LOAD CELLS 4500

INSTALLATION MANUAL

Rev.	Date	Reason
1	11/03/2019	Including points 7, 8, 9, 10, 11 and 12 - EU Declaration of Conformity
2	29/10/2020	Update of the EU Declaration of Conformity + modification of the ATEX label CE 0492 becomes CE 2813
3	24/05/2023	UK certification + ATEX/HAZLOC instructions Exi moved in annex " LOAD CELLS USER'S GUIDE APPENDIX"

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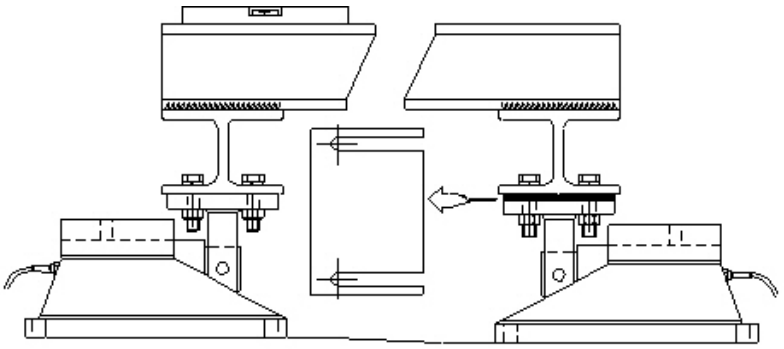
1. GENERAL INFORMATION

1.1. Placement at level

Few 0.1 mm differences are usually tolerated with the 4500 bending cell series. Nevertheless, if the differences are more important and when the mounting is more than three feet high, it is important for correct
use to install shim packs that insure equal force distribution on the former.
The references of these shim packs are:

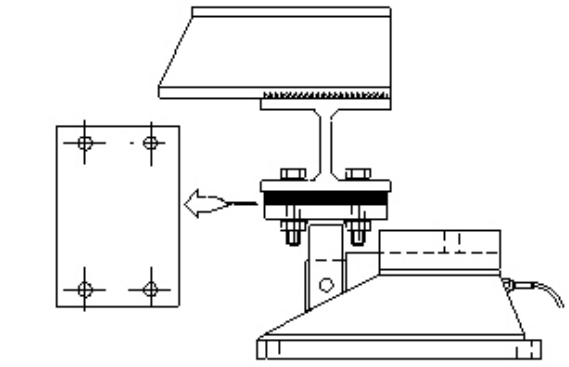
G4500-500 (E-M 0.5-3 t)
G4500- 5 t (E-M 5-7.5 t)
G4500-10 t (E-M 10-20 t)

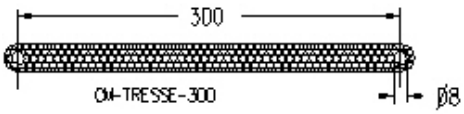
They exist in 3 thickness : 0.5/1/2 mm



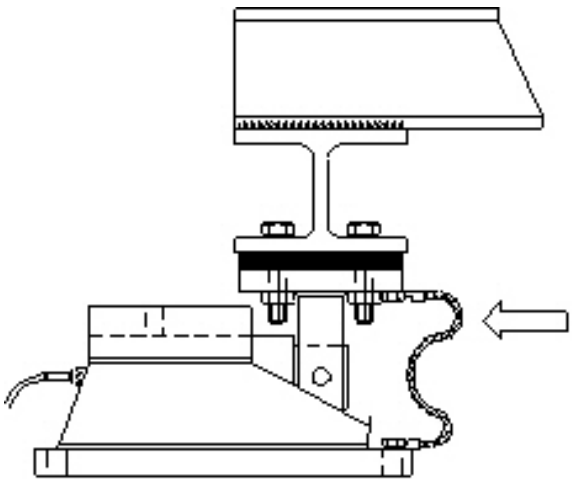
1.2. Shocks

When shocks are feared, it is preferable to install a shock absorber between the load and the cell.
These are made from a stack of rubber and metal plates.





