UDS2-77 SC

OKOndt GROUP

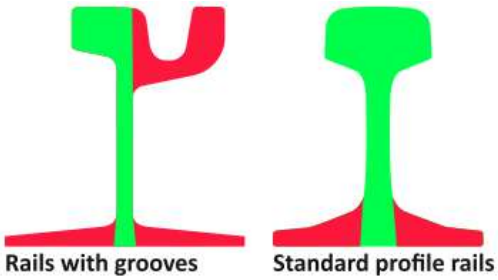
NDT SUPPLY.COM
7952 Nieman Road, Lenexa, KS 66214-1560 USA
Phone: 913-685-0675, Fax: 913-685-1125
www.ndtsupply.com, sales@ndtsupply.com

Ultrasonic Flaw Detector for tram rail

UDS2-77 SC Ultrasonic Flaw Detector for tram rail

Ultrasonic single rail flaw detector UDS2-77 SC is a hand-push trolley designed for autonomous inspection of one tramline with a “grooved” type rails and standard profile rails.

Module structure: a frame on rollers, a central electronic unit, multiplexer units, 100% high quality testing of the rail is provided at a scanning speed of up to 5 km/h (3 mp/h) which corresponds to the average walking speed of a person.

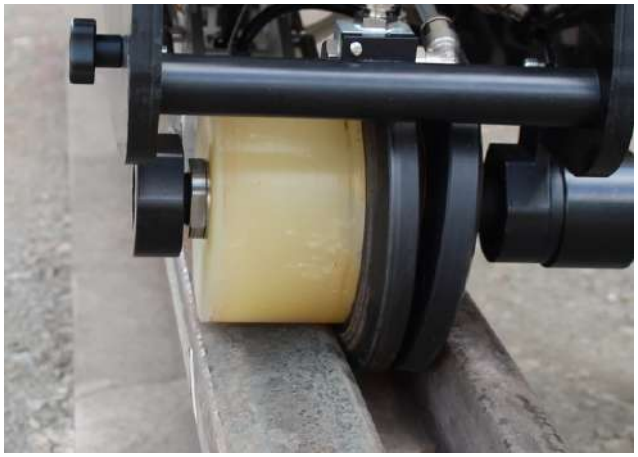


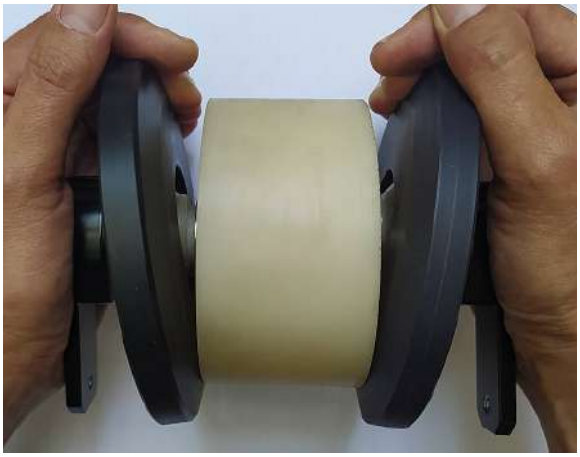
The rail flaw detector deploys a unique scanning scheme that allows you to test the entire section of the rail, except for the foot flanges and the checkrail, using the pulse echo, echo-shadow and echo-image methods.

Some original technical solutions in the design of the UDS2-77 SC alignment and adjustment systems enable testing of many rails of the same type differing in geometry and dimensions – with a single flaw detector.

