INTACTON
FRABA

OPTICAL LENGTH AND VELOCITY SENSOR
OPTIPACT

Main features

- Contact-free optical measurement principle
- Two orthogonal measuring axes
- Compact industrial design
- Speed up to 4 m/s depending on the version
- Detection of standstill
- Detection of direction of motion
- Tolerant against working distance variation
- Self adapting to measurement object
- Long-life LED illumination
- Programmable via RS232 with the graphical user interface "Sensor Configurator“

Applications

- Distance or velocity measurement for quality control
- Control of Manufacturing and Trimming processes with tape products
- Positioning of Trucks, Automated Guided Vehicles (AGV), etc...
- Regulation or control of continuous production, cutting and movement processes
- Replacement of incremental encoders with measuring wheels through non-contact measurement

Electrical Features

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

Mechanical Features

- Aluminium housing
- Front window made of unbreakable, scratch resistant and durable plastic
- Protection class IP 65

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Product Overview

	OPTIPACT-F1	OPTIPACT -S1	OPTIPACT -M1
Velocity Range	up to 1 m/s (3 ft/s)	up to 4 m/s (13 ft/s)	up to 2.5 m/s (8 ft/s)
Working Distance	15.5 mm (0.6 in)	40 mm (1.5 in)	180 mm (7 in)
Tolerance	± 10 %	± 10 %	± 6 %
Measuring Uncertainty (*)	< 1 %	< 1 %	< 0.5 %
Reproducibility (*)	< 0.2 %	< 0.2 %	< 0.2 %
Best Resolution	15 µm	65 µm	30 µm
Power	5 V or 10 – 30 V	5 V or 10 – 30 V	10 – 30 V
Dimensions	120 x 42 x 47 mm (4.7 x 1.6 x 1.8 in)	120 x 42 x 47 mm (4.7 x 1.6 x 1.8 in)	280 x 170 x 82 mm (11 x 6.7 x 3.2 in)
Weight	0.25 kg (0.55 lb)	0.25 kg (0.55 lb)	3.5 kg (7.72 lb)
Power Consumption	0.5 W	0.5 W	4 W
Protection Class	IP 65		
Temperature Range	-15 to 55 °C		
Interfaces	Incremental, RS232(**)		
Illumination	red LED		

(*)Tested for a total length of 10m on red abrasive paper (P100) within the tolerence of the working distance.
(**) Only when used in conjunction with the INTACTON software “Sensor Configurator”

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Technical Data

Sensor Characteristics

Sensor	OPT-F1	OPT-S1	OPT-M1
Speed-Measuring Range	up to 1 m/s (3 ft/s)	up to 4 m/s (13 ft/s)	up to 2.5 m/s (8 ft/s)
Typical Uncertainty (*)	< 1 %	< 1 %	< 0.5 %
Resolution (optical)	15 µm	65 µm	30 µm
Resolution (Output)	Typically 100 µm other resolutions programmable		

(*)Tested for a total length of 10m on red abrasive paper (P100) within the tolerence of the working distance.

Measuring Materials

The sensor OPT-F1 is primarily for use on very delicate surfaces, such as copy paper, cardboard, plastic, foil, shiny metal surfaces or high-grade, finely woven textiles, which do not necessarily have visible structures. It may also be programmed for coarser materials.
The two sensor types, OPT-M1 and OPT-S1, however, are more suited for surfaces which through its roughness, by color or by changing reflectance, have optical structures that are easily identifiable even by the naked eye (For example, non-woven textiles, fabric, abrasive papers, etc ...)

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Optics and Illumination

Sensor	OPT-F1	OPT-S1	OPT-M1
Nominal Working Distance (*)	15.5 mm (0.6 in)	40 mm (1.5 in)	180 mm (7 in)
Working Distance Tolerance	± 10 %	± 10 %	± 6 %
Typical Measurement Area	< 4 mm² (2 mm x 2 mm)	< 64 mm² (8 mm x 8 mm)	< 25 mm² (5 mm x 5 mm)
Illumination	Red LED		

(*) Greater working distances available upon request.

