWK70-5		5	70	4-1500	7	1.5	–		

[1] : at 3255 m/s

*) The specified upper limit of the operation range applies to attenuation-free material. In practice, if the frequency increases there will be a strong decrease in the upper limit. We have a large range of special probes suitable for measurements on hot surfaces (see page 29).



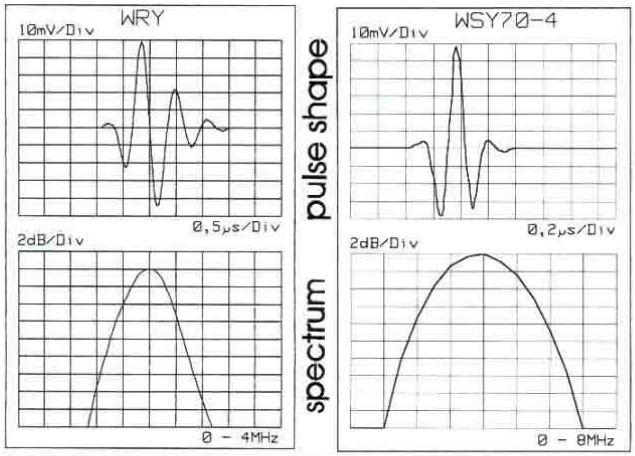
Probe cable MPKL2
and spare soles MWP(E)

ACCESSORIES Description	Type	Remark
Probe cable (2m)	MPKL2 MPKM2	*for MWB, MWK..* *for SMWK*
Wedges		
Spare soles (1 set = 10 pcs)	MWP(E) WP47	*for MWB.., MWK..* *for MUWB.*
Couplant	ZG-F	*see page 36*
DGS scales		*see page 35*

Probe cable MPKM2 and wedge QC-X 45

Angle beam probes with plastic wedges for longitudinal waves

Special feature: specially suited for testing coarse grain material



Note

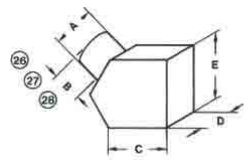
Bold *= preferred probe, delivered at short notice*

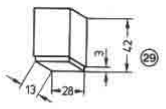
O = probe data sheets are available

[] = DGS scales are available

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes Refer to the beam shape no. on page 37.





Typ	A B	C D	E
26	40 50	60 50	80
27	30 59	55 45	70
28	30 22	46 25	52

Type [Order code]	D [mm]	f [MHz]	β[1)] [Grad]	AB [mm]	N [mm]	EB [mm]	Beam shape no.	Remark	Sketch
application of a special wedge; characteristic bandwidth: 60%									
K0,5S *) + KSY45	34	0.5	45	50-200	22	8	0.5-34		Type 26
K1S *) + KSY45	34	1	45	30-800	46	5	1-34	delay block must be separately ordered see Accesories	
K1SM *) + KSMY45	28	1	45	25-500	31	5	1-28		Type 27
K1SC *) + KSMY45	24	1	45	20-700	23	5	1-24	with composite-element	Type 27
K2SC *) + KSMY45	24	2	45	12-1400	45	3	2-24	with composite-element	
With composite element and integrated wedge, characteristic bandwidth: 70 %									
WRY45	24	1.5	45	10-140	34	4	1.5-24	including exchangeable delay block	Type 28
WRY60		1.5	60	10-120	34	4	1.5-24	WRY70 is suitable for excitation of creeping waves in mild steel	
WRY70		1.5	70	25-80	34	4	1.5-24		
WSY45-2	10	2	45	8-200	8	3	2-10	with integrated fixed wedge	Type 29
WSY60-2		2	60	8-150	8	3	2-10		
WSY70-2		2	70	8-100	8	3	2-10		
WSY45-4		4	45	4-800	16	1.5	4-10	WSY70 is suitable for excitation of creeping waves in mild steel	
WSY60-4		4	60	6-500	16	1.5	4-10		
WSY70-4		4	70	6-350	16	1.5	4-10		

[1)] : at 5750 m/s

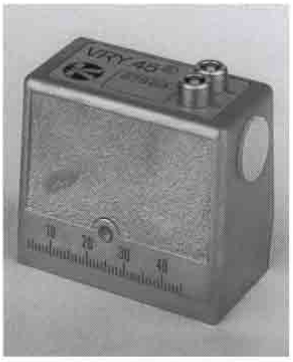
*) These probes are identical to the straight beam probes having the same name. This is the reason that wedges KSY.. and KSMY.. must be ordered separately for longitudinal waves and KS.. and KSM for transverse waves!

Probe cable PKLL2 with two Lemo 1 connectors and MPKL 2 with a Lemo 1 and Lemo 00 connector

ACCESSORIES Description	Type	Remark
Probe cable (2m)	PKLL2 MPKL2	*for K..S, K..SM, K..SC* *for WRY.., WSY..*
Wedge (to be ordered separately)	KSY45 KSMY45 KS45 KSM45	*for K.. S (Long)* *for K..SM (Long)* *for K..S (Trans)* *for K..SM (Trans)*
Spare Wedge	54885 54886 54887	*for WRY45* *for WRY60* *for WRY70*
Couplant	ZG-F	*see page 36*

Wedges KSY45, KSMY45 and 54885

TR angle beam probe VS45



TR angle beam probe VRY45

TR angle beam probe VSY45

TR angle beam probe VSY45, view to the contact face

Main features:

* Separate transmitter and receiver elements are inclined and therefore produce a focal range of high flaw detectability
* Angle scanning of transverse waves with probe type VS..
* Angle scanning of longitudinal waves with coarse grain probes VRY.. and VSY..
* Coarse grain probes with short sound pulses for a large signal-to-noise ratio when testing strong sound scattering material
* A rugged and practical metal case.

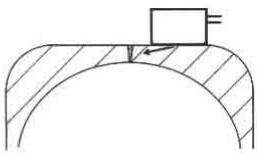
Main applications:

General: Detection and evaluation of small flaws which occur directly under the surface of the test object or in certain areas, not accessible with TR probes, as well as those positioned vertically or at an angle to the surface.

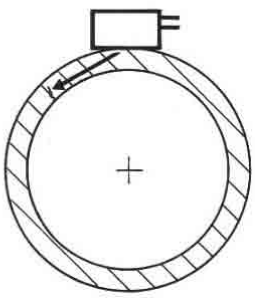
VS..:
Testing of small to middle sized objects with smooth or slightly rough surfaces, whose material does not greatly have a sound attenuative effect on transverse waves (e.g. non-alloyed or low alloyed fine grained steels). For example, they are used on small mountings for the detection of radial cracks, corrosion cracks on the inside of thin walled containers, as well as transverse cracks on heat exchanger tubes in the direct scanning mode. This means that there is no reflection of the sound beam from the backwall of the test object.

VRY..:
Used for testing middle sized to large thick-walled objects which cannot be tested with transverse waves due to the high sound scattering (e.g. containers and tubes made of austenitic steels, austenitic welds on chemical and power plants). The excitation of creeping waves in mild steel are made with 70° probes.

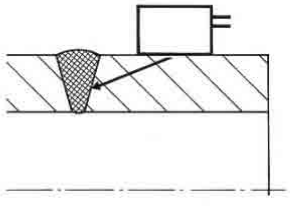
VSY..:
For testing small to middle sized objects which cannot be tested with transverse waves and whose shape requires the application of small probes. For example, they are well proven in the detection of bonding flaws in all types of welds and soldered joints on parts with complicated shapes. The excitation of creeping waves in mild steel are made with 70° probes.



