1 or 2 channel wheel slide protection sensor

Customised sensor
with UIC certification

GEL 2475Uxxx
GEL 2476Uxxx

Technical Information

Version 07-2019

Description

- Application approved speed sensor
- Magnetic measuring system, for measuring scales made of ferromagnetic materials
- Safe detection of slow rotation without pulse loss and for high-speed rotation
- Two channels shifted by 90° provide the direction of rotation
- Robust and compact stainless steel housing
- Customised cable fittings

Left GEL 2476U, right GEL 2475U

Advantages

- Maintenance- and wear-free operation due to contactless measurement of rotation
- Current output signals unsusceptible to electromagnetic disturbances
- Detection of functionality by current output or standstill monitoring voltage

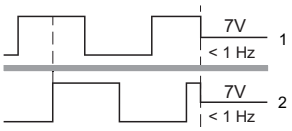
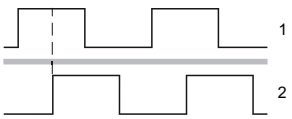
Certified for the following wheel slice protection devices [(a)]

WGMC 19	Knorr-Bremse /MRP
MRP-GMC 29	Knorr-Bremse /MRP
MGS 1	Knorr-Bremse
MGS 2	Knorr-Bremse

INTERNATIONAL UNION OF RAILWAYS

[(a)] Confirmed in accordance with conditions of UIC-Certificates number B-004/2011–04 and B-001/2019-01.

Output signals

Signal pattern		Pulse diagramme
EM	1 channel, voltage output with standstill monitoring voltage	
DM	2 channel, galvanically separated, 90° phase shift, voltage output with standstill monitoring voltage	
EI	1 channel, current output	
DI	2 channel, galvanically separated, 90° phase shift, current output	

Right to technical changes and errors reserved.

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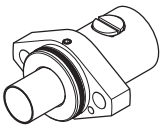
Lenord, Bauer & Co. GmbH
Dohlenstraße 32
46145 Oberhausen, Germany

LENORD +BAUER

Description

All UIC-certified speed sensors are customer-specific special versions and are manufactured according to a drawing or an application description.
For each customised special version, a U number is assigned. A special version may vary from the standard technical specifications.

Flange types

	GEL 2475U	GEL 2476U
Dimensions[a]	26/42	30/40
Design		
Sensor tube diameter[b]	EM, DM: 20 mm EI, DI: 16 mm	
Index pin[b]	DM, DI standard EM, EI upon request	no Index pin

(a) flange seat diameter / distance of screw holes
(b) depends on signal pattern

Order options

	Flange type						
	5U Standard flange 26/42						
	6U Standard flange 30/40						
		Signal pattern					
		E 1 channel square-wave signals					
		D 2 channels square-wave signals with 90° phase offset, galvanically separated					
			Signal output				
			I Current				
			M Voltage with standstill voltage 7 V				
				Modul M			
				100 Module 1.00			
				125 Module 1.25			
				150 Module 1.50			
				175 Module 1.75			
				200 Module 2.00			
				225 Module 2.25			
				250 Module 2.50			
				350 Module 3.50			
					Cable outlet/protection		
					K Cable gland		
					W Flexible conduit fitting		
					G Rubber conduit fitting		
						Cable length L	
						xxxx cm cable length	
247	_ _	_	_	_ _ _	_	_ _ _ _	

General data

Standard flange 26/42

Mechanical Data	
Degree of protection on measuring side (1)	IP 68
Vibration resistance	DIN EN 61373:2011-04 cat. 3
Shock resistance	DIN EN 61373:2011-04 cat. 3
Sensor tube material	stainless steel
Flange material	stainless steel
Weight of sensor (incl. 2 m cable)	approx. 500 g

Standard flange 30/40

Mechanical Data	
Degree of protection on measuring side (1)	IP 68
Vibration resistance	DIN EN 61373:2011-04 cat. 3
Shock resistance	DIN EN 61373:2011-04 cat. 3
Sensor tube material	stainless steel
Flange material	stainless steel
Weight of sensor (incl. 2 m cable)	approx. 660 g