Mechanical Data

Sensor	OPT-F1	OPT-S1	OPT-M1
Housing	Aluminum		
Shock Resistance (EN 60068-2-27)	≤ 25 g (Half Sine, 6 ms) (*)		
Permanent Shock (EN 60028-2-29)	≤ 10 g (Half Sine, 16 ms) (*)		
Fatigue (EN 60068-2-6)	≤ 1 g (5 Hz ... 200 Hz, sine) (*)		
Weight (Standard Version)	approx. 250 g (0.55 lb)		approx. 3.5 kg (7.72 lb)
Mounting holes	M4		M6

(*) 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)

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Electrical Data

Sensor	OPT-F1	OPT-S1	OPT-M1
Power Supply (absolute values) (*)	5 V or 10 - 30 V DC		10 – 30 V DC
Maximum Power Consumption	2.5 Watt		4 Watt
EMC	Emission: EN 61000-6-4		
	Immunity: EN 61000-6-2		
Interface	Incremental Interface, RS232 (**)		
Incremental Interface (Step Frequency)	Using one Axis: up to 41 kHz (at four times edge count) Using two Axis:: up to 20.5 kHz (at four times edge count)		
Electrical Lifetime	$> 10^5$ h		

(*) Supply voltage according to EN 50 178 (safety extra-low voltage).
(**) RS232 is only to be used in conjunction with the "Sensor Configurator" software.

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Environmental conditions

OperatingTemperature	-15 to + 55 °C (8 to 120 °F)
Storage Temperature	- 20 to + 60 °C (0 to 128 °F)
Relative Humidity	80 % (without condensation)
Protection Class (EN 60529)	IP 65

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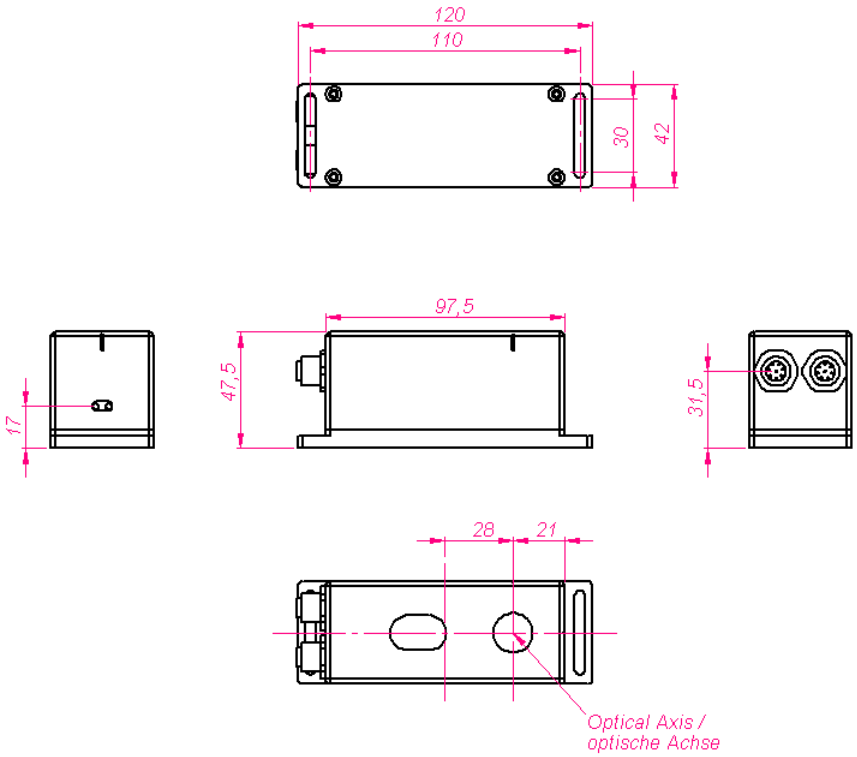
Mechanical Drawings

OPT-F1 and OPT-S1

All dimensions are in mm. Tolerances according to DIN ISO 2768-1-f.



