Optimum / MACC R2

Galvanic Anode Current Controller Overview.
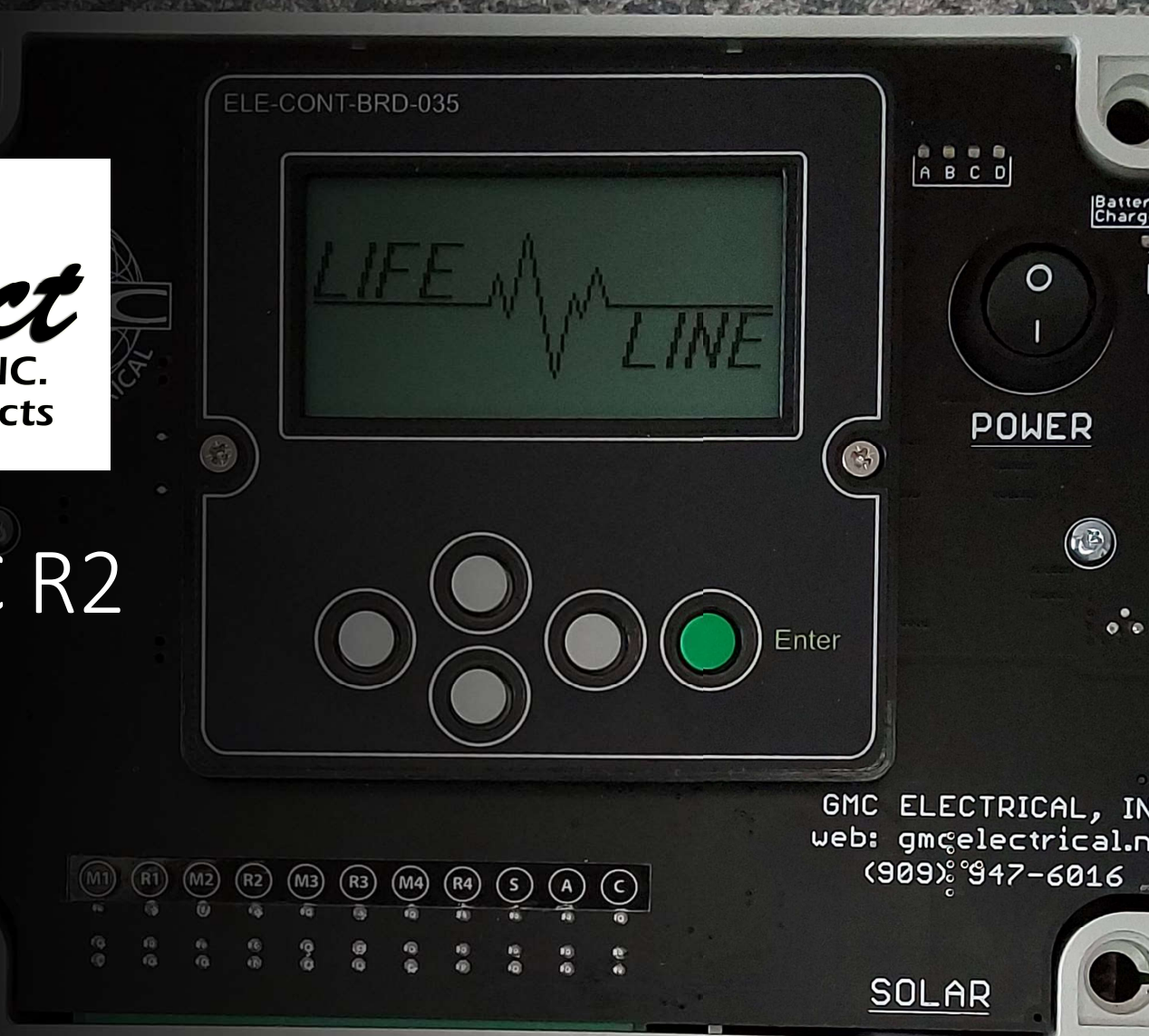