EPMA Series
Liquid Resistance Starters

a member of CSE Global
The Australian-built market leading Unistarter EPMA Series liquid resistance starters offer the ultimate quality in starting large slip ring motors in mining, cement and water industries. Offering simplicity, reliability and minimal maintenance, the Unistarter EPMA LRS units provide a perfect solution for critical project applications requiring high starting torque and low starting current with the enhanced fully stainless steel design ensuring suitability for installation in harsh environments.

The CSE-Uniserve Advantage

CSE-Uniserve proudly offers a complete range of services to ensure the successful application, installation, commissioning and maintenance of the EPMA LRSs to provide optimal performance and long term operation.
Testing & Commissioning
CSE-Uniserve’s extensive experience in motor starting ensures that all LRS equipment is installed and commissioned to project specific standards, providing optimal performance. Offered testing and commissioning services include:

- Client witnessed factory functional test
- Installation supervision
- Electrolyte concentration & conductivity verification
- Starting torque analysis
- Waveform capture

Engineering Solutions
CSE-Uniserve has in-house capability to offer fully engineered solutions for a wide range of industry applications from simple pump control to more complex grinding mill starting, incorporating torque control functionality. Working closely with our customers from project concept stage, through to project delivery, we offer design flexibility to incorporate specific customer requirements.

Maintenance & Technical Support
Our specific understanding of Australian conditions and applications and our 30 years experience allows us to develop the most effective maintenance plans and technical support. Technical services around LRS include:

- Tank inspection
- Inspect and test components and connections
- Control panel and circulation system inspection
- Record data of functional and electrical tests
- Refill tank and electrolyte conductivity verification
- Record rotor current waveforms
- Comprehensive inspection & performance report

Customer Training
CSE-Uniserve offers a range of training courses for all its EPMA products, ranging from application guides and operation/maintenance courses through to detailed training programs built around specific projects.

Significant Projects
CSE-Uniserve has provided its LRS technology and/or integration services to prominent and innovative Australian and global projects including:

**Cadia Gold Mine - NSW (NEWCREST Mining)**
Ball, SAG and Vertimill and conveyor applications:

- Single & Dual models
- Ratings up to 8000 kW Dual (16000 kW total)
- Mill start option
- Starting torque control
- Variable and fixed speed
- SER compatibility
- Conductivity Monitoring

**Ahafo Gold Mine - Ghana (NEWMONT Mining)**
Ball and SAG mills and cyclone feed pump applications:

- Mill start option
- Starting torque control
- Variable and fixed speed
- Conductivity Monitoring
- Ethernet communications

**Boddington Gold Mine - WA (NEWMONT Mining)**
Ball mills, primary and secondary crushers and conveyor applications:

- Single & Dual models
- Ratings up to 7800 kW Dual (15600 kW total)
- Mill start option
- Starting torque control
- Conveyor start / stop option
- Liquid to liquid & liquid to air cooling
- Conductivity monitoring
- ProfiBus and Conductivity monitoring

Analysis of motor rotor current during operation of a liquid resistance starter.
EPMA LRS
Application and Solution

For applications ranging from grinding mills, crushers, conveyors and shredders requiring high starting torque at low starting currents, through to pump and fan applications, CSE-Uniserve delivers smooth motor starting solutions with optimum control of current and torque, achieving reduced mechanical shock to system components.

CSE-Uniserve’s enviable market position and reputation has been built on our proven performance, flexibility of design and commitment to provide enhanced solutions to meet project specific requirements.

Superior Build Quality

Our Unistarter LRS units are designed and purpose built to operate in the harshest environments. Their characteristics Include:

- Complete stainless steel fabrication
- Welding to Australian standards
- Purge welded stainless steel pipe construction work
- IP65 control and HV cubicle
- Designed for outdoor installation
- Full factory testing
Customisable to Specific Requirements

The Unistarter EPMA LRS series units can be customised to suit a wide range of requirements for specific applications. These include mill control, conveyor start profiling, load sharing, torque limiting, fixed speed and variable speed operation for single and dual motor applications.