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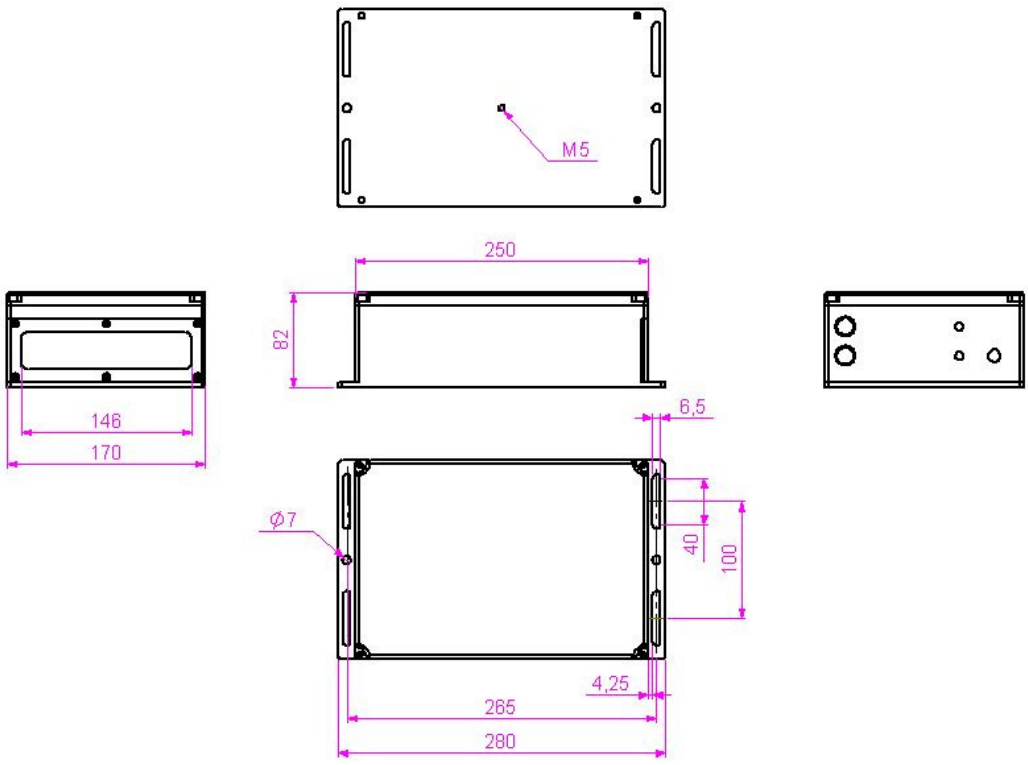
OPT-M1

All dimensions are in mm. Tolerances according to DIN ISO 2768-1-f.



OPTICAL LENGTH AND VELOCITY SENSOR
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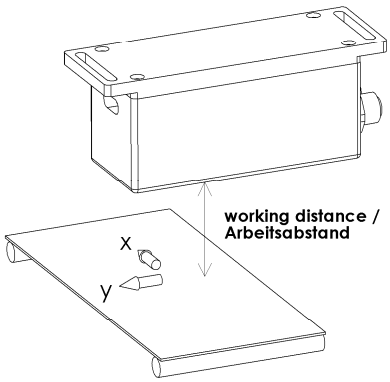

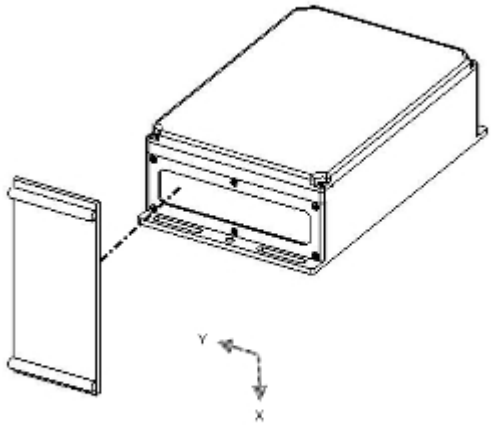

Mechanical Installation

The drawings above show the measurement of the products OPT-F1 and OPT-S1 (left) and the OPT-M1 (right). The front surface of OPTIPACT must run parallel to the surface of the measurement object, to minimize the error caused due to misalignment. It is also important to make sure that the distance between the object and the front of the sensor are set to the nominal working distance of each sensor type to ensure consistency and to minimize error.

The long holes for M4 (OPT-F1 and OPT-S1), and M6-bolts (OPT-M1) in the base plate of the OPTIPACT allow an appropriate orientation.

The Measuring area below the camera optics is dependent on the sensor and is as follows:

OPT-S1	OPT-F1	OPT-M1
8 x 8 mm²	2 x 2 mm²	5 x 5 mm²

The sensor should be arranged so that the object to be measured is completely covered.

If the movement of the target is in a horizontal direction, we reccomend the asssembly shown above.

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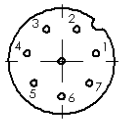
Electrical Connector and Pin Assignment

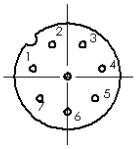
8 Pin M12-Connector male (*)

Pin Number	Signal
1	X_A
2	/X_A
3	X_B
4	/X_B
5	+ U_b_Ext
6	Gnd_Ext
7	RS232 Rx
8	RS232 Tx

Stecker
Male Connector



Dose
Female Connector



8 Pin M12-Connector female (*)

Pin Number	Signal
1	Y_A
2	/Y_A
3	Y_B
4	/Y_B
5	Digital Input 1
6	Gnd_Ext
7	Digital Output 1
8	Digital Output 2

