

LUXACT 1D Compact

**Slip-free, speed-over-ground sensor with dynamic yaw,
pitch and roll correction**

The LUXACT® 1D COMPACT sensor is a multifunctional, powerful tool for contactless, slip-free speed over ground measurement. This sensor incorporates the proven and tested, unique LUXACT® optical technology, which is free of environment disturbances, like abrupt changing surface properties, heights to the ground variations, EM noise and objects crossing the field of vision or testing neighborhood properties. In addition, the compact housing also includes an inertial measurement unit (IMU) and performs onboard speed calculations in real-time. Measurement results are available directly in CAN bus and can be processed by all industry standard CAN loggers and DAQ systems.

LUXACT® 1D COMPACT corresponds to requirements of modern automotive R&D engineers for a universal and robust high-precision speed over ground system. Integrated IMU is responsible for highly dynamic and accurate yaw, pitch and roll corrections of the optical signal increasing significantly the repeatability of test results during dynamic testing scenarios. Unlike other systems, surface-specific re-calibration or IMU setup are not required making the testing process more efficient.



Highlights

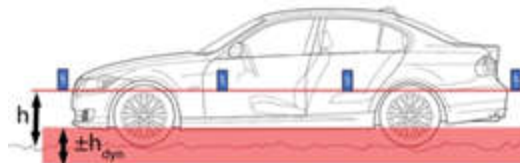
- Speed and distance uncertainty $\leq 0.1\%$
- Distance uncertainty for a passenger car during ABS brake test from 100 km/h (ca. 40 m): $\leq 0.1\%$
- Any typical surface conditions without re-calibration: asphalt, wetness, ice/snow, cobblestones, etc.
- Low & constant latency
- Dynamic speed correction according to yaw, roll and pitch angle
- Clear start-up and standstill
- Integrated precision trigger with automatic brake test analysis including output of all spatial angles during braking process

LUXACT® Technology

The LUXACT sensors are based on an unique, proven and tested optical measurement design concept which enables contactless measurement of displacement and velocity, independent of the reflecting surface's texture, and allows large working distances. LUXACT® 1D Compact covers fields of application for this technology, in which the distortions of the optically measured speed caused by the vehicle's motion over ground is compensated by an IMU and appropriate measurements of 6 degrees of freedom. This setup provides reliable and precise results in real time, even in dynamic processes such as brake or performance testing of vehicles. The results feature high repeatability and improved data integrity even under adverse conditions.

Technical Specs - LUXACT 1D

General		
Parameter	Unit	Value
Velocity measurement range	km/h	0.2 to 300 in x axle
Acceleration measurement range	m/s ²	±156 in x, y, z axle
Angular velocity measurement range	°/s	±2000 around x, y, z axle
Velocity measurement error 3σ	% FS RMS	≤0.1
Displacement measurement error 3σ	%	≤0.1 at s>200 m
Displacement measurement error under real world conditions – typical car ABS brake test 100 to 0 km/h (ca. 40 m)	cm	≤3
Acceleration resolution	m/s ²	0.005
Angular velocity resolution	°/s	0.02
Bandwidth of outputted inertial data	Hz	0 to 20 Hz (256 Hz without filter)
Nominal Mounting height h	mm	400
Dynamic height working distance h _{dyn}	mm	±120 w/o influencing measurement error
Measurement frequency and output rate	Hz	250 (800 optional)
Filtering		none needed
Latency from physical event	ms	constant 3 to 50 ms, depending on IMU data filter
Light source / MTTF		invisible LED light / 100.000 h



Output interfaces - software adjustable	
Parameter	Default values
CAN-Bus (standard including 5 m cable)	Intel/Motorola format, 2.0A/2.0B Baud rate: 500, 1000 kBit/s
TTL Output (standard, TTL-cable not included in delivery)	Quadrature / TTL 0 to 5 V TTL, 100 Hz per 1 km/h; 1 pulse = 2.7 mm
TTL Input (standard, TTL-cable not included in delivery)	Quadrature / TTL for wheel odometer & consumption measurement devices; output to CAN Bus
Trigger Input (standard including 5 m cable with Binder M12 connection)	all isolated triggers, TTL signals incl. power supply to sensors for light barriers, brake pedals, 3 rd -party triggers
RS485 (standard, RS-485 cable not included in delivery)	output of all measured values like CAN Bus (after technical clarification)

Physical properties		
Parameter		
Dimension (L x B x H)	mm	90 x 82 x 141 w/o connectors
Weight	g	950
Protection class		IP66 & IP68
Operating conditions		-40 °C to +85 °C, 10 to 90 % relative humidity w/o condensation
Schock / vibration resistance w/o damage to hardware		50 g half-sine 6 ms / 30 g, 10 to 150 Hz Measurement performance can be restricted
Power supply	V DC	9 to 36 with overvoltage and inverse-polarity protection EM Filter EN-55022 Class B
Power consumption	W	12