Applicable standards	
Electromagnetic compatibility	according to DIN EN 50155:2008-03 prescribed tests from DIN EN 50121-3-2
Railway applications	DIN EN 50155:2008-03

(1) Degree of protection of the cable outlet side depends on the cable gland or protection

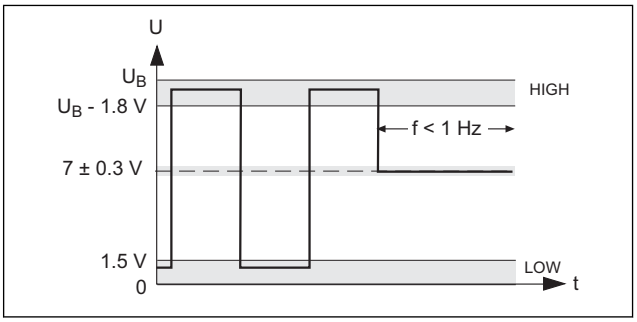
Voltage output with standstill monitoring voltage

Technical data

Electrical data	
Supply voltage U_B (reverse battery protected)	10 to 20 V DC
Current consumption per ch. I_B (no load)	≤ 12 mA
Output signal (short circuit-proof)	square-wave signals, voltage output
Output signal level high(1)	≥ U_B - 1.8 V
Output signal level low(1)	≤ 1.5 V (2)
Output current per channel	≤ 10 mA
Frequency range	0 to 8 kHz
Duty cycle (3)	50% ± 10%
Phase shift	typically 90°
Insulation strength	750 V DC (based on DIN EN 50155:2008-03)
Environmental conditions	
Operating and ambient temperature	-40 °C to +85 °C
Storage temperature	-40 °C to +120 °C
MTTF value	2,000,000 h at 55 °C
Requirements on measuring scale	
Module M	1.00 to 3.50
Air gap(4)	M 1.00 to 1.25: 0.2 to 0.8 mm M 1.50 to 3.50: 0.2 to 1.3 mm
Tooth form	involute gear as per DIN 867, rectangular gear 1:1, slotted disk (on request)
Material of measuring scale	ferromagnetic steel
Width of measuring scale	≥ 10 mm (smaller ones upon request)

	EM	**DM**
Cable data		
Cable	halogenfree and screened (5)	
Cable diameter	5.4 ± 0.2 mm	8.0 ± 0.3 mm
Cross-section	4 × 0.5 mm^2	12 × 0.34 mm^2
Minimum bending radius static / dynamic	16 mm / 27 mm	24 mm / 40 mm

Output signal level



Connection assignment

Signal	**EM**	**DM**	
Channel 1	YE	YE	
Channel 2			WH
GND (0 V)	BU	BU	GY
+U_B	RD	RD	PK
Cable / screen	1 / 1	2 / 2	
screen connected to the sensor housing Colour code: **BU** blue, **GY** grey, **PK** pink, **RD** red, **WH** white, **YE** yellow			

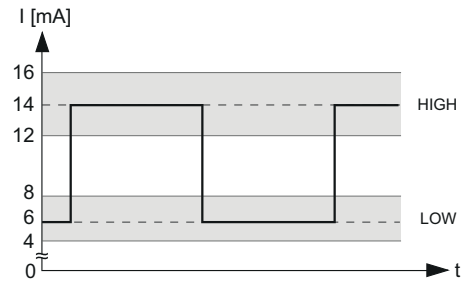
(1) depends on output current and temperature
(2) standstill monitoring voltage: 7 V ± 0,3 V at frequencies < 1 Hz ± 0,3 Hz
(3) depending on measuring scale and air gap
(4) depends on module of target wheel. Observe the air gap in technical drawing!
(5) specification upon request