(*) Looking at the connectors on the sensor

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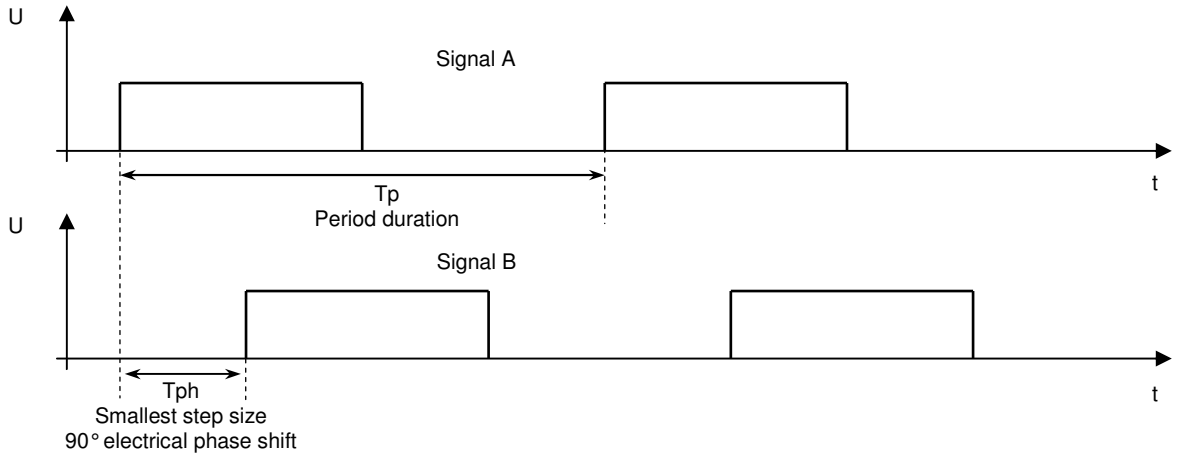
Incremental Interface

The incremental interface can be used to transmit the displacement information. Incremental length information is provided by a quadrature signal pair consisting of two square pulses, shifted in phase to each other by 90°. The direction of the movement can be deduced from the order in which the signal edges appear. In the example below an edge from signal B follows an edge from signal A with a phase shift of 90°. If the measurement object turns over to the other direction an edge of signal A will follow an edge of signal B.

Signal Diagram



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

Tp: Period duration
Tph: 90° electrical phase shift

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Electrical Data

Sensortype	**OPT-F1**	**OPT-S1**	**OPT-M1**
Max. Output Frequency	Using one Axis: up to 41 kHz (at four times edge count) (*) Using two Axis:: up to 20.5 kHz (at four times edge count) (*)		
Velocity Range	See Picture at page 14		
Line Driver Version			
Max. Output Current	Max. 25 mA		
Push-Pull Version			
Max. Output Current	Max. 25 mA		
Max. Output Voltage	Power Supply		
Short Circiut Poof	Signal output against each other and to ground		
Noise immunity	Balanced line transmission provides high noise immunity		
Paired lines	Shielded and twisted pair lines are essential to maximize noise immunity.		
Output Driver Circuit	Line Driver, RS422 compatible		

(*) Please divide by 4 to get the corresponding number at 1x edge count.

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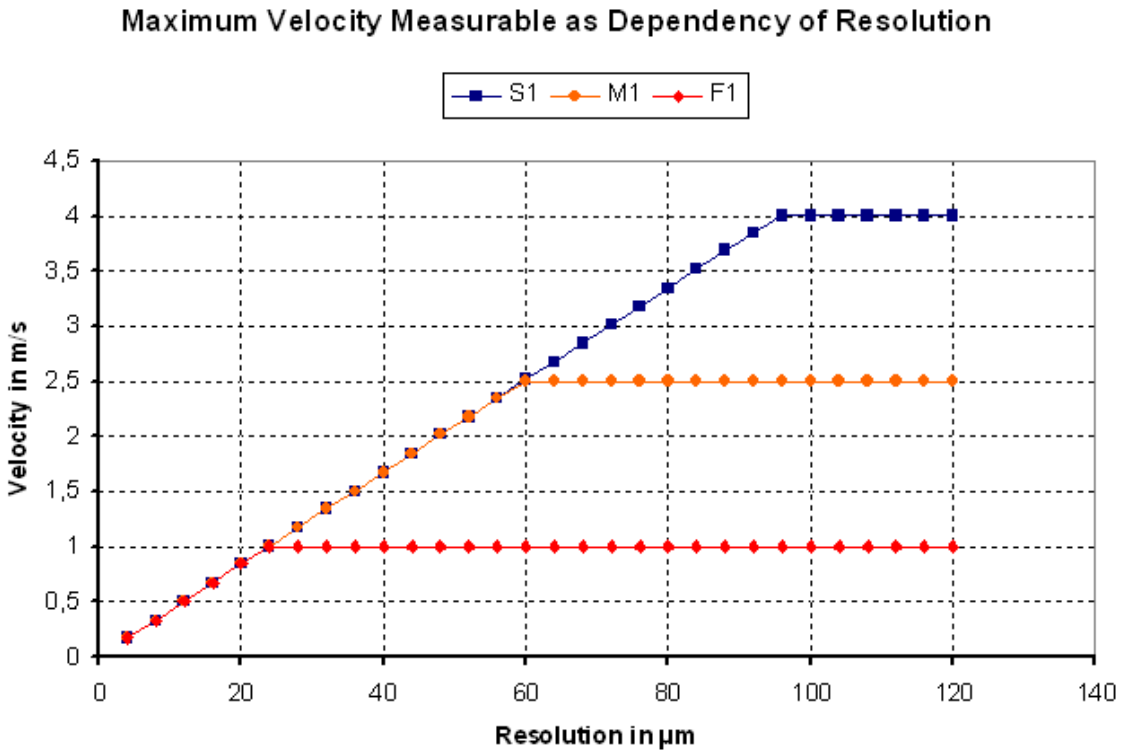

