MOLD LEVEL MEASURING SYSTEM

OLD

NEW

SLAB
THIN SLAB
BLOOM
BEAM BLANK
**FEATURES AND BENEFITS**

- No dangerous radiation, no precautions for protection of health.
- The electromagnetic sensor is fastened directly to the mold top so it does not obstruct operating personnel and/or function of a tube-changer in any way.
- It is possible to use the MLM System signal also for automatic start of casting.
- The mold level sensor could be assembled and fully tested on the mold in the workshop to save necessary time for mold exchange on the casting machine.
- MLM System measures true molten steel level in the mold regardless thickness of slag or casting powder on surface of molten steel bath.
- The system characteristic does not depend on the steel grade.
- Sensitivity of the mold level measurement and control to local meniscus instabilities is widely suppressed because the system measures “global” mold level. The slab detector measures the level in the area of approx. ± 300 mm from the sensor axis. The bloom detector measures the level near two opposite mold wall.
- Quick time response adjustable from 0.1 s to 2.5 s.
- Low noise of the detector signal corresponds to the mold level standard deviation less than ± 0.5 mm.
- No manipulation or calibration before casting AUTOSET procedure could be initialized automatically by PLC executes a remote zero calibration mold level setting before casting.
- Heavy duty construction of the sensor. Protection of the sensor against damage at short-time overflow is ensured by efficient water cooling. Damaged mold level sensor can be repaired in VUHZ.
- Detector comprises effective auto-diagnostic systems for quick solving even prevention of most common operating troubles:
  - The permanent checking of the transition resistances of the contacts in connectors.
  - The measurement of the leakage resistances in the sensor and sensor intermediate cable within the AUTOSET.
  - The SELF-TEST procedure for quick testing of electronic part of the detector.
- The detector comprises extra hardware and firmware for:
  - Suppression of the influence of the narrow mold plates of slab or thin slab mold if necessary (if changing of the mold width during casting is applied).
  - Suppression of the influence of the vertical movement of the tundish during casting if the gap between the mold level sensor cover and the tundish is less than 200mm.
  - Suppression of the waves (swinging) of the liquid steel surface in the slab mold.
  - Suppression of the influences of the electromagnetic brake (EMBR) or mold stirrer (MEMS) caused by the mold level sensor surrounding.
  - The possible suppression of the impact of the manipulation with metal tool or splashing by drop of liquid steel close to one (left or right) reading coil of the sensor.

Two versions of evaluation unit are available. Cost effective one-signal unit SH-D and three-signal unit 3SH-D which provides the signals mold level for control as well as of the local level in the areas left and right from the submerged entry nozzle separately.

**IMPORTANT CONDITIONS FOR GOOD PERFORMANCE OF THE VUHZ ELECTROMAGNETIC MOLD LEVEL MEASURING SYSTEM**

Proper fixing of the sensor/sensors on the mold top.

No handling with ferromagnetic tools in proximity of sensor during automatic mold level control.

No splashed steel near sensing coils.

Sufficient flow rate of cooling water that meets technical requirements.

Good mechanical conditions of the sensors.

In case that utilizing of MEMS, FC mold or EMBR is intended then any components in the vicinity of the mold level sensor must be made of non-magnetic steel with contents of ferromagnetic phase below 1 %.
SENSOR FOR SLAB CASTER
PAIR OF SENSORS FOR SLAB CASTER OR THIN SLAB CASTER
PAIR OF SENSORS FOR BLOOM CASTER – SENSOR COVER FIXING
PAIR OF SENSORS FOR BLOOM CASTER
– MOLD COVER FIXING
### BASIC TECHNICAL SPECIFICATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Slab</th>
<th>Bloom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical measuring range in [mm] below the top edge of the copper mold plate:</td>
<td>100 x 600 mm or bloom 260 x 350 mm</td>
<td>260 x 350 mm</td>
</tr>
<tr>
<td>Nominal range in [mm] recommended for the automatic mold level control:</td>
<td>80 to 120 mm</td>
<td>80 to 120 mm</td>
</tr>
<tr>
<td>Minimum mold level that can be approximately indicated (for auto-start purposes only):</td>
<td>220 mm</td>
<td>140 mm</td>
</tr>
</tbody>
</table>

**Linearity:** ± 3 % of measuring range

**Long-term stability of global level measurement:** very slow drift of output signal in 8 hours at the mold level of 80 mm: ± 5 mm

**Measurement accuracy** = Short-time fluctuation of an output signal: < ± 1 % of the measuring range for mold level of 80 mm

**Response time:** Adjustable 0.1 s to 2.5 s

**Influence of temperature:** it is comprised in the long-term stability

### ELECTROMAGNETIC SENSORS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Slab Sensor</th>
<th>Slab Cover</th>
<th>Bloom Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum mold size:</td>
<td>100 x 600 mm</td>
<td>100 x 600 mm</td>
<td>200 x 200 mm</td>
</tr>
<tr>
<td>Sensor cable length:</td>
<td>max 15 m; option: sensor cable split into sensor cable and intermediate cable which are coupled by an intermediate connector placed on the mold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions and mass of one sensor (sensor cable 3 m included) and sensor cover:</td>
<td>63 x 150 x 570 mm, approx. 30 kg</td>
<td>83.5 x 220 x 590 mm, 19 kg</td>
<td>63 x 150 x 260 mm, approx. 15 kg</td>
</tr>
<tr>
<td>Relative humidity:</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EVALUATION UNIT SH-D

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply: 1 / N / PE AC 110-240 V 50/60 Hz 150 VA</td>
<td>PLC communication</td>
</tr>
<tr>
<td>Excess voltage category in installation: II (IEC 664)</td>
<td>or hard wire by user interface SH-D1</td>
</tr>
<tr>
<td>Dimensions: 550 x 360 x 220 mm</td>
<td>Analogue output</td>
</tr>
<tr>
<td>Mass: 21 kg</td>
<td>Analogue inputs</td>
</tr>
<tr>
<td>Protection rate: IP 65</td>
<td>Analogue inputs</td>
</tr>
<tr>
<td>Ambient temperature: 0 to 60 °C</td>
<td>Global mold level signal 4÷20 mA, refr. period 20 ms</td>
</tr>
<tr>
<td>Relative humidity: 90 % (non condensing)</td>
<td>Digital input</td>
</tr>
</tbody>
</table>

**GPS coordinates:** 49° 40’ 25” N, 18° 23’ 33” E

**Contacts:**

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