USM 35
UNIVERSAL ULTRASONIC FLAW DETECTOR

GENERAL DESCRIPTION

Universal Ultrasonic Flaw Detector with Bright Color Display and protected according to IP 66

A new design provides an improved environmental protection for everyday outdoor use.

Protection - A very sturdy housing has been designed for the USM 35X. We achieve a higher environmental protection and have improved the durability of this flaw detector for harsh use. The IP level corresponds to the degree of protection provided by the housing according to the IEC 529:1989. IP 66 means that the instrument is totally protected, i.e. dust and water cannot penetrate into the instrument, even with heavy rain, sea spray and powerful jets of water coming from any direction.

Fast and bright color screen - Color brings you many additional benefits in your daily inspection job:

- Color display of monitor gates and curves (DAC, TCG, DGS) for direct recognition
- Messages and alarms in red characters for increased attention
- Use of color to display references (A-scan) to make comparisions easy
- Patented color coded display of legs for angle beam inspection of welds
- Colorized envelope curve display for echo dynamic analysis
- Multicolor screen combinations for operator preferences and to select best suitable color scheme according to the working environment.
- VGA output to connect the instrument to an external monitor or video projector

New readings - Three new additional readings can be displayed for measurements taken with gates:

- dB-difference to reference gain with DAC / TCG (in the USM 35X DAC and USM 35X S)
- DGS reference gain (in the USM 35X S)
- Flaw classification according to JIS Z3060 (in the USM 35X DAC and USM 35X S)

Other benefits

We have also implemented innovations from the computer industry in the battery concept to make your daily work easier: the rechargeable lithium-ion battery pack enables you to carry out your inspections for at least 14 hours. Charging is easily carried out internally within the instrument over night just by connecting the power pack/battery charger to the USM 35X. You can also insert 6 normal C-cells should the battery pack be drained and if no A/C power connection is available.

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Making technology work for you!

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TECHNICAL SPECIFICATIONS

Calibration ranges

Min.: 0 to 0.5 mm +10 % (steel),
0 to 0.02" +10 % (steel)

Max: 0 to 9,999 mm +10 % (steel),
0 to 393" +10 % (steel) within the frequency range from 0.2 to 1 MHz / 0.5 to 4 MHz
0 to 1,420 mm +10% (steel),
0 to 56" +10 % (steel) within the frequency range from 0.8 to 8 MHz / 2 to 20 MHz

Sound velocity

1,000 to 15,000 m/s, 40 to 600 inch/ms variable in steps of 1 m/s, 0.1 inch/ms and fixed programmed values

Display delay

From -10 to 1,000 mm, -0.3 to 40" (340 µs)

Probe delay

0 to 200 µs

Auto calibration

Measurement and sensing of sound velocity and probe delay using two known calibration echoes (2-point calibration)

Pulse intensity

220 pF, 1 nF

Damping

50 ohms, 500 ohms (1,000 ohms in TR mode)

Pulse repetition frequency

4 to 1,000 Hz, variable in 30 steps

Frequency ranges (-3 dB)

0.2 to 1 MHz / 0.5 to 4 MHz / 0.8 to 8 MHz / 2 to 20 MHz

Gain

0 to 110 dB, variable in steps

Gain steps

0.5 / 1 / 2 / 6 / 12 dB (or user-adjustable), step 0 is locked

Fine gain

4 dB, continuously variable in 40 steps

Rectification

Full-wave, negative and positive half-wave, RF mode

Reject

Linear, 0 to 80 % screen height
Variable in steps of 1 %

Monitor gates

2 independent gates in color bar mode, start and width variable over the entire calibration range, response threshold of 10 to 90 % screen height variable in steps of 1 % (coincidence and anti-coincidence), alarm signal via LED and connectable external horn, Gate A switchable as interface gate for Gate B, gate magnifier (zooming of gate range over the entire display range)

Sound path measurement

Digital display of sound path (projection distance, depth) between initial pulse and the first echo in the gate, or between the echoes in the two gates, measurement always at the intersection point with the echo flank or echo peak

Measurement resolution

0.01 mm within a range up to 99.99 mm
0.1 mm within a range from 100 to 999.9 mm
1 mm above 1,000 mm,
0.001" within a range up to 9.999"
0.01" above 10"
With evaluation in the frozen A-scan: 0.5 % of the calibration range sensing

Amplitude display

In % screen height
USM 35X DAC: additionally in dB above DAC or TCG
USM 35X S: additionally in dB above DGS curve or ERS