With the setting of the finest sensor resolution, the maximum speed in the application must be considered, see graph . This graph is based on an analysis of a four times incremental edge count.

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Importance of Diagnostic LEDs

The red and green LED shows the operation status of the OPTIPACT. The LED can be permanently lit (on), not lit (off) or blinking. The following Table explains the different operating conditions.

LED Status and Meaning

Green LED	Red LED	Meaning
On		Measurement mode
Blinking		Configuration mode
Off		No supply voltage
	On	Inability to measure
	Blinking	Restricted measurement
	Off	Normal operation

Meaning of diagnostic LEDs in detail

Green LED	Red LED	Meaning
On	Off	Measurement mode, all parameters operating within specification.
Blinking	Off	Configuration mode
Off	Off	No supply voltage
On	Blinking 1x	Measurement mode. Restricted measuring ability. Image brightness outside the defined range of parameter; Preventive maintenance is recommended.
On	Blinking 2x	Measurement mode. Restricted measuring ability. Image quality operating outside the defined range of parameter; Preventive maintenance is recommended.
On	Blinking 3x	Digital filter indicates sporadic drop outs.
On	Blinking 4x	More than one indicator signals restricted measurement ability.
Blinking	Blinking	Verification mode, transmission of test data without relationship to movement of measurement object.
Off	Blinking	Transmission of image data
On	On	Measurement mode. Measurement errors are likely. One or more parameters operating outside the defined range.
Blinking	On	System error in configuration mode.
Off	On	System error in measurement mode.

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Models / Ordering Description

Bezeichnung	Type Key														
Optipact	**OPT-**	_	1	_ _ _ _ _ _ _ -	_ _ _	_ _	1	2 -	_ _	P	_ -	A	0	00
Model		**F**												
		S												
		M												
Generation			**1**											
Velocity Range	F: -1..+1 m/s			**N 0 0 1 0 0 1**										
	S: -4..+4 m/s			**N 0 0 4 0 0 4**										
	M: -2.5..+2.5 m/s			**N 0 0 2 0 0 2**										
Working Distance (*)	F: 15.5 mm				**0 0 1**									
	S: 40 mm				**0 0 4**									
	M: 180 mm				**0 1 8**									
Distance Deviation	F: 10%					**1 0**								
	S: 10%					**1 0**								
	M: 3%					**0 3**								
Image sensor	Internal Identifier						**1**							
Measurement axis	2 Orthogonal Axes							**2**						
Incremental	RS422 Compatible								**1 0**					
Interface	Push-Pull (Output Level = $+U_b$)								2 0					
	TTL								3 0					
Connection Type	Connector									**P**				
Supply Voltage	10 – 30 V										**1**			
	5 V										2			
Housing	Aluminium											**A**		
Version													**0**	
Options	without													**00**

(*) Other working distances on request.

Standard-Version = **bold**

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Accessories and Documentation

Description	Article number
M12-male connector with 10 m cable and open end, IP 65	10005015
M12-female connector with 10 m cable and open and, IP 65	10005016
Configuration software (GUI) for OPTIPACT and COVIDIS (*)	-
OPTIPACT Manual, English (*)	-

These accessories are not part of the standard delivery and have to be ordered separately.

(*) Visit our homepage www.intacton.com. All files 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.