1.3. Electrical weldings



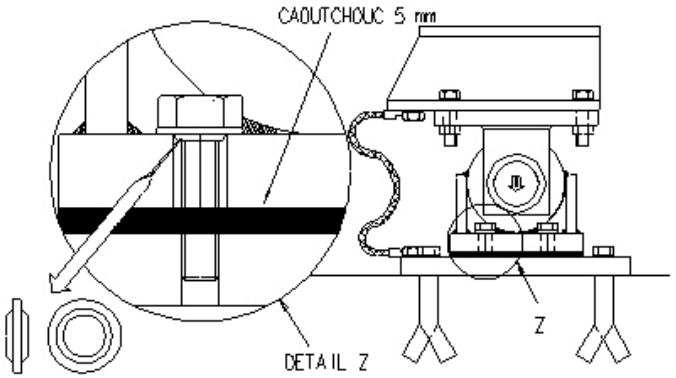
When arc welding must be done on the structure, it would be advised to install stranded ground wire in order that the derived current could not pass through the cell, damaging it. It would also be advised to disconnect the cells of the measuring instrument.
These stranded wires exist in 2 dimensions.

Ref.: CM-TRESS-250 (Length=250 mm)
CM-TRESS-300 (Length=300 mm)

They can be fixed with a M8 screw.

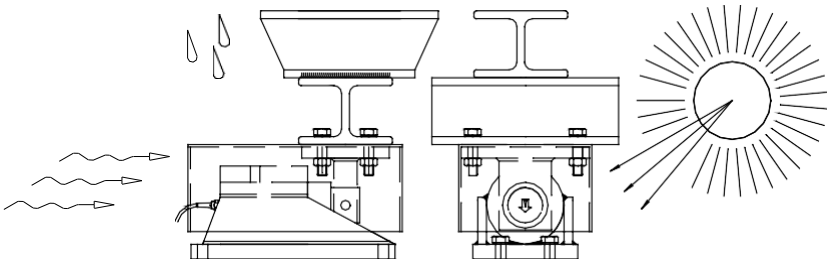
1.4. Lightning

If there is a risk of lightning, it would be advised to isolate the cell completely and derive the former by stranded wire. In order to do that, there is a rubber sheet under-neat the sole and polyamide waterproof washers under the fixing screw.
Ref: Washers
VI-NMG-12 for M12



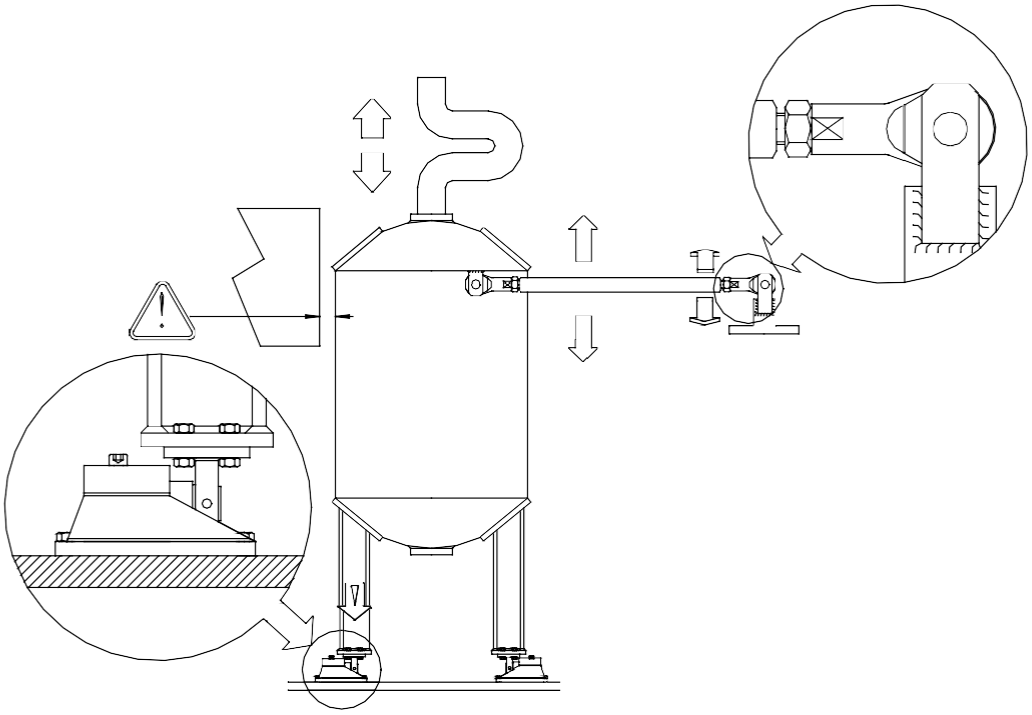
1.5. Protection hood

Load cells are sensitive to differential change in temperature.
Measuring errors may occur if the temperature changes fast. In which case, it could be useful to install a protecting screen to avoid solar radiation or abrupt the thermal convection (violent wind).
The hood has another function: to protect against shocks, projections (mud, water, etc.) and to avoid dirt at the level of the cell. Screws that join the cell to the structure ensure the fixation.
It is important that this hood does not hinder the movement during loading.
If necessary, the sides of the hood can have a thermal barrier.