Current output

Technical data

Electrical data	
Supply voltage U_B (reverse battery protected)	10 to 20 V DC
Output signal (short circuit-proof)	square-wave signals, current output
Output signal level high(1)	typ. 14 mA
Output signal level low(1)	typ. 7 mA
Output current per channel	≤ 16 mA
Frequency range	0 to 8 kHz
Duty cycle(2)	50% ± 25%
Insulation strength	750 V DC (based on DIN EN 50155:2008-03)
Environmental conditions	
Operating and ambient temperature	-40 °C to +85 °C
Storage temperature	-40 °C to +120 °C
MTTF value	2,000,000 h at 55 °C
Requirements on measuring scale	
Module M	1.00 to 3.50
Air gap(3)	M 1.00 to 1.25: 0.2 to 0.8 mm M 1.50 to 3.50: 0.2 to 1.3 mm
Tooth form	involute gear as per DIN 867, rectangular gear 1:1, slotted disk (on request)
Material of measuring scale	ferromagnetic steel
Width of measuring scale	≥ 10 mm (smaller ones upon request)
Cable data	
Cable material	halogenfree and screened (4)
Cable diameter	5.4 ± 0.2 mm
Cross section	4 × 0.5 mm^2
Minimum bending radius static/dynamic	16 mm / 27 mm

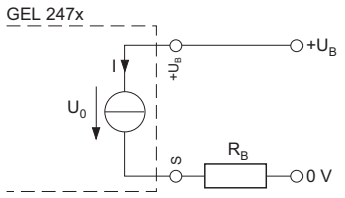
Output signal level



Connection assignment

Signal	EI	DI	
Channel 1	WH	WH	
Channel 2			GN
$+U_B$	RD	RD	OG
Cable / screen	1 / 1	1 / 1	
screen connected to the sensor housing Colour code: **GN** green, **OG** orange, **RD** red, **WH** white			

Current output – resistor



U_B Supply voltage
U_0 Voltage drop in the sensor [6 V]
S Signal
I_{max} Maximum output current [16 mA]

The resistor to be connected R_B must not exceed the following specific value:

$R_{B,max} = (U_B - U_0) / I_{max}$

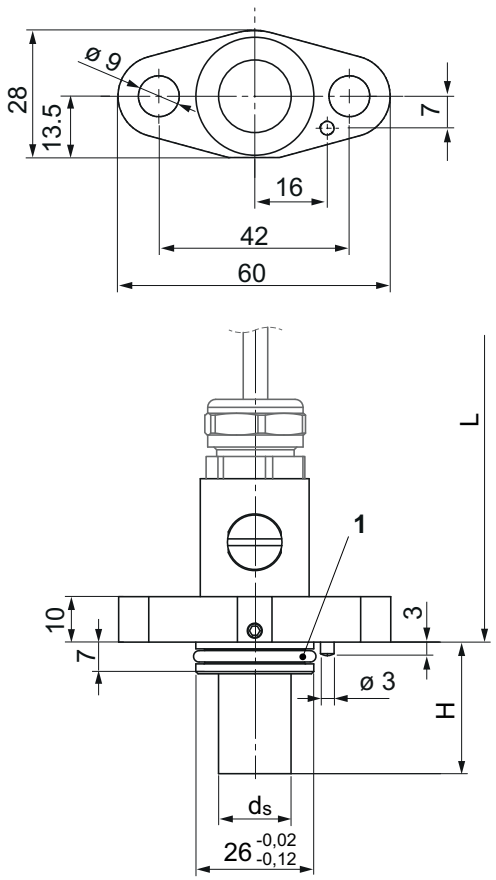
Example for U_B = 15 V, U_0 = 6 V, I_{max} = 16 mA:

$R_{B,max}$ = (15 V - 6 V) / 16 mA = 562 Ω

(1) depends on output current and temperature
(2) depends on air gap
(3) depends on module of target wheel. Observe the air gap in technical drawing!
(4) specification upon request

