Railway special

EPHY MESS
Gesellschaft für Elektro-Physikalische Meßgeräte mbH

EPHY MESSAGE 09/10

E D I T O R I A L

EPHY-MESS quickens its pace

Not a L, not a W nor a U, but a V as scenario of the economic cycle is here! The financial crash took place first and then directly afterwards, as a pullback, the economic boom came and caused a V-curve of the economic development. Since the end of May, after eleven month of short-time work (in the production and quality assurance department), the German export activities have been increased due to the economic development in the BRIC states. Thus the business at EPHY-MESS is booming again.

The slowdown of investment stopped abruptly. After a decline in sales in 2009 of 25% in comparison to the previous year (the best fiscal year since the company foundation in 1955) the estimated sales volume for the year 2010 is 12 million Euros. This is an increase of +10% compared to the extraordinary successful fiscal year 2008.

Due to the economic recovery EPHY-MESS currently builds a new company building. Five million Euros will be invested to enlarge the production facilities by 2200sqm (!) and to construct a new R&D Center with triplet capacities. The move into the new building is planned for summer 2011. Until then an interim solution for the production (containers) is necessary due to a strong increase in receipt of orders especially in the segment of temperature sensors for high speed trains (wheel set bearing, traction, gearbox and control cabinet). 10 to 25 new jobs are provided presently. Current order income guarantees the production volume up to mid of 2012 and all signals are showing green light. Full speed ahead!

Visit us at the InnoTrans exhibition in Berlin for a personal conversation.

Sincerely yours

Andreas Becker
Corporate management

Temperature sensors for international high-tech trains

EPHY-MESS keeps trains running

In the year 2009 two billion commuters and tourists used the railway as means of transport in Germany. Due to the desire for more mobility, faster accessibility, higher comfort and efficient environmental protection the importance of the traffic engineering and especially the railway transportation is increasing to a great extent. Europe is becoming more and more a standardized rail traffic region. Security and reliability demand high requirements to the railway technology and hence to the sensors applied in the trains. Particularly in high speed trains, sensors must work absolutely reliable under different operating conditions.
EPHY-MESS temperature sensors, speed sensors and oil level gauges fulfill these requirements and have already been used and proven in famous international trains.

Railway sensors from Wiesbaden-Delkenheim are not only well-known in Europe, but the quality of EPHY-MESS railway components has got around to China. Three application examples of EPHY-MESS products are presented here:

Used in the RailJet

The RailJet is the flagship of the Austrian Federal Railways ÖBB. It is a locomotive-hauled push-pull train for the Austrian and transnational high speed passenger transportation (to Germany and Hungary). The train is hauled by a locomotive of the EuroSprinter-family which can reach a maximum speed of 230 km/h. For the thermal supervision of the driving motors EPHY-MESS sensors have been chosen. The main criteria for the selection of the manufacturer were mechanical stability and high measuring dynamics. Beside the temperature detection, speed and driving direction are also measured with sensors from EPHY-MESS. An oil level gauge, especially developed for the high speed range, completes the metrological equipment in the locomotive chassis. It is used to easily inspect the oil level in the gearboxes. This special oil level gauge works without a protection cap or bulletproof glass and still guarantees that a straight stone-chipping with a velocity of 230 km/h causes no leakage of gear oil. The locomotive, a Siemens ES 64 U2, is named "Taurus" by the ÖBB and is employed as type series 1016 (15 kV version) and 1116 (2-systems-version: 15 kV and 25 kV).

Image: Siemens Mobility Division

The high speed train RailJet has an operating speed of 230 km/h on its route between Munich, Vienna and Budapest. EPHY-MESS temperature sensors, speed sensors and oil level gauges are part of the monitoring system.

Visit us at the following exhibitions:

InnoTrans 2010, Berlin, September 21- 24, 2010, Hall 4.2 Booth 237
Husum WindEnergy 2010, Husum, September 21- 25, 2010, Hall 4 Booth 4E05
SPS/IPC/DRIVES 2010, Nuremberg, November 23- 25, 2010, Hall 1 Booth 159