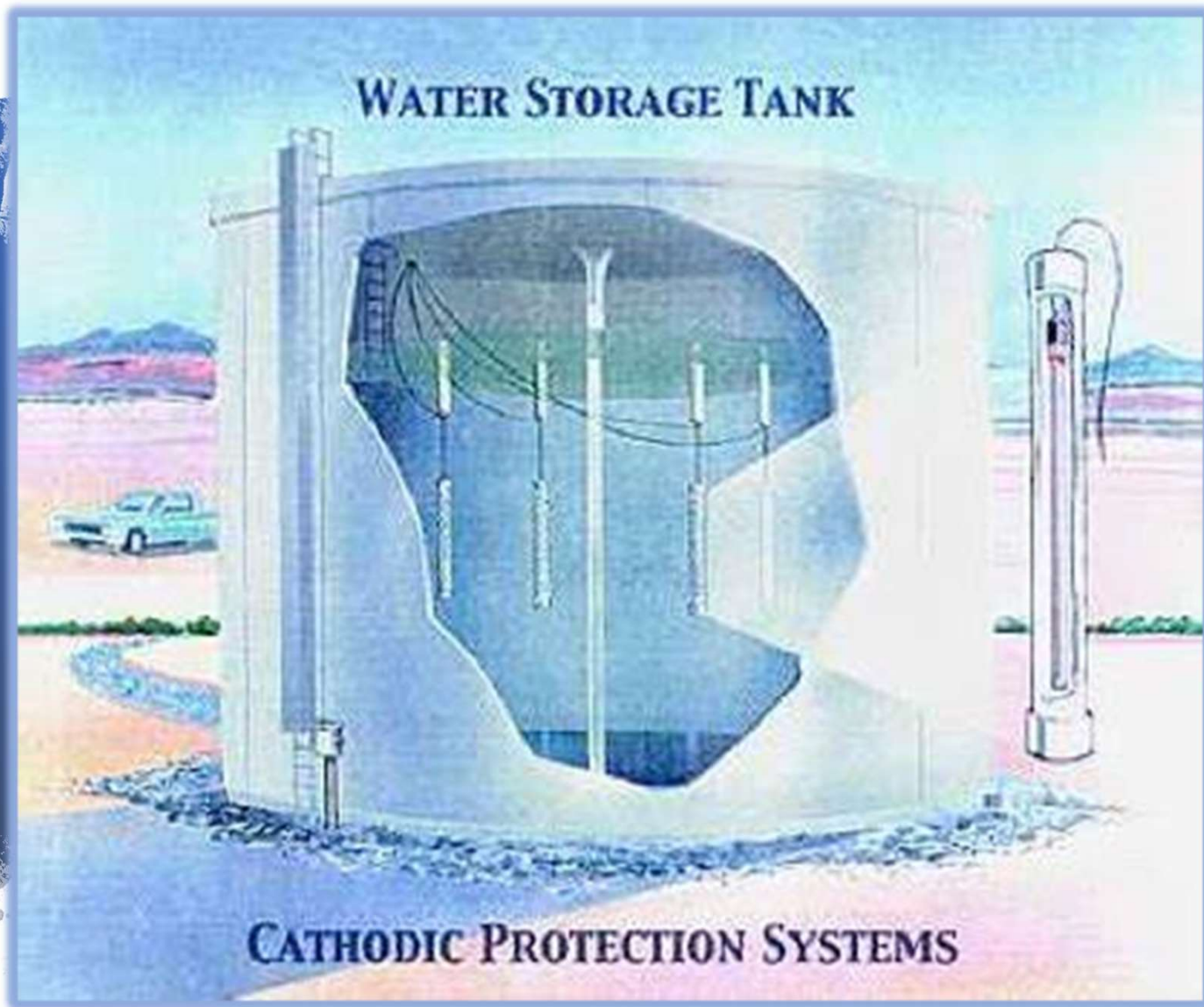
Sacrificial Cathodic Protection
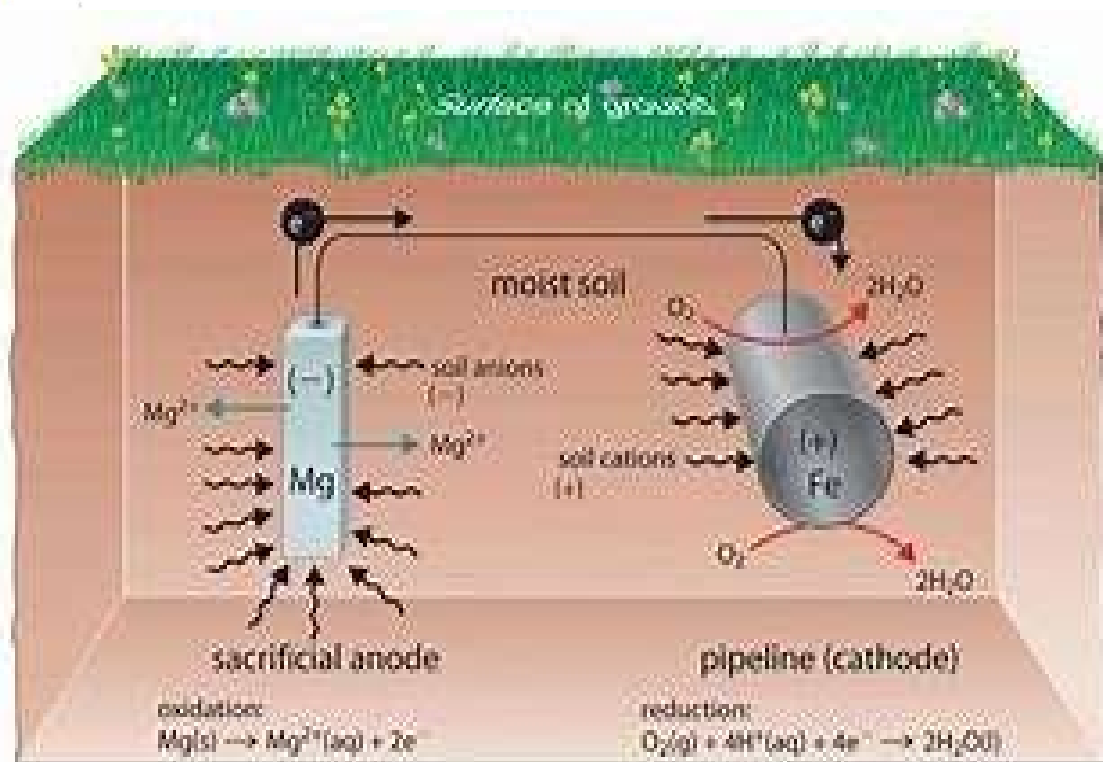
WATER STORAGE TANK

