CORRSYS DATRON
Sensorsysteme GmbH

CORREVIT® LL

Non-Contact Optical Sensor

for

slip-free measurement of vehicle speed and distance

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USER MANUAL

CONTENTS

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Art. No. 1.023.00

The CORREVIT® LL Sensor meets all the requirements of longitudinal dynamics testing. Measured parameters include distance, speed, acceleration and deceleration. Used in conjunction with an incremental wheel transducer, this highly accurate sensor can also measure wheel slip during driving and braking.

The CORREVIT® LL Sensor uses proven optical correlation technology to ensure the most accurate possible signal presentation. This technology incorporates a high-intensity light source that illuminates the test surface, which is optically projected by the sensor onto an optical grating system. Fast, easy mounting and universal applicability distinguish this proven non-contact, optical sensor.

The CORREVIT® LL Sensor functions accurately across an exceptionally wide speed range and at a variable operating distances. Due to its compact size and low weight, the sensor also offers the advantage of unrestricted vehicle maneuverability in real-world dynamic testing.

Features

- Wide speed range from 0.5 to 400 kph (optional 600 kph).
- Exceptionally high measuring accuracy – better than ±0.1% as a result of precision optical gratings and direct signal processing.
- Compact, robust but lightweight sensor construction with integrated filter electronics and serial interface.
- Programmable standardized analog and digital signal outputs using the latest processor techniques, fast and easy calibration.
- Easy operation and direct connection to PC or other evaluation systems.
- Tested and used under extreme weather conditions.
- Negligible service and maintenance requirements as a result of durable technology.

Applications

The compact, lightweight CORRSYS-DATRON LL Sensor is designed for use in dynamic vehicle testing applications that require highly accurate measurement of the following variables:

- Distance
- Speed
- Acceleration
- Deceleration

2. Extent of delivery

Standard delivery

1. (1) LL Sensor #1.023.00 + PC connection cable *
2. (1) LL Signal Conditioning Unit + 2 x output signal #K.022.1C.31 *
3. (1) Sensor/Signal Conditioning Power Cable #K001.40.42
4. (1) Sensor to Signal Conditioning Box Communication Cable #K0022.CC.52
5. (1) Halogen Lamp, 20 watt, 12V, 17°
6. (2) Bolts (for mounting hardware)
7. (2) Thumb Screws (for mounting hardware)

* 2 Digital / Analog output cables, BNC to Lemo #K022.1C.31

Options/Accessories

8. (1) CD-ROM with CeCalWin Software and User Manual
9. Calibration certificate ISO 9000 ++

- Suction Mounting Hardware
- Transport Case
- Replacement Halogen Lamp 20 watt, 12V, 17°
- Signal cable #K001.82.41 for connection to DAS 2A

About replacement halogen lamps
It is recommended that only halogen lamps supplied by CORRSYS-DATRON be used as these have been subjected to a special treatment. Optimal sensor function can only be assured when using original-equipment lamps.

3. Installation and connection

3.1 Connecting the LL Sensor to PC or laptop for calibration and sensor-setting adjustments with CeCalWin Software

1. Connect the CE_CAL Communication Cable to the data port of the LL Sensor.

2. Connect the Power Cable to the power input of the LL Sensor.

3. Connect the CE_CAL Communication Cable to the serial port of the PC or laptop operating CeCalWin Software or trigger box (trigger box is required if calibration should be started or stopped by a light barrier or a brake switch).

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4. Connect the Power Cable to 12 V DC power supply.

3.2 Connecting the LL Sensor to data acquisition

1. Connect to the Signal Cable to the Breakout Adaptor Cable.

2. Connect the Signal Cable to the data port of the LL Sensor.

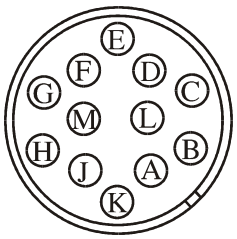
3. Connect the BNC Connectors of the Breakout Adaptor Cable to the data acquisition system.

4. Connect the Power Cable to 12 V DC power supply.

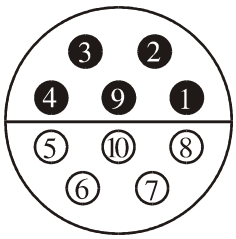
3.1 Pin assignments

3.1.1 Pin assignments: signal

Binder	Lemosa	Assignment	Signal	Signal Type & Description
A	1	shield (white)	GND ANA1	
B	2	white	ANA1	Speed - analog
C	3	brown		
D	4	shield (brown		
E	5	green	TTL1	Longitudinal distance - digital
F	6	yellow	/TTL1	
G	7	gray		
H		pink		
J	9	blue		
K	10	red		
L	7	gray	GND TTL	
M				



