EMLI

Furnace level measurement, Casting level measurement and Slag Detection monitoring systems

— A ‘State of the Art’ integrated electronics platform for Molten Metal Measurement Systems
Combine the most accurate and powerful Furnace, Ladle, Tundish & Mould Level Measurement Systems with the most sensitive Slag Detection available.

System Overview EMLI

The EMLI Electronics Base allows maximum flexibility for the Customer, together with Agellis, to design a layout to suit the required measurement situation at the furnace or casting area. This will achieve technically superior and cost effective solutions for your measurement problems.

The system is configured so that a single Management Unit can run multiple Control Units at the same time.

This means that the customer can utilize any combination of furnace level, furnace/ladle slag detection, tundish level, launder level and mould level system numbers that they may require in their plant.

To further enhance the possibilities and provide the backup necessary in a critical production area, the EMLI Control Units can run completely independently of the Management Unit when required to do so. This gives the customer peace of mind.

For example, any of the level measurement or slag detection systems will continue to function, even if the Management Unit should fail or the cables between the Management Unit and Control Unit should be accidentally cut.

The plant operators can have complete control over all measurement possibilities at all times.
Management Unit can also include remote connection to Agellis Sweden for monitoring, fault finding and configuration support.

All electronic system spare parts are shared and common, which minimizes the number of parts required in steel plant stock.

The unique advanced logging capability provides historical data for configuration, fault finding and process development.
EMLI SIL Slag Detection

Provides the operator with extremely sensitive control over the final part of teeming from ladle to tundish. Unique, convenient sensor design and location allows access to sensors at all times to make service quick, easy and very cost effective. Individual ladle identification assists system function and improves customer process control. Automatic slag sensitivity settings from 0 – 100% allows the steel maker to input steel grade and required quality specifications with regard to slag carryover. Steel plant tested components make the EMLI System extremely durable with low maintenance costs. Sensors require no special handling.

EMLI T Tundish Level Measurement

Provides the operator with extremely sensitive measurement of the true steel level in a continuous casting tundish, irrespective of the amount of slag or powder present. With a measurement range over the full depth of the tundish, the steel maker will always have precise information about the steel level, be able to maintain the correct pressure head and also to drain the tundish while preventing slag carryover to the mould, thus increasing yield. Individual tundish identification assists system function and improves customer process control. Automatic calibration, high & low level alarms, self diagnostics, multiple input/output options and continuous data logging, enable the system to be compatible with all customer operating procedures and control requirements. Steel plant tested components make the EMLI System extremely durable with low maintenance costs. Sensors are mounted against the inside wall of the tundish, protected and exit through compression fittings to heavy duty connectors on the outside. Sensors require no special handling.

EMLI M Mould Level Measurement Systems

Provides the operator with extremely sensitive measurement of the true steel level in continuous casting moulds, irrespective of the amount of powder present. Unlike radio-active systems, the EMLI M & Ms eddy current systems are unaffected by the addition of mould powder and therefore give the operator a very accurate metal level measurement in the mould. The EMLI Mould Systems come in two main types, the mould mounted sensor system and the suspended sensor system. They cover the full casting size range from slab to bloom, square & round. The sensitivity and depth of measurement gives the steel maker accurate control of the level in the continuous casting mould at all times. Automatic calibration, high & low level alarms, self diagnostics, multiple input/output options and continuous data logging, enable the system to be compatible with all customer operating procedures and control requirements. Steel plant tested components make the EMLI System extremely durable with low maintenance costs. Sensors require no special handling.

EMLI SIO & SIE Slag Detection

Constantly monitors the steel flow during tapping of the furnace and provides alarm outputs at the onset of slag in the stream. These outputs can be used to immediately end tapping by gate closure or change tilting, while also giving visual and audible alarms. Sensors/cabling are customized to fit any furnace and sliding gate/tap-hole arrangement with only minimal modification to existing equipment. The Management Unit is capable of running multiple Control Units of the same or different EMLI system types. This enables the user to expand the system to run extra slag detection systems or add mould level or tundish level measurement systems. Steel plant tested components make the EMLI System extremely durable with low maintenance costs. Sensors require no special handling.
**EMLI S Smelter Level Measurement**

The EMLI electronics platform allows Agellis to provide several molten metal level measurement systems such as the EMLI S for smelters/furnaces. Using the same powerful EMLI platform enables accurate measurement and thus control over metal levels in smelters/furnaces.

With measurement over the range of the sensors, the operator will always have precise information about the metal level, be able to make correct decisions about when to tap and also to control metal tapping while preventing unwanted slag carryover. There will be no need to stop the smelter/furnace to take dip pin measurements. This will allow more melting time and thus increase yield.

Automatic calibration, high & low level alarms, self diagnostics, multiple input/output options and continuous data logging, enable the system to be compatible with all customer operating procedures and control requirements. Molten metal plant tested components make the EMLI System extremely durable with low maintenance costs.

Sensors require no special handling.

**ELP Electromagnetic Furnace Profile System**

The Agellis Electromagnetic Furnace Profile System is a measurement unit for recording a complete furnace material profile at a fixed location when required. Can be used in all furnace/smelter types where access is possible and the process requires knowledge of different material levels. Slag thickness, matte level and bottom build-up can all be provided quickly and easily.

The System is easy to use with a pre-prepared lance performing a software controlled sequence of immersion and withdrawal. During the immersion sequence an electromagnetic sensor picks up conductivity changes as it passes through different materials. This information, in combination with lance position and time is fed to the plant PLC.

