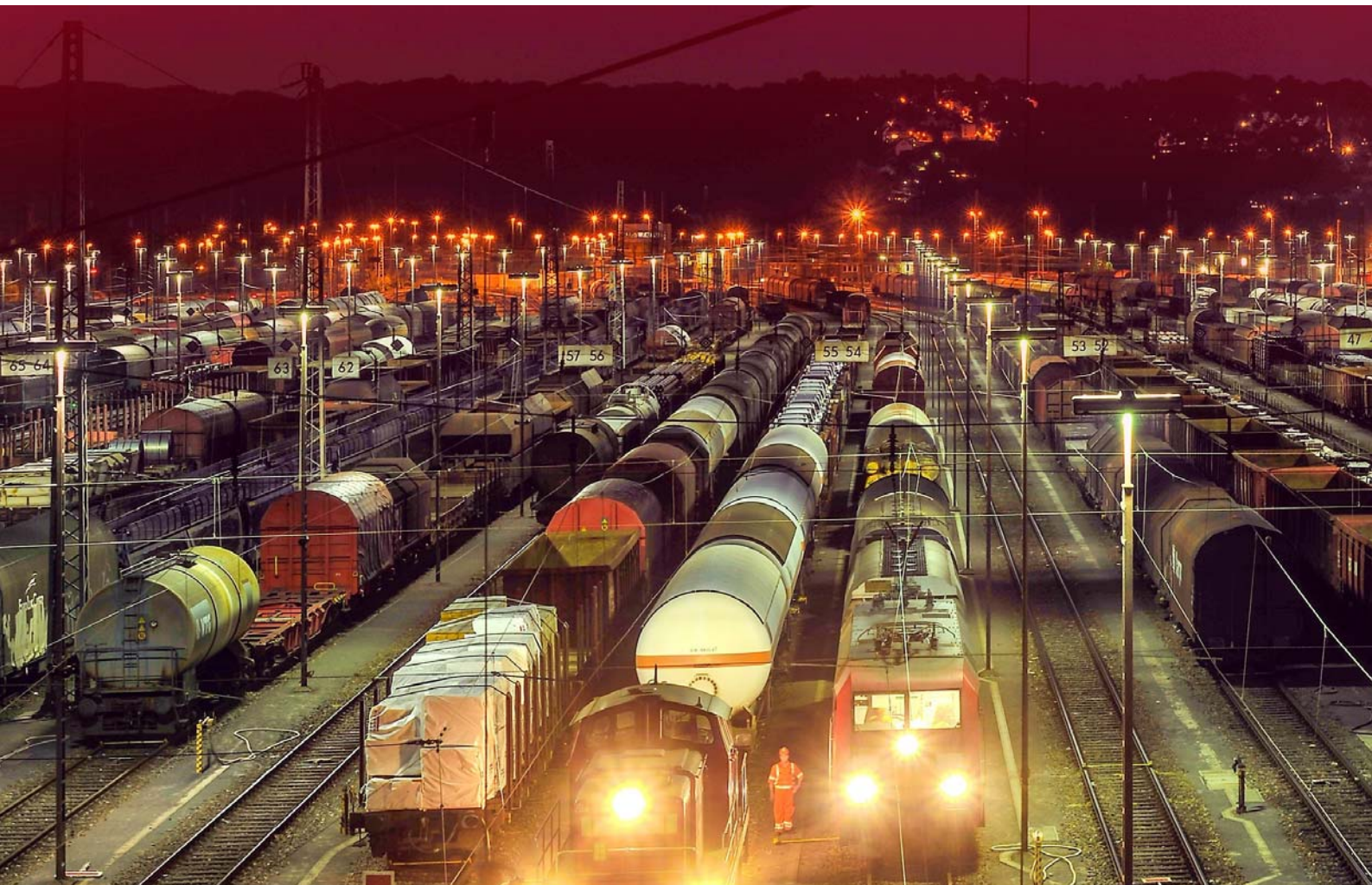


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Wheel Sensor
Document

2N59-1R-200-40
2-EL-81161-00-EN_0_01

Datasheet

for

Double wheel sensor

2N59-1R-200-40



Date of release: 2020

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1.1 List of Changes







Version	Editor	Date	Verifier	Date	Reason of Change
00	G. Ulke	16.02.2002	Friedhelm-Joost	21.02.2013	First edition (German translation) EL-81232-00-00
01	S. Dünnwald	16.12.2013	H.-P.-Wenzlawski	17.12.2013	Transfer into Layout PITB, international rail profiles
03					
04					
05					