1.6. Exterior mechanical influences

In order to avoid measuring errors, the load to be weighed must not be subject to parasitic contributions: if there are any connecting pipes, cables and balls or draw-bolts, they must be installed with great flexibility. Also, ladders or bridges for access will be suitably articulated.



1.7. Sliding mounting

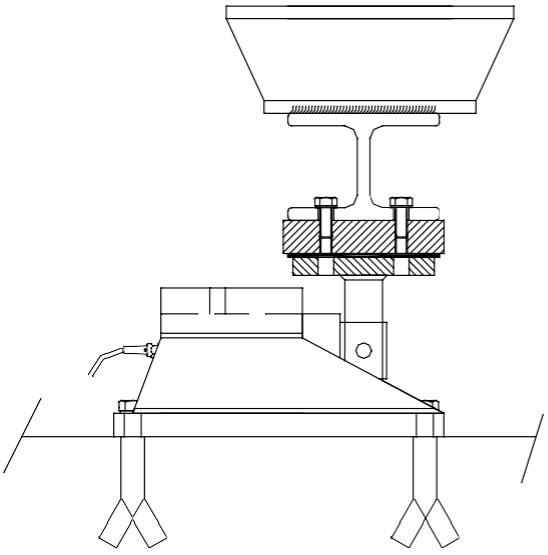
If great dilatations are to be expected, it is necessary to install one or two sliding cells.
The EASY-MOUNT is solidly anchored to the ground or soldered to the structure.
The head support is equipped as follows:
- One 1 mm thick stainless steel plate is glued with structural paste.

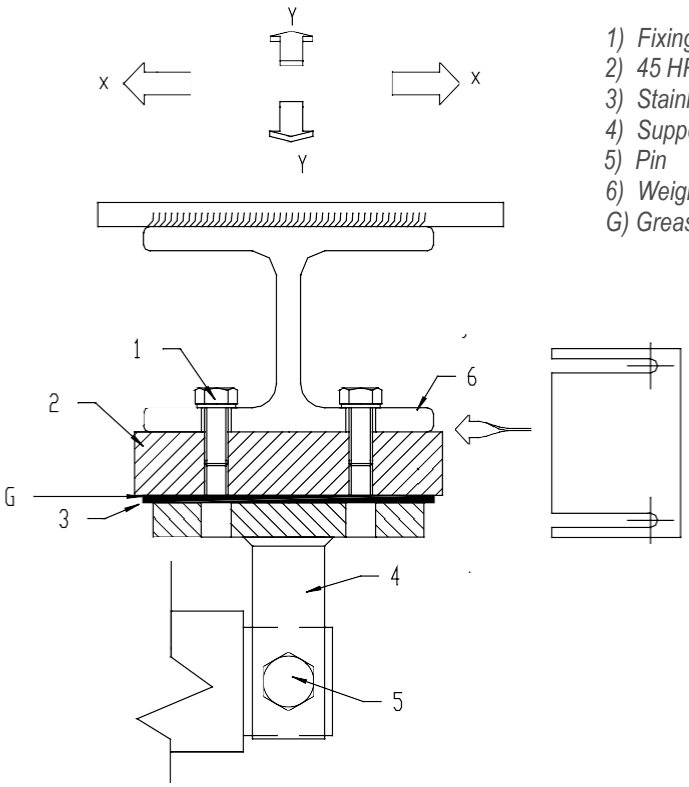
Ref: 1 mm stainless steel plate
SM-I4500-PI500 (0.5-3 t)
SM-I4500-PI5T (5-7.5 t)
SM-I4500-PI10T (10-20 t)

- One ±20 mm high hardened plate is installed on top with special grease between this piece and the stainless-steel plate.

Ref: CM-POLY-TU10GR grease (Molykote long-term 2+)

The hardened plate is fixed to the structures; the shim packs, if there are any, will be installed between this plate and the structure.
The support pin should be left.