- Modular design of the trolley consists of a support frame with adaptive rollers; electronic unit for testing and visualization; multichannel unit; battery pack; couplant (water) tank; probe units; suspension mechanism of the probe units to bring them into operation/transportation position; encoder.
- Position of epy electronic unit for testing and visualization can be adjusted along three axes.
- Probe unit (slide or roller) is transversely positioned in relation to a rail with the help of a dedicated testing device.
- Probe unit can be centered using adaptive rollers.
- Suspension mechanism of the slide probe unit ensures a stable acoustic coupling.
- The electronic equipment of the flaw detector is resistant to moisture, dust and corrosion. The protection class is not less than IP54 according to EN 60529.
- The trolley is made of lightweight but rigid composite materials, bringing the total weight of the device to not more than 20.5 kg/45 lb (without water and GPS/Wi-Fi module). The total weight of the flaw detector with the couplant and the GPS/Wi-Fi module is not more than 26.5 kg (58.5 lb).

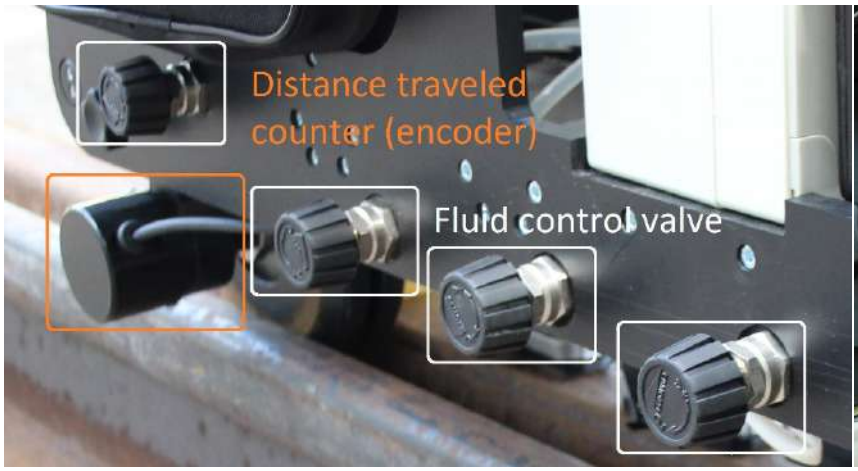
The support rollers for the grooved rails and tram rails of a standard profile have dynamic adaptive elements in design that always ensures positioning of the scanning unit initial adjustment selected by the operator during a subsequent testing.

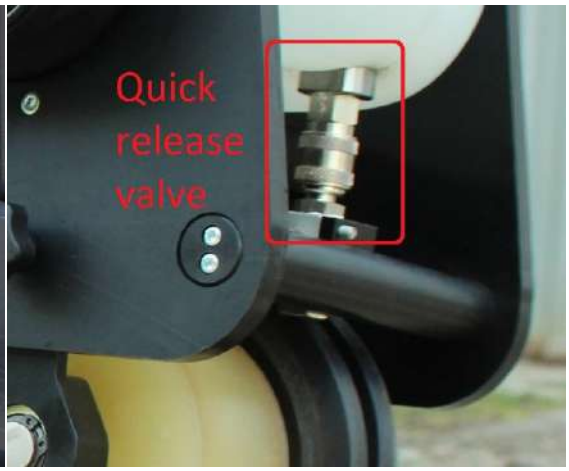




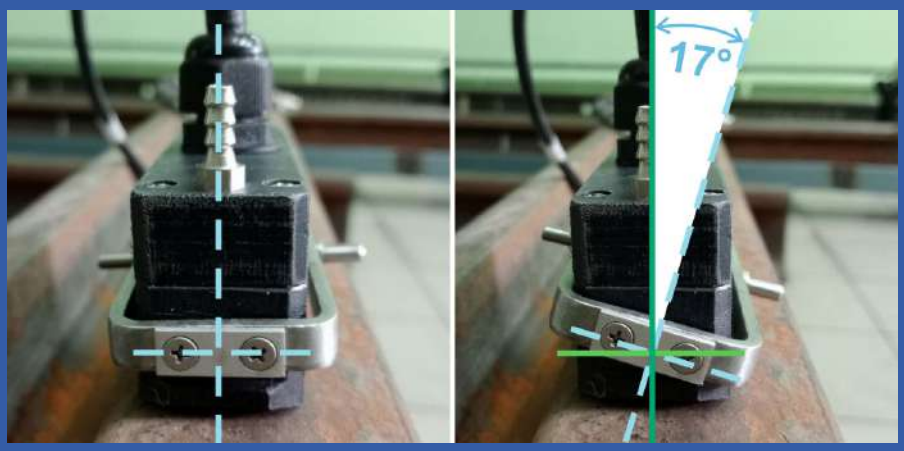
Position of the scanning units on the rail head surface has a transverse adjustment. The transverse adjustment ensures the setting of the scanning units for successful ultrasonic testing of rails of any dimension and wear rate (permissible by the standards).