CATHODIC PROTECTION SYSTEMS

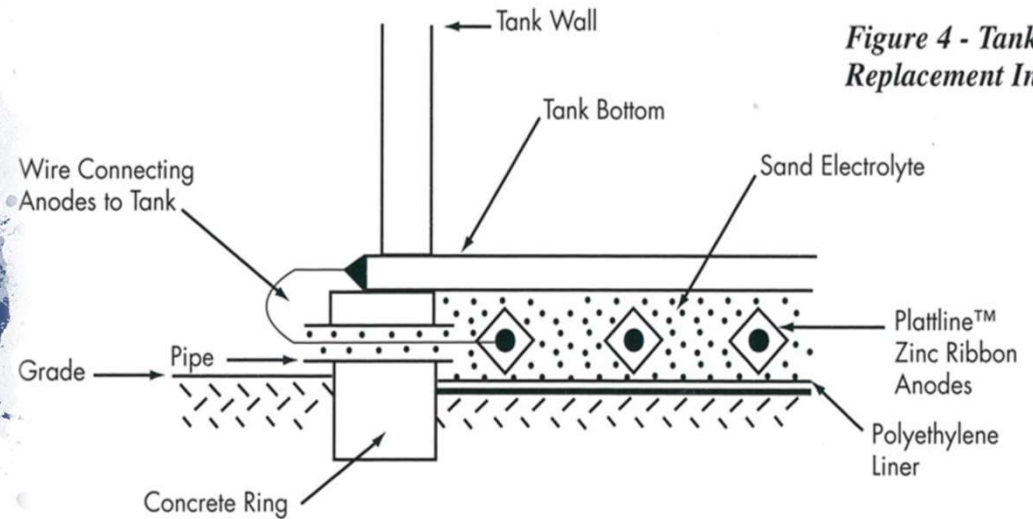Tank Base Sacrificial Cathodic Protection

