



# MODEL 5560S

## USER MANUAL



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Rev.	Date	Reason
1.	18/06/2014	Little modifications in chapter 6 & 7
2.	24/09/2014	Insertion of IECEx and CSA (in preparation) certifications in point 7
3.	16/05/2017	Modification of CSA label (the "in preparation" mention was cancelled)
4.	21/08/2017	Modification of ISSeP label (0492 becomes 0518)

## **1. GENERAL**

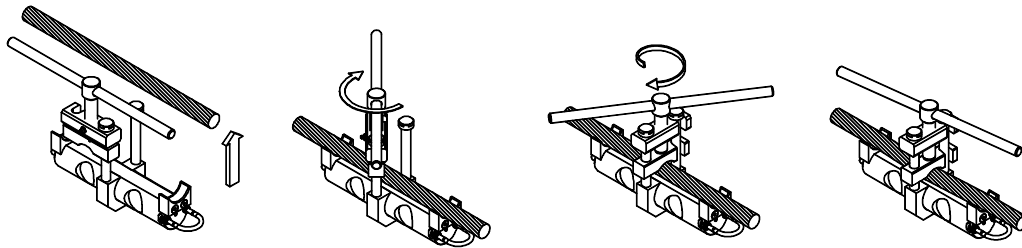
The sensor model 5560S is meant for the measurement of tension of fixed cable. It can be used in all applications where the traction force in the cable must be known without having to disassemble the mechanics of the unit.

## **2. PRINCIPLE OF OPERATION**

Constraints of deformations of the sensor generated by the light deflection of the cable are measured and provide an electric signal proportional to the traction in the cable. By its design and its principle of operation, the sensor allows the measurement of the effort on the whole utilization range, without any modification of component and with a precision better than 4% FS (full scale). The utilization range is defined either by the maximum and minimum diameters of cable as by the maximum capacity.

## **3. SENSOR INSTALLATION**

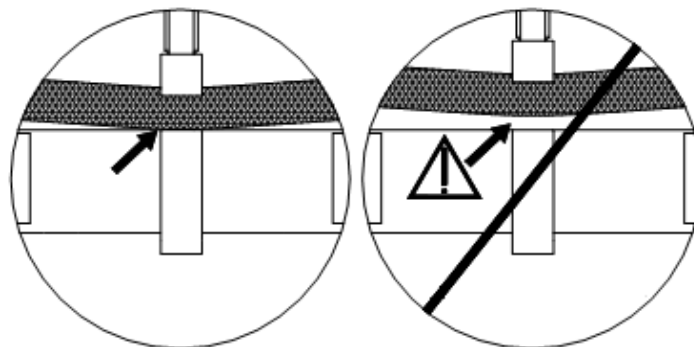
The 5560S is easily assembled by locking and tightening the clamp once the sensor is in contact with the cable.



Use the handle to attach the tensiometer and prevent it from falling of the cable.

Caution:

During tightening, make sure that the cable is well in contact with the sensor. This contact is necessary to guarantee the deflection angle of the cable and the output signal of the sensor. If necessary, use a tube to lengthen the arm of lever of the tightening handle.



#### **4. RECOMMENDATION FOR USE**

Do not open! No removable parts! No part of the Tensiometer may be withdrawn.

Don't forget to lubricate the pressurizing screw before the first use.

The moving parts and parts on contact with the cable are made of hard steel, which decreases wear and increases longevity. In order to facilitate tightening and avoiding screw jamming, remove dirt set on the screw and use lubricant regularly. For handling, storage and wiring, all precautions applicable to the strain gauge sensors are also applicable to the tensiometer: avoid particularly shocks, overloads, as well as all other use than measurement of traction on fixed cable. For fixed installations on cable of the tensiometer where there is risk of electric shocks (lightning, welding, ...), it is recommend to bridge the sensor with a copper braid.

Beyond the mechanical and electrical precautions and the necessary care for assembly, a particular attention has to be paid to following points:

##### 4.1. Shock and overload protection

A sensor can be damaged when it has to sustain an overload between 1.5 and 3 times its nominal capacity. This overload can be static, but may also come from dynamic effects (shocks, vibrations ...).

##### 4.2. Electrical risk protection

Outdoor systems are particularly vulnerable to lightning. Sensor having sustained an over-voltage due to lightning can suffer from partially or totally damaged strain gauges, which will influence the performances. Indoor systems can also be subject to over-voltage (welding, grounding of electrical device ...) and have to be protected. Protecting the sensor has to be done by means of a by-pass through a grounding braid.

An electronic protection has also to be considered, as far as it does not have any impact on the measurement precision (temperature drift, signal weakening ...).

##### 4.3. Never weld on a structure equipped with sensors

If welding cannot be avoided, make sure that the current does not go through the sensor.

##### 4.4. Protection against electrical perturbation

Due to the low work voltage of the sensors, the measurement chain is to be kept from perturbations that can generate induced tensions and currents (make sure that it is placed away from magnetic fields, from power cables...) For best EMC immunity, twisted pair shielded cable should be used. Each cable should have an overall braid to ensure a good EMC seal with the connector and assure ground continuity.

