

DIGITAL / ANALOGUE SERVO-INCLINOMETER : SX 41900 SERIES



SPECIFICATIONS

- Digital and/or analogue output.
- Designed for use in severe environments.
- Configuration and visualisation programme available.
- Conform to CE norm EN 50081 - 1 & 2.
- Very good long term stability.
- Excellent rapport performance / price ratio.
- Oil damped with servo mechanism.

GENERAL DESCRIPTION

The SX41900 servo inclinometer is a tilt sensor with a measurement range from $\pm 5.75^\circ$ to $\pm 90^\circ$. Output is either analogue ($\pm 5V$ or $4-20\text{ mA}$), or both analogue and digital (RS232 or RS485).

Power supply is unipolar, 9 to 30 volts. Current output requires a minimum 15V power supply.

The analogue version delivers an output proportional to the sine of the angle while the digital output version delivers an output directly proportional to the angle. A program provided with the digital version allows direct communication with a standard PC, and the parameters of acquisition and visualisation can be chosen by the user.

Because the mechanism is immersed in oil, the unit has a high resistance against shock and vibration and a good damping factor. Use of an inertial mass with servo feedback, optical position pick up and friction free mounting gives the SX 41900 a high accuracy with good long term stability and high reliability.

OPERATING PRINCIPLE

When the unit is subjected to an inclinaison or acceleration, the inertial mass, mounted to the coil, will tend to move with respect to the housing. The movement is picked up by the optical detector and transformed into a current which is re-injected in the coil. The current will bring the inertial mass back to the neutral position.

By measuring the current required to keep the pendulum stable, an output is obtained that will be proportional to the applied acceleration or tilt.

APPLICATIONS

- Structure monitoring (buildings, viaducts and bridges).
- Platform leveling (machine installation, radar positioning).
- Control of angular movement (smelting, tunneling and drilling machines, cranes).

GENERAL SPECIFICATIONS (AT 25 °C)

Characteristics	Voltage output	Current output	Digital output
Measurement range	$\pm 5,75^\circ$; $14,5^\circ$; 30° ; $\pm 70^\circ$; $\pm 90^\circ$ (note 1)		
Supply voltage	9 to 30 V	15 V min (note 2)	9 to 30 V
Consumption	< 10 mA	< 50 mA	25 mA (± 5 V) 50 mA (4-20 mA)
Output	± 5 V (± 1 %)	4-20 mA (± 1 %) Load < 500 Ohm	RS232 Full Duplex RS485 Half Duplex and ± 5 V or 4-20 mA (note 3)
Signal output type	Sinusoidal	Sinusoidal	Linear
Linearity error (least squares)	< 0,1 % of Full Scale (FS) and < 0,25 % FS for the ranges $\pm 70^\circ$ and $\pm 90^\circ$		
Zero null voltage	< 0,15 % FS		
Electrical noise (DC at 20 Hz)	< 2 mV	< 2 μ A	3 mV
Non repeatability and hysteresis	Negligeable	Negligeable	0,03 % FS
Max output current	22 mA	22 mA	-
Frequency response (at -3 dB)	5 Hz ± 10 %	5 Hz ± 10 %	Configurable from 0,1 to 5 Hz
Frequency response (at 10%)	70 ms	70 ms	70 ms to 3 s
Cross-axis sensitivity (Y axis)	< 0,01 g/g (or 0,57° for transverse inclinasion of 90°) < 0,02 g/g for ranges $\pm 70^\circ$ and $\pm 90^\circ$		
Zero thermal drift	0,01 % of FS/°C		
Sensitivity thermal drift	0,015 % of signal/°C		
Environment			
Operating temperature	- 40 to + 85 °C		
Storage temperature	- 55 to + 85 °C		
Electro-magnetic compatibility	EN 50081-1; EN 50081-2; EN 50082-1; EN 50082-2 norms		
Vibration	5 g eff. from 20 to 2000 Hz		
Shock	500 g / 1 ms		
Protection	IP 65		
Weight	300 g (whithout cable)		

Note 1 : The $\pm 90^\circ$ range is not available with digital output.

Note 2 : Minimum supply voltage depends on the output load :
15V for $R < 100$ Ohms ; 18V for $R < 250$ Ohms ; 23V for $R < 500$ Ohms

Note 3 : The digital data is transmitted in ASCII code and expressed in mrad.
Communication protocol : 9600 bauds, 8 bits, 1 bit Start, 1 bit Stop, no parity.
A configuration and visualisation programme is supplied with the sensor in its digital version.

