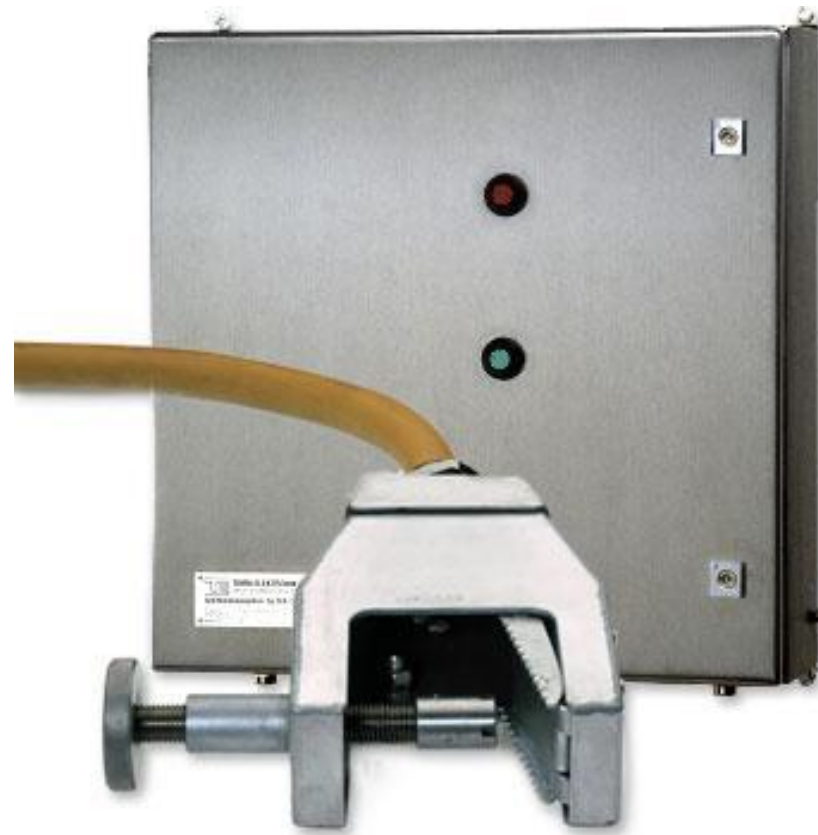




Marine Grounding System SEK-2

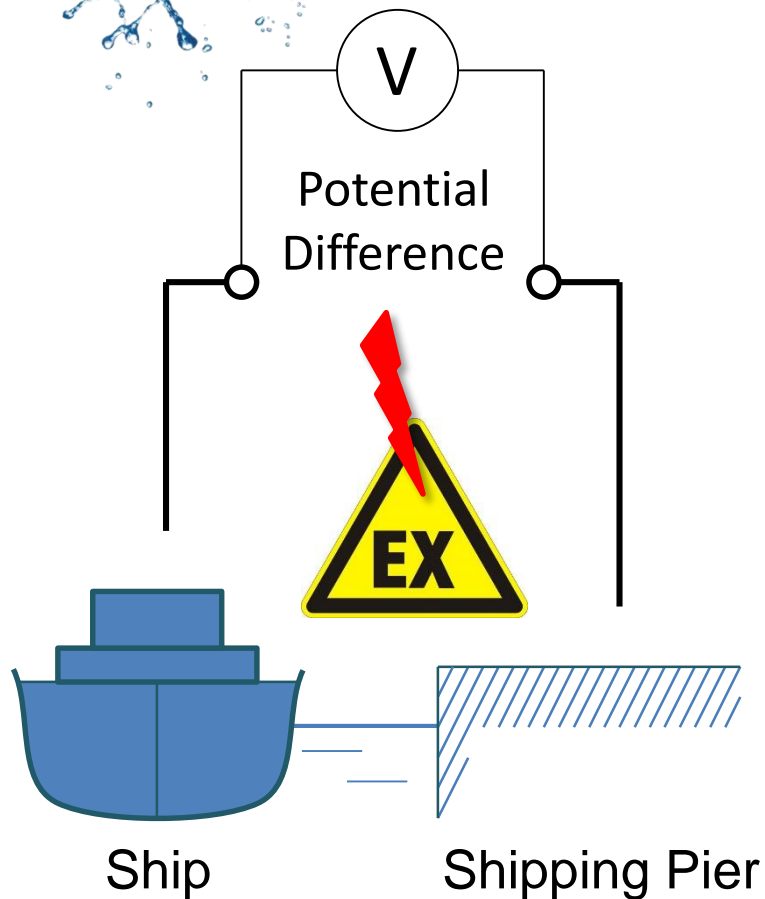






Loading Dock with Marine Grounding System SEK-2

Scope of Marine Grounding



Electrical potential differences
can cause ignition by heat



Elimination of these risks by
monitored bonding



Active Voltage Sources

- Electrochemical source: “Battery Effect”
- Active cathodic corrosion prevention of shipping pier
- Induced voltages into steel constructions by radio waves
- Frictions by loading operations

