

### General Description

In order to know continuously the absolute position of the rod in a cylinder (oleodynamic cylinders application for example), Optoi developed a reflective sensor, based on optical technology. The patented platform is based on smart sensor, based on optical emitters and receivers, combined to a robust bar code's type, which is located on the rod of the piston. The bar code is made according to more than 10 years of experience in the automotive machines for industrial and agricultural market. A portion of this codification is detectable continuously, during the piston's motion in the cylinder, through suitable detecting means which are usually arranged in the cylinder of the cylinder-piston unit.

The main advantages of this innovative measuring method, compared to the traditional ones (magnetostrictive and potentiometers), are: the absence of installation workforce (the sensor can be simply plugged into the cylinder envelope, not into the rod), the contactless of the measure (optical reflection principle), the suitability for steering cylinders (passing through rod), the robustness of the rod (which can be solid and not drilled) and finally the absence of calibration/easy substitution.

In few words, a plug & play and reliable technology.

### Applications

Steering cylinders position control

Lift cylinders position control

Tilt cylinders position control

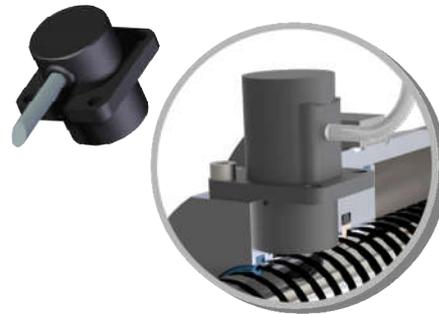
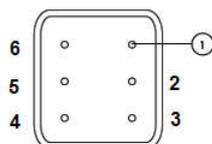
#### made for

Satellite driven machines

Agricultural machines

Rough terrain machines

Handlers, forestry machines



### Features

- The easiest to be assembled
- Non invasive (contactless, no rod drilling)
- Installable also on double effect cylinders
- Robust against EM noise and vibrations
- No calibration required
- High reliability (MTTF = 180 years)
- Precise, accurate and absolute measure
- Smart electronics with adaptive algorithms
- Fast sampling rate ( > 400S/s)
- Low profile (< 20mm outside the cylinder)

### Pin Functions

No.	Name	Function
1	RX	Control pin rx (do not connect, for factory use only)
2	TX	Control pin tx (do not connect, for factory use only)
3	V <sub>cc</sub>	Power Supply
4	GND	Ground
5	OUT	Voltage Linear Output (0.5 - 4.5) V
6	D	Diagnostic pin (currently not implemented)

### Ordering Information

OIS22 -XXXX

Subcode Description:

- 0545: Analog 0.5-4.5V output

- 4505: Analog 4.5-0.5V output (reverse)

Absolute position sensor

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Min	Max	Unit
T <sub>S</sub>	Storage Temperature	-20	85	°C
T <sub>A</sub>	Operating Temperature Range	-20	80	°C
V <sub>CC</sub>	Supply Voltage Range	8	30	V
R <sub>L</sub>	Max output load (analog version)	20	100	kΩ

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

T<sub>A</sub> = 25°C, unless otherwise noted.

**GENERAL CHARACTERISTICS**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
A <sub>T</sub>	Total Accuracy	Sensor + cylinder		0.05		mm
R <sub>S</sub>	Sensor's resolution			0.03		mm
τ	Response time (sampling time)		400			S/s
T <sub>C</sub>	Temperature coefficient	On analog output		0.00035		V/K

**ELECTRICAL CHARACTERISTICS**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage Range	Battery	8	12	30	V
V <sub>J</sub>	Jump start voltage allowable				36	V
I <sub>CC</sub>	Device current consumption	No load, whole voltage and temperature range		40		mA