It is important that all elements of the installation have the same grounding potential and that the grounding net does not generate perturbations and do not suffer from ground current circulation.

##### 4.5. Protection against humidity and chemical products

Sensor's electronic circuitry is highly sensible to corrosion. Use sensors with protection indexes (IP) corresponding to the environmental conditions and type of use, made of appropriated material that will not be influenced by these environmental conditions (some environments do represent an actual electrolyte with risk of galvanic couple between the sensor and other parts, made of different material, in the near area).

## 5. PERIODIC INSPECTIONS

1. Make sure by suitable means that the sensor and its mechanism are not subject to jamming. (At least an annual control)
2. Check output for zero load (annually)

Option	Min acceptable	Max. acceptable
(mV/V / 4 wires)	0.15mV/V	-0.15mV/V
Option C- (4-20mA / 2 wires)	6mA	3mA
Option J- (4-20mA / 3 wires)	6mA	3mA
Option T- (0- 5V / 3 wires)	0.8V	0V
Option T- (0- 10V / 3 wires)	0.8V	0V
Option T- (1-5V / 3 wires)	1.5V	0.5V
Option T- (1 -10V / 3 wires)	1.5V	0.5V
Option T- (-10 / 0 / + 10V)	+1.5V	-1.5V

3. Make sure that the sensor has not been knocked (markings) or chemically attacked (some corrosive greases). If points 1 and 2 are not accounted for, just take preventive measures. (annually)
4. Check for cracks or loosen screw.
5. In case of doubt, reply to the diagnostic questionnaire provided with the individual form of the load cell joins and consult the constructor.
6. Verify the integrity of the cable.
7. After any serious functioning incident, repeat operations 1 to 3
8. Remove dirt set on the screw and use lubricant regularly

## 6. USE FEATURES

(The exact characteristics are systematically given in the control sheet delivered with every load cell!)

		option C	option J	option T		option U
Type	Resistive	4-20 mA 4-12-20mA 2 wires	4-20 mA 4-12-20 mA 3 wires	1-5 V 3 wires	0-10 V et 1-5-10 V 3 wires	-10-0-10 V 3 wires RS232 RS485
Compensated temp. range	From - 10° to + 45° C					
Operating temperature range	From - 30° to + 70° C <sup>1</sup>					
Storage temperature range	-50 to +85°C	From - 40° to + 85° C				
Power supply (VDC)	5... <u>10</u> ...15 <sup>2</sup>	9 – 30 <sup>3</sup>	13 – 30	13 – 30	15 - 18 <sup>4</sup>	6... <u>12</u> ...18
Load impedance (Ω)	NA	≤ 750	≤ 1.000	> 5k		
Nominal sig. range	0 – 1...2mV/V	4 - 20 mA	4 - 20 mA	0.1-5 V	0.1-10V	-10-0-10V
Saturation	> ...3... mV/V	> 24mA	> 24mA	> 11V		

<sup>1</sup>Max +60°C for EX-I options  
<sup>3</sup> 9-28VDC for EX-I C6 options

<sup>2</sup> 5 to 12VDC for EX-I T4 GD and EX-I T6 GD options  
<sup>4</sup> 15 to 27VDC with a 1000Ω bridge

## 7. USE IN HAZARDOUS AREAS (INTRINSIC SAFETY PROTECTION)

Use of sensors in hazardous zones can only be done with Ex marked sensors, delivered with one or more of the certificates hereunder:

ATEX: ISSeP07ATEX012X  
 ATEX: Sira13ATEX2365X  
 CSA: Master Contract 259620  
 IECEX: IECEX SIR 13.0148X

All issued by accredited organizations. Sensors must be used with appropriate safety material (Zener barrier or galvanic isolator) corresponding to the requested requirements mentioned in the certificate.

SENSY's load cells which are marked Ex i comply with the following standards:

ATEX	CSA (in preparation)	IECEX
EN 60079-0: 2012	ASI/UL 60079-0 5 <sup>th</sup> Ed	IEC 60079-0: 2011
EN 60079-26: 2007	ASI/UL 60079-0 5 <sup>th</sup> Ed	IEC 60079-11: 2011
EN 60079-11: 2012	ANSI/ISA 61010-1: 2004	IEC 60079-26: 2006
	ISA 61241-0	
	ISA 61241-11	

The use of junction boxes or additional cable lengths must be considered in the choice of protection. The electrical characteristics of the cable being limited (see certification), it is recommended to carefully chose the cable length and avoid any winding of the cable. After having defined all elements, it is mandatory to control if the sensor's output tension is still compatible with the electronic device in use and the requested accuracy.

See certificate for the special conditions for safe use.

## 8. GUARANTEE

The manufacturer's guarantee is applicable as far as mounting recommendations and general use principle, like above described, are respected.

For any particular use, not described in this document, it is mandatory to obtain a prior written agreement from Sensy S.A. for the validity of the guarantee.