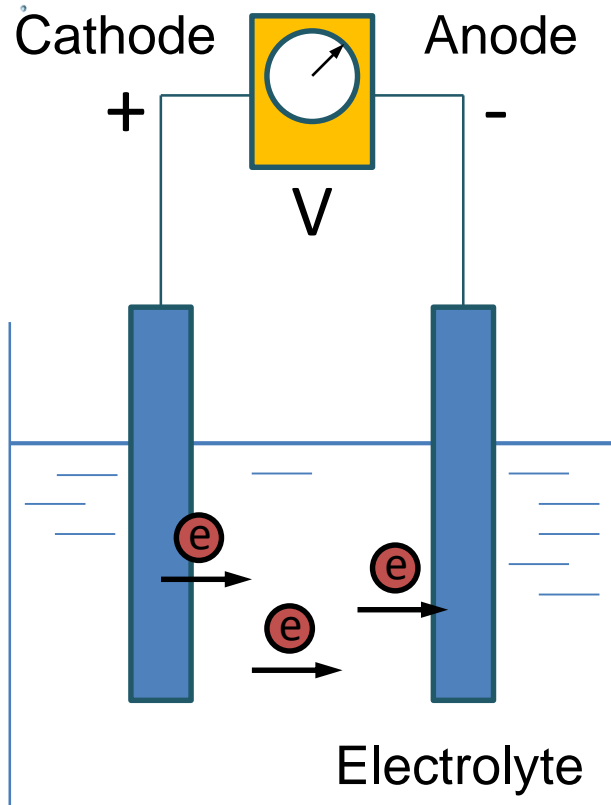


Result in lasting Electric Potential Differences

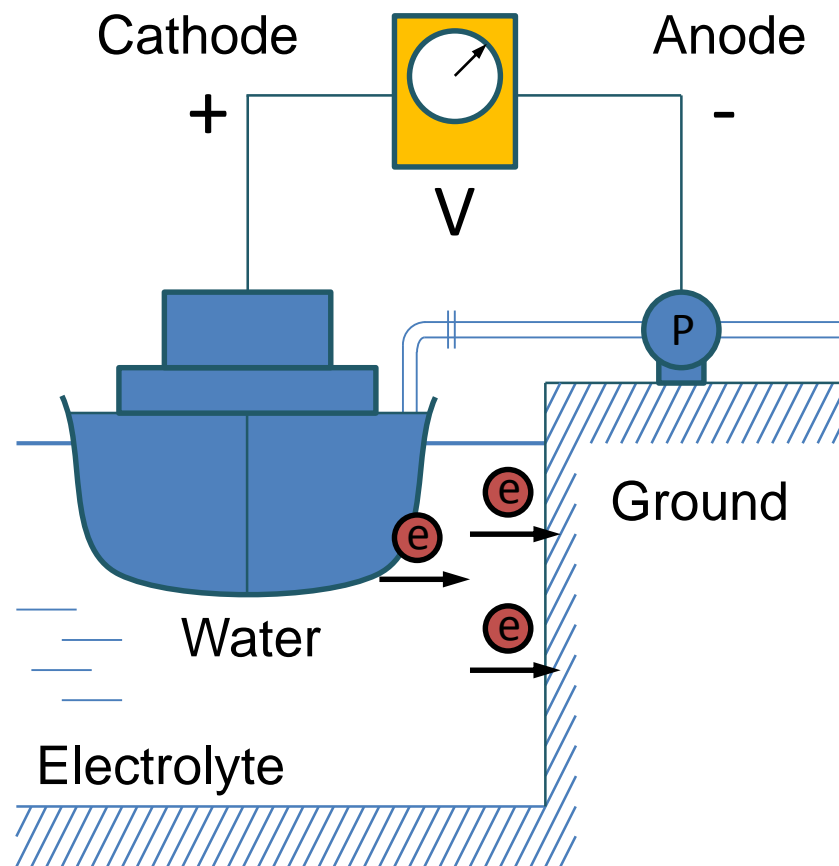


Battery Effect

Battery



Loading pier





High Risk of uncontrolled Short Circuits

- Permanent risk of bypassing insulating flanges unintentionally:
 - Gangway
 - Steel hawser
 - Ladder, tools, etc.



