INTACTON

OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

Main Features

- Contact-free optical measurement principle
- Measurement in 2 orthogonal axes, alignment effort is significantly minimized by using the resulting direction function
- Compact industrial design
- Velocity range up to +/- 4m/s
- Detection of standstill
- Detection of direction of motion
- Allows deviation from nominal working distance
- Suited for rough and structured surfaces
- Measurement uncertainty <1 %
- Self adapting to measurement object
- Long life LED illumination

Programmable Parameters

- Resolution
- Positive / negative direction

Mechanical Structure

- Aluminium housing
- Front window made of unbreakable, scratch resistant and durable plastic
- Protection class IP 54

Electrical Features

- +5V or 10V..30V supply voltage selectable
- Polarity inversion protection
- Over-voltage-peak protection
- 2 status LEDs

INTACTON GmbH
Konrad-Adenauer-Allee 11, D-44263 Dortmund
Phone +49 (0)231-47730-300, Fax +49 (0)231-47730-309, www.intacton.com, info@intacton.com

INTACTON

OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

Technical data

Sensor Properties

Velocity measurement range	-4 m/s to + 4 m/s
Measurement uncertainty	<1 % relative to value of measured length. Based on a total length of 10 m and constant velocity of 4 m/s.
Resolution (physical)	65 µm
Resolution (output)	Typical 100 µm, other resolutions programmable
Materials to measure	Rough and structured materials are best suited for measurement. The following listing is by far incomplete and provides only a selection: Textiles, webs, fleece, wood etc.

Optics and Illumination

	OPT-_ _-_ _ _ _ _ _ _ - 004 10 -
Distance to object (*)	40 mm
Distance deviation	±10 %
Measurement spot size	< 64mm² (8mm x 8mm)
Illumination	LED

(*) other measurement distances on request

Mechanical data

Housing material	Aluminium
Shock resistance (EN 60068-2-27)	≤ 25 g (half sine, 6 ms) (*)
Permanent shock (EN 60028-2-29)	≤ 10 g (half sine, 16 ms) (*)
Vibration (EN 60068-2-6)	≤ 1 g (5 Hz ... 200 Hz, sine) (*)
Weight (standard version)	approximately 250 g
Mounting	2 slotted holes for M4

(*) corresponding to class 3M5 (EN 60721-3-3: compliant to applications associated with significant vibrations, e.g. caused by machines or vehicles, or shocks with high density of energy, e.g. caused by heavy machines or conveyor belts)

OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

Mechanical drawings

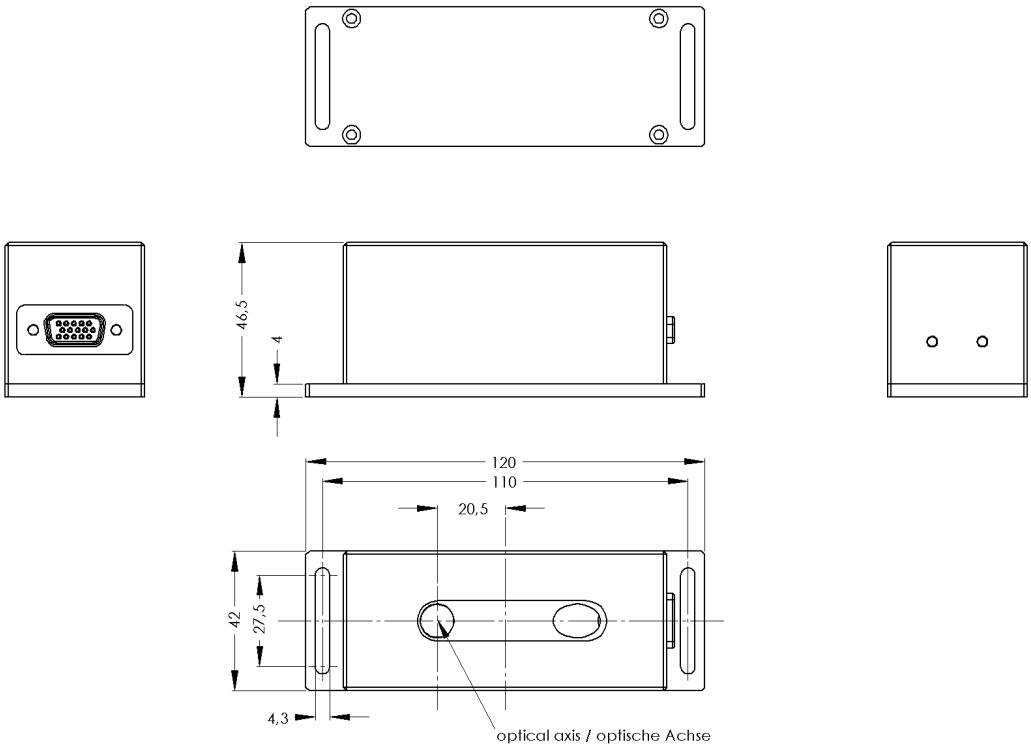


Fig. 1 Mechanical drawing (all dimensions in mm)

Electrical data

Supply voltage	5 V or 10 - 30 V(*) DC (absolute limit)
Power consumption	≤ 2.5 Watt
EMC	Emitted interference: EN 61000-6-4
	Noise immunity: EN 61000-6-2
Interface	Field bus (**), Incremental, SSI
Data transfer rates	
- Incremental interface, (maximum step frequency)	1 D: up to 70 kHz 2 D: up to 35 kHz
- SSI	100 kHz - 300 kHz
Electrical lifetime	> 10^5 h

(*) Supply voltage according to EN 50 178 (safety extra-low voltage).

(**) On request

Environmental conditions

Operating temperature	-15 to + 55 °C
Storage temperature	- 20 to + 60 °C
Humidity	80 % (without liquid state)
Protection class (EN 60529)	Enclosure: IP 54

OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

Synchronous Serial Interface (SSI)

The SSI interface can be used to transmit an ascending length or a velocity.

Electrical data

Noise immunity	Balanced line transmission provides high noise immunity
Paired lines	Shielded and twisted pair lines are essential to maximize noise immunity.
Clock input	Galvanically isolated via opto-coupler
Clock frequency	100 kHz – 300 kHz
Differential input voltage for clock	Minimum 2,8 V / maximum 5 V
Output driver circuit	Line Driver, RS422 compatible
Maximum output current	25 mA

Timing

Delay time t_p	< 30 µs
Latency time t_m (at single shift)	> 1,5 ms
Latency time t_m (at multiple shift)	> 55 µs

Data transmission

Output data is transmitted synchronously to the clock signal of the control system (e.g. PLC or a counter card). When non-operational clock and data line levels are high. As soon as the clock signal of a sequence changes for the first time from high (H) to low (L), data is latched for transmission.

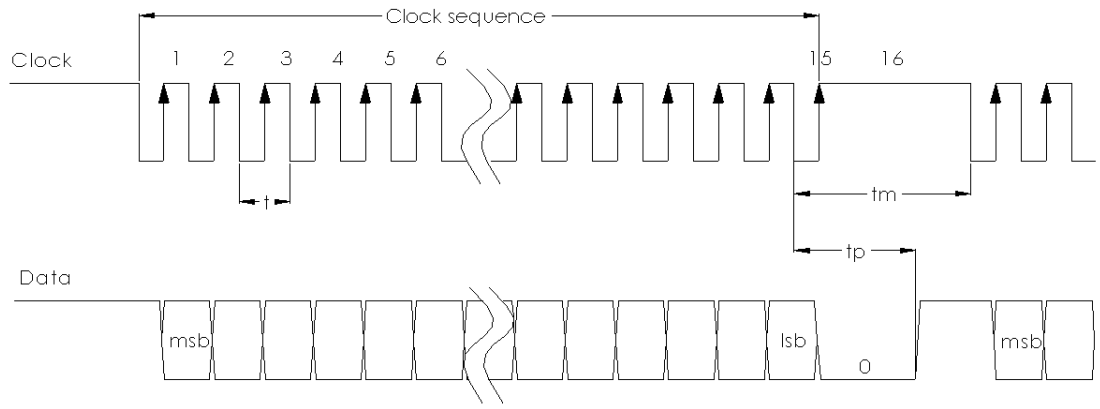
Data bits are shifted on rising clock edges starting with the most significant bit. Transmission ends on the last rising clock edge and is terminated after excession of the ssi delay time (latch is cleared after 30 µs).