1.2 List of Abbreviations

Abbreviation	Meaning
ABG	Switching amplifier module
DWS	Double wheel sensor
LWB	Linear eddy current brake
MTBF	Mean time between failure
SSPV	DWS test plate

1.3 Safety instructions

To avoid possible damage to property or injuries it is essential to comply with the following instructions:

Symbol	Name	Meaning
	Tip	Useful recommendations are given here
	Note	Draws attention to possible problems
	Caution	Hazards that could result in minor injury or severe property damage
	Attention	Hazards that could cause serious injury or death
	Danger	Immediate hazards that will certainly lead to serious injury or death
	ESD	This component/module is sensitive to ESD! Handle with care! When working with electronic components which are sensitive to electrostatically discharges precautionary measures are required: sufficient methods for ESD- protection during transport (conductive and electrically conductive packaging) and handling (electrical grounding and prevention of electric charging) have to be applied and observed. Improperly handling of ESD- sensitive components may lead to damage and voiding the warranty!

2 Application

The device is for directional detection of the wheel flanges of railway wheels.

The massive metal flange of the wheel rolling across the double wheel sensor systems is occupying the individual system of the double wheel sensor. This causes a change in the internal resistance of the DSS-system. This change is evaluated in the evaluation device, the switching amplifier module ABG.

3 Technical Data

3.1 Drive operation

Actuation : By the wheel flange

Rail profiles according to DS 820 : From **S33, 90ARA** (min. height 134 mm) to **R65, 140RE** (max. height 180 mm)

<u>Rail-Wheel</u> diameter	:	≥ 330 mm	≥ 600 mm	≥ 1000 mm	≥ 2100 mm
Traversing speed	:	≤ 160 km/h	≤ 250 km/h	≤ 250 km/h	≤ 250 km/h
Min. axis-center distance	:	0,7 m	1,4 m	1,4 m	1,4 m

Lateral offset of wheel : 0 to 70 mm

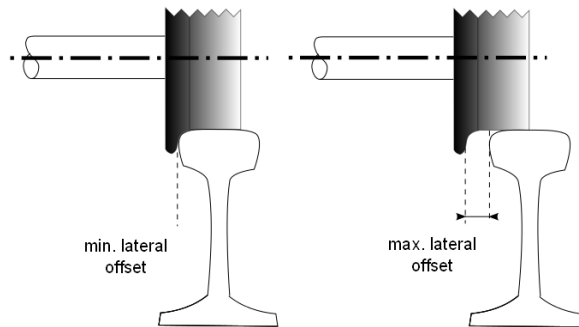


Figure 1: Lateral offset principle

Wheel flange height : Minimum of 26 mm for a wheel diameter of more than 760 mm
 : Minimum of 32 mm for wheel diameters between 330 mm and 760 mm

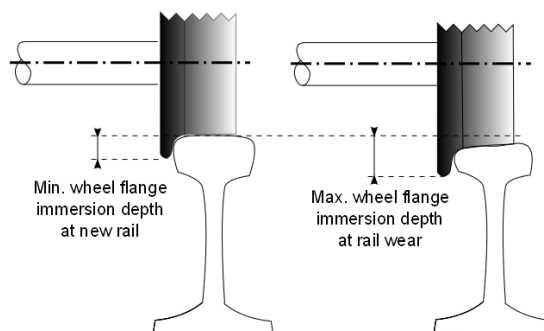


Figure 2: Wheel flange height principle

Rail wear : 18 mm



After 8 mm of rail wear, the DWS is mounted in a 9 mm lower position (Pos.1 to Pos.2), the existing spacers are reduced or completely removed (refer to the installation instruction spreadsheet).

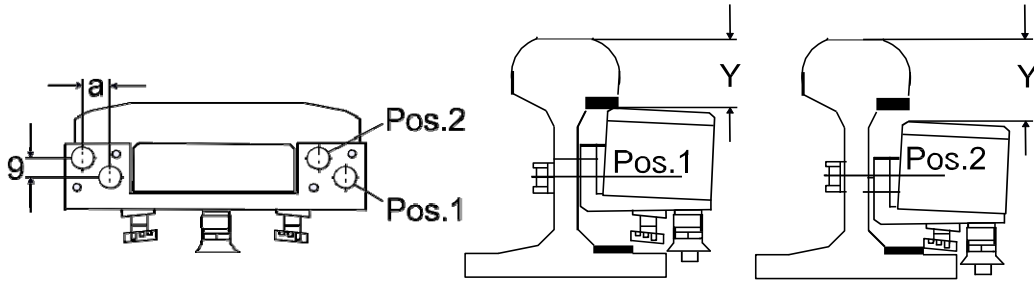


Figure 3: Normal high and lowered position of the DWS

3.2 Switching characteristics

Minimal switching distance : ≥ 39.5 mm
 Typical switching distance (check with SSPV) : 43.0 mm [+ 2.0 mm / - 1 mm]



for further information see the installation instruction

Attenuation length at wheel diameter of :
 300 mm : ≥ 170 mm*
 600 mm : ≥ 200 mm
 1000 mm : ≥ 270 mm