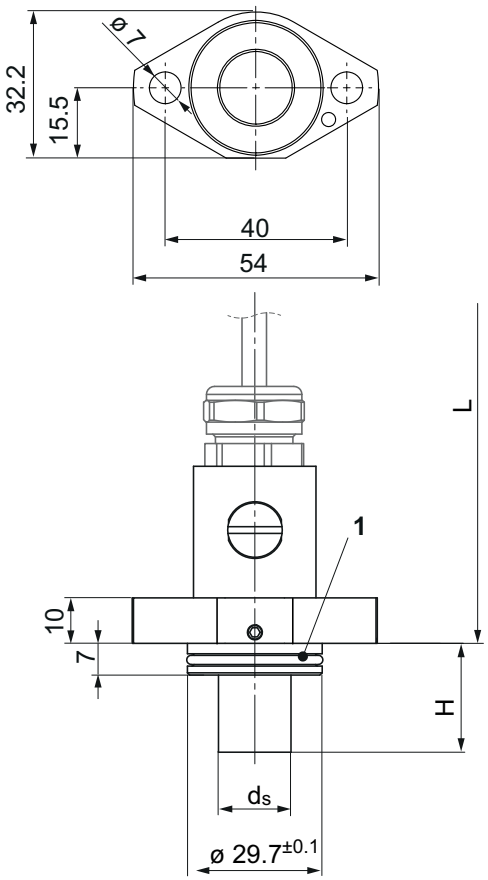
Dimensional drawings

Flange 26/42



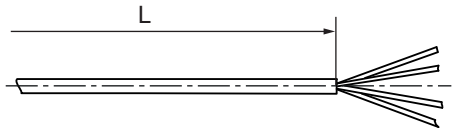
1 sealing ring (O-ring 21 x 2.5 mm; NBR)

Flange 30/40

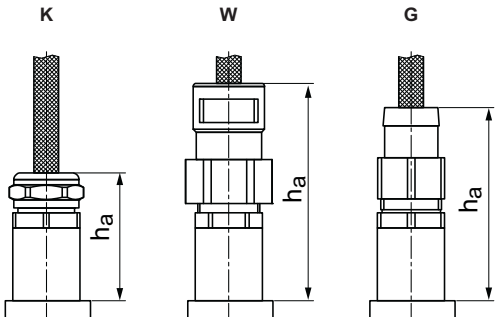


1 sealing ring (O-ring 26 x 2 mm; NBR)

Cable end (standard design flying lead)



Cable outlet



Dimensions

Flange		26/42	30/40
Sensor tube length	H	29 -0.1	24 -0.1
Sensor tube diameter (1)	d_S	16	16
		20	20
Cable length	L	according to order option	
Cable protection: h_a connection height			
K cable (without protection)		≈ 42	≈ 48
W flexible conduit (DN 12)		≈ 72	≈ 78
G rubber conduit (DN18)		≈ 64	≈ 70

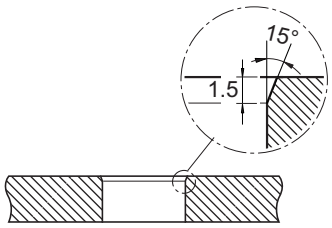
screen connected to the sensor housing;
Observe the notes on EMC in the mounting instructions.

(1) depends on signal pattern

Notes on mounting

All dimension in mm (≈ approximate dimension) – General tolerance DIN ISO 2768 mK

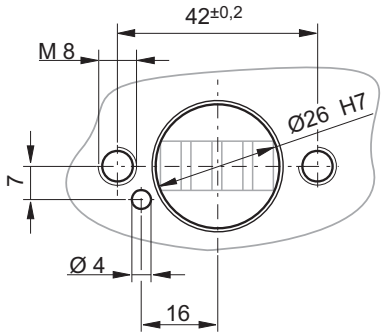
Insertion chamfer

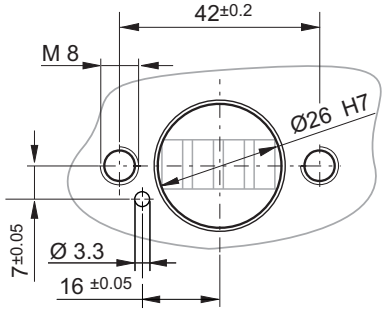


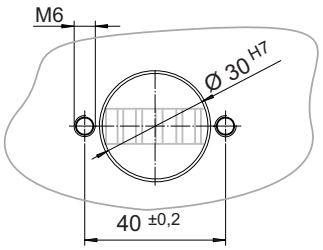
Provide an insertion chamfer on the bore to prevent damage to the sealing ring.