To avoid multiple transmission of identical data, requests should not follow each other faster than 1.5 ms (cycle time of internal measurement).

The maximum data word length is 31 bits (15 bits for x-axis related data starting with the first rising edge and 15 bits for y-axis related data, followed by a zero bit). Thus, a full data transmission requires 31 clock cycles. For 1 dimensional operation, a clock burst of 16 cycles is sufficient (including the zero bit). All data words must be interpreted as absolute values, therefore length progress between two readings is given by the difference value. Velocity information containing negative values are encoded in twos complement format.

OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

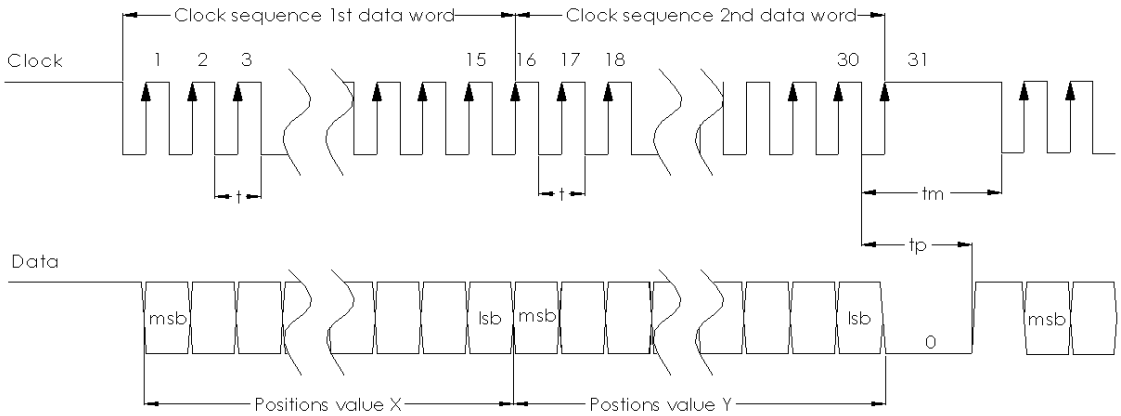
Signal diagram 1D



t_p < 30 µs t_m > 55 µs (at multiple transfer) / t_m > 1.5 ms (at single transfer) t< t_m

Fig. 2 1D data transmission signal diagram

Signal diagram 2D



t_p < 30µs t_m > 55µs (at multiple transfer) / t_m > 1.5ms (at single transfer) t< t_m

Fig. 3 2D data transmission signal diagram

Multiple tranfer

For redundancy testing, data can be transmitted multiple times by requesting data faster than 0.75 ms (the delay time of 30 µs has still to be accounted for). Performing requests in this manner result in reception of identical data words on each demand.

After expiration of the latency time (1.5 ms), the sensor provides data from an updated measurement.

OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

Incremental interface

Incremental length information is provided by a quadrature signal pair consisting of two square pulses, shifted in phase to each other by 90°.

