An angular pulse generator which is used in speed sensors, based on phonic wheel or turning cable technologies, is installed inside the ERCU box and transmits information to an electronic system to:
- Detect whether the train is running or stopped, in order to trip or release safety systems such as door locks
- Measure the speed of the train
- Detect which way the train is traveling
- Detect when a train is braking, with possibilities of skidding/sliding/locking of individual axle. In these cases adhesion between the rails & wheels is crucial. Above situations can cause damage to wheel sets with increased braking distance. The Speed sensor will detect the speed of the wheel and inform the Wheel Slide Protection System which main purpose is to optimize the available adhesion.

Mersen innovate in adapting two different speed sensor technologies in our Earth Return Current Units range.
First one is based on a non-contact sensor counting of RPM of a phonic wheel, the second speed sensor technology is based on a cable connected to junction box.

These 2 in 1 solutions bring you many advantages (compactness, weight, cost) and they are based on two proven technologies in railway applications.

Some references:
Railway : MANILLA (PH)

FEATURES & BENEFITS
- Saving in Mounting time with this 2 in 1 single device instead of two
- Saving Space and modification (holes) on the bogie
- Saving Weight on the bogie
- Two technologies available (phonic wheel or cable connection) adaptable on radial ERCU’s (3 or 4 gaines 12,5 x32 or 20x40)
- Cost effective, prooven technologies and simple fixing on the bogie
- The Axial contact 3 brushes 12,5 x 32 Earth Return Current Unit is installed at the end of the axle, to provide an effective shunt around the bearings.
- There is a possibility to supply a complete adaptation including the contact disc, the support of the contact, the adapter, etc...

APPLICATIONS
- Speed sensor for all kind of trains and Metro
Speed Sensor 3 Gaines Standard Axial 12,5x32 (300Amp)

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>Axial</td>
</tr>
<tr>
<td>Rated current</td>
<td>300 A</td>
</tr>
<tr>
<td>Number of brushes</td>
<td>3</td>
</tr>
<tr>
<td>Cross section of the brushes</td>
<td>12.5 x 32 mm</td>
</tr>
<tr>
<td>Short time withstand current 100ms</td>
<td>7 kA</td>
</tr>
<tr>
<td>Short time peak withstand current</td>
<td>19 kA</td>
</tr>
<tr>
<td>Resistivity</td>
<td>5 mHms</td>
</tr>
<tr>
<td>Constant brush pressure</td>
<td>34 kPa</td>
</tr>
<tr>
<td>Material of body</td>
<td>Stainless Bronze, connection tinned</td>
</tr>
<tr>
<td>Material of cover</td>
<td>3 mm thick zinc plated (15 microns) steel cover plate</td>
</tr>
<tr>
<td>Material of spring and screws</td>
<td>stainless steel</td>
</tr>
<tr>
<td>Material of insulating ring</td>
<td>Compound polyester</td>
</tr>
<tr>
<td>IP</td>
<td>547</td>
</tr>
<tr>
<td>Pulse per meter</td>
<td>172 pulses/meter</td>
</tr>
<tr>
<td>Speed measurement</td>
<td>0.2 ... 400 km/h</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

*Dented wheel + sensor - principle*

The sensor system is based on non contact type of counting of RPM.

This is ensured with the help of phonic wheel & sensor probe fitment with some air gap.

*Turning cable - principle*

The function of speed sensor is to relay the signals with the rotation of the cable mounted on axle end and convey WSP system.
Speed Sensor 3 Gaines Standard Axial 12.5X32 (300Amp)

DIMENSIONS

Earth Return Current Unit - 3 brushes with Dented wheel speed sensor - view 1 (dwg 1048133)

Earth Return Current Unit - 3 brushes with Dented wheel speed sensor - view 2 (dwg 1048133)
Speed Sensor 3 Gaines Standard Axial 12,5X32 (300Amp)

DIMENSIONS

Earth Return Current Unit - 3 brushes with Turning cable speed sensor (dwg 1032852)
**Functions**

**Operations**
In the patented Earth Return Current Unit the contact is made to the axle end by means of 2 independent brushes guided in 2 boxes of rectangular section in the radial direction of the axle. Two independent pressure systems of the close coiled roller spring type without inertia, apply a constant pressure to each of the 2 brushes.

The Earth Return Current unit is fitted to the axle by means of an adaptation part which replaces the axle box end cover, and is therefore easily accessible. For the inspection purposes, it is a simple matter of undoing 3 screws removing the cover/spring assembly for access to the brushes. An insulating support positioned between the Earth Return Current Unit and part ensures the effective shunting of the roller bearing by the unit.

The connection lug for the electrical connection is an integral part of the unit.

The rotating contact face is a disc fitted to the axle end and possibly protected against lubricants emanating from the axle box bearing by a guard.

Due to the simplicity of the device and the very slow rate of brush wear (about 1 to 3mm per 100’000 km or 190’000 miles after patina creation), maintenance required is virtually zero. With the appropriate brush grade the formation of the skin on the surface of the contact disc can be observed and no evidence of hammering nor bevelling appears on the brush contact faces. The brushes are generally a metal graphite mixture grade manufactured by Mersen.

**Contact disc - Slip disc**
Mersen can study, design and supply the slip disc adapted to your axel end (material is CuSn8Ni3P)

**Brushes**
For the maintenance, the replacement brushes designed and dedicated to your Ground Brush can be provided by Mersen.
FUNCTIONS

**Connexion cables + Braided cable**
Connexion cables or braided cables are studied for your application. Mersen can supply and guarantee them. They are delivered with the possibility to customize the total length plus the adapted hardware for bolted connection.

**Electrical isolation**
ERCU are sealed to offer electrical isolation and a perfect protection from outside aggression and dirty environments. On a regular basis, they offer IP547 but they can be modified to offer IP65.

**Connexion plate**
Connection plate can be designed for “external” or “internal” connections to meet your requirements. Also, the cover of the ERCU can be electrically isolated.

**Salt mist protection**
Standard version of ERCU offer 96 hours protection against salt mist but Mersen can propose higher protection with Zinc Nickel coating on the cover for 500 hours protection and a cataphoresis coating on the cover for a protection up to 1000h against salty mist.
Speed Sensor 3 Gaines Standard Axial 12,5X32 (300Amp)

**Personal identification**
Mersen can add identification like data Matrix or QR code on each product

**Cable support**
Cable support system can be studied to hold the cable and enlarge its life.

**Painting of Steel covers**
We can paint the metal covers on your ERCUs to the color specified as per the RAL chart, for purely cosmetic reasons.

**Training and commissioning**
Mersen team can help you for training your Maintenance team and for commissioning your new installations all around the world.

**LCC; RAMS; Type tests**
Mersen teams can supply Life Cycle Costs “LCC” and Reliability Availability Maintainability Safety “RAMS” and Failure Mode and Effect Analysis “FMEA” studies. They can operate Qualification type tests.