**MECHANICAL CHARACTERISTICS**

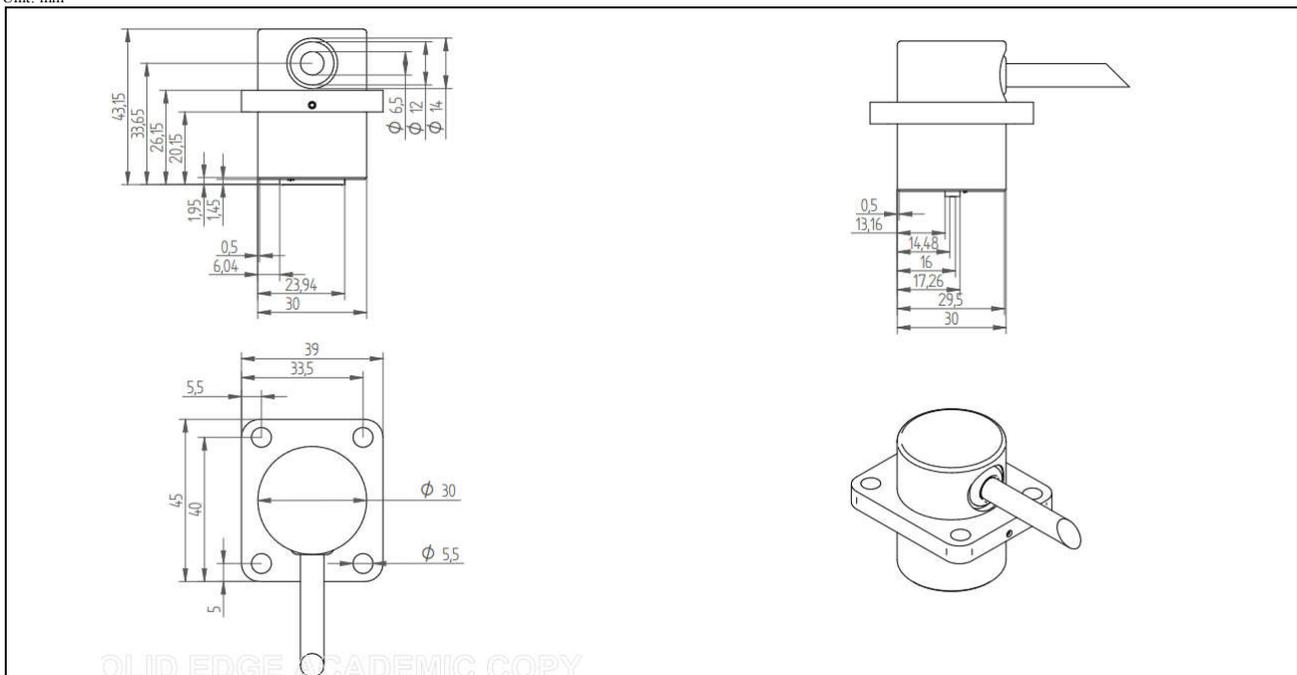
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
L	linearity	% on full scale		0.02		%
R	repeatability			0.03		mm
IP	Protection grade				IP67	
L <sub>c</sub>	Length tolerance (cable version 6x0.5mm <sup>2</sup> )	0.5m cable		± 20		mm