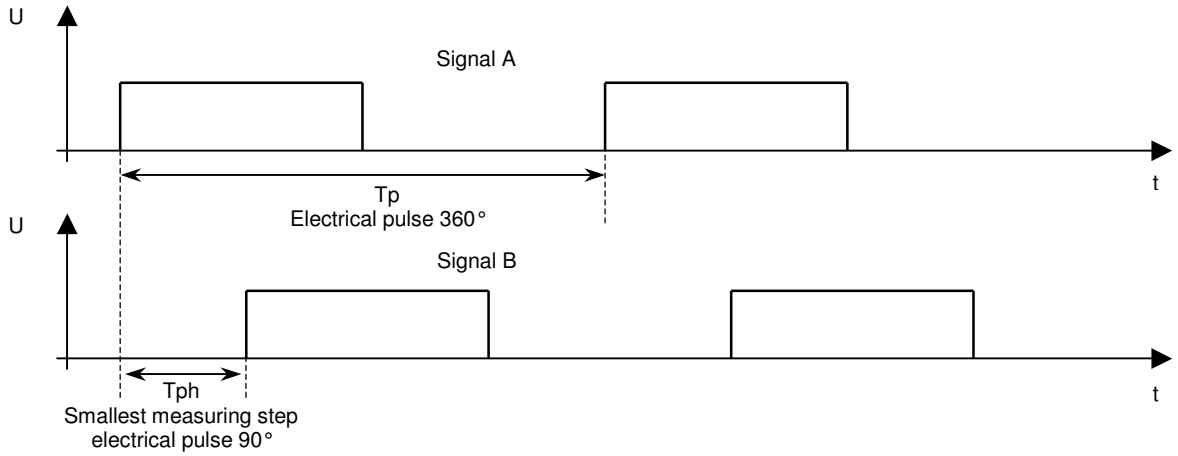
Electrical data

Maximum output frequency	1D: up to 17,5 kHz (at 1x edge count) up to 70 kHz (at 4x edge count) 2D: up to 8,75 kHz (at 1x edge count) (each axis) up to 35 kHz (at 4x edge count)
Velocity range	v_{max} = ± 4m/s @ 250µm pulse resolution v_{max} = ± 1,75m/s @ 100µm pulse resolution v_{max} = ± 1,13m/s @ 65µm pulse resolution (min. resolution)
Resolution (output)	Min. 1 pulse = 65 µm (smallest measuring step 16,25 µm) 1 pulse = 100 µm (smallest measuring step 25 µm) 1 pulse = 250 µm (smallest measuring step 62,5 µm)
Signals	
One-dimensional operation	channel A, /A, B, /B
X/Y-operation	X-axis: X_A, /X_A, X_B, /X_B ; Y-axis: Y_A, /Y_A, Y_B, /Y_B
Phase shift	90° between channel A and B in each case
Line driver version	
Maximum output current data	25 mA
Push-Pull version	
Maximum output current	25 mA
Maximum output voltage	Operating voltage
Short-circuit proof	Signal output against each other and to ground

(*) Maximum velocity and highest resolution are not independent. More information on request.

OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

Signal diagram



Signal A: Square signal A, incremental signal
Signal B: Square signal B, incremental signal

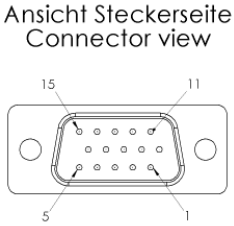
Tp: Period duration
Tph: 90° electrical phase shift

Electrical Connection

Plug

15 pin male connector Sub-D High Density

Pin number	SSI Signal	Incremental Signal	
		1D	2D
1	Motion	Motion	Motion
2	Ready	Ready	Ready
3	Reserved	Reserved	Reserved
4	+ U_b_Ext	+ U_b_Ext	+ U_b_Ext
5	Gnd_Ext	Gnd_Ext	Gnd_Ext
6	Start/Stop	Start/Stop	Start/Stop
7	Data +	n.a.	X_A
8	Data -	n.a.	/X_A
9	Clock +	n.a.	X_B
10	Clock -	n.a.	/X_B
11	n.a.	A	Y_A
12	n.a.	/A	/Y_A
13	n.a.	B	Y_B
14	n.a.	/B	/Y_B
15	Reserved	Reserved	Reserved



OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

Diagnostic LED's

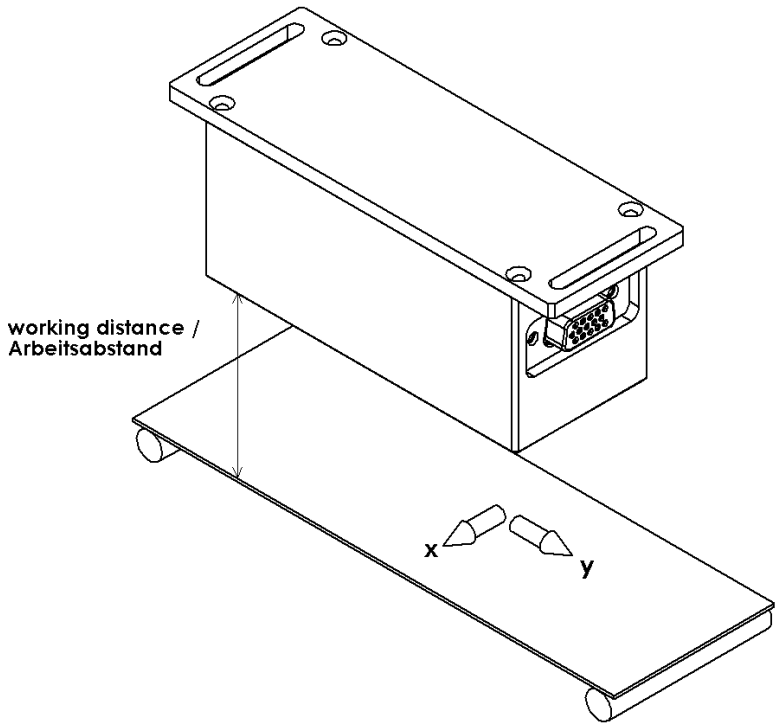
The LEDs mounted on the housing backside allow easy diagnostics during initial setup of the sensor or in case of fault without any additional tools.