For the fastest series-production train of the world

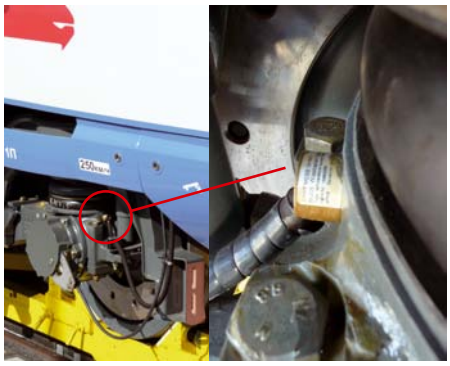
Since 2007 the Spanish National Railway (RENFE) operates a high speed trainset on different scheduled lines in Spain under the label AVE S-103. With an operating speed of 350 km/h, e.g. on the line Madrid – Barcelona, it is currently the fastest series-production train of the world. At such extremely high velocities the demands on the sensor system in the area of the drive system are tremendous. Strong vibrations due to extremely high air speeds mainly stress the sensor cables in an extensive way. The loads due to impacts, which despite of the suspension still act on the sensor system, require a special internal assembly of the measuring equipment to assure the necessary availability. Especially in this technologically challenging field EPHY-MESS has acquired a competent knowledge and gathered useful experiences over the years. For this train EPHY-MESS delivers temperature sensors for the thermal supervision of the traction motors, the gearboxes and the wheel bearings as well as speed sensors for the detection of speed and driving direction. The Velaro E, AVE S-103 is a further development of the ICE3 which is well-known in Germany. In contrast to locomotive-hauled trains the drive systems/traction is distributed under floor over the whole length of the train. Therewith a higher traction is achieved. Compared to the ICE3, the passenger compartments were also further developed. There are three different classes (Turista Class, Preferente Class, Club Class) instead of the typically known two classes in Germany.

Image: Siemens Mobility Division

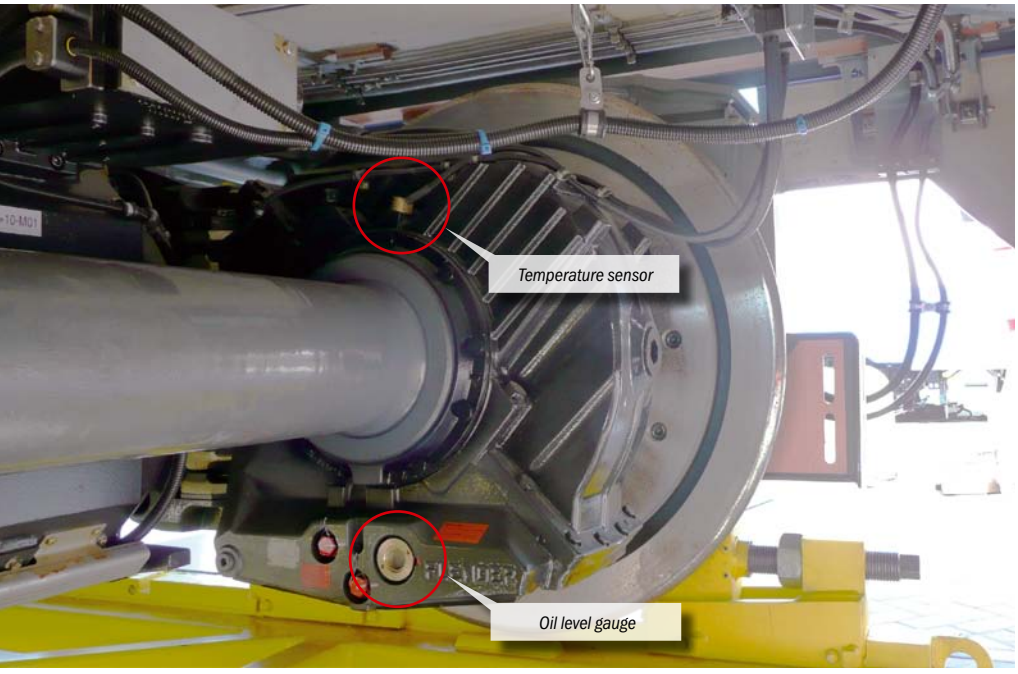
Velaro E, the Spanish high speed train, has a maximum operating speed of 350 km/h. EPHY-MESS temperature and speed sensors easily fulfill the enormous requirements.

Image: Siemens Mobility Division

Velaro RUS (peregrine falcon), equipped with EPHY-MESS temperature sensors, drives with a speed of 250 km/h in Russias climatic challenging country side.



Reliable thermal supervision of wheel set bearings of the Velaro RUS by EPHY-MESS sensors.



EPHY-MESS oil level gauges for measuring the gear oil level and EPHY-MESS temerature sensors in the high speed train Velaro RUS.

Partner for 350 km/h projects in China

When the Chinese "Velaro" version was discussed, EPHY-MESS could qualify as a partner for the long-distance passenger traffic projects in China due to its many years of experience with sensors in the underfloor zone of high speed trains. The requirements are - similar to the Spanish high speed trains - very demanding. The operating speed of the trainsets with the label "CRH3" is 350 km/h. Especially the pressure differences, occurring while entering or leaving tunnels at such high velocities, cause tremendous mechanical loads to the sensors which are installed in the underfloor zone. Manufacturer as well as operating companies of these "extreme means of transportation" trust in the EPHY-MESS technology. As in Spain, temperature sensors are installed at motors, gearboxes and wheel set bearings.