Figure 4 - Tank Bottom Replacement Installation.

What is the Magnesium Anode Current Controller?

It is installed into Sacrificial Cathodic Protection Systems.

limits the current of a Sacrificial Anode.

Increases Anode efficiency.

It measures Anode current, controls it and reports on it.

It measures Structure to Soil Potential, controls it and reports on it.

It automatically measures Instant off, controls it and reports on it.

It measures coupon current, controls it and reports on it.

Provides the user with information about system efficacy, operation and prevents unnecessary consumption of the Sacrificial Anode.

Where is it inserted in a SACP system?

- Installed between the Anode and structure connection
- Connect the Anode to the Anode terminal.
- Connect the structure to the structure connection.
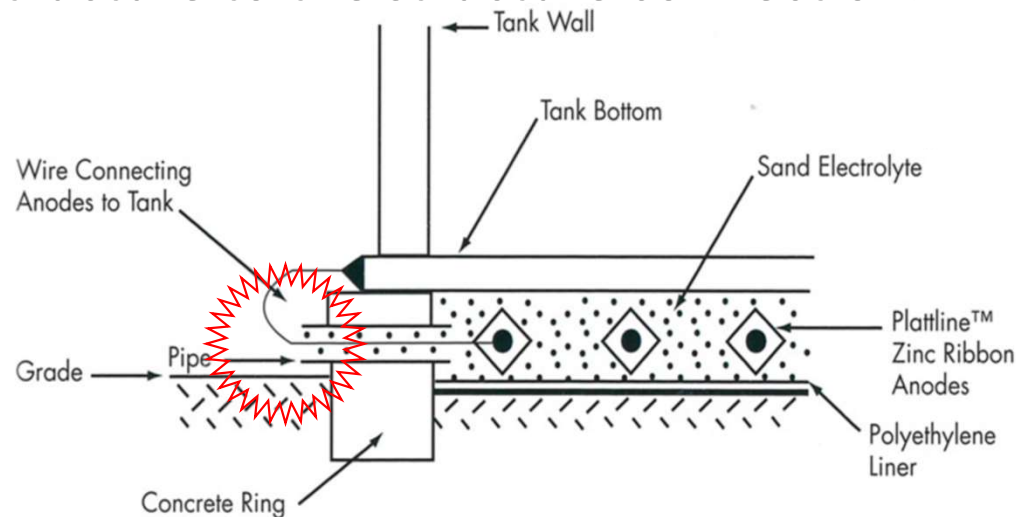
4 control modes are available?