Each probe unit has its own (independent) contact liquid system with a check valve for liquid. For quick and easy couplant refilling, the tank can be unbolted and installed without liquid loss thanks to a quick-release valve with automatic safety lock. The average liquid consumption is 1 liter per 1 kilometer (0.42 gal per mile) of testing.





UDS2-77 SC Ultrasonic Flaw Detector for tram rail

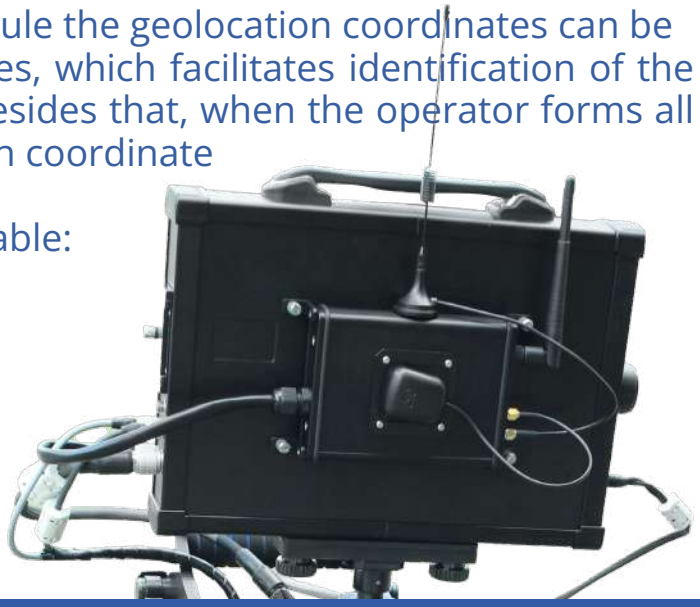


Each probe unit has its own (independent) suspension system and transverse angular degrees of freedom ensuring constant acoustic coupling when the flaw detector deviates from the rail vertically within 17 degrees both to the left and to the right.

Probe units are protected against wear out.

Additionally, using a GPS/Wi-Fi module the geolocation coordinates can be recorded along with the track coordinates, which facilitates identification of the defective section of the railroad track. Besides that, when the operator forms all available types of reports, the geolocation coordinate is automatically entered into the reports.

In total, 7 types of reports are available: 3 in-process reports at the detection site using a flaw detector and 4 types of reports in the post-processing mode using specialized pre-installed software “RailInspector”.



Key features

- Scanning the rail in one pass in one direction.
- Detection of artificial reflectors in the form of flat-bottom holes and cylindrical holes according to EN 16729-1.
- The sounding step of the rail at a testing speed of up to 5 km/h (3 mp/h) is no more than 2.5 mm (0,1 in).
- Representation of test results in the form of A-scan, multi-A-scan, B-scan for all channels.
- Real-time display of test results in the form of B-scan.
- Data recording and saving (operator’s name, line, direction, track number, left/right position, initial track coordinate, date, time, final track coordinate).
- Screenshot saving (PrintScreen).
- Saving the test results in the form of data array (B-scan) to the internal memory.
- Use of USB flash drive for transferring the test results to a PC.
- Saving the track coordinate (Encoder) and global coordinate (GPS).
- Availability of measuring gates in A-scan & B-scan modes.
- Post-viewing of the test result on the flaw detector with the possibility to measure conditional sizes of defects.
- Possibility to put the track markers (e.g. “Bridge”, “Crossing”, “Bolt hole”, etc.).
- Signaling about the presence of defects: sound, light, visual, indication of the set testing sensitivity values, defect coordinates, current track coordinate – digitally on the screen built into the flaw detector.