Programmable Parameter (set by manufacturer)

Resolution	The resolution of the output value is emanating from the physical resolution (65µm) by an adjustable scaling.
Sign of direction	Defines the sign of motion.

Mounting Situation

The drawing shows the measurement setup. Please note the reference points for the working distance and the orientation of the sensor relative to the direction of movement. The slotted holes in the base plate allow flexible adjustment of the sensor.
The coordinates of the optical axes are given in the mechanical drawing. During operation of the sensor the area between the object and the window must not be obstructed.



INTACTON

OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

Models / Ordering Description

Description	Type key																
Optipact	**OPT-**	A	1	_ _ _ _ _ _ _ -	_ _ _	_ _ -	1	_ -	_	_	_	_ -	A	0	00
Model		**A**													
Generation			**1**												
Velocity range	-4..+4 m/s			**N 0 0 4 0 0 4**											
Working distance (*)	4 cm				**0 0 4**										
Distance deviation	10% from measuring distance					**1 0**									
Image sensor	Internal identifier						**1**								
Measurement axis	1 measurement axis (resulting)							1							
	2 orthogonal measurement axes							**2**							
Incremental-interface	Without								0						
	RS422 compatible								**1**						
	Push-Pull (output level = $+V_{CC}$)								2						
	TTL								3						
Field bus interface (**)	Without									**0**					
	SSI (RS422 compatible)									1					
	SSI with Push-Pull (output level= $+V_{CC}$)									2					
	SSI with TTL									3					
Connection type	Connector										**P**				
Supply voltage	10 – 30 V											**1**			
	5 V											2			
Housing	Aluminium												**A**		
Version														**0**	
Options	Without														**00**

(*) further working distances on request
(**) further field bus interfaces on request

Standard = bold, further models on request

INTACTON

OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

Available models

	Model	Generation	Velocity range	Working distance	Distance deviation	Image sensor	Measurement axis	Incremental interface	Field bus interface	Connection type	Supply voltage	Housing	Version	Options
OPT-	A	1	N 0 0 4 0 0 4	0 0 4	1 0 -	1	_ -	0	1	P	1 -	A	0	0 0
OPT-	A	1	N 0 0 4 0 0 4	0 0 4	1 0 -	1	_ -	0	2	P	1 -	A	0	0 0
OPT-	A	1	N 0 0 4 0 0 4	0 0 4	1 0 -	1	_ -	0	3	P	1 -	A	0	0 0
OPT-	A	1	N 0 0 4 0 0 4	0 0 4	1 0 -	1	_ -	1	0	P	1 -	A	0	0 0
OPT-	A	1	N 0 0 4 0 0 4	0 0 4	1 0 -	1	_ -	2	0	P	1 -	A	0	0 0
OPT-	A	1	N 0 0 4 0 0 4	0 0 4	1 0 -	1	_ -	3	0	P	1 -	A	0	0 0

Accessories and Documentation

Description		Type
Connector, counterpart	Female, IP53	15 pole HD Sub-D
Manual (*)	Installation- and configuration, German	UMD-OPT
Manual (*)	Installation- and configuration, English	UME-OPT

(*) Visit our homepage www.intacton.com. All data sheets and manuals can be downloaded free of charge from our homepage.

We do not assume responsibility for technical inaccuracies or omissions. Specifications are subject to change without notice.