SELECTION GUIDE

Range	± 5 V output	4-20 mA output	RS232/485 ± 5 Voutput	RS232/485 4-20 mA output
$\pm 5,75^\circ$	41930	41931	Sxi 41932	Sxi 41933
$\pm 14,5^\circ$	41940	41941	Sxi 41942	Sxi 41943
$\pm 30^\circ$	41950	41951	Sxi 41952	Sxi 41953
$\pm 70^\circ$	41960	41961	Sxi 41962	Sxi 41963
$\pm 90^\circ$	41970	41971		

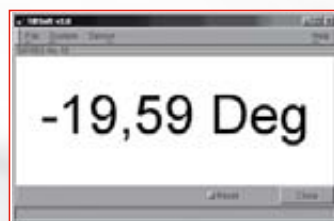
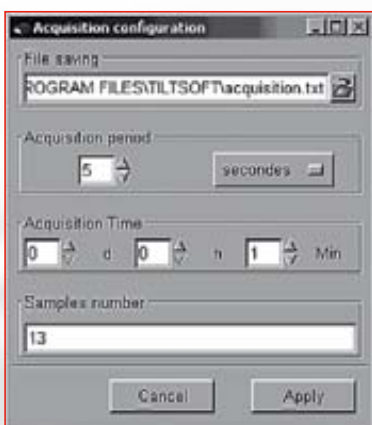
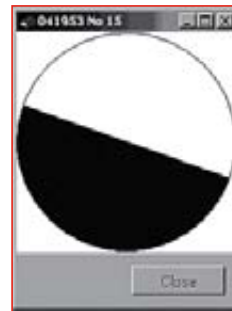
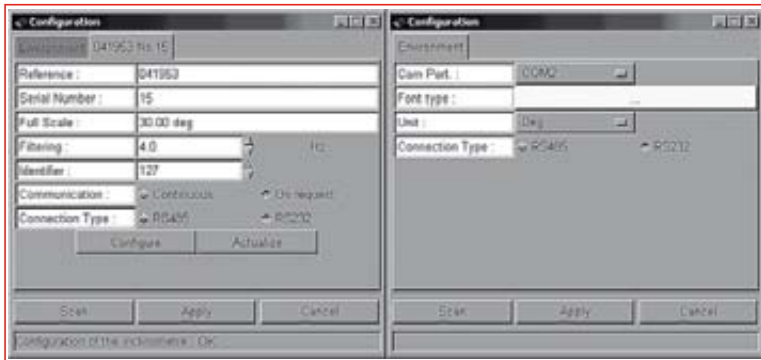
Digital Version :

The 41900 series inclinometer interfaces with a PC, through an RS232 or RS485 serial Link. The digital is transmitted in ASCII format, and expressed in mrad. The communication protocol is the following : 9600 baud, 8 bits, 1 bit Start, 1 bit Stop, without parity.

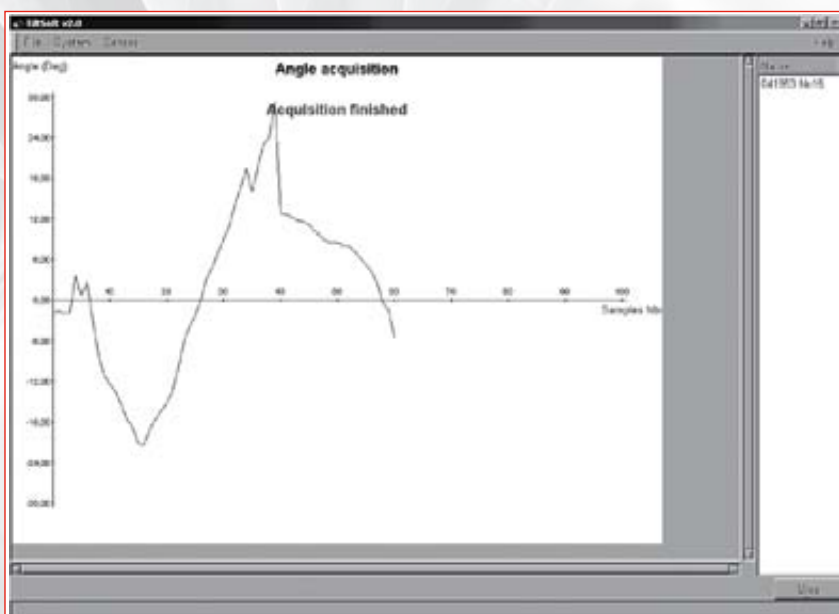
The 41900 is sold along with an Configuration / Acquisition / Display Software. Moreover, Labview and DDL pilots are provided, to allow an easy integration of the inclinometer's functions into your acquisition chain.