Dipl.-Phys. Gerhard Herdt
Project manager Railway sensors
Phone: +49 6122 9228-13
E-Mail: gerhard.herdt@ephy-mess.de

Iris certification: Even more successful

IRIS Certification

Since July 2009 EPHY-MESS is successfully certified according to the International Railway Industry Standard IRIS and well prepared to fulfill the requirements of the railway industry. IRIS is a quality standard developed by UNIFE. It is a standardized management system that should guarantee that customer requirements concerning products and/or services in the field of railway industry are fulfilled and that the quality is even improved. IRIS is mainly based on ISO TS 16949, a well-known quality standard applied in the automotive industry. All aspects of ISO 9001 are included in this standard, too. In addition it focuses on a systematic realization of railway projects with the method of project management. The guaranty of reliability and delivery performance as well as the storage of gathered knowledge and experiences are further important issues of IRIS. The advantages for EPHY-MESS customers (and the company itself) are clear: the product quality has to be guaranteed and if possible it should be further improved. In the surveillance audit in June 2010 EPHY-MESS could achieve an even better result than in the previous year.

Highly adjustable and cost-efficient

Temperature sensors specially designed for the railway industry

Since about 20 years EPHY-MESS develops and manufactures temperature sensors for the use in railway vehicles and high speed trains. EPHY-MESS has constructed a building block system that offers fast and cost-effective problem solutions adapted to the particular requirements of the respective railway engine.

In order to be able to keep investment- and operational costs low, sensors for the railway technology must fulfill the following requirements:

- low constructional efforts
- safe operation
- low susceptibility to damage
- high availability
- fast and safe disconnection from wagon for maintenance works
- low price

The building block system for sensors helps to achieve these objectives. Temperature sensors, speed sensors, cables and plug connectors can be combined flexibly. For this reason, the measuring sensors and additional components can be individually adapted to the requirements of the railway engines.

Custom-made but also standard – application specific temperature sensors

The thermal supervision of railway engines is not only important in terms of safety, but it also should prevent drive and control units from failure and should optimize maintenance costs by Condition Monitoring. Different measuring tasks require an exact thermal supervision of

- traction motor
- wheel set bearing
- control cabinet
- gear oil

Temperature sensors must measure the temperature of motor coil heads, bearings and gear oil as well as in control boxes under all operating conditions in a reliable manner.

The thermal supervision of wheel set bearings has high security relevance. Overheated bearings can cause serious failures. In the European high speed railway system a thermal monitoring of wheel set bearings is therefore prescribed as an Onboard system (on the train). A side effect is the supervision of the wear of the bearing in the field of preventive maintenance.

Power and control electronic devices placed in the control cabinets are very temperature sensitive. At high temperatures, e.g. due to badly dissipated thermal losses, the devices can be damaged. Therefore reliable temperature monitoring is a must.

Due to strong frictions, gear rings and gear wheels abrade. To avoid and detect any damage the oil temperature should be monitored continuously. The thermal supervision of gear oil also allows an identification of possible damages of the gear rings and gives information about the mechanical condition of the gear wheels.

Speed sensors for a correct driving speed and direction

By supervising railway engines an exact detection of rotational speed and direction of rotation is very important. EPHY-MESS develops and produces incremental impulse sensors based on Hall-elements for detecting speed and driving direction. They are used in locomotives and multiple units, in high speed trains, metros and suburban trains worldwide. Beside temperature sensors the speed sensors are part of the modular EPHY-MESS sensor concept that also contains assembled sensor cable harnesses.

Characteristics of EPHY-MESS speed sensors:

- reliable detection of rotational speed and direction of rotation
- easy and fast installation due to its brass flange housing
- resistant to shocks and vibrations acc. to DIN 61373 Cat. 3
- maintenance- and wear-free
- compact construction
- non-magnetic housing (made of brass)
- short circuit protected against supply voltage
- long term stability and temperature resistance

The maximum switching frequency is up to 25.000 Hz and a gearing of gear-wheel-modules from 1.0 can be detected. Moreover the speed sensor is suitable for zero-speed. The output signal is a square wave signal, also with inverted and galvanically isolated signals, with a phase shift of 90 degrees ± 30 degrees. It is resistant to vibrations of 200 m/s² (acc. EN 61373) and shocks up to 200 g. The magnets on the inside of the speed sensors are high temperature resistant. As a result the magnetism withstands temperatures up to 300°C and causes very good long term stability. EPHY-MESS speed sensors can be applied in temperature ranges of -50°C respectively -40°C up to +125°C. All requirements of protection class IP 68 are fulfilled and ATEX-proofed versions are available on request. The conformity to EN 60751, EN 61373 Category 3, DIN 5510, NF F16-101, EN 50305, UIC 564-2, EN 50265-2-1, EN 50268-2 is given. On request EPHY-MESS produces impulse sensors according to individual requirements. Cable, plug, switching frequency and module can be selected individually.