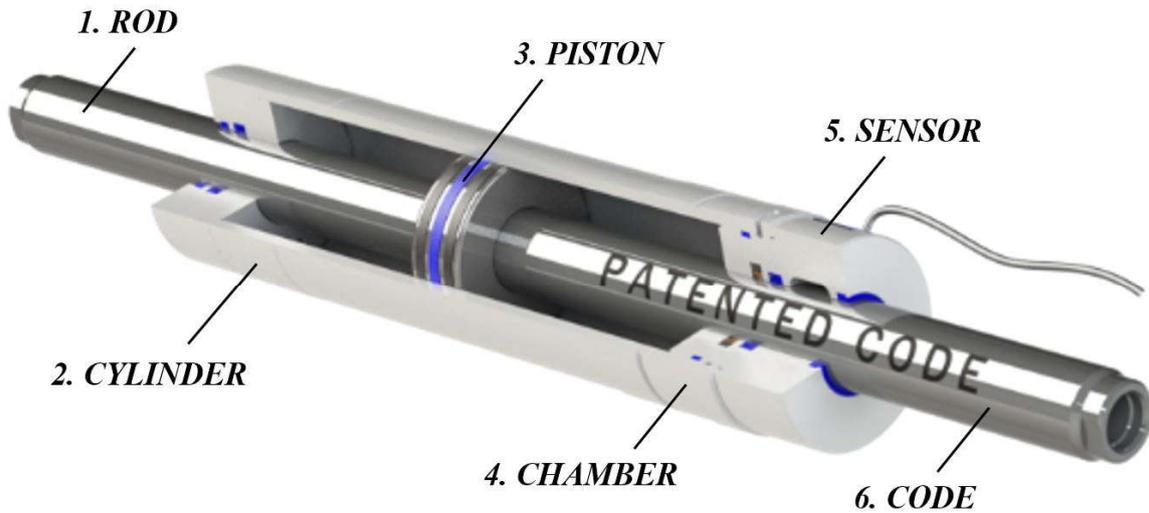
**RELIABILITY PARAMETERS**

Symbol	Parameter	Value	Unit
MTTF	Mean Time To Failure [T <sub>a</sub> =40°C, V <sub>CC</sub> =12V, environment=mobile]	180	years

**MECHANICAL DIMENSIONS**

Unit: mm



**TECHNOLOGY OVERVIEW – HOW DOES IT WORK**

The OIS22 sensor is an absolute position sensor, you plug the device into the cylinder (equipped with a special marked rod), and the system is ready. No calibration is required, since the sensor gives you an absolute position at it recognizes immediately the absolute code marked on the rod. No external workforce is required at customer side, who can buy the complete sensitized cylinder and install it on the machine or also buy the sensor only and make the cylinder by itself, according to marking specifications.

The OIS22 has been developed especially for steering cylinders, but it can be used also in many other different applications, like loaders, aerial platforms for example, wherever you have to measure a position between a cylinder and a piston.

The system is made of these main parts:

1. **ROD** : the rod can be a massive rod, unlike the *magnetostrictive* technology, no drilling of the rod is required, ensuring the maximum mechanical robustness.
2. **CYLINDER**: the sensor works with different sizes of cylinders/rods, as it is depending only from the code.
3. **PISTON**: the piston that moves the rod pushed by the oil left or right is not modified by the system.
4. **CHAMBER**: the chamber of the sensor is located at one side of the cylinder and it isn't subjected to the cylinder pressures, as it is separated from the oil chamber. The separation is guaranteed using special seals, that ensures a perfect clean surface of the rod under the sensor. The rod surface is continuously cleaned every time it pass into the chamber.
5. **OIS22 SENSOR**: it is a reflective optical smart sensor and it "looks" a portion of the codification, it is able to detect the absolute position of the piston in real-time.
6. **CODE**: the code is a patented robust codification, marked on the rod with special process, which is robust against aging and against all the environmental conditions and substances, which may be present in the industrial and agricultural fields.

Moreover, the company gives its know how at your disposal, in order to permit an high level of customization based on customer needs. Some examples are the mechanical and electrical connections, the maximum distance range, the diagnostic level, the total accuracy.

**REGULATORY COMPLIANCE TABLE (CE CONFORMITY)**

<b>EC DIRECTIVES</b>	<b>Description</b>
EMCD 2014/30/UE	EMC directive
2011/65/EU	ROHS directive
<b>HARMONIZED STANDARDS</b>	<b>Description</b>
ISO 13309:2010	Electromagnetic compatibility of machines with internal power supply
ISO 14982:2009	Agricultural and forestry machinery – Electromagnetic compatibility – Test methods and acceptance criteria

**Table 1 – compliance table**