- Constant Anode current
- Constant Reference Potential
- Instant off (Interrupted)
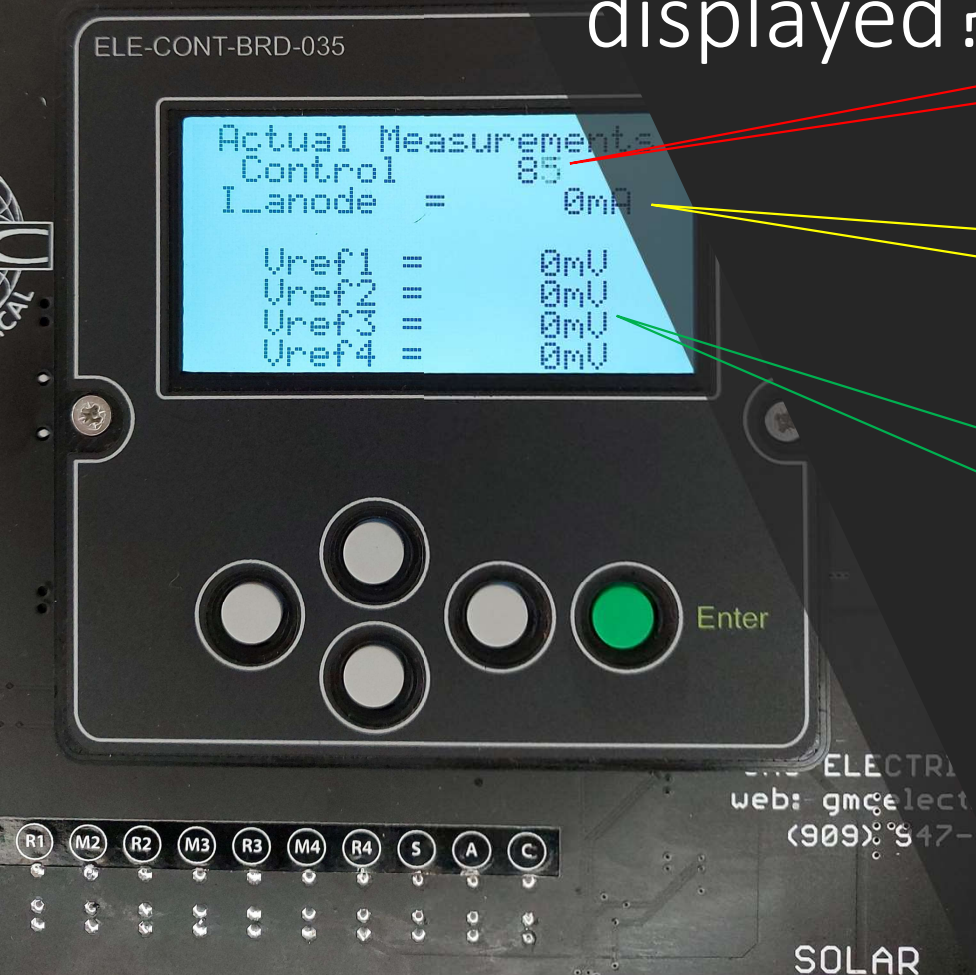- Constant coupon current

What measurements are displayed?

Degree to which the control element is being driven.

Actual Anode current.

Up to 4 isolated Reference Electrodes. Any type!

What measurements are displayed?

Current flowing on to or off of the coupon.

Derived current density based upon Coupon surface area.

What measurements are displayed?

Back-up battery voltage
Max 4.2V

Modem type
RC1 South Africa
RC2 USA

Unique field object serial number
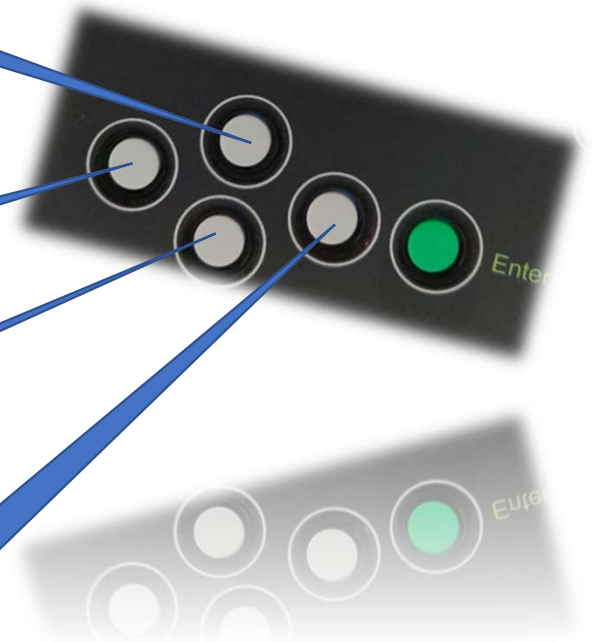
Menu driven selection!

