

## LINEAR END STROKE SENSOR SERIES LES1000

The LES1000 End Stroke Sensor (see Fig. 1 and Fig. 2) aims to detect the presence of nearby objects without any physical contact, having a linear motion in distance, or closed to be linear. It may be directly connected to a control unit, or used as a relay command.

The principle is based on Eddy current sensor (ECS) technology from CEDRAT TECHNOLOGIES (CTEC): This sensor generates an AC magnetic field at high frequency and senses the behavior of the induced magnetic field in regards of a conductive target (Aluminum is preferred). An output signal (ON/OFF type) is generated when the target enters in the switching distance (Fig. 3).

The LES1000 is a contactless electronic micrometric switch, to be used as alternate approach compared to classical mechanical end stops, which require contact, or electromechanical relays (such as hall effect sensors), which still require a trigger force when approaching the sensor. The mechanical alignment is easy and cannot be affected by thermal gradient.

No external actuation force is necessary and any possible damage on the component due an excess of travel is suppressed, thanks to the non-contact detection.

This product could be customized with different ranges (1mm up to 3mm) and could be used in several applications like:

- End-Position Sensor for Hatch Axis,
- Release Sensor with Crash Pad,
- Angular position detection (for example in deployment mechanisms).

This product is compatible with large voltage range and large temperature range without drift of its performances.

The performances are summarised in the Table 1.



Fig. 1: View of the LES1000 proximity sensor

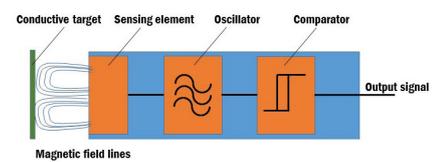


Fig. 2: Construction of the LES1000 proximity sensor

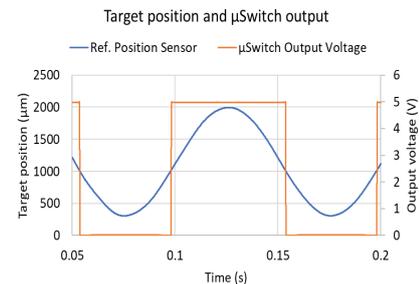


Fig. 3: Example of conductive target detection and relative output voltage

PERFORMANCES	VALUES	UNITS
Switching distance	>1	mm
Repeatability	+/-0.1	mm
Hysteresis	<0.1	mm
Integration bias	+/-1	mm
Response time	<1	ms
Power supply	3.3-5	V
Output signal level	Low<0.4 and High>1.9	V
Power consumption	<100	mW
Operating temperature	-50;+90	°C
Mass	<50	grams
volume	Ø16 x 45	mm
Harness Length	<5	m
Radiative environment	100 - 300	kRad
Outgassing	TML <1 CVCM<0.1	%
Vacuum compatibility	10-9	Torr

Table 1: Performances of the LES1000

The reached Technology Readiness Level is TRL5. This product was developed in the field of the CNES contract R-S16/TG-0002-118.

To increase its TRL as required for a space product, CEDRAT TECHNOLOGIES is working in the frame work of the ESA ExPro contract 4000126261 CONTACTLESS MICRO-SWITCH DEVELOPMENT ; In this context, CEDRAT TECHNOLOGIES is interested in discussion and/or collaboration with space pilot customers, to take into account future needs; In addition to normal motion sensing, a tangential motion sensing could be considered.

**The objective is to develop an alternate technology to the current state of the art on micro-switches, for space mechanism.**

- Enhanced reliability
- Contactless detection
- No triggering force
- Ultra-Long lifetime
- High cost efficiency for space recurrent manufacturing