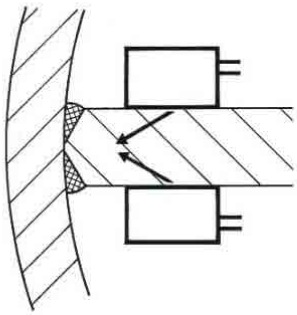
Testing a weld for penetration with angle beam TR probe VS45



Testing aluminum rings for inside longitudinal cracks with the angle beam TR probe VS60



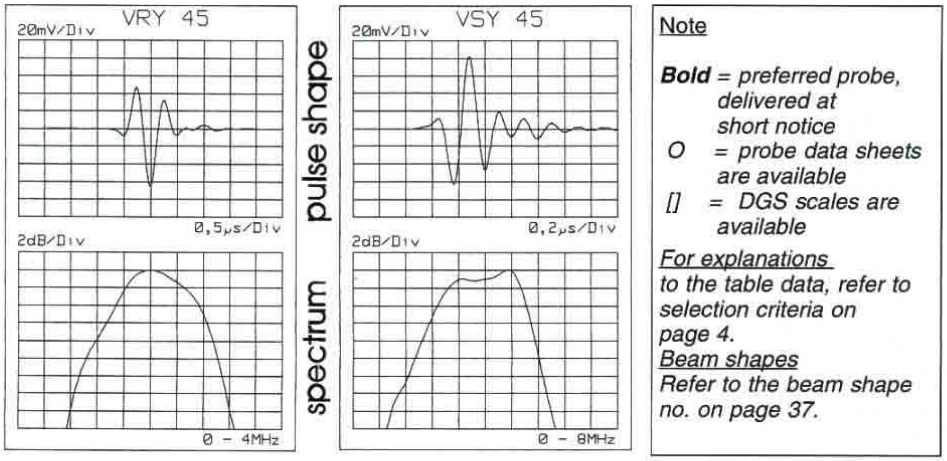
Testing austenitic welds on tubes with the angle beam probe VRY60



Weld testing on pump housings with the angle beam probes VSY45 and VSY70

Angle beam TR probes
with integrated plastic wedges for longitudinal waves or transverse waves

Special feature: Very good near resolution

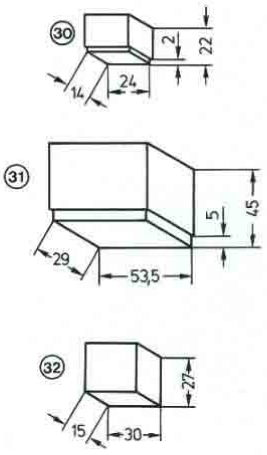


Note

Bold *= preferred probe, delivered at short notice*
O = probe data sheets are available
[] = DGS scales are available

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes
Refer to the beam shape no. on page 37.



Type (Order Code)	a x b [mm]	f [MHz]	β[1] [Grad]	AB*) [mm]	F [mm]	EB [mm]	Beam shape no.		Remark	Sketch
transverse waves, characteristic bandwidth: 40%										
VS45	3.5 x 10	4	45	1.5-800	10	2	4-3.5x10	O		Type 30
VS60		4	60	1.5-560	10	2	4-3.5x10	O		
VS70		4	70	1.5-560	10	2	4-3.5x10	O		
longitudinal waves, with composite elements, characteristic bandwidth: 80 %										
VRY45	10 x 22	1.8	45	21-150	40	3	1.8-10x22	O	for testing coarse grain material	Type 31
VRY60		1.8	60	20-120	35	3	1.8-10x22	O		
VRY70		1.8	70	15-100	35	3	1.8-10x22	O	VRY 70, suitable for excitation of creeping waves in mild steel	
VSY45-2	5 x 10	2	45	4-30	16	3	2-5x10		for testing coarse grain material	Type 32
VSY60-2		2	60	4-30	16	3	2-5x10			
VSY70-2		2	70	5-25	16	3	2-5x10		VSY 70 and VSY 70-2, suitable for excitation of creeping waves in mild steel	
VSY45		4	45	3-40	20	2	4-5x10			
VSY60		4	60	3-40	20	2	4-5x10			
VSY70		4	70	4-35	20	2	4-5x10			

1) with 3255 m/s (transverse waves) and 5750 m/s (longitudinal waves)
Probes with other frequencies, element sizes, bandwidths or design on request.
*) The specified upper limit of the operation range applies to attenuation-free material. In practice, if the frequency increases there will be a strong decrease in the upper limit.

Probe cable SEKL2 with two Lemo 1 and two Lemo 00 connectors on the probe side

ACCESSORIES Description	Type	Remark
Probe cable (2m)	SEKL2	*for VRY ..*
	SEKM2	*for VS ..*
	SEKN2	*for VSY ..*
Couplant	ZG-F	*see page 36*

Probe connection cable SEKN2 with two Lemo 1 and a large and a small Microdot connector at the probe side.

Immersion probes
Immersion probes
Immersion probes
Immersion probes
Immersion probes

Immersion probes are mainly applied for mechanized or automatic ultrasonic testing:
In principle they work the same as contact probes.

A major part of the tests is made in immersion tanks filled with water (fig. 1). In most of the cases, the test object is completely immersed and either solidly fixed or, according to shape and test task, is positioned onto a turntable or roller block and constantly moved past the probe.

The immersion probe is arranged, or is guided along the test object, so that its ultrasonic pulses are transmitted through the water and into the test object and then reflected from the borders or inhomogeneities in the test object back to the probe.

This method of coupling offers the best conditions for constant coupling and exact reproducible test results.

Frequently, large test objects cannot be completely immersed due to their size. In such cases, special holders are used which enable coupling of the immersion probe, e.g. from below via a water filled chamber (bubbler technique, see fig. 2) or via a freely flowing water jet (squirter technique, see fig. 3).
For inclined scanning, the probes are positioned at an angle to the surface of the test object.

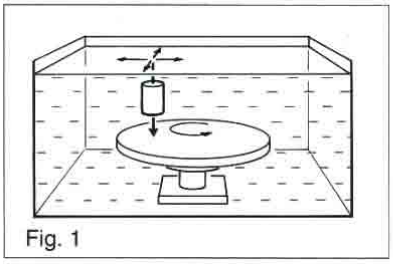


Fig. 1

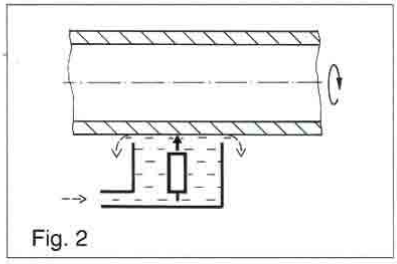


Fig. 2

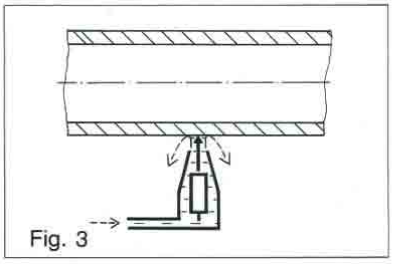


Fig. 3

Selection criteria for immersion probes

As opposed to the corresponding direct contact probes, there are a number of considerations to be made when selecting immersion probes:
With the exception of immersion near resolution, all data concerning the sound field (operating range, near field length, focal distance) are related to the propagation in water.

The shapes of the sound beams are only shown for non-focused probes because tests with focused probes are made in the direct vicinity of the focal area.The following changes are to be observed when selecting a focused probe as opposed to the non-focused probe:

a) Focusing is only possible within the near field length.
b) Flaw recognition improves due to the smaller sound beam dimensions in the focal area, as opposed to this, the working range is reduced.
c) Line focusing gives a larger lateral beam with a smaller focal width, point focusing produces a reduced sound beam in both axes vertical to the sound beam, and also gives the best possible flaw detection capability.

Immersion probe Z4N identical in design to H..N

Immersion probe Z4K identical in design to H..K

Immersion probe Z10M identical in design to H..M

Immersion probes IA 5.8, IAP-F80.2.1 and IAP-FM25.2.1 with UHF or Microdot connectors

Main features:

* Single element for transmission and reception of sound pulses
* Vertical or angle scanning of longitudinal waves or transverse waves via a water delay path (non-contact test)
* Completely watertight version, either with fixed connection cable or with watertight connection socket (except for Microdot)
* Rugged metal case
* Increased flaw recognition with line and point focused versions normally used
* Very high detection capability for very small inhomogeneities with polymer probes having higher frequencies.

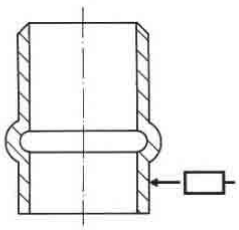
Main areas of application

General: Semi-automatic and fully automatic testing of serial or mass produced parts, via a water delay path, for small and smallest flaws or flawed material structures at the best possible reproducibility of the test results.

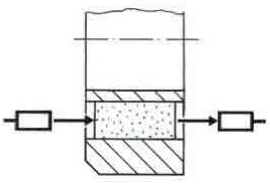
Z..N, Z..K and Z..M:
Probes with very gain reserve for testing of small to middle sized objects having an increased sound attenuation without great demands on the resolution. The main area of application is plastic composite materials (e.g. honeycomb and multi-layer structures), forgings (e.g. axles, disks and shafts) as well as weld constructions (e.g. gears and clutch parts) and rolled steel products (bars, rails, plates).

H..N, H..K and H..M:
Especially suitable for wall thickness measurement. Can also be used for testing small parts for small flaws and inhomogeneities, e.g. all types of bonding flaws in soldered joints, flaws in thin welded joints, cracks, cavities and pores in high quality castings and sintered metal, cracks in fittings made of brass or bronze.

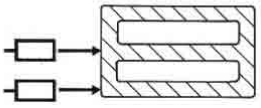
IA-... and IAP-...:
Very high resolution for the detection of the smallest flaws, in high quality parts made of metallic and non-metallic materials, which extend to under the surface; e.g. material separations, pores and inclusions in semiconductor substrates, electrical contacts and surface protection layers. This also applies likewise for diffusion welds, friction welds and adhesive bondings as well as for preformed parts made of ceramic, powder metal, titanium and other alloys.