Displayed reading

Sound path, (reduced) projection distance, depth, amplitude for every gate, user-configurable at four positions of measurement line and of the zoomed display in the A-scan

A-scan functions

Manual or automatic A-scan freeze,
A-scan comparison, echo dynamics (envelope), peak echo storage

Color functions

Patented color-coded display of flaws in angle sensing, adaptation of background color to the light conditions of test environment, color display of monitor gates and of registration curves (DAC, TCG, DGS) for direct recognition, messages and alarms in red characters

DAC / TCG (Option)

Only USM 35X DAC and USM 35X S: Distance-Amplitude Curves (DAC) or TCG line (TCG) with a maximum of 10 reference echoes,
4 other curves or lines can be displayed with variable dB intervals. JIS DAC can be selected in order to allow inspection according to JIS Z 3060-2002 (Japanese Inspection Standard). Automatic gain control during DAC recording.

DGS (Option)

Only USM 35X S: DGS curves for single-element and dual-element probes (B1S, B2S, B4S, MB2S, MB4S, MB5S, WB...-1, WB...-2, SWB...-2, SWB...-5, MWB...-2, MWB...-4, SEB and MSEB) and for all materials, sound attenuation and transfer loss correction, 4 other curves can be displayed with variable dB intervals

Display size / resolution

116 mm x 87 mm, 4.6" x 3.4" (W x H)
320 x 240 pixels

A-scan size / resolution

116 mm x 80 mm, 4.6" x 3.2"
320 x 220 pixels (zoom)

Units of measurement

mm, inch

Data memory

800 instrument setups or reports, including A-Scans can be stored, recalled, printed or exported to a computer

Direct documentation

Display screen contents, report including A-scan, reading, function list (parameter dump)

Printer driver

HP DeskJet, HP LaserJet, HP OJ 1200 (DeskJet HP LJ 1012 (LaserJet), EPSON FX/LX, SEIKO DPU

RS 232 interface

9-pin DSUB, bi-directional, 300 - 57,600 baud
An USB adapter cable can be provided to connect the USM 35X to a computer that does not have RS 232 port

Input/Output

8-way Lemo-1 socket (trigger output, gate alarm, test data release)
Additional analog output for amplitude or sound path in selected gate

VGA output

10-way Lemo-1 socket for the connection of an external display screen or beamer

Probe connections

2 x Lemo 1 or BNC

Dialog languages

German, English, French, Italian, Portuguese, Spanish, Danish, Swedish, Norwegian, Finnish, Czech, Slovenian, Romanian, Dutch, Croatian, Hungarian, Russian, Polish, Slovakian, Japanese

Battery operation

Li-Ion battery or 6 C-cells (NiCad, NiMH or AlMn), operating time: 14 hours with Li-Ion battery (6.6 Ah), approx. 3 hours with NiMH cells (3 Ah), battery charge check by an icon in the measurement line

Power pack/ battery charger operation

Via an external power supply (85 to 265 VAC)
Operating voltage: 6 to 12 VDC
Current consumption: max. 9 W, depending on the setting

Weight

2.2 kg, 4.9 lbs., including batteries

Size

177 mm x 255 mm x 100 mm,
7.0" x 10" x 3.9" (H x W x D)

Environmental

Protection class: IP 66
Shock proof acc. to DIN IEC 68: 6 ms, 60 g, 3 shocks per orientation
Vibration proof acc. to DIN IEC 68: 0 - 150 Hz, 2 g, 20 cycles per orientation
Operating temperature: 0° to 60°C; 32° to 140°F (-10°C; 14°F on special request)
Storage temperature: -20° to 60°C; 4° to 140°F

Data Logger Option

Memory capacity

5,000 readings, 500 A-scans for the readings, 100 jobs, 30 comment texts per job

Storable readings

Sound paths and sound path differences of all gates, amplitudes (% SH, dB-to-threshold, dB-to-curve, %-to-curve, ERS), alarms of all gates or tolerance monitor

Lines / columns

Number of lines: maximum 5,000 (Linear file with one column), numerical indexing
Number of columns: maximum 26, indexing: A, ..., Z

Tolerance monitor

Lower and upper acceptance level with monitor function

Minimum reading capture

Storage of the minimum value measured in continuous scanning, display of the value 3 seconds after uncoupling the probe

Monitor gate

1 additional independent gate in color bar mode

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