Hole pattern

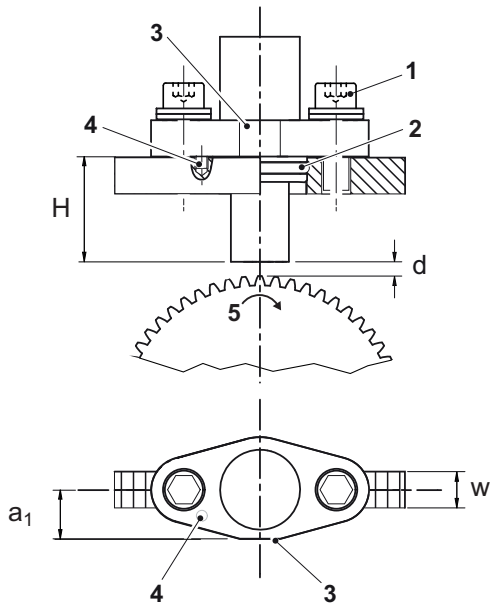
Flange 26/42		Flange 30/40
Standard	minimum phase offset (1)	







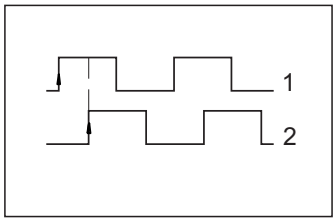
Assembly drawing



d air gap (see customised mechanical drawing)
1 mounting screw
2 sealing ring
3 orientation surface (2)
4 index pin
6 toothed wheel (direction of rotation forwards)