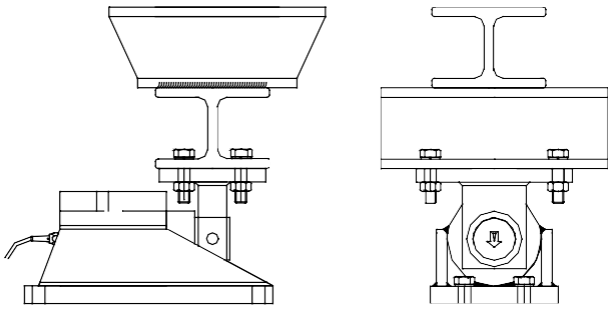


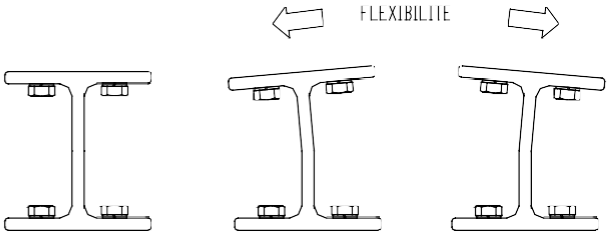


1) Fixing of 45 HRC hardened plate
2) 45 HRC plate
3) Stainless steel sheet
4) Support
5) Pin
6) Weighing structure
G) Grease (for sliding)

2. TOLERANCE

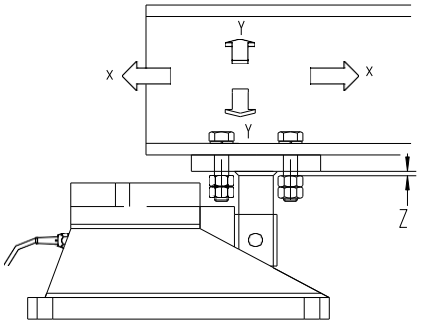
The direction of the load on the cell is essential. Nevertheless, the respect of this rule is conditioned by mountings, which minimize exterior mechanical influences such as thermal dilatation, elastic deformation.





2.1. Using I beam

An “I” beam of weak inertia (HEA type) could be used to minimize some mechanical effects.

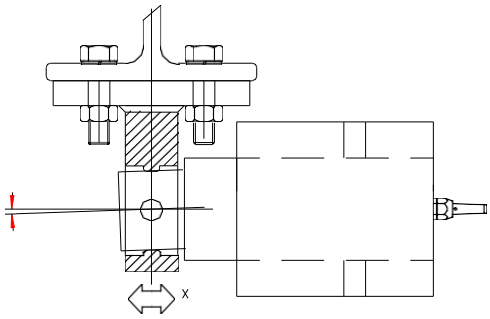


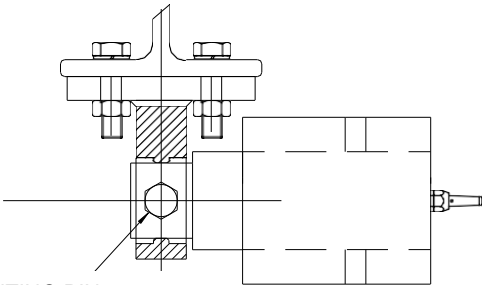
2.2. Tolerance in the fixation

It is simple to allow small displacement by leaving a z amount of a few mm of play and by using lock nuts to secure the fixation.

2.3. Mounting pin

Our EASY-MOUNT is equipped to allow a small angular amount of play in order to have a better output signal of the cell. In a small mounting where the thermal dilatation is weak, the threaded pin can be left permanently. In other cases, it is necessary to remove it after the fixation of the EASY-MOUNT to the structure, to allow a possible x movement. If desired, it can be replaced by another lower structure.



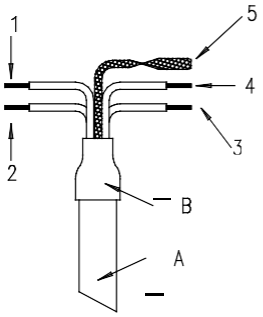


3. CABLING

3.1. Cable

The cells are delivered with a 4-wire screened cable.
The screen (shielded cable) cannot in any case be in contact with the ground, e.g.: in metallic junction boxes,

it is necessary to isolate the screen with a sheath (thermal).
The screen can only be connected to standardized earth.
It is advised to install a thermo-retractable sheath (retracted 4x) at the end of the cable inside a waterproof paste, in order to avoid any leak.
If there is any possible danger of damage along its wiring, it is necessary to use an additional cable protection, passing the cable through a pipe (steel, preferably).