Reliable danger prevention only by performing a supervised equipotential bonding line



Statement on Marine Grounding

„Electrical potential differences between vessel and terminal, caused by active sources, can be reduced by marine grounding actions“

TUHH

Technical University Hamburg-Harburg

Prof. Dr. rer. nat Frank Gronwald,
Study on Marine Grounding,
December 2013



Statement on Marine Grounding

„For seaports and concerning endangerments by cathodic protection, isolation flanges are sufficient for avoiding electric sparks – in all other cases a bonding line to filling terminal is necessary.

To secure operation, the bonding line should be monitored by an apparatus. It is advised to install this automatic monitoring device at all loading terminals“

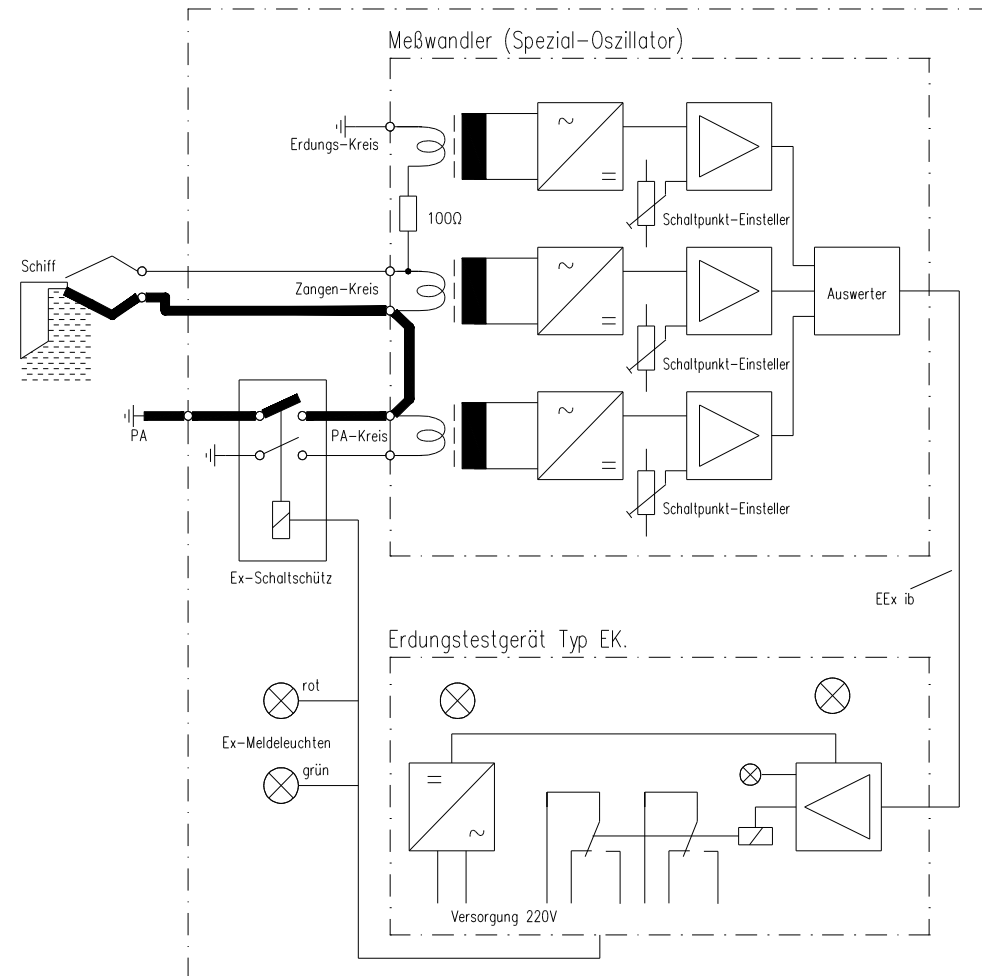


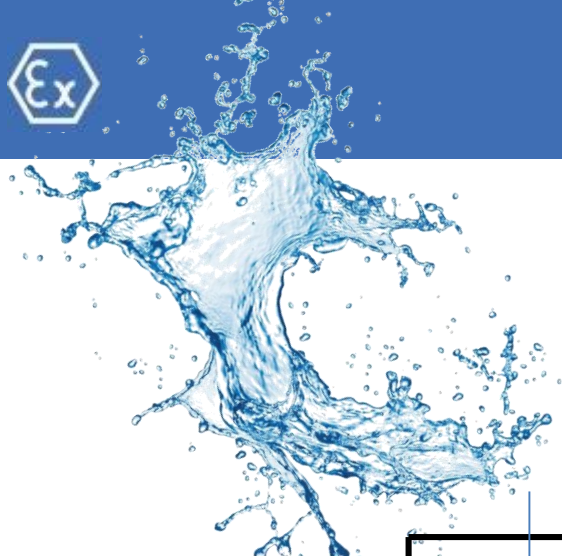
Statement TÜV Rheinland
to Shell Germany,
June 1996



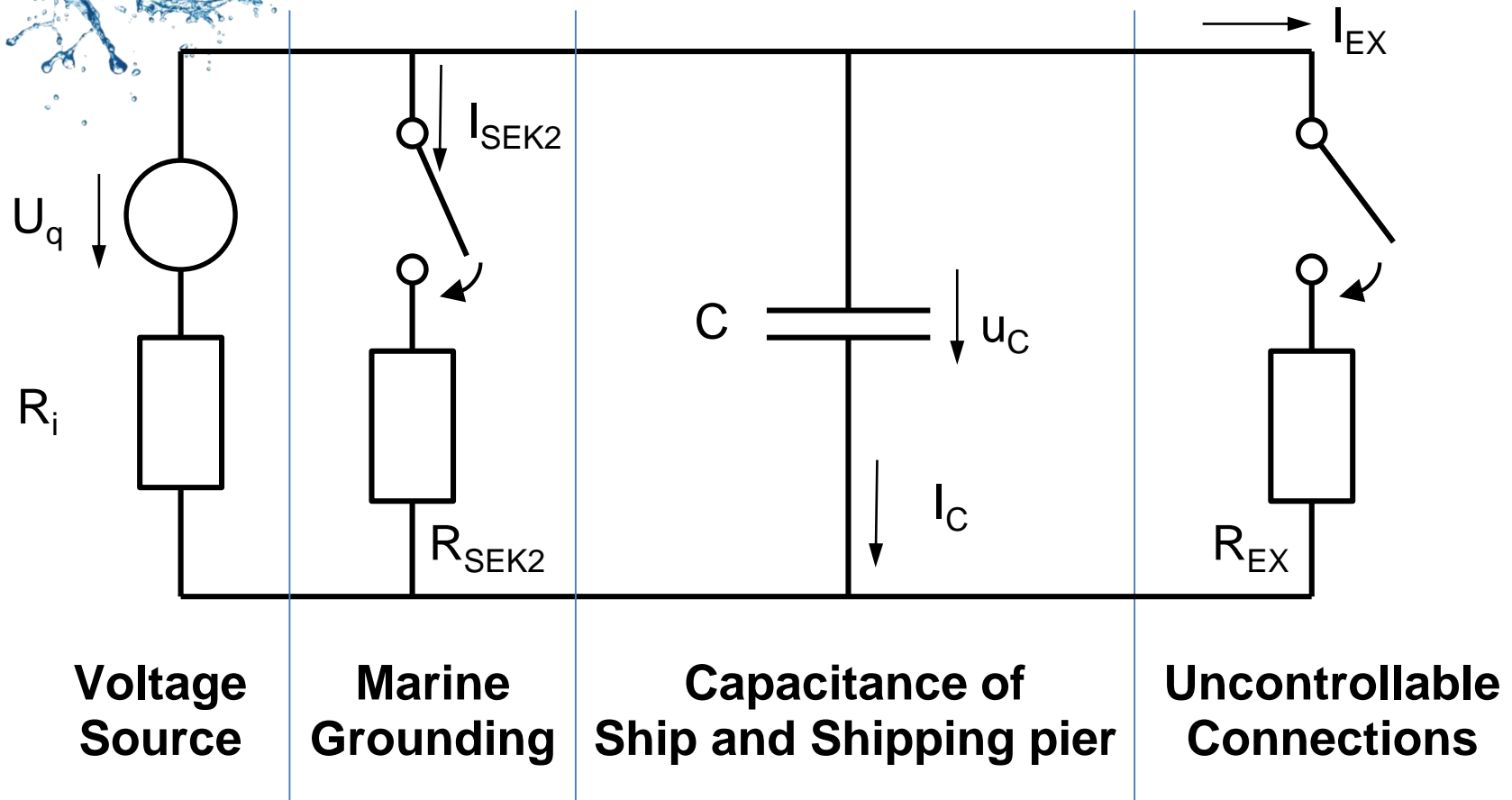
Operating Principle

- Special grounding clamp
- Integrated auxillary contact for connecting through the measuring line