Measurement values

AUX connector
Trigger input
 brake pedal / light barrier

TTL input:
 quadrature / TTL e.g. from
 consumption measurement
 device or
 wheel odometer



AUX

CAN

CAN connector

Permanent signals:

- vehicle velocity
- distance
- acceleration x, y, z
- angle rate around x, y, z
- optical signal quality

Trigger-event signals:

- rel. spatial angle since trigger
- path after/between trigger(s)
- velocity at trigger instant (high-precision)
- time since trigger
- average delay after trigger until standstill: $a(v,t)$, $a(s,t)$, $a(v,s)$, MFDD
- brake test quality (traffic light)

TTL output:

- quadrature distance/velocity signal

Installation on vehicle

It is highly recommended to use original and tested mounting accessories. LUXACT® has standard mounting systems for magnetic or suction cup surface mounting on car's body, towing eye mounting and non-rotating wheel hub mounting.

All mounting systems allow mounting height adjustment, fit curved body surfaces and fit most cars.

Additionally, LUXACT® 1D is delivered with a set of mounting brackets that fit dovetails on the housing and allow for uncomplicated mounting to any available mounting structures.



SFX3C mounting to vehicle side wall
user can replace magnet vs. suction cup modules



MFX3C mounting to vehicle front/rear wall



TFX1 universal towing lug mounting with additional flexible carbon fixator with a pump suction cup.
TFX1 mounting fits all standard towing lugs and vehicles.



TFX1 Universal towing lug mounting with additional flexible carbon fixator with a pump suction cup.
TFX1 mounting fits all standard towing lugs and vehicles.

Included in delivery

- 1x LUXACT 1D Compact incl. standard carbon frame
- 1x CAN & power cable, 5 m, with 9-pin DSUB female connector jack and 4 mm banana jacks. IP69K on sensor side
- 1x trigger cable, 5 m, with M12 female connector jack. IP69K on sensor side
- 1x calibration certificate as per ISO/IEC 17025
- 1x carrying case ABS with additional room for LUXACT mounting fixture

Options		
Name	Article number	Description
LC...	1330065 – 10m	Extension for included standard (5 m) CAN cable
	1330053 – 20m	IP69K on sensor side, power cable remains 2 m
KC...	L20115 – 5m	Cable for CAN, IP69K at sensor. 2 m power cable. 9-pin female DSUB on data capture side, CAN standard pinout (5 m included in standard delivery)
	1330031 – 10m	
	L20117 – 20m	
KT...	L20118 – 5m	Cable for TTL, IP69K at sensor. 2 m power cable, TTL 15-pin male DSUB, standard imc pinout INA, INC
	L20119 – 10m	
MF3C	1330066	Flexible magnetic mounting for curved surfaces with height adjustment and easy release mechanism.
3SC-KIT	L20136	Conversion set 3x pump suction holder
SFX3C	L20141	Flexible suction cup mounting for curved surfaces with height adjustment and easy release mechanism.
3MH-KIT	L20137	Conversion set 3x magnet holder
TFX1	L20139	Universal towing lug mounting with additional carbon fixator with suction cup.
D080	L20111	Output rate: 800 Hz
SGCC	L20140	Carbon-fiber reinforced splashguard shield for rugged operating conditions
SGCC-H	L20138	Carbon-fiber reinforced splashguard shield for rugged operating conditions with built-in heating element
XLAS2	L30103	Laser sensor as trigger, 1000 Hz switching frequency with 1 set of reflectors
BPT	L30105	Brake pedal switch as a trigger, bounce-free, with quick strap system.

	model	nom. height [mm]	max. velocity [km/h]	output-rate [Hz]	cable length LC=CAN LT=TTL
LXT	1DC	400	300	250	LC10 / LT10
LXT	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	LC.. / LT



Ulteriori informazioni

Da oltre 25 anni, **imc Test & Measurement GmbH** sviluppa, produce e vende, hardware e soluzioni software, a livello mondiale nel campo della tecnologia di misura di parametri fisici.

Le applicazioni sono su veicoli, banchi prova, macchinari e nel monitoraggio di impianti di produzione.

I sistemi imc sono reputati produttivi, facili da utilizzare e redditizi. Quando richiesto, nella ricerca, sviluppo, nella sperimentazione o nel commissioning, imc offre soluzioni specifiche "chiavi in mano" oppure soluzioni standard, complete di software applicativo.

Le soluzioni di imc sono adatte nella meccanica e nella mecatronica e offrono bande di acquisizione fino a 100 kHz per canale, per la maggior parte dei sensori per la misura delle più diffuse grandezze fisiche, quali: pressione, forza, coppia, velocità, spostamento, accelerazione, vibrazioni, rumore, temperatura, tensione e corrente.

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Fondata nel 1988 e con sede a Berlino, imc Test & Measurement GmbH impiega circa 160 dipendenti che lavorano continuamente per sviluppare ulteriormente il già ampio portafoglio di soluzioni. imc è presente a livello mondiale con oltre 25 aziende partner specializzate nella distribuzione e supporto locale delle sue soluzioni.

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