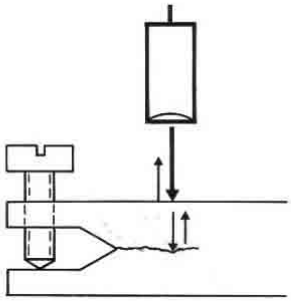
Detection of porosities in the end zone of brass fittings with probe H5M



Detection of pore clusters in the rubber of absorbers with probe H2K



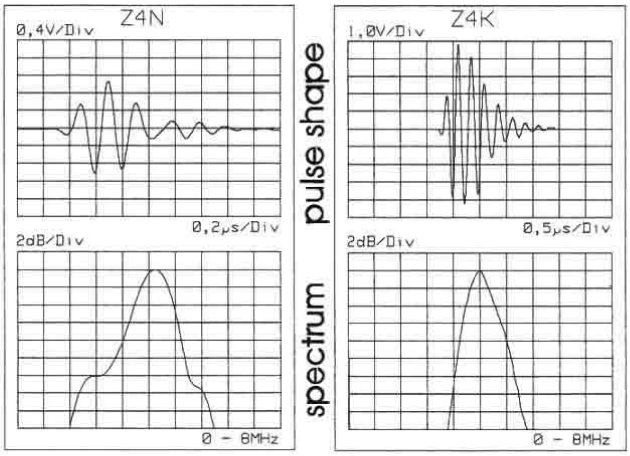
Detection of cracks in the inside web as well as density changes in the outside wall of SiC profiles with probe H10M



Mesurement of crack progression with tension crack corrosion on aluminum with probe IAP 50.3.2

Straight beam probes with sturdy watertight cases

Special feature: high gain reserve



Note

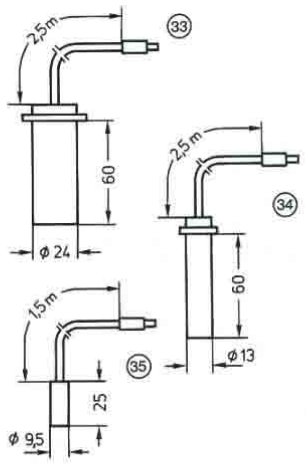
Bold = *preferred probe, delivered at short notice*

O = *probe data sheets are available*

[] = *DGS scales are available*

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes
Refer to the beam shape no. on page 37.



Type [Order Code]	D [mm]	f [MHz]	AB 6/1[1)] [mm]	N [mm]	F [mm]	Near resolution FBH [mm]	Beam-shape no.	Remark	Sketch
Large case with fixed cable; characteristic bandwidth: 40%									
Z1N	20	1	28-156	64		5 Ø in 28	1 - 20		Typ 33
Z2N		2	50-267	127		2 Ø in 19	2 - 20	detacha-ble collar	
Z4N		4	100-534	254		2 Ø in 9,6	4 - 20		
Z5N		5	127-668	318		2 Ø in 8	5 - 20		
Middle sized case with fixed cable; characteristic bandwidth: 40%									
Z2K	10	2	14-77	32		2 Ø in 9	2 - 10	detacha-ble collar	Typ 34
Z4K		4	28-154	64		2 Ø in 6,5	4 - 10		
Z4KP20		4	15-32		20	2 Ø in 6,0	-	point fokus	
Z4KL20		4	15-32		20	2 Ø in 6,0	-	line fokus	
Z5K		5	34-190	80		2 Ø in 5	5 -10		
Z10K		10	68-380	160		2 Ø in 4	10 -10		
Small case with fixed cable; characteristic bandwidth: 40%									
Z5M	5	5	8-52	20		2 Ø in 3	5 - 5		Typ 35
Z10M		10	16-104	40		2 Ø in 2	10 - 5		
Z10ML15		10	10-23		15	2 Ø in 2	-	line fokus	
Z10MP15		10	10-23		15	2 Ø in 2	-	point fokus	
Z15M		15	24-156	60		2 Ø in 1,6	15 - 5		

Alle Prüfkopfe mit Punkt- oder Linienfokus lieferbar (bitte Fokusabstand angeben). Andere Frequenzen, Wandlerdurchmesser oder Bauformen auf Anfrage
1) Bitte Definition auf Seite 5 beachten.

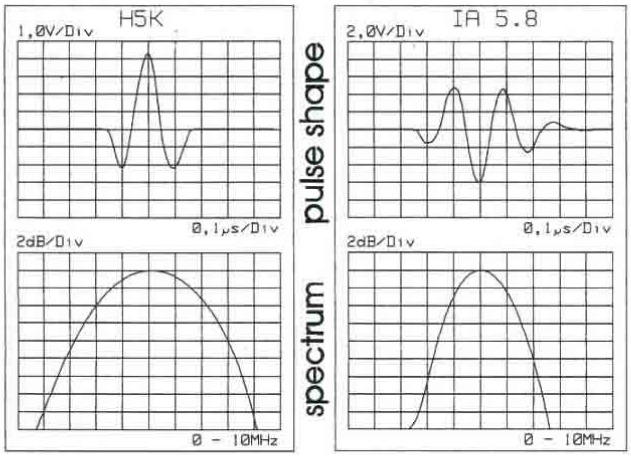
Delay line and adapter ZKQ2 for Z.K for mounting the delay

ACCESSORIES Description	Type	Remark
Delay line for contact testing with Z..K		*on request*
Coupling caps	on request	*for dry coupling see page 36*

Focusing lenses LKL and LKP and adapter ZKQ2 for Z.K for mounting the lense.

Straight beam probes with watertight sturdy cases

Special features: Exellent resolution and very good flaw detectability



Note

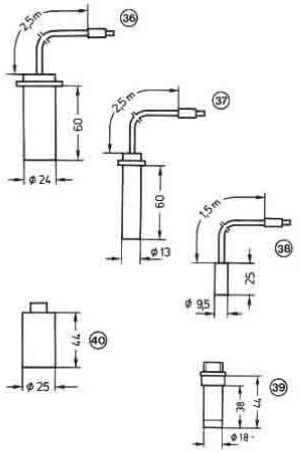
Bold = *preferred probe, delivered at short notice*

O = *probe data sheets are available*

[] = *DGS scales are available*

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes
Refer to the beam shape no. on page 37.



Type [Order code]	D [mm]	f [MHz]	AB [mm]	N/F [mm]	Near resolution[1)] [mm]	Beam shape no.	Remark	Sketch
High-resolution probes for flaw detection, UHF sockets, characteristic bandwidth: 80 %								
IA5.8	12.7	5	60-190	130	ZYB 0.5 Ø in 3	5 - 12.7		Type 39
IAP5.12.6	19	5	115-225	150	ZYB 0.5 Ø in 1,5	–	point-focused	Type 40
IAP10.6.3	9.5	10	55-130	75	FBB 0.4 Ø in 1,3	–	point-focused	Type 39
IAP15.6.2	9.5	15	40-65	50	FBB 0.4 Ø in 1,0	–	point-focused	Type 39
Shock-wave probes with fixed cable, characteristic bandwidth: 100 %								
H1N	20	1	28-156	64	FBB 5 Ø in 19	1 - 20		Type 36
H2N	20	2	50-267	127	FBB 2 Ø in 13	2 - 20		
H2K	10	2	14-77	32	FBB 2 Ø in 6.5	2 - 10		Type 37
H5K		5	34-190	80	FBB 2 Ø in 4	5 - 10		
H10K		10	68-380	160	FBB 2 Ø in 2	10 - 10		
H5M	5	5	8-52	20	FBB 2 Ø in 3	5 - 5		Type 38
H10M		10	16-104	40	FBB 2 Ø in 1.5	10 - 5		
H10MP15		10	10-23	15	FBB 2 Ø in 1.5	–	point-focused	
H10ML15		10	10-23	15	FBB 2 Ø in 1.5	–	line-focused	
Broad-band probes with fixed cable, characteristic bandwidth: 80 %								
L1N	20	1	28-156	63	FBB 2 Ø in 24	1 - 20		Type 36
L2N	20	2	50-264	127	FBB 2 Ø in 12	2 - 20		Type 36
L2K	10	2	14-77	32	FBB 2 Ø in 6	2 - 10		Type 37
L4K	10	4	28-154	64	FBB 2 Ø in 5	4 - 10		
L5K	10	5	34-190	80	FBB 2 Ø in 3.5	5 - 10		Type 38
L5M	5	5	8-52	20	FBB 2 Ø in 2.5	5 - 5		

All probes are available with point or line focusing (please state focal distance). Other designs on request.