Equivalent Circuit Diagram





Safety Features

- All components are certified in accordance to ATEX 95
- Approved for hazardous areas of zone 1
- Detection of correct grounding
- Very low-ohmic grounding cable (near to 0 Ohm)
- Compact water-jet protected housing of stainless steel



Operating Features

- Two clearly visible indicator lamps
- 20 m Neoprene grounding cable
- Specially designed grounding clamp
- Potential free contact outputs



Actual Research Project “Innovative Shipgrounding System“

Status

- Unspecified physical effects
- Marine Grounding is not mandatory yet

Mission

- Scientific prove of potential differences between ship and loading terminal (measurements)
- Scientific investigation on further effects
- Detecting and description of principles
- Proof of necessity for marine grounding

Target

- Further improvements on marine grounding system



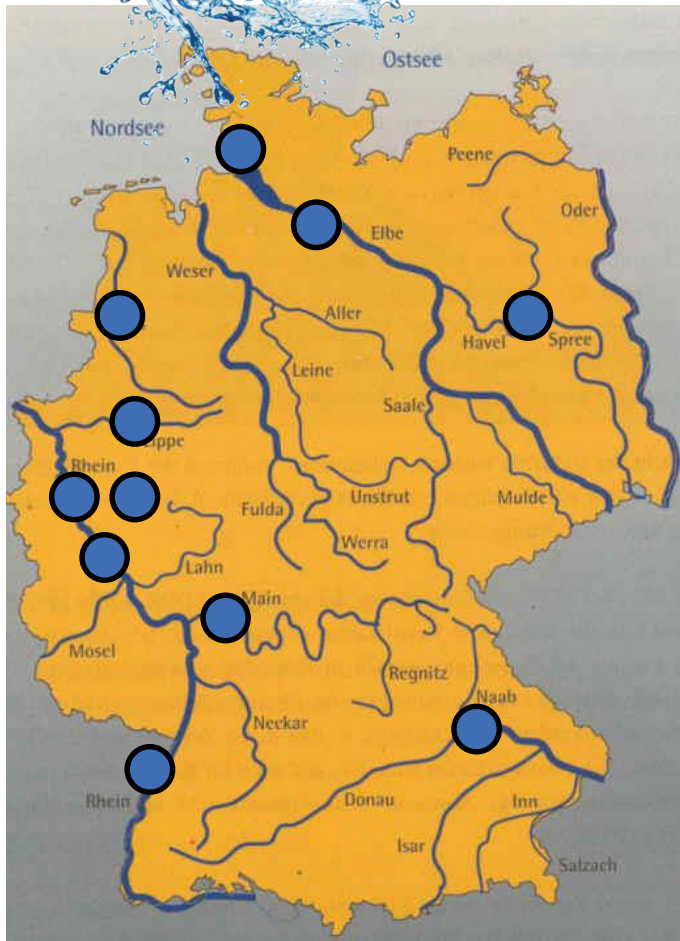
Quantities

- Distribution of Timm Elektronik ship grounding devices with measuring oscilloscope since 1980
- Widely-used throughout Europe
- Sold quantities up to 30 devices / year in the past 10 years



Technology and Market Leader

References (Examples)



SHELL

- Refineries Rheinland, Wesseling, Godorf, Heide, Hemmingstedt, Kattwyk Hamburg
- Tank Depots Dortmund, Raunheim

OILTANKING

- Tank Depots Hamm, Duisburg, Hanau, Rheinau, Antwerp (Belgium), Kotka (Finland)

BAYER Industrie Services GmbH & Co.KG

- Leverkusen, Krefeld-Uerdingen

RUWAIS Fertilizer Industries in Abu Dhabi, United Arab Emirates

BASF Antwerpen N.V. in Belgium

... and numerous more



SEK-2 at SHELL

Shell Refinery
Kattwyk Hamburg



Loading pier



Marine Grounding System



SEK-2 at VOPAK

Vopak Dupeg
Terminal Hamburg



Marine Grounding System



Attaching Grounding Clamp to Ship



Thank you!

