GENERAL INSTRUCTIONS MANUAL FOR LOAD CELLS WITH STRAIN GAUGES

(This manual is applicable to load cells not provided with specific manual)

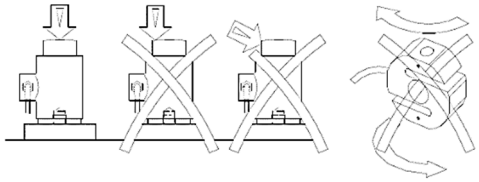
Rev.	Date	Reason
1.	07/04/2014	Modification of the paragraphs 3.4, 4 and 6
2	24/09/2014	Insertion des certifications IECEx et CSA (in preparation)
3	23/10/2014	A CE declaration of conformity is added at the end of the manual
4	16/03/2015	Modifications of the paragraphs 4,6 and the DOC for ATEX T2 & CSA
5	11/02/2019	Update of output signal tables and update of the UE declaration of conformity
6	21/02/2020	Modification of Ex label (CE 0518 becomes CE 2813)
7	05/10/2022	Modification of Ex label to include UKEX and UKCA logo, replacement of ISSeP certificate with CML certificates
8	16/12/2022	UK certification + standard update additional notes and labels for CSA

1. CHOICE AND MOUNTING

The choice of a sensor must be done with the perfect knowledge of the application in which it has to be integrated. Focus need to put on capacity, mechanical conception, operating temperature, eventual vibrations and shocks, presence of chemical products, hazardous environment and overload.

Mounting is to be assured by skilled technician, in conformity with state-of-the-art mounting methods for each type of sensor. Among others: hardness, flatness and state of the bearing surfaces, adjustments, adapting parts, decoupling and control of the tightening.

The sensors are manufactured to assure a force measurement in the direction it has been engineered. They must be tightened in a way that their sensible axle corresponds to the direction of the force application. Either torsion and flexion moments or lateral interferences have to be prosecuted. Loading mistakes (non – axial load, not – centred load, torsion moment, bending moment) may cause wrong measurement and even damages to the sensors.



All necessary precautions in terms of security have to be taken during load handling and use of tooling. Mounting the sensors cannot be achieved by force or by hitting. The load cell is always used with its original cable otherwise modification of the characteristics announced. Contact us in advance about this. It is mandatory to connect the sensor to its electronic device according to the colour code specified on the sensor's data sheet, conform to the specifications of the electronic device in use. The technician in charge of the installation will check the cable integrity after on-site mounting. Any damage on the cable sheath or on a wire implies its replacement by SENSY S.A.

2. MAINTENANCE

Sensors do not require particular maintenance. However, depending on requested performances, utilization and environmental conditions, it is necessary to perform following operation (check either particular instructions belonging to precise models):

- Clear the close area of the sensor
- Remove all objects that could cause effort transfer interferences (concrete, scrap iron, …)
- Protect against humidity and corrosive elements (ageing acceleration of the sensor)

- Keep from corrosion, especially electrolytic corrosion. Refurbish the oxidized elements (by sanding, painting, …)
- Control the cable integrity
- In order to guarantee the system performances and to control the measurement chain in its totality, perform at least once a year testing with duplicate standard forces. Re-calibrate if necessary
- Visual control of the mechanical parts and mounting (centring, wearing, dulling, …)

3. PARTICULAR PRECAUTIONS

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

3.1. 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, silo filling …).

3.2. 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. In case of lightning risks, isolating electrically the sensor from the structure and its supports offers an additional protection.
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 …).

3.3. Never weld on a structure equipped with sensors

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

3.4. 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, use shielded cable, and even, for digitals (U) or analogical (C, J and T) options, twisted pair. Each cable must have a shielding to ensure a good EMC sealing with the connector and ensure ground continuity.
It is mandatory 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.

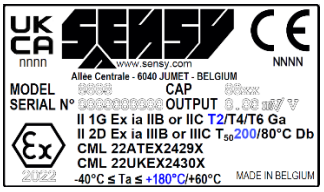
3.5. Protection against humidity and chemical products

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).