1) Note the definition on page 5

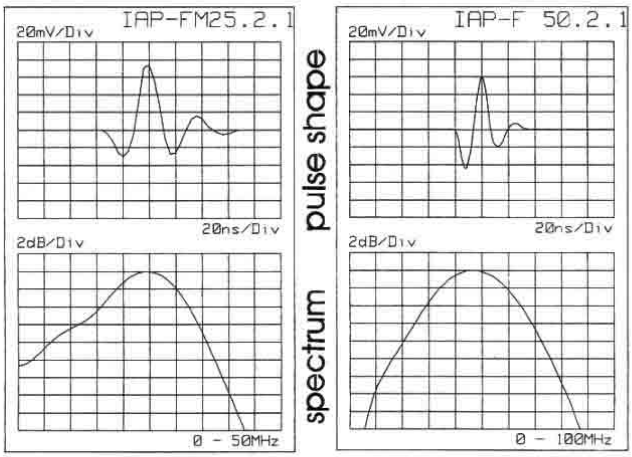
Probe cable PKI2 with UHF and Lemo 1 plug

ACCESSORIES Description	Type	Remark
Probe cable (2m)	PKI2	*for IA.. u. IAP..*
Delay line for contact testing with H..K		*on request*
Coupling caps	on request	*for dry coupling see page 36*

Adapter ZKQ2 and delay line for H..K

High frequency straight beam probes with polymer probe elements

Special features: Very high resolution, very small beam width in the focal area



Note

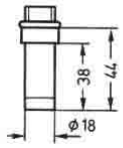
Bold = *preferred probe, delivered at short notice*

O = *probe data sheets are available*

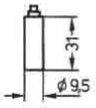
[] = *DGS scales are available*

For explanations to the table data, refer to selection criteria on page 4.

Beam shapes
Refer to the beam shape no. on page 37.



Typ F



Typ FM

Type *) [Order Code]	D [mm]	f [MHz]	AB6/1 [mm]	N / F [mm]	FD6 1) [mm]	Beam shape no.	Sketch
Point focus, either with UHF or Microdot connectors*); characteristic bandwidth: 100%							
IAP- .. 25.2.0,5	3	25	9.4 - 20.6	12.5	0.25	-	Type F
IAP- .. 25.2.1	3	25	16 - 60	25	0.49	-	or
IAP- .. 25.3.1	5	25	20 - 35	25	0.30	-	Type FM
IAP- .. 25.3.2	5	25	34.5 - 100	50	0.59	-	
IAP- .. 50.2.0,3	3	50	6.6 - 8.4	7.5	0.07	-	
IAP- .. 50.2.0,5	3	50	10.6 - 15.8	12.5	0.12	-	
IAP- .. 50.2.1	3	50	18.5 - 41	25	0.25	-	
IAP- .. 50.3.1	5	50	21.5 - 29	25	0.15	-	
IAP- .. 50.3.2	5	50	40 - 71	50	0.30	-	
Non-focused, either with UHF or Microdot connectors*); characteristic bandwidth: 100%							
IA- .. 25.2	3	25	17 - 86	36	0.7	25 - 3	Type F
IA- .. 25.3	5	25	45 - 227	99	1.2	25 - 5	or
IA- .. 50.2	3	50	33 - 170	71	0.7	50 - 3	Type FM
IA- .. 50.3	5	50	89 - 455	198	1.2	50 - 5	

*) In place of .. in the order code for the required case design, enter the following letters:
F for rugged case with UHF connector; FM for light case with Microdot connector.

1) Note the definition on page 5.


Probe cable PKIB0.18 with BNC and UHF connectors

ACCESSORIES Description	Type	Remark
Probe cable: Microdot/BNC	PKI-S0,75	*for IA(P)-FM 25/50*
Adapter: BNC socket/ Lemo-plug	PKLB1	*for PKIS ...and PKIB..*
Probe cable: UHF/BNC	PKIB0,75	*for IA(P)-F 25/50*
Adapter	ANP21	*extension tube with UHF and BNC*


Adapter ANP21

Thickness probes

Special applications

Probes for wall thickness measurement are specially matched to our digital wall thickness gauges.

Thickness Gauge	Measurement [mm]	Order code	Contact area Ø [mm]	f [MHz]	Remarks
CL304/ CL3DL	0.13 - 5	Alpha 2A Mini DFR	5	20	Rechangeable delay line 118-440-043
	0.18 - 25	CLF4	7.5	15	Rechangeable delay line CLFV1
	1.6 - 250	CLF5	9.5	10	
	1.6 - 380	CA211A	19	5	
	1.6 - 25	CA215	13	5	
	0.125 - ...	Alpha DFR-P	7.5	22	For measurements on plastics, delay line DFR-PV1
CL304	3-500	CA214	15	5	For materials showing strong sound attenuation, with rechangeable protective membrane and delay line on request.

For measurements at temperatures above 60 °C there are special delay lines.

Probes CA211A, Alpha 2A MiniDFR, CLF4 and CLF5

Probes DA305, DA301, DA317, DA312

Thickness Ganges	Range [mm]	Short code [Order code]	Contact face Ø [mm]	f [MHz]	Temperature [° C]	Cable	Remarks
DM4...	1.2 - 200 0.6 - 50	DA301 DA312	12.5 7.5	5 10	-20 ÷ 60 -20 ÷ 60	DA231 DA235	
	5 - 300 7 - 60	DA303 DA0,8G	17 29	2 0.8	-20 ÷ 60 -10 ÷ 60	DA231 DA231	
	2 - 80 1.0 - 15 5 - 150 4 - 60 1 - 50	DA317 DA319 DA315 DA305 HT400	12.5 7.5 17 16 13	5 10 2 5 5	25 ÷ 300 25 ÷ 300 25 ÷ 300 10 ÷ 600 -10 ÷ 540	DA233 DA233 DA233 DA235 KBA535	short-time contact
	0.6 - 20 0.7 - 12	DA312B11 DA312B16	4 3	10 10	-20 ÷ 60 -20 ÷ 60	fixed 1.5m Cable	
		Dialogtechnique					
	1.2 - 200 0.6 - 50	DA401 DA412	12.5 7.5	5 10	-10 ÷ 60 -10 ÷ 60	DA231 DA235	
	5 - 300 7 - 60	DA403 DA408	17 29	2 0.8	-10 ÷ 60 -10 ÷ 60	DA231 DA231	

Transverse wave straight beam probes

These probes transmit transverse waves vertically into the test object. An extremely high viscosity couplant is required. The probes are mainly used to determine the elastic properties (e.g. modulus of elasticity) of materials.

Type	f [MHz]	a x b [mm]	EB [mm]	Probe cable
B1Y	1	18 x 18	10	PKLL2
B2Y	2	18 x 18	6	PKLL2
MB2Y	2	9 x 9	6	MPKL2
MB4Y	4	9 x 9	4	MPKL2
K2NY	2	18 Ø	4	MPKM2
K4KY	4	9 Ø	3	MPKM2

Low frequency straight beam probes

There are probes with frequencies below 0.5 MHz for testing strong sound absorbing materials such as ceramic ladle plugs, natural stones, oven stones, wood, rubber and cement, below 0.1 MHz in through transmission with transmitter probe and receiver probe. The USD10NF is especially suited for such tasks.

Type	f [MHz]	Contact face	Probe cable
K0,25G	0,25	45 mm Ø	PKTL2
K0,1G	0,1	45 mm Ø	PKTL2
B 0,05 N	0,05	30 mm Ø	PKTL2
B 0,05 NN	0,05	5 mm Ø	PKTL2
G 0,2 R1	0,2	60 mm Ø	PKTL2
B 0,05 US	0,05	56 mm Ø	PKTL2
B 0,05 UE	0,05	56 mm Ø	PKTL2

Probes for testing spot welds

15 MHz and 20 MHz straight beam probes with a water delay path and soft protective membrane for optimum coupling to the surface of the spot weld. A certain element diameter is necessary according to the diameter of the weld nugget. The code for the probes is G15MN x.x and G20MN x.x (x.x = the element diameter). For more details ask for leaflet GK 39.

Probes for testing at high temperatures

In addition to the wall thickness probes described on page 28 there are also probes which can be used for ultrasonic testing at high temperatures. The straight beam TR probes, SEB.KV, withstand constant temperatures of 200 °C and can be used up to temperatures of 600 °C when pauses are made, between brief contacts with the hot surface, for cooling. The angle beam probes W..B.GV can withstand constant temperatures of 200 °C and can be used in intermittent operation up to about 350 °C.