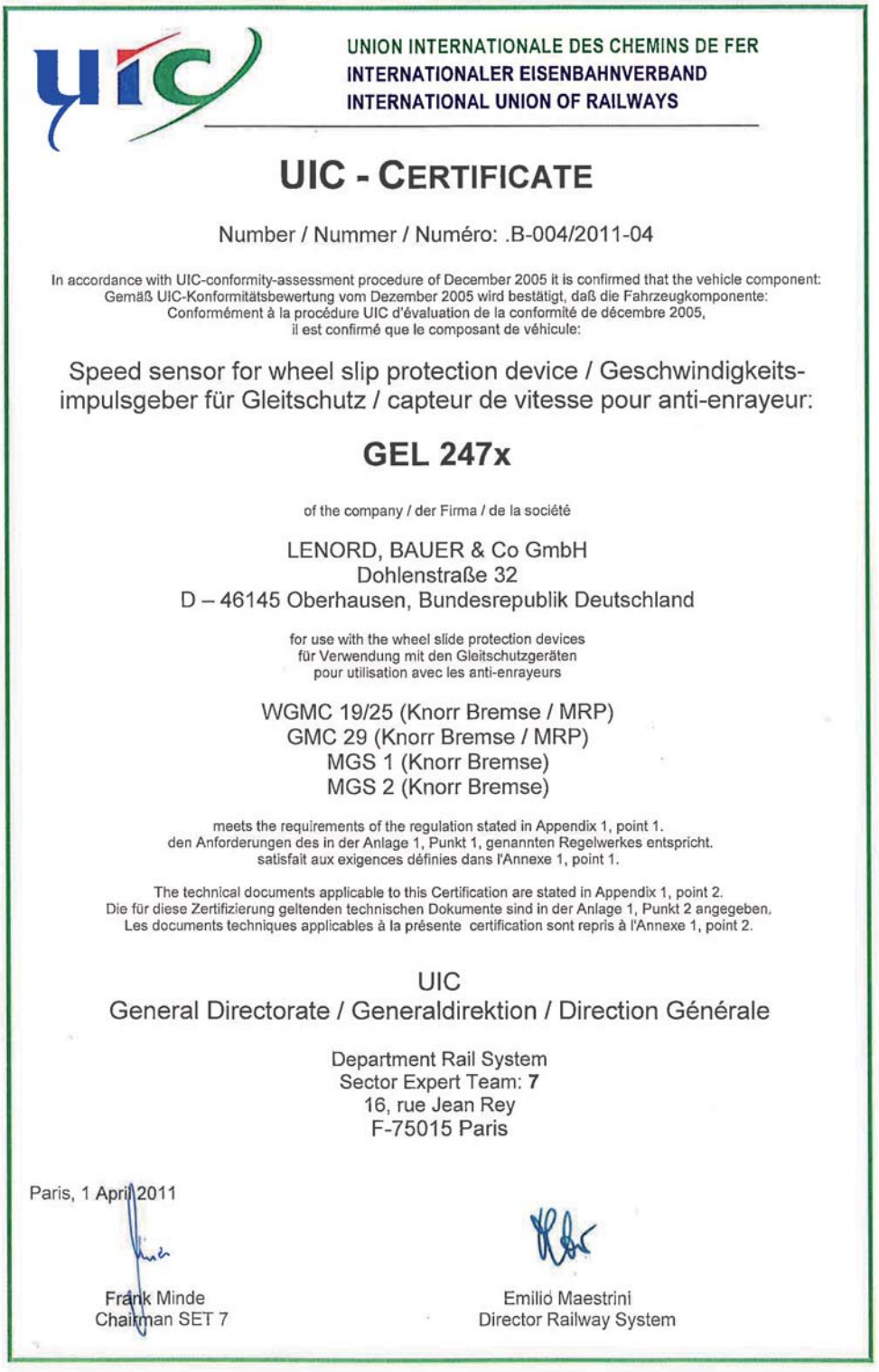
Standard flange		26/42	30/40
axial offset	a_1	13.5 (±1)	15.5 (± 1)
width of toothed wheel	w	≥ 10	≥ 10
Sensor tube length	H	29 $_{-0.1}$	24 $_{-0.1}$
recommended hex socket screw (DIN EN ISO 4762)		M8 x 20	M6 x 20

Signal for forward direction



(1) Tighter mounting tolerances for the index pin minimise the phase tolerance
(2) With view on the visible surface signals are output in forward direction when the target wheel rotates clockwise.

Certification for UIC-sensors with voltage output (page 1 of 1)



UNION INTERNATIONALE DES CHEMINS DE FER
INTERNATIONALER EISENBAHNVERBAND
INTERNATIONAL UNION OF RAILWAYS

UIC - CERTIFICATE

Number / Nummer / Numéro: .B-004/2011-04

In accordance with UIC-conformity-assessment procedure of December 2005 it is confirmed that the vehicle component:
Gemäß UIC-Konformitätsbewertung vom Dezember 2005 wird bestätigt, daß die Fahrzeugkomponente:
Conformément à la procédure UIC d'évaluation de la conformité de décembre 2005,
il est confirmé que le composant de véhicule:

Speed sensor for wheel slip protection device / Geschwindigkeits-impulsgeber für Gleitschutz / capteur de vitesse pour anti-enrayeur:

GEL 247x

of the company / der Firma / de la société

LENORD, BAUER & Co GmbH
Dohlenstraße 32
D – 46145 Oberhausen, Bundesrepublik Deutschland

for use with the wheel slide protection devices
für Verwendung mit den Gleitschutzgeräten
pour utilisation avec les anti-enrayeurs

WGMC 19/25 (Knorr Bremse / MRP)
GMC 29 (Knorr Bremse / MRP)
MGS 1 (Knorr Bremse)
MGS 2 (Knorr Bremse)

meets the requirements of the regulation stated in Appendix 1, point 1.
den Anforderungen des in der Anlage 1, Punkt 1, genannten Regelwerkes entspricht.
satisfait aux exigences définies dans l'Annexe 1, point 1.