4. USE IN POTENTIALLY EXPLOSIVE ATMOSPHERE (OPTION)

4.1. Intrinsic safety protection

Use of sensors in hazardous zones can only be done with Ex i marked sensors, delivered with one or more of the certificates hereunder, all issued by accredited organization:

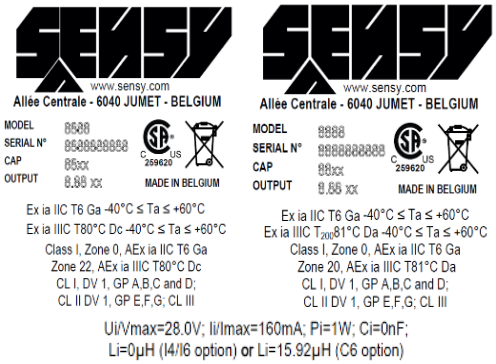


CML 22ATEX2429X CML 22UKEX2430X	II 1 G Ex ia IIC T2 Ga II 2 D Ex ia IIIC T50200°C Db	-40°C≤Ta≤+180°C (0) -40°C≤Ta≤+180°C
	II 1 G Ex ia IIC T4 or T6 Ga II 2 D Ex ia IIIC T5080°C Db	-40°C≤Ta≤+60°C (1) -40°C≤Ta≤+60°C
	II 1 G Ex ia IIB T6 Ga II 2 D Ex ia IIIB T5080°C Db	-40°C≤Ta≤+60°C (2) -40°C≤Ta≤+60°C
Master contract 259620	Ex ia IIC T6 Ga Ex ia IIIC T80°C Dc - Vol < 580cms3 Ex ia IIIC T81°C Da- Vol => 580cms3	-40°C≤Ta≤+60°C -55°C≤Ta≤+60°C (3)
Sira13ATEX2365X IECEx SIR 13.0148X CSAE 22UKEX1396X	II 1G Ex ia IIC T6 Ga II 3 D Ex ia IIIC T80°C Dc for Volume < 580cm³ II 1 D Ex ia IIIC T200 81°C Da for Volume ≥580cm³	-40°C≤Ta≤+60°C -55°C≤Ta≤+60°C (3)

(0) If Ex I T2 option applies
(1) If Ex I T4,T6, C6 & C8 option applies
(2) If C7 option applies
(3) If option CP-55°C option applies.

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

ATEX	CSA	IECEx
EN 60079-0 EN 60079-11	CAN/CSA-C22.2 No. 0 CAN/CSA C22,2 61010 CAN/CSA-C22.2 No. 60079-0 CAN/CSA-C22.2 No. 60079-11 ANSI/UL 508 ANSI/UL Standard 913 ANSI/UL 60079-0 ANSI/UL 60079-11	IEC 60079-0 IEC 60079-11



Refer to standard date issue mentioned on ATEX/HAZLOC certificate and conformity certificate of your product for label information related to your product.

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

4.2. Specific conditions of use indicated in certificate for hazardous area

When the apparatus is used in dust atmospheres, connectors, plugs and cable glands used shall have an ingress protection of at least IP6X.
The equipment is not capable of withstanding the 500V dielectric strength requirement in accordance with clause 6.3.13 of EN 60079-11.
Some enclosure for specific options might be manufactured from sparkling material (see certificate).
In rare cases, ignition sources due to impact and friction sparks could occur.
This shall be considered during installation. See certificate for the special conditions for safe use.

5. PERIODIC INSPECTIONS

1. Check output for zero load (annually)

Output signal	Min acceptable	Max acceptable
mV/V / 4 wires	-0.15 mV/V	0.15 mV/V
4-20mA / 2 wires	3 mA	6 mA
4-20mA / 3 wires	3 mA	6 mA
0- 5V / 3 wires	0 V	0.8 V
0- 10V / 3 wires	0 V	0.8 V
1-5V / 3 wires	0.5 V	1.5 V
1 -10V / 3 wires	0.5 V	1.5 V
-10 / 0 / + 10V	-1.5 V	1.5 V

2. Make sure that the axle beam 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)
3. In case of doubt, reply to the diagnostic questionnaire available on Web: www.sensy.com/support.
4. Verify the integrity of the cable.
5. After any serious functioning incident, repeat operations 1 to 4.

