SPEED SENSORS

Speed sensors, based on incremental impulse sensors, are part of the modular EPHY-MESS sensor concept for rail vehicles. Through the encoder signal the rotating direction and speed of locomotives, motor- and high-speed trains are measured.

EPHY-MESS speed sensors are installed in high speed trains, metros and trams worldwide. They are also used successfully under harsh conditions in the mining sector.

In general

EPHY-MESS produces speed sensors according to individual requirements. Cable versions, connector, switching frequency and gearwheel module are available. Angled configurations are also possible.

The speed sensor measures rotational movements contactlessly; they are offered in 1- and 2-channel version. Speed sensors are available for gearwheel modules from 1.5 to 3.0. The maximum switching frequency is 25.000 Hz. In addition, EPHY-MESS speed sensors are suitable for zero-speed detection. They are applicable in the temperature range from -50°C to +125°C and meet the requirements of protection type up to IP68. The sensors comply with:

DIN EN 61373 cat. 3	DIN EN 50305	UIC 564-2	DIN EN 45545-2
DIN EN 60332-1-2	DIN EN 61034-2	DIN EN 50121-4-2	DIN EN 60947-5-2

EPHY-MESS currently manufactures 3 versions of speed sensors

- speed sensor for ferromagnetic gearwheels with
  - a) DC voltage supply between 8 V DC to 24 V DC (limit 30 V DC)
  - b) current loop 7 mA / 14 mA
- speed sensors for electrically conductive gear wheels 8 V DC to 20 V DC

Rev. 20180102

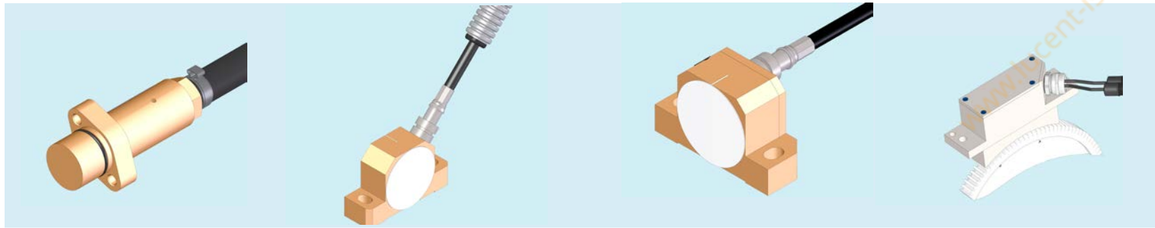
DWG 04
straight cable output

DWG 05
cable output aside

DWG 06
half flange housing,
cable output 180°

DWG 07
threaded sleeve M20 x 1,5
straight cable output

DWG 08
flange housing with
asymmetrical flange



DWG 09
big flange version,
straight cable output

DWG 21
flat housing,
cable output aside

DWG 22
flat housing,
backside cable output

DWG 41
grinding housing

ELECTRICAL DATA FOR SPEED SENSORS

DC-voltage powered speed sensor for ferromagnetic gearwheels

supply voltage U_B
8 - 24 V DC (max. 30 V DC)
current demand without load
< 25 mA at 24 V DC
insulation resistance
>200 MΩ / 500 V DC
(encoder-electronics to encoder-housing)
max. output current
20 mA
frequency range
0.01 – 20000 Hz (standard)
output level
at push-pull output
high-level ≥ UB - 2.0 V
(at 1.67 kΩ load resistance)
low-level ≤ +1.5 V
duty cycle
0.5 ±0.2 at involute toothing
reverse polarity protection
yes, for power supply
short circuit proof
yes, outputs continuously

Current-loop speed sensor for ferromagnetic gearwheels

supply voltage U_B
8 - 24 V DC
external load (R_A) ≥ U_B current loop power supply (≤ 24 V) / 14 mA (R_A in Ω and U_B in V)
(The external load depends on the voltage of the current loop power supply)
insulation resistance
>200 MΩ / 500 V DC
(encoder-electronics to encoder-housing)
output current
low-level nominal 7 mA
(tolerance values 5.6 – 8.4 mA)
high-level nominal 14 mA
(tolerance values 11.2 – 16.8 mA)
frequency range
0.01 – 20000 Hz (standard)
duty cycle
0.5 ±0.2 at involute toothing
reverse polarity protection
yes