Connections!

- Solar (2 core cable)
- AC Power
- Coupon
- Anode
- Structure
- 4 High Input impedance Reference's >10GΩ.

Solar!

- 10W 6V Mono or Poly crystalline.

- Standard cable length 3m terminated on cell with appropriate connector on loose end.

- Option length can be accommodated

- Standard Extensions 10m & 20m

Power!

- 96 to 264VAC 50 or 42 – 64 Hz.
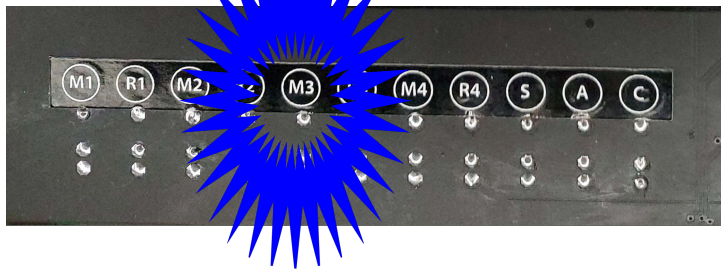
- Standard cable length 3m terminated one end only to suit fixed connector.

- Option length can be accommodated.

- Standard Extensions 10m & 20m
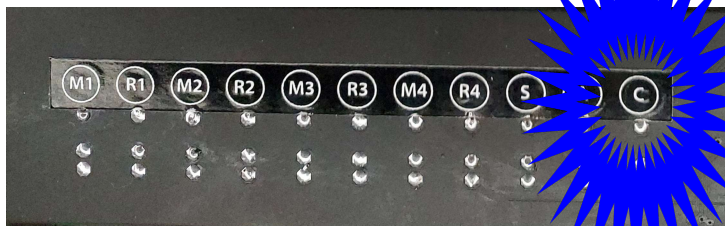
Coupon?

- When connecting a Coupon the cross-sectional area in millimetres must be know and entered to enable the MACC to compute the current density.
- Mac Coupon diameter 500mm^2
- Max current 2000micro amps (200milli amps)

Monitor?

- Monitor is a noncurrent carrying conductor fed back from the structure to ensure accurate Reference Measurements.
- Monitor should not have no associated volt drop due to current flowing in it. As the reference electrode input impedance is >1Giga Ω it is preferable to feed a separate "ground" cable to ensure accurate measurements.
- 4 terminals are provided.
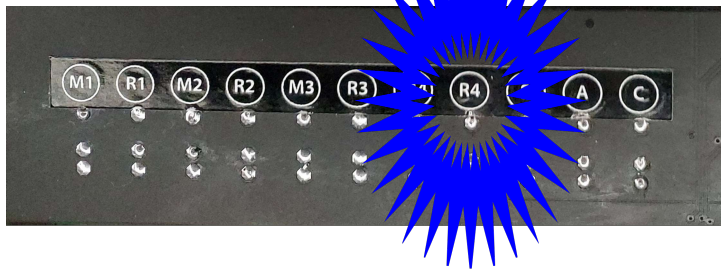
Reference?

- 4 Reference terminals are provided.
- The "Control" reference can be user programmed.
- All reference potentials presented at the terminal are displayed.
- In "Instant off" control both the "off" potential and the "on" potential measured is displayed.
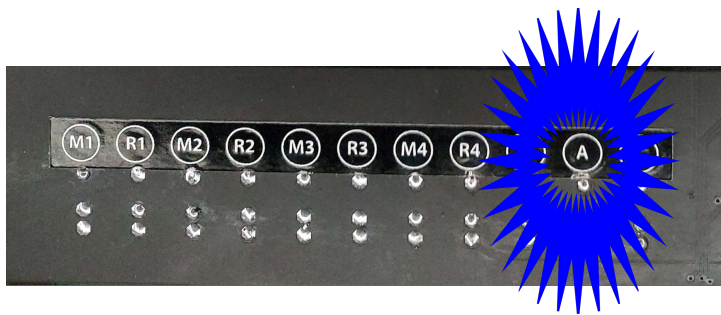
Anode?