Available options include:

- **Rotor Current Monitoring**
  - Load sharing dual applications
- **Electrolyte Heating**
  - Repeatability of torque control
  - Environmental conditions
- **Torque Profiling**
  - Torque pulsation minimisation
  - Application specific designs
- **Variable Speed Operation**
  - Heat exchanger integration
  - Application specific designs
- **Electrolyte Conductivity Meter**
  - Repeatability of starting performance
  - Continuous monitoring
- **Circulation Pump**
  - Duty / standby
  - Slip Energy Recovery Compatibility
- **Alternate PLCs**
  - Possible on request
### UNISTARTER LRS - STANDARD SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td>Base models</td>
<td>EPMA 1, 2, 3 &amp; 4</td>
</tr>
<tr>
<td>Tank capacity</td>
<td>1000 - 10,000 litres</td>
</tr>
<tr>
<td>Motor powers</td>
<td>Up to 20MW</td>
</tr>
<tr>
<td>Rotor voltage</td>
<td>Up to 4000 Volts</td>
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<tr>
<td>Rotor current</td>
<td>Up to 2100 Amps</td>
</tr>
<tr>
<td>Auxiliary supply voltage</td>
<td>3 Phase 415 V + N &amp; E 50Hz</td>
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<tr>
<td>Control voltage</td>
<td>24VDC</td>
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<tr>
<td>Shorting contactor type</td>
<td>Bar Contactor or Block Contactor</td>
</tr>
<tr>
<td>Maximum ambient temperature</td>
<td>45 deg C Higher upon request</td>
</tr>
<tr>
<td>Minimum ambient temperature</td>
<td>5 deg C - Lower upon request</td>
</tr>
<tr>
<td>Altitude</td>
<td>Up to 1000m - Higher upon request</td>
</tr>
<tr>
<td>Adjustable starting time range</td>
<td>15 - 40 seconds</td>
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<tr>
<td>Starting time</td>
<td>Approx 25 seconds - Longer upon request</td>
</tr>
<tr>
<td>Number of starts from cold</td>
<td>Typically 3-4 (for standard unit)</td>
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<tr>
<td>Number of starts per hour</td>
<td>Custom designed</td>
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<tr>
<td>Standard starting torque setting</td>
<td>140% @ 40degC Electrolyte</td>
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<tr>
<td>Starting torque settable range</td>
<td>40% - &gt;200% (May require Options)</td>
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<tr>
<td>Isolating voltage tested phase/phase</td>
<td>2 times rated + 1000V</td>
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<tr>
<td>Isolating voltage tested phase/ground</td>
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<tr>
<td>Manufacturer</td>
<td>CSE-Uniserve</td>
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<td>Country of manufacture</td>
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### CONSTRUCTION

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<tr>
<td>Electrode material</td>
<td>Bronze</td>
</tr>
<tr>
<td>Bus bar material</td>
<td>Nickel plated copper</td>
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<tr>
<td>Tank material</td>
<td>304 - Stainless steel</td>
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<tr>
<td>Tank cover material</td>
<td>304 - Stainless steel</td>
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<tr>
<td>Enclosure material</td>
<td>304 - Stainless steel</td>
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<tr>
<td>Fixings screws and nuts</td>
<td>Stainless steel</td>
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<tr>
<td>Control cubicle</td>
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<tr>
<td>Welding method</td>
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### PROTECTION

<table>
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<tr>
<td>IP rating of the MV enclosure</td>
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<tr>
<td>IP rating of the LV enclosure</td>
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<tr>
<td>IP rating of general enclosures</td>
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### STANDARD INCLUSIONS

- Electrolyte level switch
- RTD temperature protection
- Electrolyte level indicator
- 4 X panel mounted indication lights
- VSD controlled electrode drive motor
- Programmable logic control (MicroLogix 1200)
- Modbus RTU
- Anti- evaporation oil
- Anticondensation heaters
- Electrolyte agitator motor

### AVAILABLE OPTIONS

- Electrolyte immersion heater
- Electrolyte circulation pumps - duty / standby
- Control voltage step-down transformer
- Programmable logic control (project specified)
- ProfiBus communication
- DeviceNet communication
- Ethernet communication
- Heat exchanger - liquid to liquid or liquid to air
- Mill start program
- Conveyor start/stop program
- Variable speed control
- Slip energy recovery drive ready
- Electrolyte Conductivity and temperature meter
- Hall effect rotor current monitoring
- RTD output - 4-20ma
- Dual motor control
- Load sharing slip resistors
- Cooling water valve control (on/off)
- Electrode position transducer
- Analogue outputs (4-20ma)
- Electrolyte flow monitoring
- Increased resistance ratio
- Extended starting time
<table>
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<tbody>
<tr>
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<th>Width (mm)</th>
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</thead>
<tbody>
<tr>
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<td>2125</td>
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<td>EPMA 3 DUO</td>
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<td>2500</td>
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<tr>
<td>EPMA 4 DUO</td>
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