The flaw detector provides detection of internal defects in tram rails which correspond to the following codes according to IRS 70712:2018 (UIC 712 R):

- HORIZONTAL CRACKING OF THE RAIL HEAD – code 112 (0°probe – pulse echo and echo-image technique);
- VERTICAL CRACKING OF THE RAIL HEAD – code 113 (0° probe – pulse echo and echo-image technique, and 45°probe – pulse echo technique, in case of the crack location in the web projection);
- SHELLING OF RUNNING SURFACE – code 122 (0° probe – pulse echo technique);
- HORIZONTAL CRACKING AT THE WEB-HEAD FILLET RADIUS – code 1321(2321) (0° probe – pulse echo and echo-image technique);
- HORIZONTAL CRACKING AT THE WEB-FOOT FILLET RADIUS – code 1322 (2322) (0° probe – pulse echo and echo-image technique);
- LONGITUDINAL VERTICAL CRACKING (PIPING) – code 133 (233) (0° probe – pulse echo and echo-image technique, 45° probe – pulse echo technique);
- STAR-CRACKING OF FISHBOLT HOLES – code 135 (235) (0°probe – pulse echo and echo-image technique, 45° probe – pulse echo technique);
- DIAGONAL CRACKING AWAY FROM ANY HOLE – code 236 (0°probe – 45°probe);
- PROGRESSIVE TRANSVERSE CRACKING (KIDNEY-SHAPED FATIGUE CRACK) – code 211 (70° probe, 55° probe – pulse echo and echo-mirror technique 'Rhomb');
- HORIZONTAL CRACKING – code 212 (0° probe – pulse echo and echo-image technique, 45° probe – pulse echo technique);
- LONGITUDINAL VERTICAL CRACK – code 213 (0° probe, pulse echo and echo-image technique, 45°probe – pulse echo technique, in case of the crack location in the web projection);
- SHELLING OF THE RUNNING SURFACE – code 2221 (0° probe – pulse echo and echo-image technique);
- SHELLING OF THE GAUGE CORNER – code 2222 (55°probe – pulse echo technique);
- HEAD CHECKING / FISSURING / SCALING AT THE GAUGE CORNER – code 2223 (55° probe – pulse echo technique, 70° probe, displaced into the gauge face side)
- ISOLATED WHEEL BURN – code 2251 (0° probe, 55° probe – echo-mirror technique 'Rhomb');
- REPEATED WHEEL BURNS – code 2252 (0°probe, 55° probe – echo-mirror technique 'Rhomb');
- SQUAT / CRACKING AND LOCAL DEPRESSION OF THE RUNNING SURFACE – code 227 (0 probe, 55° probe – echo-mirror technique 'Rhomb', 70°probe);
- LONGITUDINAL VERTICAL CRACKING – code 253 (0° probe – echo-image technique, in case of the crack location in the web projection);
- CORROSION – code 254.2 (45° probe – pulse echo technique);
- FAULTY MACHINING – code 302 (70°probe, 55° probe – pulse echo, echo-mirror technique);
- TRANSVERSE CRACKING OF THE PROFILE – code 411 (421, 431) (70°probe, 55° probe – pulse echo, echo-mirror technique);
- HORIZONTAL CRACKING OF THE WEB – code 412 (422, 432) (0° probe, 45°probe);
- TRANSVERSE CRACKING OF THE RAIL HEAD – code 471 (70°probe, 58° probe – pulse echo, echo-mirror technique, 45°probe);
- DETACHMENT OR SHELLING OF THE RESURFACED PORTION – code 472 (0°probe);
- TRANSVERSE CRACKING UNDER ELECTRICAL CONNECTION – code 481 (0°probe, 70°probe, 58° probe – pulse echo, echo-mirror technique, 45° probe).