Switching hysteresis : ≤ 2 mm (in direction of movement)

Repetitive accuracy of switching points : ≤ 0.5 mm
 ≤ 0.1 mm at constant temperature

Switch-on distance : ≥ 90 mm*

Overlapping detection range of both systems : ≥ 70 mm*

Switching characteristics (dynamic) : $V = 250$ km/h



Pulse length : ≥ 3.5 ms*

Offset between the systems : ≥ 1 ms*

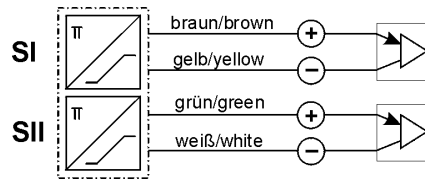
Overlapping detection range of both systems : ≥ 2.5 ms

Reliability of systems against : Eddy current braking

No effect of systems : Magnetic train brakes (for use of the DWS with magnet brakes set the switching distance according to installation instruction)

	* New rail:	Diameter of wheel 300 mm, wheel flange 27,5 mm, wheel offset 70 mm, temperature range - 40 °C up to + 85 °C
		As speed increases, the pulses shift in direction of train (e.g. at 9 m/s about 60 mm)

3.3 Control Circuit



Connection diagram :
Operating voltage :

8 V [± 5 %]

Tolerated line resistance : ≤ 200 Ω (higher values possible depending on the electrical data of the evaluation device)

Transmission power : < 30 mW

Test voltage between DWS- system to ground : Surge: 5 kV (1,2 μs / 50 μs)
Withstand voltage: 2,5 kV / 50 Hz


Lightening protection : Suppressor diode 1,5 kW / 1 ms

Interference resistance against :

- HF-fields according to EN 50121-4
- Electromagnetic rail brake (appropriate installation and adjustment of the sensor according to the installation instruction)
- LWB (save against destruction)

Permissible rail currents :

AC 16 ⅔ Hz and 50 Hz	<input type="checkbox"/>	Continuous current	$I_{cc} \leq 2 \text{ kA}_{eff}$
	<input type="checkbox"/>	Short circuit current	$I_{sc} \leq 15 \text{ kA}_{eff}$
DC	<input type="checkbox"/>	Continuous current	$I_{cc} \leq 10 \text{ kA}_{eff}$
	<input type="checkbox"/>	Short circuit current	$I_{sc} \leq 30 \text{ kA}_{eff}$

	Usually, the DWS is delivered without a reduction plate, but there is an option to mount the DWS with a reduction plate. This option is needed if the reduction plate is to provide any help with expected high rail currents above the limits shown in the upper table. This option should be considered before installation! For DC short-circuit currents $I_{cc} \geq 21 \text{ kA}_{eff}$ there is specific rail section adapted reduction plate that is recognizable by a captive-mounted designation (inquire availability for appropriate rail profile).
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Exceeding the permitted rail current the DWS provides a signal for normal wheel detection ⇒ regardless the DWS will not be destroyed

3.4 Wiring

- Cable wires : 4 each per double wheel sensor (DWS)
- Cable : Railway cable, twisted star quad in accordance with the DB specification 416.0115 resp. 416.0116 or signal cable in accordance to VDE 0816 (with reinforced insulation)

3.5 Housing

- Base plate : C-Cu-Zn 33 Pb (DIN 1709)
- Cap : Plastic, fully cast
- Connecting line : 4 x 0.75 mm² PURWIL[®] PUR/PUR polyurethane molded in the housing.
Typical lengths: 5 m, 10 m, 20 m



If the application in which the DWS will be used demands interlocking security, the cable must be sufficiently protected, e.g. in a neoprene protective tube 28/20 mm.