6. USE FEATURES

(The exact characteristics are systematically given in the control sheet delivered with every load cell and function of the output signal!)

Output signal:	mV/V	4-20 mA 2 wires	4-20 mA 3 wires	1-5 V 3 wires	0-10 V 3 wires	-10…0…+10 V 3 wires	RS-232 RS-485
Compensated temp. range	-10…+45°C						
Operating temperature range	-30[0]… +70°C[1]						
Storage temperature range	-50…+85°C	-50…+85°C					
Power supply (VDC)	5…10…15[2]	9 – 30[3]	13 – 30	13 – 30		15 - 18[4]	6…12…18
Load impedance e (Ω)	NA	≤ 750	≤ 1.000	> 5k			
Nominal sig. range	0 – 1…2 mV/V	4 - 20 mA	4 - 20 mA	0.1-5 V	0.1-10 V	-10…0…+10 V	
Saturation	> 3 mV/V	> 24 mA	> 24 mA	> 11 V			

[0] Min value depends on option(min on request: -55°C)

[1] Max +60°C for EX-I T4, T6 and C6/C7/C8 options

[2] 5 to 12VDC for EX-I T2 GD, EX-I T4 GD and EX-I T6 GD options

[3] 9-28VDC for EX-I C6/C7/C8 options

[4] 15 to 27VDC with a 1000Ω bridge

7. 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.

8. EU DECLARATION OF CONFORMITY

Manufactured by:
SENSY SA
Z.I. Jumet – Allée Centrale
B – 6040 JUMET
Phone: +32 71 25.82.00
Fax: +32 71 37.09.11
Website: http://www.sensy.com

CONCERNED ITEMS: strain gauge sensor, see calibration certificate related to model and serial number.

SENSY S.A. certify that the items described here above have been duly designed, manufactured, and tested for use in accordance with the essential requirements defined in the European Directives listed here under.

2014/30/EU	Electro-Magnetic Compatibility Directive
2006/42/CE	Machinery directive
2011/65/EU amended by directive 2017/2102/EU	Restriction of the use of certain hazardous substances in the electrical and electronic equipment (RoHS)
2014/35/EU	Safety / low voltage directive

Conception and compliance of this equipment is made according to all of part of the following standards:
Rule FEM 9761
NBN 52-010 / 52-011
EN 61326 (2006)

If designed, manufactured and tested safety ref. D-DP SIL3 READY (option):
see specific and separate certificate according to ISO 13849-1 and/or EN 62061

If designed, manufactured and tested for use in potentially explosive atmospheres (option):
see specific and separate certificate (EN/IEC 60079-0) in compliance with 2014/34/EU directive of 26/02/2014

Jumet
July –26 - 2022

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9. UK DECLARATION OF CONFORMITY

Manufactured by:
SENSY SA
Z.I. Jumet – Allée Centrale
B – 6040 JUMET
Phone: +32 71 25.82.00
Fax: +32 71 37.09.11
Website: http://www.sensy.com

CONCERNED ITEMS

CONCERNED ITEMS: strain gauge sensor, see calibration certificate related to model and serial number.

SENSY S.A. certify that the items described here above have been duly designed, manufactured and tested for use in accordance with the essential requirements defined in the UK regulations listed here under.

UK SI 2016 No. 1091 and amendments	Electromagnetic Compatibility Regulations 2016
UK SI 2008 No. 1597 and amendments	Supply of Machinery (Safety) Regulations 2008
UK SI 2012 No. 3032 and amendments	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
UK SI 2016 No. 1101 and amendments	Electrical Equipment (Safety) Regulations 2016
UK SI 2016 No. 1091 and amendments	Electromagnetic Compatibility Regulations 2016

Conception and compliance of this equipment is made according to all of part of the following standards:
Rule FEM 9761
NBN 52-010 / 52-011
EN 61326 (2006)

If designed, manufactured and tested safety ref. D-DP SIL3 READY (option):
see specific and separate document for calculation according to ISO 13849-1 and/or EN 62061.

If designed, manufactured and tested for use in potentially explosive atmospheres (option):
see specific and separate certificate in compliance with regulation “Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016”.

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July – 26 - 2022

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