

**DE LORENZO**  
GROUP  
educational equipment manufacturers

# CATHODIC PROTECTION TRAINER



[www.delorenzogroup.com](http://www.delorenzogroup.com)

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The **Cathodic protection** is a technique to control the corrosion of a metal surface by making it work as a cathode of an electrochemical cell. This is achieved by placing in contact with the metal to be protected another more easily corroded metal to act as the anode of the electrochemical cell. **Cathodic Protection systems** are most commonly used to protect steel, water or fuel pipelines and storage tanks, steel pier piles, ships, offshore oil platforms and onshore oil well casings.

The bench provides devices suitable to highlight the concept of the free corrosion potential measured with easy to use reference electrodes and means suitable to build with certain precision the polarization curves.

Protective techniques are moreover represented as per sacrificial anodes systems of several type of metals as per impressive **Cathodic Protection systems**, with the possibility to see the explanation of the use of constant voltage, constant current and constant potential feeders.

The bench provides facilities to study the case of isolated systems as well as the case of systems where different metals are coupled together. Particular attention is given to the presence or not of several kinds of insulating materials over the surfaces of the samples, in order to demonstrate the different behavior of the same material when coated or bare.

The bench is provided with measuring facilities characterized by suitable sensitivity and precision, in order to introduce the basis of the laboratory tests to be executed, to learn which is the correct way in order to determine the behavior of a metal in contact with the electrolyte in different conditions of temperature (thermostatic bath) and in high oxygen concentration (air insufflations pump).

A suitable multi-channel interface can connect the bench to a PC in order to record the experiment results and to give the trace for further studies.



## LIST OF EXPERIMENTS

- The measurement of the difference of potential of a sample into an electrolyte
- The reference cell
- The Daniel Cell
- The first and second species conductors
- Introduction to the Cathodic Protection Criteria
- Introduction to the sacrificial anodes in Zn, Mg, and Al
- Introduction to the Cathodic Protection Impressive Current System
- The consumable impressive current anode (Fe)
- The inert impressive anode (Ti-Pt and MMO)
- Resistance concept, circuit for the first and second species conductors
- Introduction of the specific resistance concept over three different first specie conductors (Fe; Cu; Fe-Ni)
- Wenner method Cell for second specie conductors (Resistivity fluid cell)
- Temperature effect over the resistivity (thermostatic cell)
- Air presence influence on the resistivity (insufflate air effect)
- Current density introduction and Tafel Curves construction
- Temperature effect over the Current density (thermostatic cell)
- Air presence influence over the Current density (insufflate air effect)
- Coating and Current density

## LIST OF MATERIALS

- Bench with wheels (dimensions: 1300 x 2000 x 800 mm.) with electrical console, lockable shelves and waterproof table surface
- Digital voltmeter (portable)
- PC interface for the measurement and record of 5 different channels
- Digital Voltmeter in console
- Digital ammeter in console (2 off)
- Cu/CuSO4 portable reference cell (2 off)
- Ag/AgCl portable reference cell (2 off)
- Zn reference cell (2 off)
- Copper electrode 30 x 140 mm, thickness 2 mm (10 off)
- Carbon steel electrode (bare) (10 off)
- Transparent basin to build the electrolytic test bath (4 off)
- Simple circuit with sliding resistor and lamp for the insertion into the electrical circuit of the electrolytic cell
- Zinc electrode 8 mm, length 140 mm (20 off)
- Magnesium electrode 25 mm, length 140 mm (20 off)
- Aluminum electrode 25 mm, length 140 mm (20 off)
- DC feeder (4 off)
- Ti-Pt anode (net anode 50 x 140mm) (4 off)
- MMO tubular anode (25.4 x 140 mm) (4 off)
- 1mm Cu length 1 m bar
- 1mm Fe length 1 m bar
- 1mm Fe-Ni length 1 m bar
- Resistivity fluid cell
- Waterproof resistor with thermostatic device
- Air pump with relevant sprayer
- Carbon steel electrode, completely coated with epoxy compound (10 off)
- Carbon steel electrode, partially coated with epoxy compound (10 off)
- Various reagents in plastic cans, 0.25 kg/each (10 off)
- Set of spare fuses
- Set of ancillaries and connecting leads
- Set of safety glasses and gloves
- Experiment manual in paper and CD

## THIS TRAINER HAS BEEN THOUGHT AND DESIGNED IN PARTICULAR FOR:

- Oil Companies Training Centers
- Oil Industry Contractors Training Centers
- Ministry of Oil
- Faculties of Oil Engineering
- Faculties of Chemistry
- Faculties of Civil Engineering
- Water and Sewage Companies Training Centers
- Gas Distribution Companies Training Centers



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