LSR-3D LASER SCAN
Tank Calibration System

VOLUME MEASURING
EQUIPMENT & TECHNOLOGY

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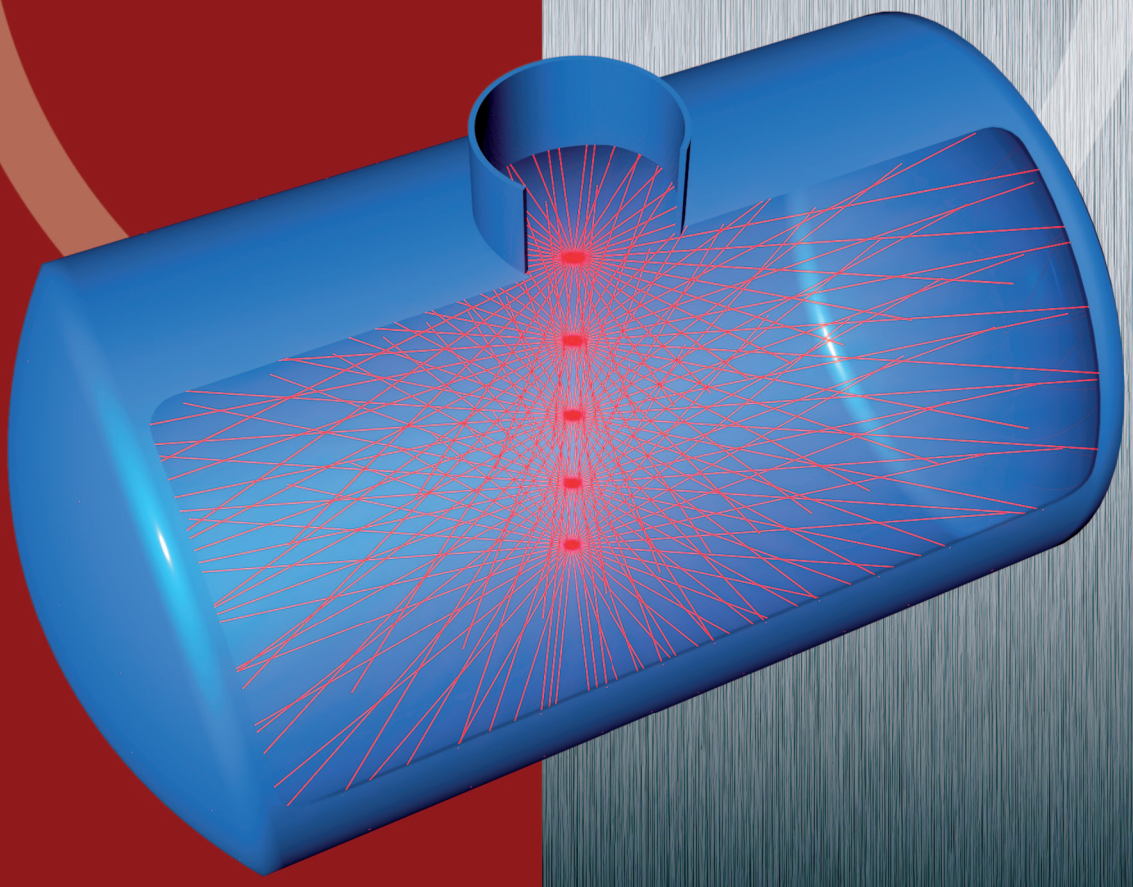


3D LaserScan Automatic Tank Calibration System

The 3D laser system performs the measure of the volume inside underground fuel tanks

Working principle

The device **LSR-3D** is an innovative system for measuring the volume for underground tanks. The LSR-3D laser system, consists of a device which carries a laser rangefinder.

A laser measuring device placed in rotation by an electric motor, advances and enters in the tank for performing a elicoidal scan thus allowing to detect a series of axial and radial values, the polar coordinates subsequently processed determine the capacity of the tank inspected. The absence of electrical components inside of the inspected tank allows the use of the equipment in the presence of flammable liquids or vapors, hazard area.

The optical guide is inserted in the empty tank through the manhole or other available opening and is adjusted to be vertical with respect to the position of tank.

In this way the effect of any inclination in the calculation of the volume of the tank is taken into account.

The LSR-3D laser device is measuring the distances between the mirror and the tank wall while it perform a complete 360° rotation along a horizzontal plane.

The laser starts the scanning of the storage tank from the top of the tank.

During a single rotation, the system records a programmed number of distances which correspond to the lengths of the sides of the isosceles triangles. The sum of the areas of those isosceles triangles represents the area of cross section of the storage tank at height of the horizontal plane being scanned.