The technical documents applicable to this Certification are stated in Appendix 1, point 2.
Die für diese Zertifizierung geltenden technischen Dokumente sind in der Anlage 1, Punkt 2 angegeben.
Les documents techniques applicables à la présente certification sont repris à l'Annexe 1, point 2.

UIC
General Directorate / Generaldirektion / Direction Générale

Department Rail System
Sector Expert Team: **7**
16, rue Jean Rey
F-75015 Paris

Paris, 1 April 2011

Frank Minde
Chairman SET 7

Emilio Maestrini
Director Railway System

UIC Certificate

Certification for UIC-sensors with current output (page 1 of 2)

CERTIFICATE
ZERTIFIKAT
CERTIFICAT

INTERNATIONAL UNION
OF RAILWAYS

Number / Nummer / numéro : B-001/2019-01

In accordance with UIC conformity assessment procedure of November 2005,
it is confirmed that the vehicle component:

Gemäß UIC-Konformitätsbewertung vom November 2005 wird bestätigt,
daß die Fahrzeugkomponente:

Conformément à la procédure UIC d'évaluation de la conformité de novembre 2005,
il est confirmé que le composant de véhicule :

Speed sensor for wheel-slip protection device / Geschwindigkeits-Impulsgeber für Gleitschutz / capteur de vitesse pour anti-enrayeur:

GEL 247x mit Sensorelement iC-MZI

of the company / der Firma / de la société

LENORD, BAUER & Co GmbH
Dohlenstraße 32
D – 46145 Oberhausen

for use with the wheel slide protection devices / für Verwendung mit den Gleitschutzgeräten / pour utilisation avec les anti-enrayeurs

MGS 2 (Knorr Bremse)

meets the requirements of the regulation stated below / den Anforderungen des unten genannten Regelwerkes entspricht / satisfait aux exigences de la réglementation spécifiées ci-dessous :

UIC Leaflet 541-05, 2nd edition, August 2005
UIC-Merkblatt Nr. 541-05, 2. Ausgabe, August 2005
Fiche UIC 541-05, 2e édition, août 2005

Dieses Zertifikat ist eine Ergänzung zum Zertifikat B-004/2011-04, vom 1. April 2011
This certificate is an addendum to certificate B-004/2011-04 issued on 1st April 2011
Ce certificat constitue un complément au certificat B-004/2011-04 issu le 1er avril 2011

The technical documents applicable to this Certification are stated in points 2 & 3. - page 2.
Die für diese Zertifizierung geltenden technischen Dokumente sind in Punkt 2 u. 3. - Seite 2 angegeben.
Les documents techniques applicables à la présente certification sont détaillés aux points 2. & 3. – page 2.

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Certification for UIC-sensors with current output (page 2 of 2)

CERTIFICATE
ZERTIFIKAT
CERTIFICAT

INTERNATIONAL UNION
OF RAILWAYS

Number / Nummer / numéro : B-001/2019-01

1. - **Decision of SET 7 "Braking" at the meeting on 16th & 17th January 2019, Agenda point 3.2.6**
Entscheidung des SET 7 „Bremswesen" bei der Sitzung am 16./17. Januar 2019, TOP 3.2.6
Décision du SET 7 "Freinage" de la réunion des 16 et 17 janvier 2019, point 3.2.6 de l'ODJ

2. - Assessment of / Gutachten von: / Expertise de : *Mrs. Inga Jensen*
UIC B 126/RP H2, Beibehaltung der Zulassung nach UIC-Merkblatt 541-05: Impulsgeber GEL 247x mit neuem Sensorelement iC-MZI als Teil einer zugelassenen Gleitschutzanlage vom Dezember 2018

3. - The technical documents applicable to this Certification are:
Die für diese Zertifizierung geltenden technischen Dokumente sind:
Les documents techniques applicables à cette certification sont les suivants :