Type	f [MHz]	β [degrees]	a x b[mm]	F / N [mm]	AB [mm]
SEB2KV	2	0	10	15	3 - 250
SEB4KV	4	0	10	18	2 - 750
W45B2GV	2	45	10 x 14	35	7 - 300
W60B2GV	2	60	10 x 14	35	7 - 280
W70B2GV	2	70	10 x 14	35	7 - 260
W45B4GV	4	45	10 x 14	70	5 - 450
W60B4GV	4	60	10 x 14	70	5 - 425
W70B4GV	4	70	10 x 14	70	5 - 400

Required cable MPKL2-V (two for SEB.KV). Contact surface: 12 Ø or 25 x 36 mm

Testing machine probes

Special applications

Probes for testing machines must meet special requirements regarding watertightness at changing temperatures and rudgedness. In order to achieve a high test speed and test reliability a number of elements are frequently contained in one housing.
For testing in the automobile and aerospace industries, immersion probes are mainly used. These are described on pages 22 - 27.

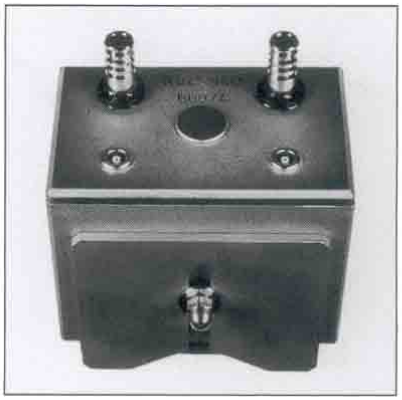
The following probes have been well proven in other applications [1]:

Type	Technical data	Application	
SEB2T, SEB2T0°	TR probe, 2 MHz, 24 mm Ø	Testing plates billets	
SEB4T, SEB4T0°	TR probe, 4 MHz, 24 mm Ø		
MSEB4T, MSEB4T0°	TR probe, 4 MHz, 13 mm Ø		
SEZ4R10R	TR wide beam, 4 MHz	Heavy plate testing	
SEZ2R20R0°T2	TR wide beam, 2 MHz	Billet testing	
SEZ5R40R	TR wide beam, 5 MHz		
W45Z2N	Angle beam probe 45°, 2 MHz, 8 x 9 mm	Weld testing e.g. on tubes or containers	
W45Z4N	dito 4 MHz		
W70Z2N	Angle beam probe 70°, 2 MHz, 8 x 9 mm		
W70Z4N	dito 4 MHz		
RB45-N	Angle beam probe 45°, 4 MHz, 2 transducer elements	Tube testing	
Z2N12 x 12 / 12 x	Immersion probe, 2 MHz, 12 elements 12 x 12 mm	Tube testing with multi-element probes	
Z4RM10 x 10 / 6 x	Immersion probe, 4 MHz, 6 elements 10 x 10 mm		
W45Z4RM20x18/6x	Immersion probe, 4 MHz, 6 elements 20 x 18 mm beam angle 45°		
H10MP15	Immersion probe,10MHz, 5 diam., point focus 15 mm	Arc welds	
H5KP...	Immersion probe, 5 MHz, 10 diam., -40 °C to +125 °C, up to 60 bar	Wall thickness measurements of pipelines from the inside	
NPK6	Slot probe, 6 MHz	Piston testing	
IAL-FG10.4 x 22.7,5	Wide beam probe, 10 MHz with 4 x 22 mm polymer element line-focused	Profile testing Lamination testing with wide beam	
	Immersion probes with water connector	Testing parts using the water bubbler or squirter technique	
H5KF	5 MHz element 10 mm Ø	see leaflet GK54	
H10MP15F	10 MHz element 5 mm Ø point focus 15 mm		
Z4KF	4 MHz element 10 mm Ø		
Z4NF	4 MHz element 20 mm Ø		

[1] These probes have been selected from a great number of types. Please contact us, there is also a probe suited to your application.

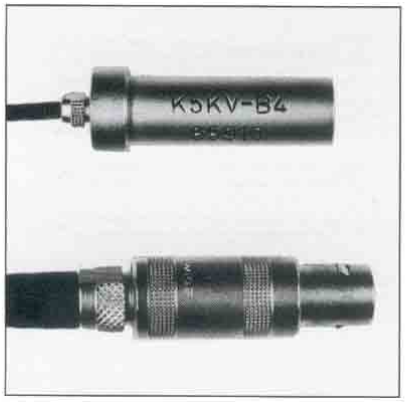
B1 K/S + B1 K/E, SEB4NW: Roller probes for dry coupling (without couplant), especially used in through-transmission for testing porous and composite materials with high sound attenuation or as TR probe.

RB45N4Q: Angle beam probe, with two elements, for testing tubes for transverse flaws in both circumferential directions in a diameter range of 60 - 400 mm. 2 MHz, element size 8 x 9 mm, angle of incidence 45°. Other frequencies and sizes can be supplied. Contact surface is matchable to the curvature of the tube. TR probes can also be supplied (SEB4RB).



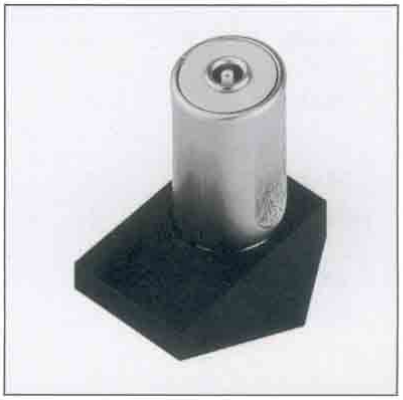
K20MN: Straight beam probe with delay line for point-to-point **wall-thickness measurement** on thin parts, measurement range approx 0.3 - 7 mm, also suitable for scanning the sound scattter from probes in complex parts (detection of interference echoes). Frequency 20 MHz, element diameter 2.5.

Z4NB5: Straight beam probe with a thread for attachment of plastic delay lines for vertical or angle beaming in axles or shafts from the front side in order to detect fatigue cracks. Frequency 4 MHz, element diameter 20 mm.



K5KVB4: Straight beam probe with heat resistant delay line for wall thickness measurement in blow moulds during the blowing process. Frequency and element size are selected according to the test conditions.

W70B2GT: Straight beam probe with special plastic wedge for angle beaming in polyethylene for detection of flaws in welds. Frequency 2 MHz, element diameter 10 mm, angle of incidence 70° or 65°. Probes for testing other materials can be delivered.



W75/75K5G22: Angle beam probe with two elements for testing metals using the tandem technique, e.g. determination of the welding penetration depth on aluminum coolers. Frequency 5 MHz, element size 8 x 9 mm, angle of incidence 75°. Other dimensioning is possible.

IW40B4: Probes for testing ceramic insulators. Frequency 4 MHz, the design is matched to the shape of the corresponding ceramic test object. For detection of disc cracks in installed parts.

This list of special probes only contains a very limited selection. We would be very interested to design a special probe for your application – possibly based on an application study performed by our application lab. For detailed information ask for our special probe catalog GP 87.

Probe cable	Length	Impedance	Plug type		Notes	
Type (order code)	[m]	[ohm]	Probe	Instrument		
CL331	2	50	Microdot	LEMO-00		
DA231	1,5	50	LEMO-00 double plug	LEMO-00 double plug		
DA232	1,5	50	LEMO-00 double plug	LEMO-00 double plug	with attenuator	
DA233	1,5	50	2x LEMO-00	LEMO-00 double plug		
DA235	1,5	50	1x Microdot 1x Microdot, large	LEMO-00 double plug		
DA 336	1,5	50	1x Microdot 1x Microdot, large	LEMO-00 double plug	with attenuator	
KBA535	1,5	50	2x Mini-LEMO	LEMO-00 double plug	with metal sheath	
KBA536	1,5	50	2x Mini-LEMO	LEMO-00 double plug		
MPKL2	2	50	LEMO-00	LEMO-1		
MPKM2	2	50	Microdot	LEMO-1		
PKBM 0,5	0,5	50	Microdot	BNC		
PKP2	2	75	LEMO-03	LEMO-1	watertight up to 60 bar	
PKI 2	2	75	UHF	LEMO-1		
PKLL2	2	75	LEMO-1	LEMO-1		
PKTL2	2	50	LEMO-1 watertight	LEMO-1	watertight up to 10 bar	
SEKG2	2	50	LEMO-00 double plug	2x LEMO-1		
SEKL2	2	50	2x LEMO-00	2x LEMO-1		
SEKM2	2	50	2x Microdot	2x LEMO-1		
SEKN2	2	50	1x Microdot 1x Microdot,large	2x LEMO-1		
VKLL5	5	75	LEMO-1 coupling	LEMO-1		

Adapter	Length	Impedance	Plug type		Notes
Type (order code)	[m]	[ohm]	Probe	Instrument	
PKLB1	0,03	75	BNC socket	LEMO-1 plug	
PKBL1	0,03	75	LEMO-1 socket	BNC plug	

Notes: The itemized cables and adapters are only a selection. We are readily prepared to make special designs tailored to your requirements.

cable connectors scale 1:1

LEMO-1

LEMO-1 watertight

LEMO-00

LEMO-00 double plug

LEMO-03

2x Mini-LEMO

Microdot large

Microdot small

UHF

PKBL1

PKLB1

Probe sets

Probe packing

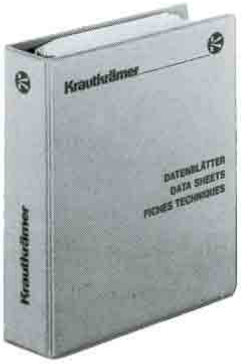
Probe set for welds PKS 4

Probe case PSK

Most of the probes are delivered in practical drawers which can be inserted into a cabinet. Our probe sets for special applications or just the case PSK are other types of storage and practical sorting.