- Weight : approx. 2,5 kg
- Color : Grey, white

3.6 Environment according to EN 50125-3

- Ambient temperature according to EN 60721-3-4 : - 40 °C up to + 85 °C
- Reliability against : Lightning strike on the rail by side mounting, climatic influence, UV radiation, greases, oils, alkaline solutions and salts, partly acid resistant
- Protective type according to EN 60529 : IP 67
(protection against dust and ingress of water by temporary immersion)
- Vibration according to EN 50125-3 (outside of rails) :
 - Random vibration 5 Hz to 2000 Hz according to EN 60068-2-64 with up to 280 m/s² RMS acceleration
 - High shock testing (peak stress) 250 g for 1 ms according to EN 60068-2-27

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- Continuous shock testing (medium stress) 420 m/s² for 6 ms according to EN 60068-2-27
- Extreme shock testing 9810 m/s² for 0.4 ms according to EN 60068-2-27

MTBF- calculation : 761.675 h at + 40 °C according to Mil-manual HDBK-217F

3.7 Mounting

Look at corresponding installation instruction with table of rail profiles.

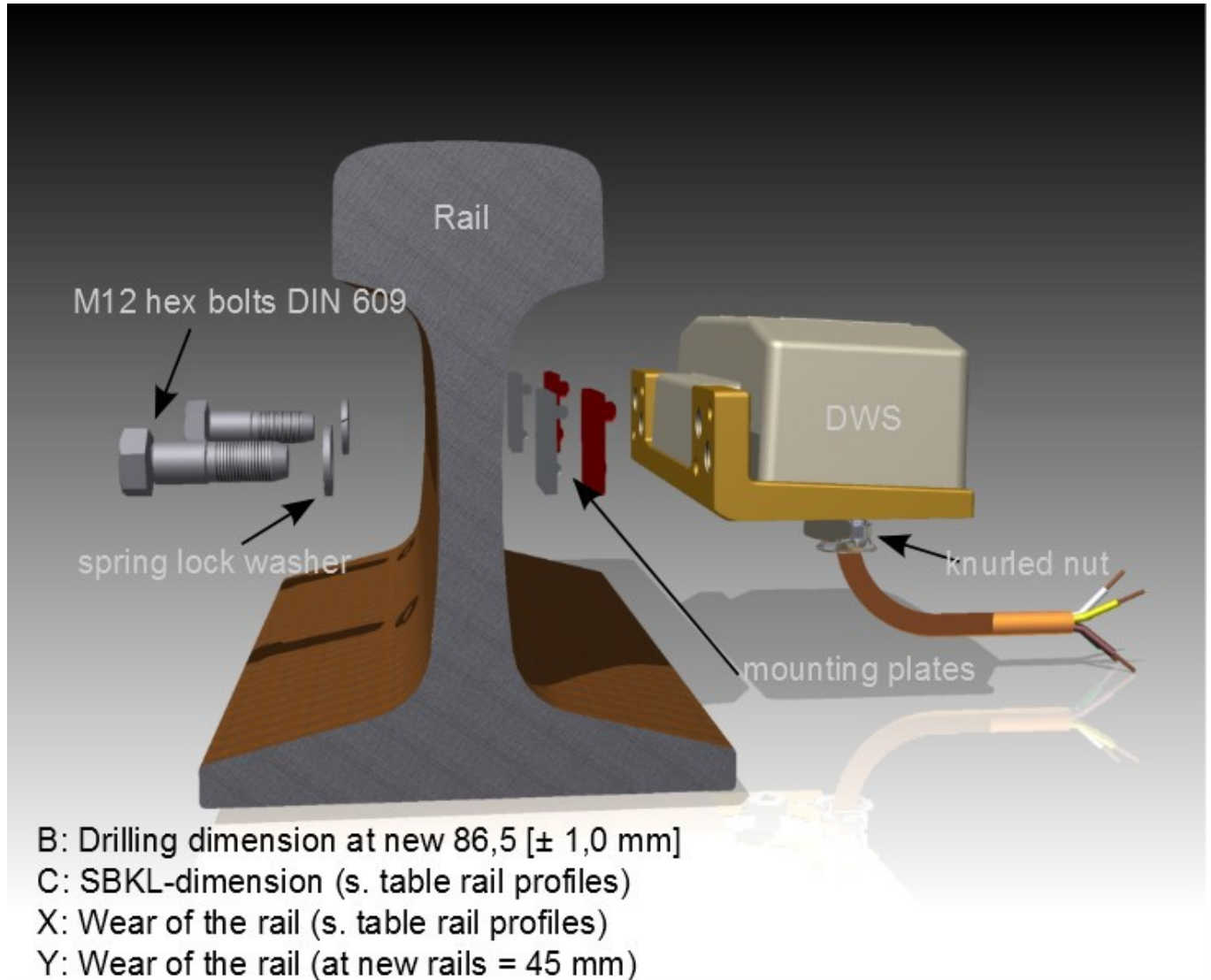


Figure 4: Mounting



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