Rev. 20180102

High voltage 110 V DC speed sensor for ferromagnetic gearwheels

supply voltage U_B
110 V DC (77.5 – 137 V DC)
current demand without load
< 80 mA at 110 V DC
insulation resistance
> 200 MΩ / 500 V DC
(encoder-electronics to encoder-housing)
max. output current
1 mA
frequency range
0.01 – 20000 Hz (standard)
output
both outputs galvanically isolated from each other and from power supply
output level
direction left
~ +2.0 V ground-referenced
direction right
~ -2.0 V ground-referenced
duty cycle
25 µsec
reverse polarity protection
yes , for power supply
short circuit proof
yes, outputs continuously
Alternatively available with the electrical data of the version with 24 V.

voltage powered speed sensors for electrically conductive gear wheels

supply voltage U_B
8 – 20 V DC (max. 24 V DC)
current demand without load
< 25 mA at 20 V DC
insulation resistance
> 200 MΩ / 500 V DC
(encoder-electronics to encoder-housing)
max. output current
20 mA
frequency range
0.01 – 20000 Hz (Standard)
output level
at Push-Pull-output
high-level ≥ UB - 2.0 V
(at 1.67 kΩ load resistance)
low-level ≤ +1.5 V
duty cycle
0.5 ±0.2 at rectangle gearwheels
reverse polarity protection
yes, for power supply
short circuit proof
yes, outputs continuously

Electrical protection

shielding supply line
connected to sensor housing
ESD-protection
fulfills requirements A acc. EN 60947-5-2
6 kV contact discharge / 8 kV air discharge
electromagnetic compatibility (EMC)
rolling stock DIN EN 50121-3-2
vibration resistance
DIN EN 61373 cat. 3,
DIN EN 60068-2-64
shock resistance
DIN EN 61373 cat. 3
DIN EN 60068-2-27
IP code (DIN EN 60529)
IPx8 (only Sensor head at 8 bar 60 minutes)
IPx6 (only Sensor head at speed sensors for electrically conductive gearwheels)
measuring range sensor
-40°C ... +125°C
(ferromagnetic gearwheels)
measuring range sensor
-40°C ... +100°C
(electrically conductive gearwheels)
temperature range cable
-40°C ... +95°C
fire protection
DIN EN 45545-2

Mechanical data

material of housing
brass (Ms),
stainless steel (VA) 1.4571 on demand;
welding housing (DWG 41) only in aluminum with brass sensor head
dimensions
upon request
connection
M16 x 1.5*)
flat housing DWG04 also with M20 x 1.5*)**)

* to connect e.g. a corrugated pipe or a rubber hose
** not possible for flat housing DWG 21/22

MODULAR SYSTEM

example of a cable harness for gear monitoring

Modular construction system

The building block system combines tested products. This ensures safe operation, excellent service quality and a high reliability. A ‚new' sensor is only a modification of a proven sensor system which is already in operation. This prevents expencive new designs as well as time consuming sample copy releases.

Components of the modular construction system
The components include a measuring element, wiring and, if needed, a plug connection with tension release. Temperature sensors and speed sensors can be widely combined to create a customized sensor or wiring harness.

With one wiring harness up to 8 sensors can be combined to one main cable that is connected via one plug. Fixed intergration of components within the wiring harness is also possible, as well as the use of additional separating plugs which could be necessary for installation and service.

In addition to the assembly groups you will receive installation material that is specifically designed for the product and a service packet covering the product from first design to setting into operation.

Rev. 20180102

modular sensor concept 2

modular sensor concept 4

Modular sensor concept 2

Due to the modular concept principle the presented temperature sensors and speed sensors can be easily mounted to one completely assembled multi-arm cable harness Two sensors are combined to on single sensor system. Generally, this system consists of a temperature sensor and a speed sensor. A combination of 2 temperature sensors is also possible. The sensors are routed to a main cable and connected via a plug. Usually each sensor cable is shielded down to the final plug that minimizes the influence of electrical interference.

Modular sensor concept 4

In addition to the modular sensor concept with 2 components, this version can be equipped with four or up to 8 sensors as standard (depending on the connector system and PIN assignment). In this case, the sensors are also routed to a main cable and connected via a plug. As with the modular sensor concept 2, the cables are laid to the system plug without interruption. The strings can therefore be replaced separately, which, in addition to minimizing sources of error, makes installation and disassembly easier during maintenance work.