Binder



Lemosa

(view: soldering side)

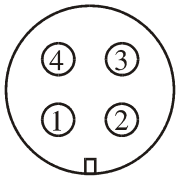
3.1.2 Pin assignments: BNC distributor

Signal	Label
Analog 1 (ANA1)	Speed - analog
Digital 1 (TTL1)	Longitudinal distance - digital

3.1.3 Pin assignments: 12 V DC power supply

Plug	Socket	Assignment	Signal
1 & 2	1 & 2	white / brown	GND
3 & 4	3 & 4	blue / black	+12 V

10.5 V minimum required at the sensor

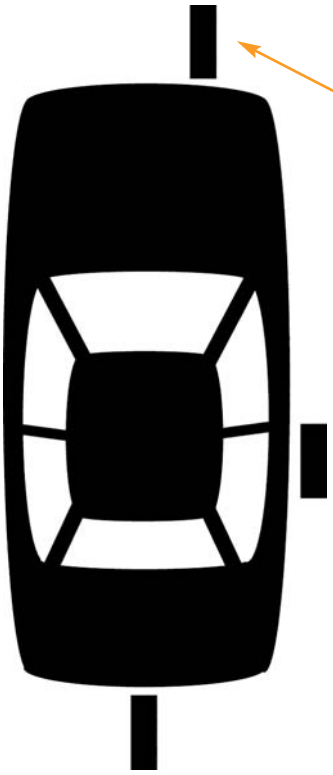


Power Supply

Reverse polarity protection

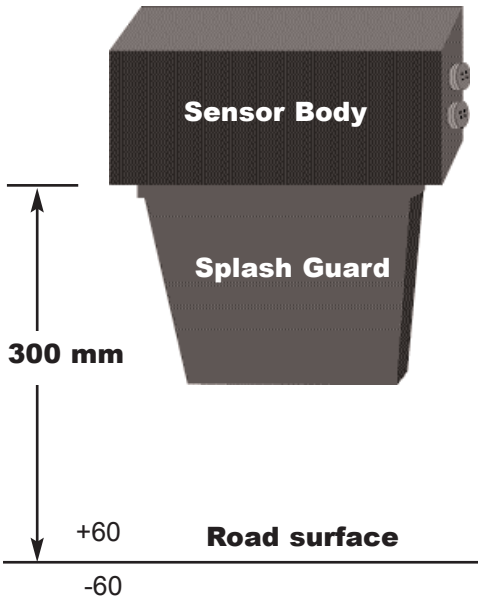
The LL Signal Conditioning Unit is equipped with reverse polarity protection. In the event that polarity is inverted (9 V - 14.5 V DC), the unit will not be damaged but the red reverse polarity indicator LED will be illuminated! If this happens, disconnect power from the unit immediately and correct the power supply connection.

3.4 Mounting the sensor on the vehicle



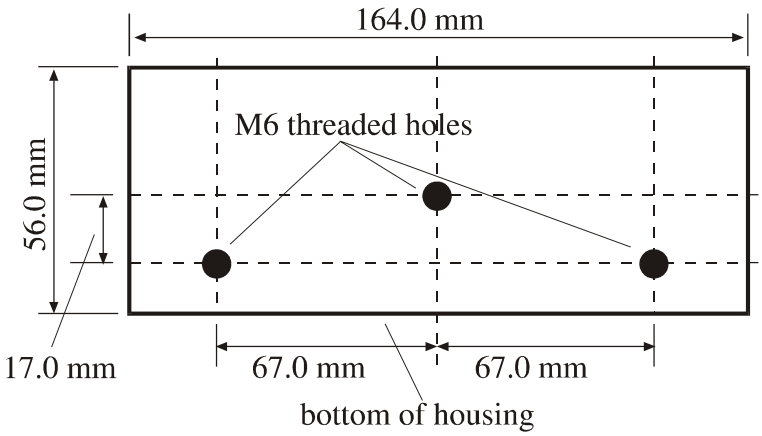
Mount the sensor in a longitudinal orientation, parallel to the vehicle

Notice:
When using the sensor in wet or snowy conditions, mount it at the front of the vehicle to avoid spray and/or blowing snow.



For optimum performance and accuracy, the mounting distance from the lower surface of the sensor body (not including the spray guard) to the road surface must be 300 mm ±60 mm.