Functionality of the ultrasonic electronic equipment of a single rail flaw detector UDS2-77 SC

1. ADC sampling rate – at least 60 MHz.
   Online-mode recording of the testing results for at least 50 km (30 mile) of the traveled distance.
2. Display of the testing results in the form of A-scan and B-scan in real time in the following modes:
   - Simultaneous display of testing results in the form of A-scan and B-scan on one selected channel.
   - Simultaneous display of testing results as a B-scan on all channels.
   - Display of testing results in the form of A-scan by the selected channel.
   - Displaying the testing results as a multi-A-scan.
3. Testing registration mode which includes filling in the following fields:
   - Date and time of testing (saved automatically when initializing testing results).
   - Line number (filled in manually by the operator or selected from the list).
   - Rail (selected manually by the operator).
   - Track number (name) (filled in manually by the operator or selected from the list).
   - Number (name) of the operator (filled in manually by the operator or selected from the list).
   - Number of the flaw detector (saved automatically).
   - Gain of each ultrasound channel (saved automatically).
   - testing direction (selected manually by the operator).
   - Rail: left/right.
   - Basic data of the defect description: line number, track number, track (or global) coordinates of the defect, type of defect according to the “UIC 712 R” catalog.
4. The time of continuous operation of the flaw detector from a fully charged battery is at least 12 hours.
5. Availability of two gates with selection of ADS operating modes (for Echo or EIT methods).
6. It is possible to disable/enable the sound alarm for each gate separately.
7. Availability of sound and visual (LED and segmental on-screen) signaling when the threshold level signal is crossed.
8. Ability to adjust gain in the range of 0 to 80 dB.
9. Ability to adjust gain in steps of 0.5, 1, 10 dB.

It is constructing the DAC curve separately for each ultrasound channel.

10. The dynamic range of HF is not less than 70 dB.
11. The number of TCG points is at least 14.
12. Presence of a screen (LCD) 10” with high resolution for high-quality display of testing results in the form of B-scan with color amplitude gradation.
13. The presence of a sun-protective hood during the monitoring in the sunny weather.
14. The flaw detector during operation is resistant to the impact of the following climatic factors: ambient air temperature – from minus 30°C (86°F) to plus 55°C (131°F) and air humidity – 95%.

An example of one of the three types of quick report that is generated through the flaw detector menu. This example shows a multi A-scan+B-scan report.

REPORT

Date/Time:08.28.2023:07.02 **SRT serial number**:Sr.No. - 2308337 **Operator**:User_#0 **Division:**Division #0 **Block Section:**Block Section #0 **Line**:Up **Current Position:**0Km 0m **Start Position:**0Km 0m **Rail:**RH **Rolling mark:**5236 Location defect:	**Probe type**: **GPS:** 50° 28.6' **Flaw Code:**235 Web, cracks at hole **Peak details:** **Classification of defect:**235 Rail/Weld:2 **Rail/Weld No:**25 **Previous Classification:**135

REPORTS

The user has access to 3 types of quick reports generated from the device menu, as well as 4 analytical reports that are generated on a remote workstation on a computer using special software “RailInspector”

In any of these reports, the descriptive part of the registered defect parameters contains the following basic information:

- track and global coordinate of the defect (saved automatically);
- defect number according to the catalog (entered manually by the operator);
- the length of the defect (saved automatically during B-scan measurement or entered manually by the operator during visual inspection);
- features of the rail (filled in manually by the operator);
- The type of rail according to the marking (for example: S60, S49 or others; entered manually by the operator);
- Type of rails according to manufacturing technology (U – hardened; S – raw; C – cold drawn; manually entered by the operator or selected from the list);
- comments (filled in manually by the operator);

An example of one of the four analytical reports created in post-processing using the RailInspector program.