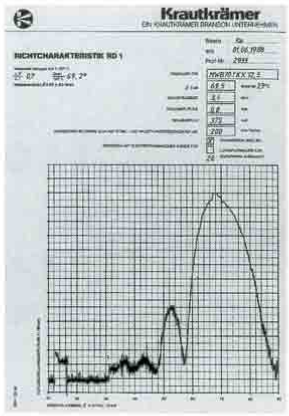
Type	Description	Probe contents
PKS 1	Coarse grain set	K0,5S; K1SM; WRY45; WRY70; WB45-1; WSY45-4, WSY70-4
PKS 2	Aircraft set	B4S; K4G; G5KB; MSEB4; K5K; CLF4; SEB10KF3; 2x MWB45-4; MWB70-4; MWB90-4
PKS 3	Steel set	B4S; SEB2; G5KB; MSEB4; MB4F; WK45-2; WK70-2; 2x MWB45-4; MWB70-4
PKS 4	Welding set	MB4S; SEB4; WB45-2; WB70-2; MWB45-2; 2x MWB45-4; MWB60-4; 2x MWB70-4
PKS 5	Casting set	B2S; SEB2; K1S; MB2S; SEB4KF8; G5KB; WB45-1; WB70-1; MWB45-2
PKS 6	Forging set	B4S; B2S; SEB2; MB4S; K2N; SEB4KF8; MB4F; WB45-2; MWB45-4; MWB70-4

Probe data sheets and certificates



Probe data sheet collection

Probe certificate PZ (E)

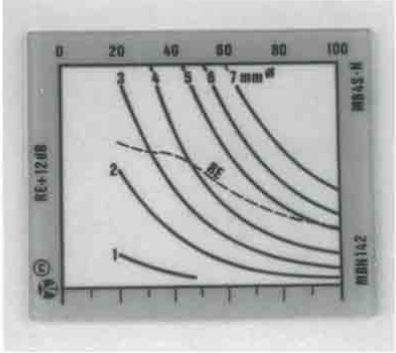


Beam profile RD1

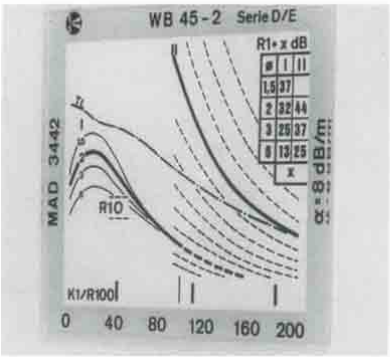
Each delivered probe is subjected to a very strict quality test which makes certain that all probes of the same type identically evaluate flaws. The corresponding probe data sheet contains proof of the data reliability. We store the data of every numbered probe for a number of years thus enabling probe certificates (PZ) to also be produced at a later date. The beam profile gives information about the sound field of a probe.

PZ(E)	Probe certificate	for an E- or F-series probe, marked with an individual probe number
PZ1	Probe certificate	for any probe, other than those of the E- or F-series
RD1	Beam profile	for an angle beam probe measured in steel
RD2	Beam profile-	for a straight beam probe measured in water

DGS scales in a file



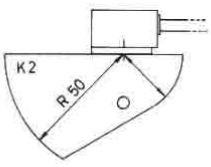
DGS scale for MB4S and USK 7

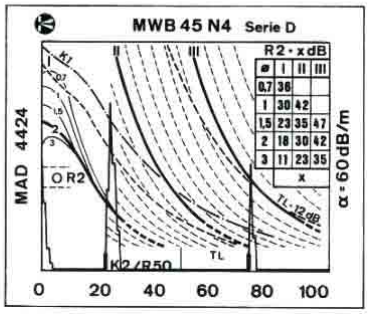


DGS scale for WB45-2 and USK 7

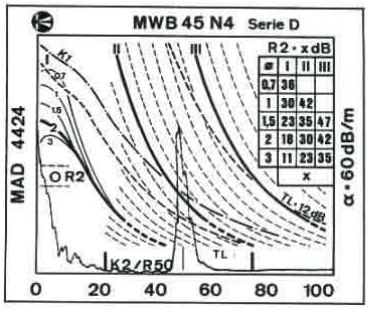
Probe type	f [MHz]	Range [mm]	Type of scale set	Remarks
B2S	2	500/1000/2000	MAN 22	Suitable for instruments:
B4S	4	250/500/1000/2000	MAN 24	USK6/USK7/USK7D USL31/USL32/USL48
MB2S/MB4S	2/4	100/200	MBN 14	
B2S/B4S	2/4	250/500/1000/2000	UM 100	Suitable for instruments:
MB2S/MB4S	2/4	100/200		USM3/USM3S
WB ** -2	2	200/500	MAD 32	Suitable for instruments:
MWB ** -2	2	100/200	MAD 42	USK6/USK7/USK7D USL31/USL32/USL48
MWB ** -4	4	100/200	MAD 44	
WB ** -2	2	200/500	UM 320 + UM 321 ++	Suitable for instruments:
MWB ** -2	2	100/200	UM 420 + UM 421 ++	USM3/USM3S
MWB ** -4	4	100/200	UM 440 + UM 441 ++	+ without sound attenuation ++ with sound attenuation

** represents the angles 45°, 60° and 70°.

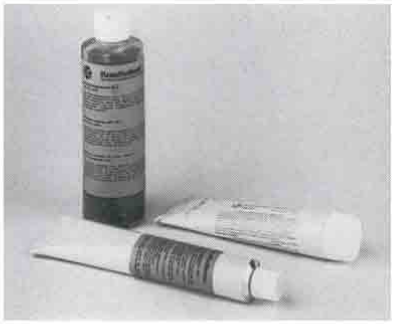




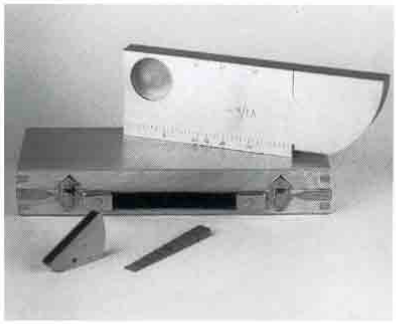
Range calibration using calibration marks on the DGS scale for the MWB45-4 and the echoes from reference block 2



Signal of a weld flaw equal to a reference reflector size 2 + 6dB



Couplants ZG-F, ZGT und ZGM



Calibration blocks V1, V2 and VW

Standard N23

Couplants are used for coupling the probe directly onto the surface of the test object. This is necessary in order to avoid air gaps occurring between probe and test object which would stop transmission of the sound pulse. Basically, all fluids and pastes can be used as couplants. However, it has been proven that special couplants have clear advantages.
At high surface temperatures it is necessary to use special pastes.

If couplant is unsuitable or prohibited, it is possible to use dry coupling in some cases. For this purpose couplant caps are used with standard probes – immersion probes can also be used – or one can apply special roller probes which roll over the test object on wheels.

Calibration blocks produce echo indications which are used for range calibration and gain adjustment of the instrument. They are very often used as a reference for evaluation of echo indications from possible flaws.

Type	Description	Remarks
ZG-F (2.5 kg)	Universal coupling paste	Thixotrope paste, non-drip, washable, non-corrosive, reaction neutral; temperature range: -20 °C to +100 °C; in a 2.5 kg container. Safety data sheet according to 91/155/EEC is available.
ZG-F (5 bottles)	Universal coupling paste	The same as above, but in batches of 5 bottles each containing 200 cm^3, can be refilled. Safety data sheet according to 91/155/EEC is available.
ZGT	Multigrade coupling paste	Paste with medium viscosity, water resistant, non-corrosive, universally applicable; temperature range: -30 °C to +250 °C; in 100 g tubes. Safety data sheet according to 91/155/EEC is available.
ZGM	High temperature coupling paste	Paste with a high viscosity, with solid filling, specially made for wall thickness measurements on hot parts; temperature range: +200 °C to +600 °C; in 100 g tubes.
K1	Calibration block no. 1 (DIN EN 12223)	Large calibration block made of fine grain steel for range adjustment with angle beam probes as well as checking the angle of incidence.
K2	Calibration block no. 2 (DIN EN ISO 27963)	Small calibration block made of fine grain steel for range adjustment with small angle beam probes as well as checking the angle of incidence.
VW	Stepped calibration block	Calibration block made of fine grain steel with steps ranging from 1 mm to 8 mm. Used for range calibration with small TR probes.
N23 N30	Standards	For direct connection to an ultrasonic flaw detector. Produces multiple echoes at distances of 50 mm in steel; also enables instrument gain checks to be made over a long period.