At the completion of every single horizontal scan, the device has performed a vertically costant displacement (step) and start to do another scan as described above. The area of horizontal section multiplied by the vertical step determines the volume of the slice of the storage tank. The scanning of the tank continues until the total height of the tank has been travelled.

TECHNICAL CHARACTERISTICS

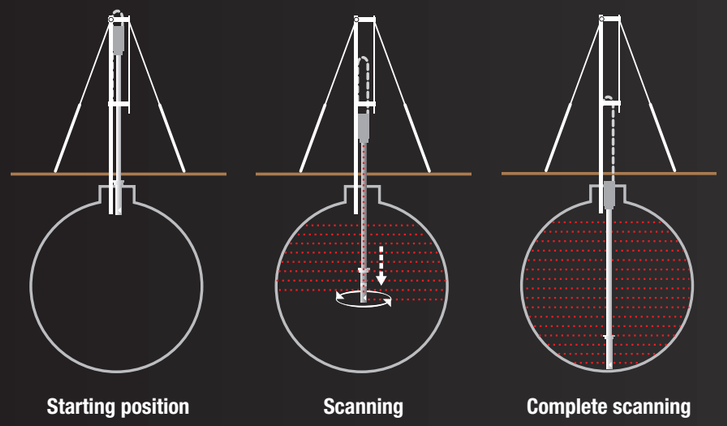
Power supply	230 Vac
Consumption	125 VA
Longitudinal measure range	10 mt
Standard diameter lenght	2750 mm
Accuracy	± 1 mm
Repeatability	0,5 mm
Scanning speed	0,5 ÷ 20 sec/turn (standard 6 sec)
Translation speed	15 min / 2750 mm
Measured points	100 ÷ 400 (standard 200)
Millimeter per turn	8,371 mm
Data output	USB
Optical guide	2 ÷ 3 m
Working temperature	-10 °C ÷ +40 °C
Dimension	350 x 30 x 30 cm (version standard)
Weight	35 Kg (including trolley)
Minimum entry hole	2”

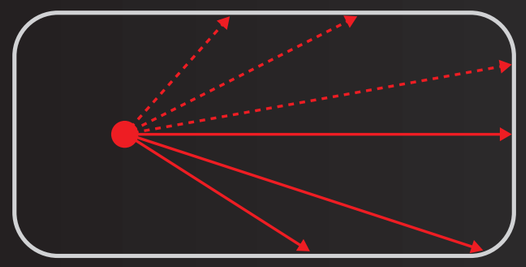
Certificates:

CEC 13 ATEX 074 II 2 G Ex px IIC T6 Gb (Tamb -20 °C ÷ +60 °C)
Compliance with OIML R71, edition 2008
Issued by **National Hellenic Institute of Metrology (EIM)**