The software gives a dynamic reading of the angle ; The display Unit can be chosen amongst : degrees, mrad, mm/m et %

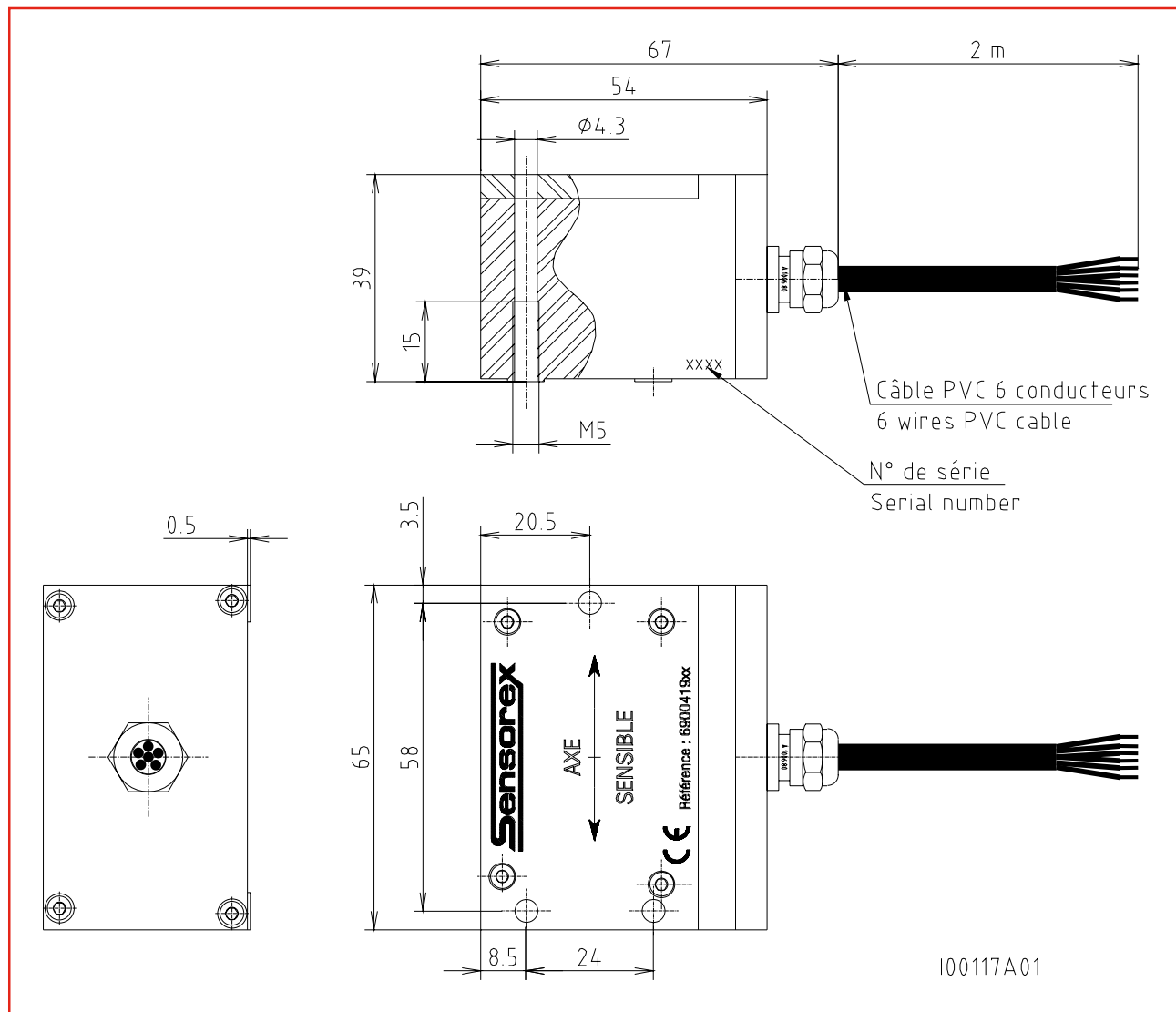
The Configuration window allows the following : set-up of the display unit (deg., mrad, mm/m, %), Bandwidth selection (0,1 to 5Hz), and communication options



Periodical recording of the inclination is also made possible. The minimum acquisition period is 1 sec. The acquisition duration can last between 1 min. and 367 days, and can be recorded as a TXT. File.



INTERFACE DRAWING



CONNECTIONS

Red wire :	+ V supply
Black wire :	0 V supply
Green wire :	Analogue output signal
White wire :	Signal cold point
Yellow wire :	RX / B
Blue wire :	TX / A