Sound beam shapes

Frequency, element shape, sound velocity and sound attenuation all determine the shape of the probe's sound beam. The sound field near the element is almost the same size as the element, at the near field distance it has its smallest size, and as the distance becomes greater it widens.
Exact details are contained in our beam profiles and also in the data sheets.

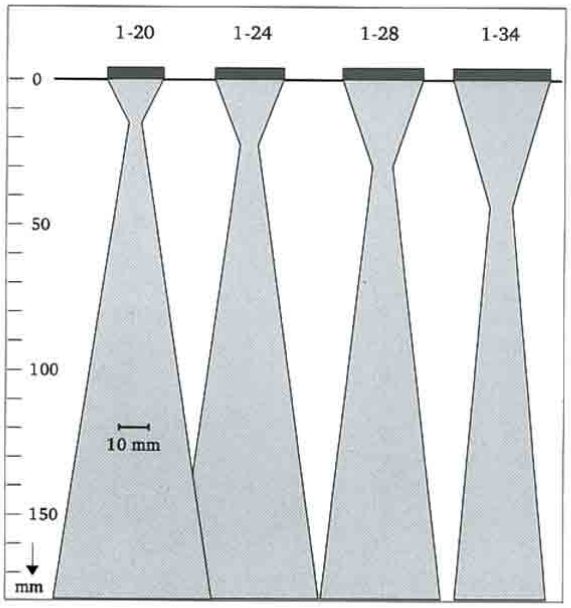
In order to help you in selecting probes quickly we have, in the following, shown the sound beam limits for a 6 dB drop of the echo amplitude in steel (C_L = 5920 m/s for straight beam probes and C_T = 3255 m/s for angle beam probes).
The zero point in the graphics corresponds to the sound exit point on the contact surface of the probe.

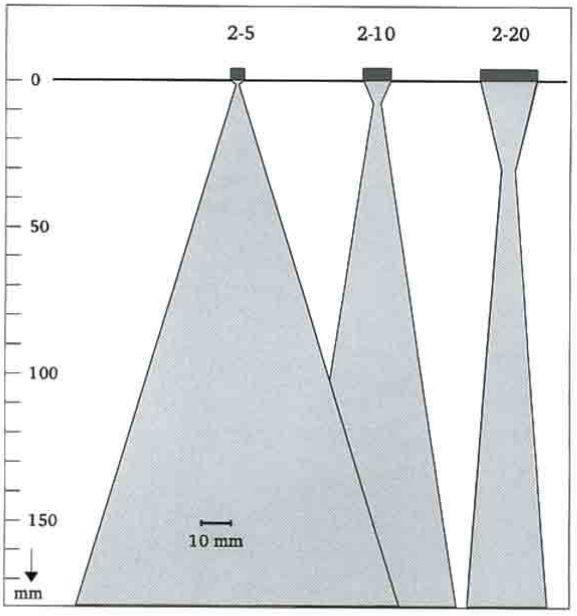
With immersion probes it is assumed that the surface of the test object is positioned in water at the near field length distance.

It is to be noted that with TR probes, when the sound field is vertical to the indicated plane it has another shape.
With all sound field data, the effect of sound attenuation has not been taken into account.

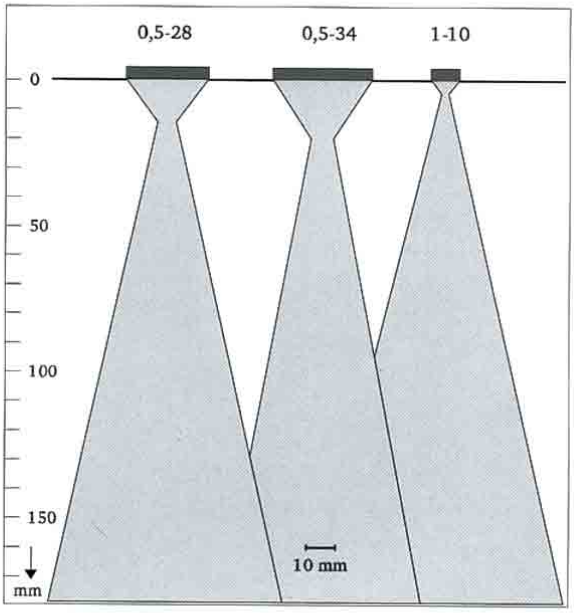
Due to the vast range of probes, only the beam shapes of the most used probes are given. However, we will gladly supply the beam profiles of the sound field of a special probe.

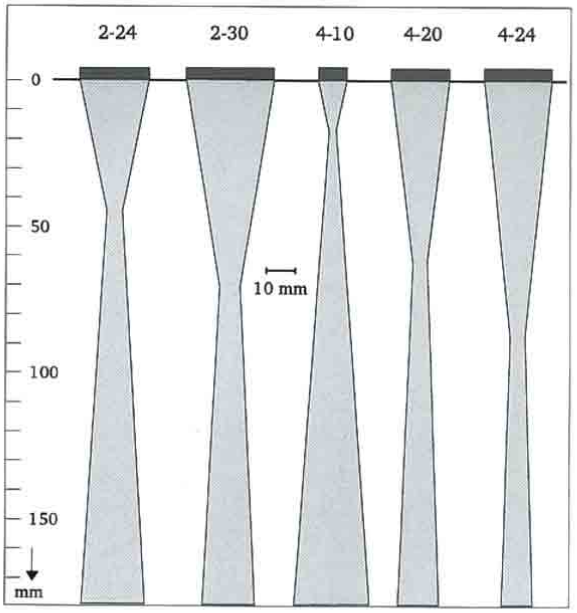
The code of the sound beam shapes corresponds to the beam shape number in the probe tables.