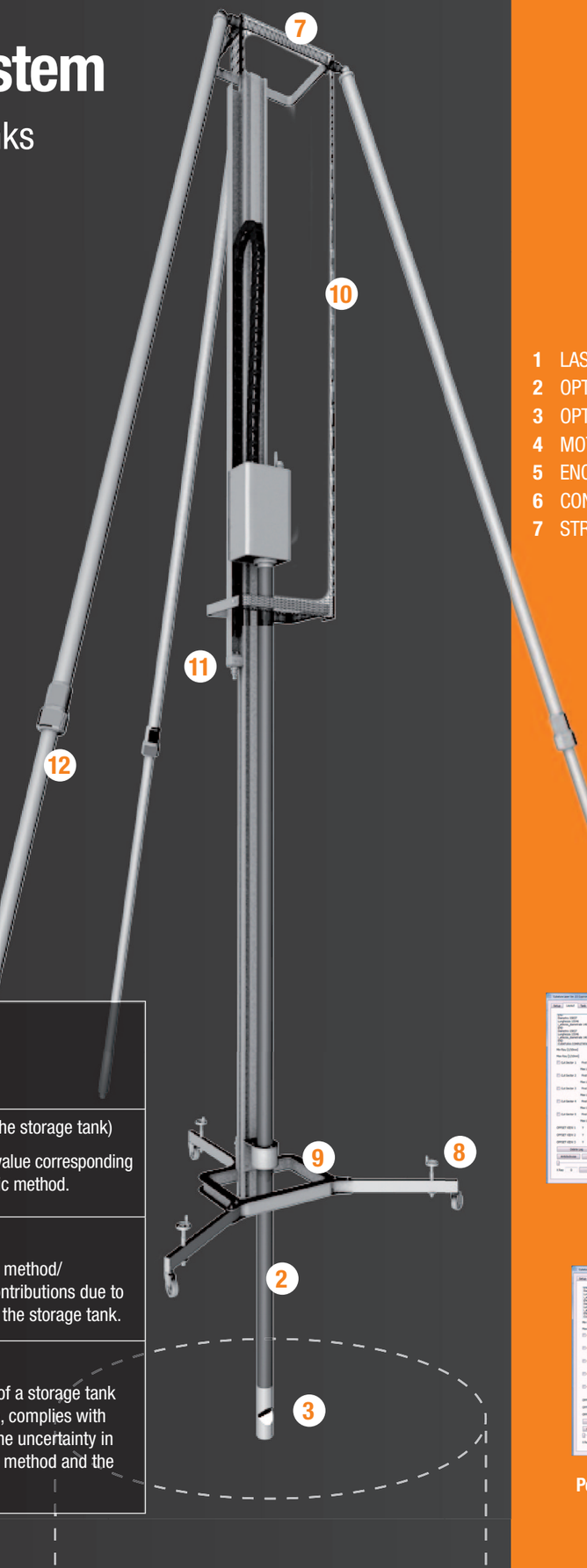
METROLOGICAL RESULTS

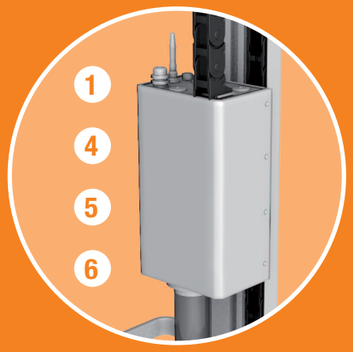
Degree of Equivalence, En*(1)	**Average En = 0.3** *The result is considered equivalent if En ≤1.0 (1) Cox M. G., 2002, Metrologia 39, pp 587-8
Accuracy of the method (% of the indicated volume)	**± 0.2 %** (over the complete calibration table of the storage tank) Accuracy is calculated with respect to the “true” value corresponding to the volume obtained by the reference volumetric method.
Expanded uncertainty of measurement (% of the indicated volume)	**0.26 % - 0.1 %** This uncertainty is entirely due to the measuring method/ instrument used. No allowances are made for contributions due to interpolation uncertainty or height uncertainty in the storage tank.
Compliance with OIML R71 with respect to the MPU (paragraph 7) (% of the indicated volume in the calibration table)	**≤0.5 %** The method, as applied to calculate the volume of a storage tank and produce a calibration table (by interpolation), complies with the MPU requirement over the complete table. The uncertainty in volume takes into account the uncertainty of the method and the uncertainty due to interpolation.



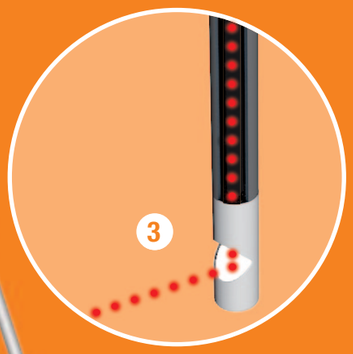


Schematic representation of the distances between the laser and the tank wall being measured during a scan of a horizontal cross section of the tank.

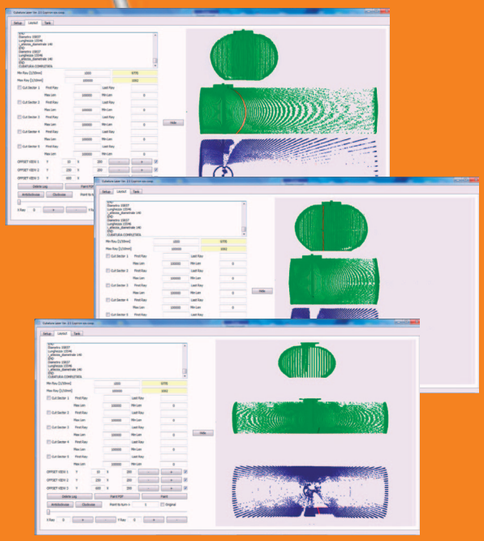




1 LASER METER
2 OPTICAL GUIDE
3 OPTICAL MIRROR
4 MOTOR
5 ENCODER
6 CONTROL UNIT
7 STRUCTURE SYSTEM
8 STABILIZER SUPPORT
9 ADJUSTABLE TROLLEY
10 OPTICAL GUIDE PROTECTION
11 CONNECTION FLANGE
12 EXTENSIBLE SUPPORTS



An optical beam emitted from the laser rangefinder crosses the measuring rod



Post-scan layouts

MAGNETOSTRICTIVE & WIRELESS TECHNOLOGY

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