- Request of Lenord & Bauer from : / Antrag der Fa. Lenord & Bauer vom : /
Demande de la société Lenord & Bauer du :
02.02.2018
- Functional description of the system / Allgemeine Systembeschreibung / description générale du dispositif :
Datenblatt „2-Kanal Drehzahlsensor GEL 2476Y050"
Datenblatt "2-Kanal Drehzahlsensor GEL 2476Y039"
Baureihenübersicht "Drehzahlsensoren für Schienenfahrzeuge GEL 247/247x mit bis zu 4 Kanälen"
- Test specifications / Prüfspezifikation / Specifications d'essai
UIC 541-05,
EN 50155,
EN60068,
EN 61373
- Test reports / Prüfberichte: / Rapports d'essais:
Typprüfreport „UIC-Approval 247x IC-MZi TTR02 (Type test Report).pdf"
Umgebungseinflüsse „2471Y152 IR DIN EN 60068-2-11_2000-02.pdf"
Salznebelsprühtest „UB 20180566-2.pdf"
Prüfstand „182743-PR01 Bericht Freigegeben.pdf"

UIC
General Directorate / Generaldirektion / Direction Générale
Rail System Department
Sector Expert Team 7
16 rue Jean Rey
F - 75015 Paris

Paris, *29 January 2019*

Frank Minde
Chairman SET 7

Marc Antoni
Director Rail System Department

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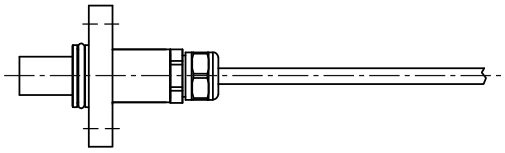
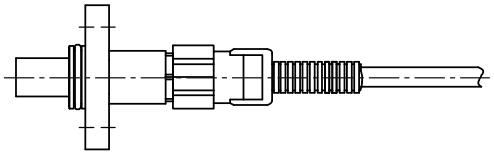
Example for customised cable connections

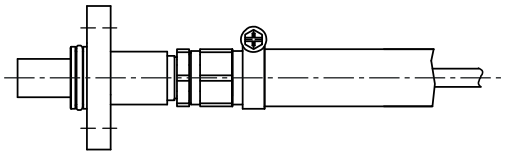
Examples for the sensor end



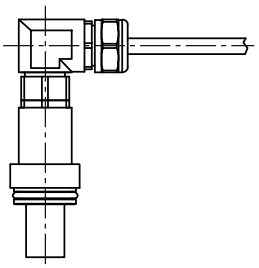
Standard: Cable without protection



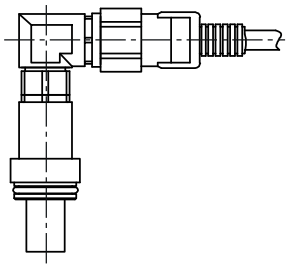
Flexible conduit



Rubber conduit

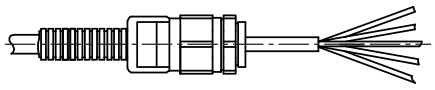


90° angle with cable

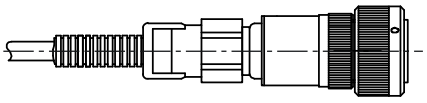


90° angle and flexible conduit

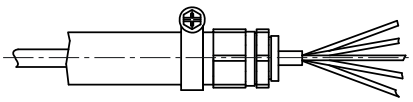
Examples for the cable end



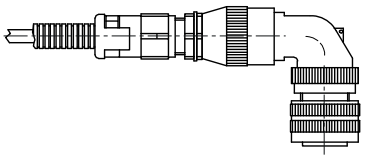
Flexible conduit and flying lead



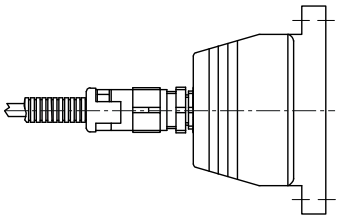
Flexible conduit with round connector



Rubber conduit and flying lead



Flexible conduit with angled round connector



Flexible conduit with rectangle connector (HTS plug)

Notes:

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