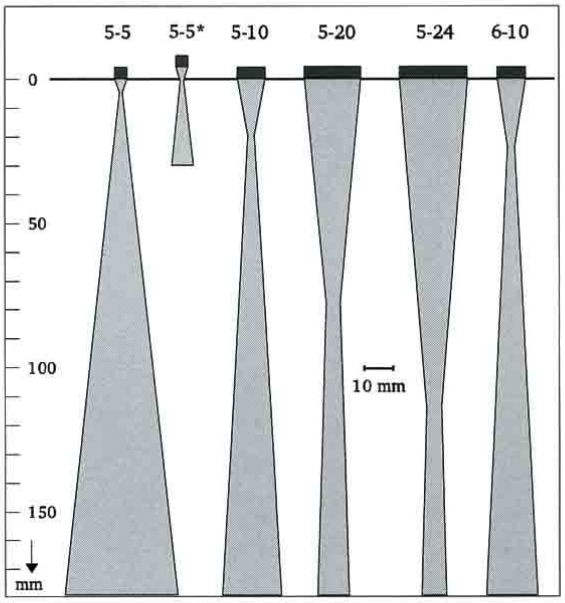


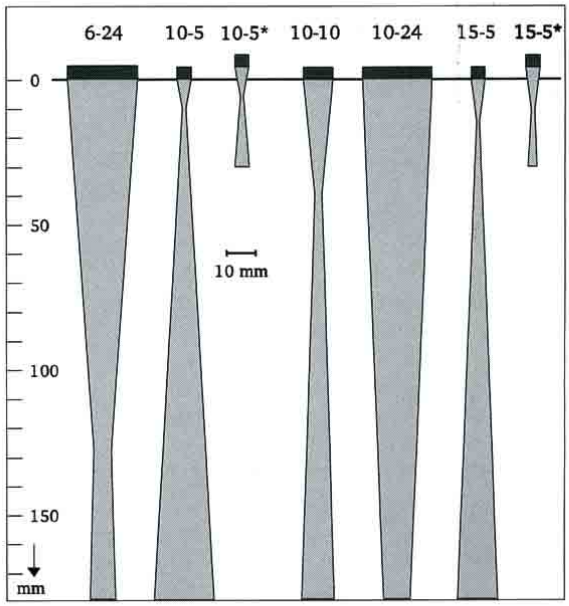


Straight beam probes

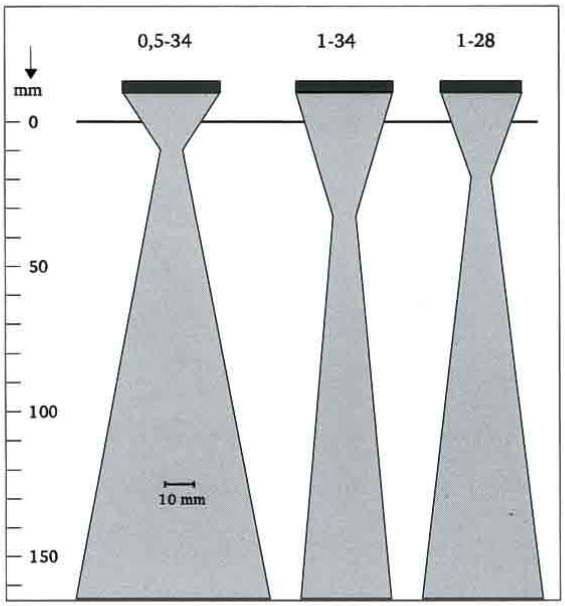


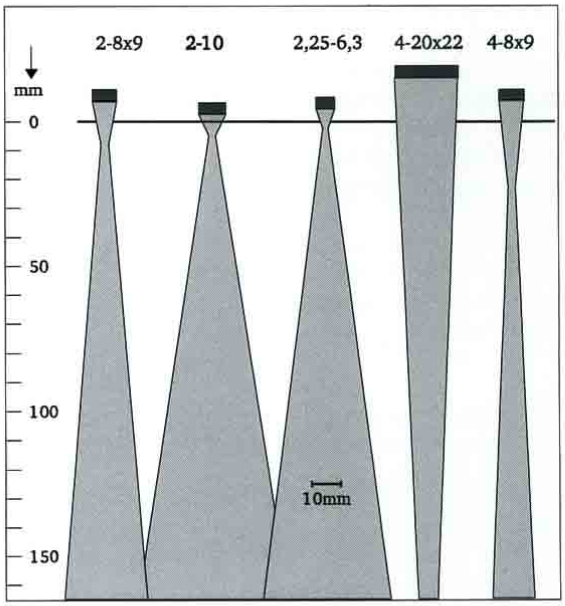


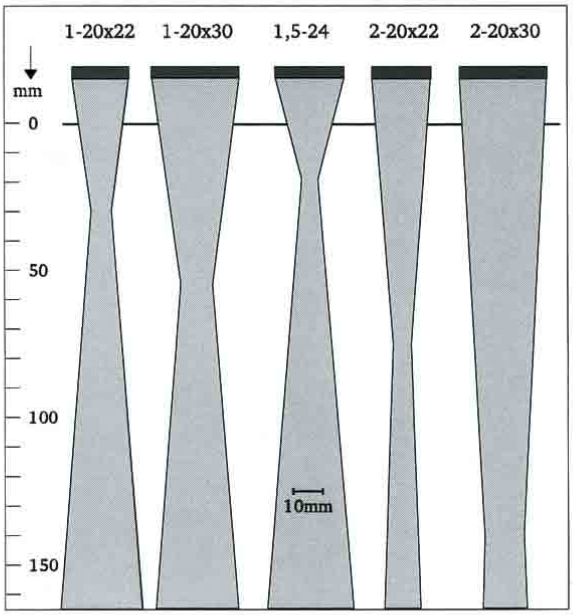


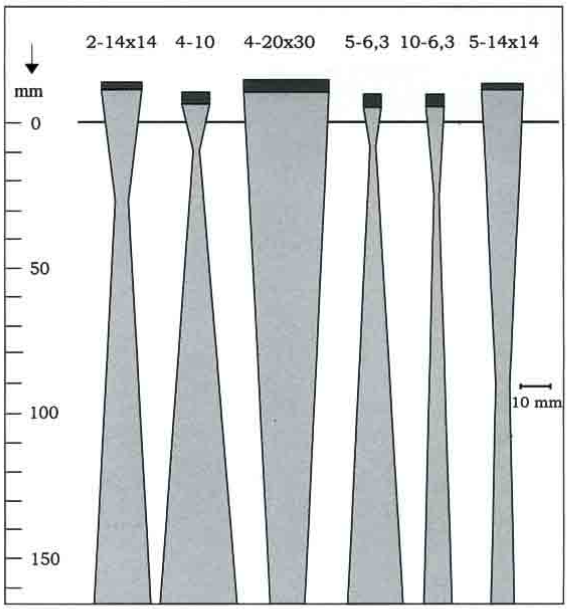


Angle beam probes (with one element; TR angle beam probes. See under TR Probes)

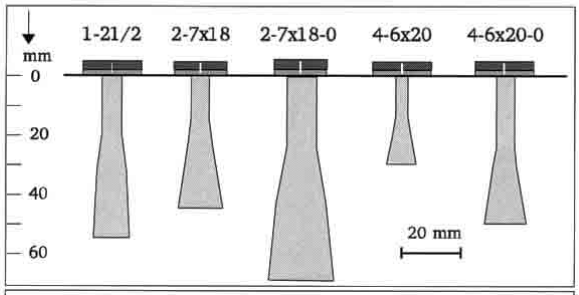


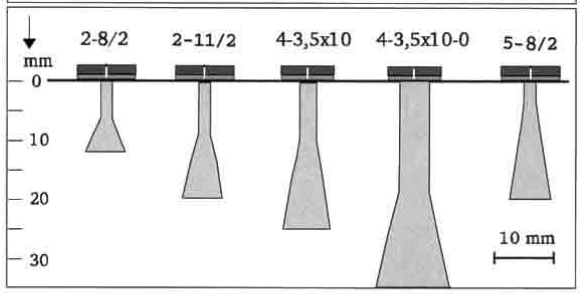


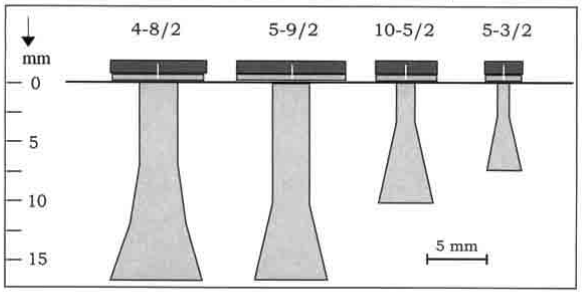


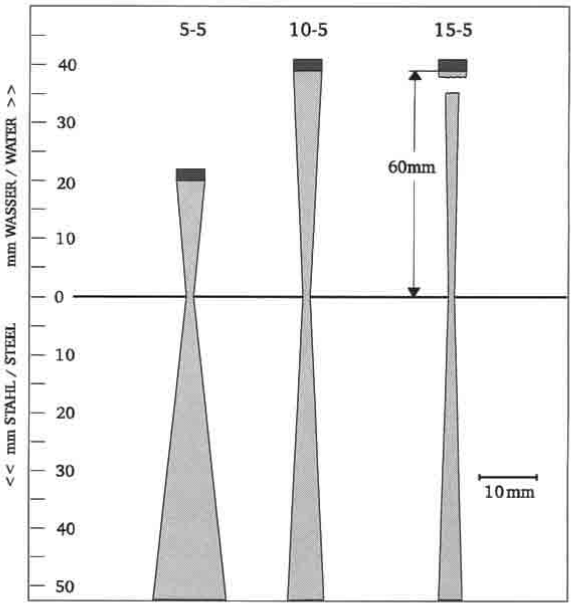


TR probes

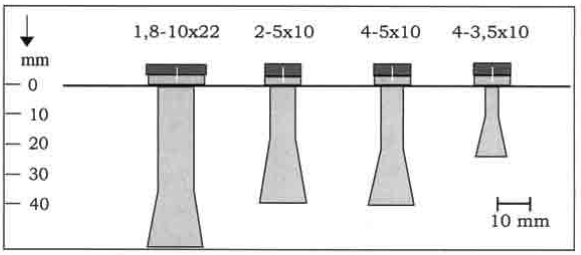


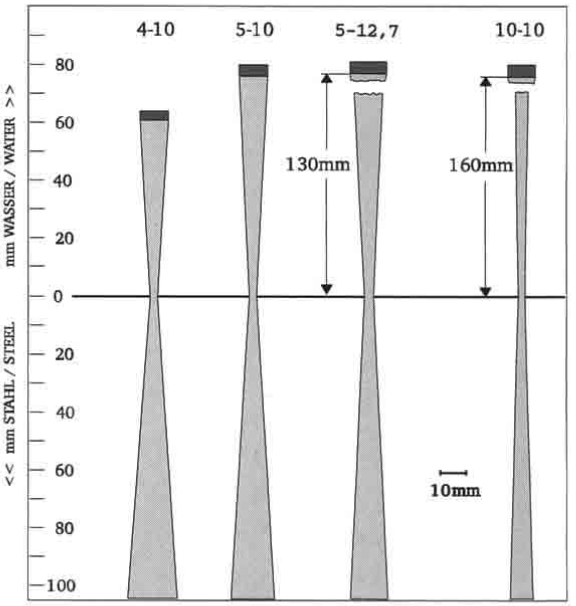






TR angle beam probes





Immersion probes