Dipl.-Ing. Thorsten Lewerenz
Project manager
Phone: +49 6122 9228-52
E-Mail: thorsten.lewerenz@ephy-mess.de

EPHY-MESS sensors for railway machines can easily be adapted to the particular requirements. Standard specifications are:

Version:	resistance thermometer
Measuring resistor:	Pt100/ Pt1000, 2xPt100 / Pt1000 in class B
Mode of connection:	2, 3 or 4 wire circuitry
Connection head:	brass, Ø32 mm x 16 mm, sealed-in
Protection tube:	INOX, Ø5,0 mm, alternative Ø6,0 mm
Installation length:	from 25 mm to 500 mm, others on request
Tension relief:	INOX
Mounting:	two fixing bores
Temperature range:	-40...+200°C (standard)
Measuring current:	max. 10 mA
Dielectric strength:	> 200 MOhm / 500 volt (higher kV-resistance on demand)
Protection:	IP 68
Supply line:	firmly secured connecting wire, free of halogen and silicone, copper and tin-plated shield, placed into a cable harness, with plug connector or free wire ends
Conformity:	EN 60751, EN 61373 Category 3, DIN 5510, NF F16-101, EN 50305, UIC 564-2, EN 50265-2-1, EN 50268-2

Length of supply line, protective tube and plug connectors can be selected freely.

Patented contribution to environmental protection

Oil level gauges

Components placed in the underfloor zone of rail vehicles are exposed to a high risk: mechanical strains (rockfalls). Oil level gauges are highly endangered and sensible components that are used for monitoring the oil level in traction gears. They must be easily accessible, quick to clean and nevertheless highly impact resistant.

EPHY-MESS oil level gauges enable a quick control of the oil level. A patented two-chamber system with integrated protective grid withstands “projectiles” up to a mass of 30g and a speed of 50m/s. In case of a damage of the sight glass due to a stronger collision, the gear oil will not leak out thanks to the two-chamber system. An environmental pollution can also be avoided. The destroyed glass can be replaced quickly during a routine test without opening the oil container and emptying the oil. Not only in railway machines EPHY-MESS oil level gauges have been proven successfully, but they are also working reliably under very rough industrial conditions like in the mining industry.

Special benefits of EPHY-MESS oil level gauges:

- highly resistant against collision due to a two-chamber system with integrated protective grid
- at damage of the outer chamber the system-tightness is completely maintained
- fast and non-polluting repair in case of damage without opening the oil container
- special designs on request

The technical specification of standard oil level gauges:

Version:	oil level gauge
Temperature range:	-40...+105°C (standard)
Protection system:	two-chamber system with a stainless steel protective grid
Collision:	outer special sheet of glass is resistant to collision with objects up to m=30g / v=50m/s
Thread:	M48x1,5, G1½”, G1¼”, G2”, other threads on request
Protection:	IP 68
Housing:	brass
Protective grid:	stainless steel
Conformity:	EN 61373 Category 3

Special designs – (almost) everything is possible

EPHY-MESS manufactures oil level gauges with housings made of brass and also made of aluminum or stainless steel. The aluminum and stainless steel versions are equipped with only one special protection glass that still guarantees complete system-tightness and high resistivity. The aluminum oil level gauges are a lower-cost alternative and very suitable for applications where weight limits are important. Oil level gauges made of stainless steel are often used in industrial applications due to their resistance to corrosion, mechanical stability and loading capacity. All different versions are available with threads M48x1,5, G1½”, G1¼”, G2”.

Dipl.-Betriebswirtin Andrea Wanieck
Marketing manager
Phone: +49 6122 9228-21
E-Mail: andrea.wanieck@ephy-mess.de

I M P R I N T

Publisher
Andreas Becker, Dipl.-Kfm.
General Manager

EPHY-MESS
Gesellschaft für Elektro-Physikalische Messgeräte mbH
Berta-Cramer-Ring 1
D 65205 Wiesbaden-Delkenheim
Tel. +49 (0) 6122-9228-0
Fax +49 (0) 6122-9228-99
info@ephy-mess.de
www.ephy-mess.de

Editorial & layout
mbk Marketing-Beratung Kuchenmeister GmbH
D 97200 Höchberg
Tel. +49 (0) 931-40,670-0
info@mbkgmbh.de

Source photographs
Image: Siemens Mobility Division