- Simply connect the anode tails to this terminal connections are achieved within the MACC.
- Maximum Anode current 6 Amps
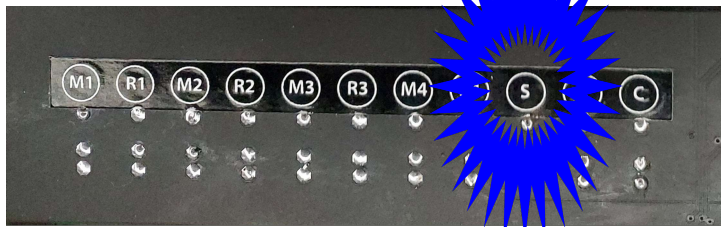
Structure?

- Simply connect the current carrying conductor from the structure to this terminal connections are achieved within the MACC.

- Maximum current 6 Amps

Measurement Specs!

Reference – 1milli Volt resolution +/- 2000mV
Current

  Anode – 1 milli Amp Resolution 6 Amps Max
  Coupon – 1 Micro Amp Resolution 500µAmp

Control Modes!

Coupon_C - Constant Coupon Current Control

A control mode that controls the current picked up by a coupon connected to the Coupon connection.

> **Control function – Coupon_C Set-Point**

Other functions behaving as limits
> Vref of control reference.
> Vref in Control.
> I_Anode

Other important parameters to be programmed by user
> Coupon Surface area

C-Current – Constant Current!

C-Current - Constant Current Control

A control mode that controls the Anode current constant.
        Control function – I_Anode Set-Point

Other functions behaving as limits
        Vref of control reference.
        Vref in Control.
        Coupon_C

Constant Reference Control!

C-Reference Constant Control Reference Control

A control mode that controls the Potential measured by the Vref in Control Constant.

Control function – Vref Set-Point

Other functions behaving as limits
I_Anode
Coupon_C

Instant OFF control!

- Instant OFF control mode begins its control function whilst the Anode current is flowing from the Anode to the Structure resulting in a Potential between the Structure and the connected reference electrodes. The potential measured by the reference electrodes whilst current flows is referred to as the "ON" potential.

- When the MACC initiates a control cycle, the current is interrupted known as the "OFF" potential.

- Upon interruption predictable instability occurs, and the MACC delays it measurement by 100mS to avoid false measurements.

- The user programs the period the MACC is to remain in the "OFF" state and the period between the control cycles.

Instant OFF control!

IOFF - Instant OFF Control

A control mode that seeks to control the IOFF potential constant.

IOFF Vref Set-Point

Other functions behaving as limits
Vref of control reference.
Vref in Control.
Coupon_C
I_Anode
Other important parameters to be programmed by user
IOFF OFF-Time
IOFF ON-Time

Real time clock

- Equipped with a real time clock
- User adjustable on startup.
  - Hours
  - Minutes
  - Seconds

Remote Monitoring!

- Currently equipped with SIGFOX approved modems.
- Available packages
  - Heron
    - 2 Uplinks per day
    - 1 downlink per week
      - $16.46/Annum/field object activated
  - Crane
    - 70 Uplinks per day (1 communication every 30minutes)
    - 2 downlinks per day
      - $28.42/Annum/field object activated

- In all packages 50% upfront balance as objects are activated.
- Contract duration discounts
  - 2 Year commitment 2.5%
  - 3 Year 5%
  - 4 Year 8%
  - 5 Year 10%

Thank you!

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