Lance mechanisms, speed and immersion times are all customized to fit the specific requirements at a measurement location. The system is capable of measuring a change of electromagnetic coupling and will produce a complete furnace conductivity profile.

The output from the system will be lance position, shown as height above the furnace bottom, and material conductivity, which can be shown as two 4 – 20mA signals or in other standard format.

The ELP is also available as a winched unit called the ELP W and this system can be employed where no space exists for a full lance delivery mechanism or where a furnace profile is not required and only the matte/metal level is of importance.

Sensors require no special handling.

**ELP is a patent pending technology.**

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**EMLI Technical Specification**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principle</td>
<td>Electromagnetic (Eddy Current)</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.2% of measurement range</td>
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<tr>
<td>Electronics</td>
<td>Voltage requirements: 100-240VAC 50/60Hz</td>
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<tr>
<td></td>
<td>Power consumption: 500 watts</td>
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<tr>
<td></td>
<td>Ambient temperature range: 0-55°C (32-131°F)</td>
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<tr>
<td>Transmitter</td>
<td>Output voltage: 1-4.3 volts DC</td>
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<tr>
<td></td>
<td>Output current: 0-6.5 amps</td>
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<tr>
<td></td>
<td>Maximum output power: 200 watts</td>
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<td>Output frequency: 100Hz-50KHz</td>
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<tr>
<td></td>
<td>Output control: Constant current or voltage</td>
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<td>No. of simultaneous frequencies: 3</td>
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<tr>
<td>Receiver</td>
<td>No. of Channels: 4</td>
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<tr>
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<td>No. of frequencies: 3</td>
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<tr>
<td>Receiver</td>
<td>Resolution: 24 bit</td>
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<td>Maximum sample frequency: 192ksp</td>
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<tr>
<td>I/O</td>
<td>Analog outputs: 3</td>
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<tr>
<td></td>
<td>Analog inputs: 3</td>
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<td>Digital outputs: 12</td>
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<td>Digital inputs: 14</td>
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<td>Temperature inputs: 2</td>
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<td>Vessel identification: 8</td>
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<tr>
<td>Calculation Methods</td>
<td>23-point linearization</td>
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<td>Multiple degree mathematical function</td>
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<td>Calibration Methods</td>
<td>Automatic calibration</td>
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<td>One point calibration</td>
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<tr>
<td>Sensors</td>
<td>Require no special handling</td>
</tr>
<tr>
<td>Certification</td>
<td>CE &amp; FCC Certified</td>
</tr>
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</table>
The Future of Measurement

AGELLIS Group AB is an innovative company focused on the development, marketing and sales of advanced sensor systems for the global metals industry. With a staff of industry experienced engineers, we are able to provide first class support and service. Our customers around the world use Agellis products within critical stages of production and quality assessment.

The AGELLIS Group Headquarters is located in Lund, Sweden and sales are conducted primarily through an international network of specialized distributors and agents. We have customers on five continents that include such important companies as ArcelorMittal, POSCO, Tenaris, Gerdau, Voest Alpine, Severstal, Sandvik, Anglo Platinum, Lonmin, Aurubis, Umicore, Elkem and Höganäs.

For more information please visit www.agellis.com

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Advantages and Benefits
- Fully integrated electronics measurement platform
- Designed specifically for molten metal measurement systems
- Unique Management Unit running multiple and different Control Units
- Compatible with all known Metals Industry process control computer systems
- Multiple input/output possibilities for greater control
- Fast, sensitive, repeatable, reliable measurement capabilities
- Powerful analysis processors, data logging and special software packages
- Control Units capable of running independently of Management Unit
- Noise reduction design enhances signal capture
- Multiple frequency capability
- Self diagnostics software
- Built-in safety back-up systems
- Designed to be remotely as well as locally monitored
- Meets all known safety standards

System gives operator:
- Continuous trouble-free function
- Cover for most measurement requirements
- Extensive measurement range
- High accuracy
- High resolution
- Excellent repeatability
- Rapid measurement update
- Flexible connectivity to Plant Control Systems
- Continuous data storage & historical records
- Improved Process Control
- Improved Quality
- A tool to increase yield
- Low maintenance time & costs
- Minimal spare parts consumption
- Reduced wear on caster mechanics
- Improved co-ordination at caster input/output
- Expert support via remote access for fault finding and configuration
• Improved co-ordination
• Reduced wear on caster mechanics
• Minimal spare parts consumption
• Low maintenance time & cost

• Improved Quality
• Expert support via remote access
• Improved Process Control
• Continuous data storage & logging and special software packages
• Flexible connectivity to Plant
• Rapid measurement update

• Excellent repeatability
• Extensive measurement possibilities at all times.
• Cover for most measurement situations at the furnace or casting area.
• Meets all known safety standards
• Self diagnostics software
• High accuracy
• Designed to be remotely as well as locally monitored
• Multiple frequency capability
• Noise reduction design enhances signal resolution
• Control Units capable of running multiple Control Units at the same time.
• Unique Management Unit running independently of the Management Unit when required to do so. This gives the customer peace of mind.
• To further enhance the possibilities and provide the backup required measurement situation at the furnace or casting area.
• This will achieve technically superior and cost effective solutions for your measurement problems.
• To minimize the number of parts required in steel cleaning and Drains Control
• Furnace Tapping
• Furnace Matte/Metal Level
• Tundish Steel Level

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