LL mounting jig



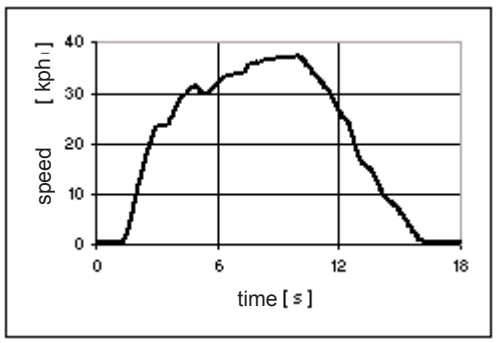
4. Technical Data

Typical Technical Specifications

Speed range:		0.5 to 400 kph (optional 600 kph)
Distance resolution:		2.2 mm
Measurement deviation:		< ± 0.1%
Working range of the sensor:		300 ± 60 mm
Digital output	digital:	10 to 460 pulses/m
Analog output	longitudinal direction:	0 to 10 V
Power supply:		9 to 14.5 V; 25 W
Temperature range	Operation:	- 25 to 50° C
	Storage:	- 40 to 85° C
	Relative humidity:	5 to 80% not condensing
System of protection:		IP 67
Dimensions of the sensor (l x w x h):		164 x 52 x 61 mm
Net weight:		520 g
Dimensions of electronics (l x w x h):		approx. 180 x 105 x 43.5 mm
Net weight:		1.0 kg
Shock:		50 g half-sine, 6 ms
Vibration:		10 g, 10 to 150Hz

Serial interface for connection to the PC,
automatic sensor identification, function control.

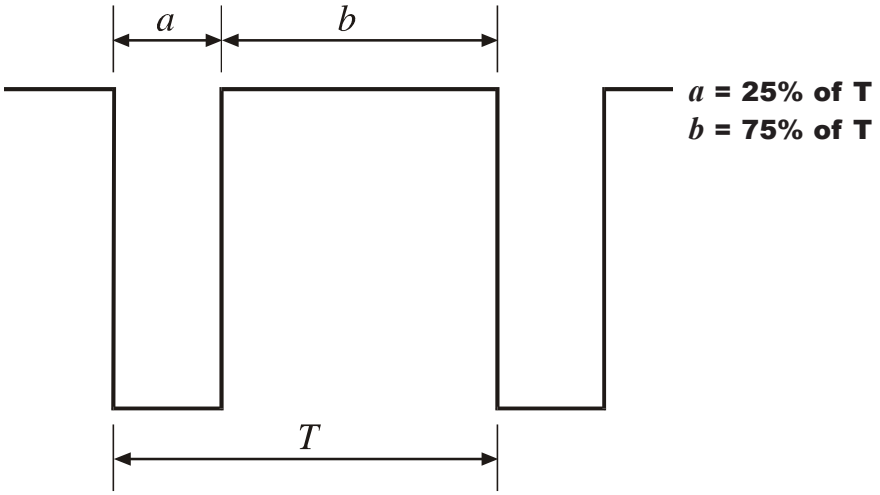
speed lVl



4.2 Measured values

Measurement	Output	Output Channel
Longitudinal speed V_L	analog	Analog 1
Pulses/m for longitudinal distance	digital	Digital 1

4.3 The calibrated CORREVIT® LL sensor (set to 460 pulses/m) supplies the following pulse form at output DIG 1.



Pulse forms at a rate of 300 kph:

Conversion of the speed factor into m/s	$\frac{300 \text{ kph}}{3.6}$ = 83.33 m/s
Frequency f of the LL Sensor	83.33 m/s x 460 P/m = 38.331 kHz
T: period	$\frac{1}{38.331 \text{ kHz}}$ = 26.09 µs
A period of 26.09 µs requires	a = 6.52 µs and b = 19.57 µs

Pulse forms at a rate of 1 kph

Conversion of the speed factor into m/s	$\frac{1 \text{ kph}}{3.6}$ = 0.277 m/s
Frequency of the LL Sensor	0.277 m/s x 460 P/m = 127.42 Hz
T: period	$\frac{1}{127.42 \text{ Hz}}$ = 7.85 ms
A period of 7.85 ms requires	a = 1.96 ms and b = 5.89ms

4.4 The LL Sensor has been set as follows:

Analog channel 1	25 $\frac{mV}{kph}$	Magnitude speed V_L
Digital channel 1	460 $\frac{pulses}{m}$	Longitudinal distance (output as pulses)

4.5 Values to be measured

With a setting of 25 mV / kph for longitudinal speed V_L, a maximum speed of 400 kph can be achieved.

The above settings produce the following values:
100 kph = 2.5 V
200 kph = 5.0 V
300 kph = 7.5 V
400 kph = 10.0 V

All signals can be used as inputs to all common data acquisition systems.
Should any problems arise, please contact CORRSYS-DATRON Sensorsysteme GmbH.

For analog signal representation of speed, the voltage scale may be changed to any of the following:

- 15 mV / kph
- 25 mV / kph
- 50 mV / kph
- 100 mV / kph