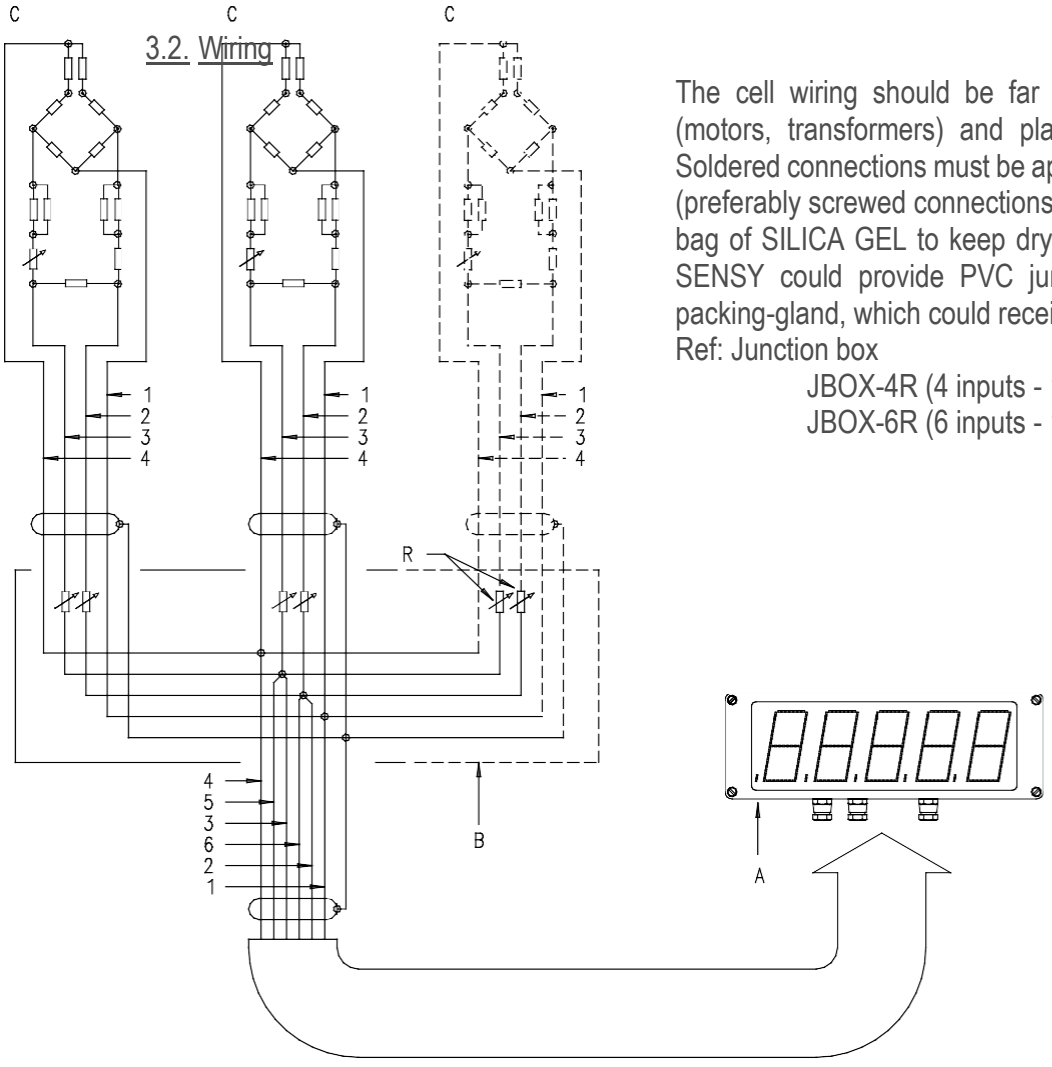


COLOR CODE

1) Excitation- (Yellow)
2) Excitation+ (Brown)
3) Signal+ (Green)
4) Signal- (White)
5) Screen

A) Cable PVC
B) Thermo-retractable sheath

3.2. Wiring



The cell wiring should be far away from power lines (motors, transformers) and placed in separate pipes. Soldered connections must be applied in the junction box, (preferably screwed connections). It is advised to place a bag of SILICA GEL to keep dry inside the junction box. SENSY could provide PVC junction box with a PG9 packing-gland, which could receive 4 or 6 parallel cells.
Ref: Junction box

JBOX-4R (4 inputs - 1 output)
JBOX-6R (6 inputs - 1 output)

A) Display (ex. Dv680)
B) Junction box
C) Cell
R) Adjusting resistance
1) – out measure (green)
2) – in supply (yellow)
3) + in supply (brown)
4) + out measure (green)
5) Ref. (sense) + (pink)
6) Ref. (sense) + (grey)

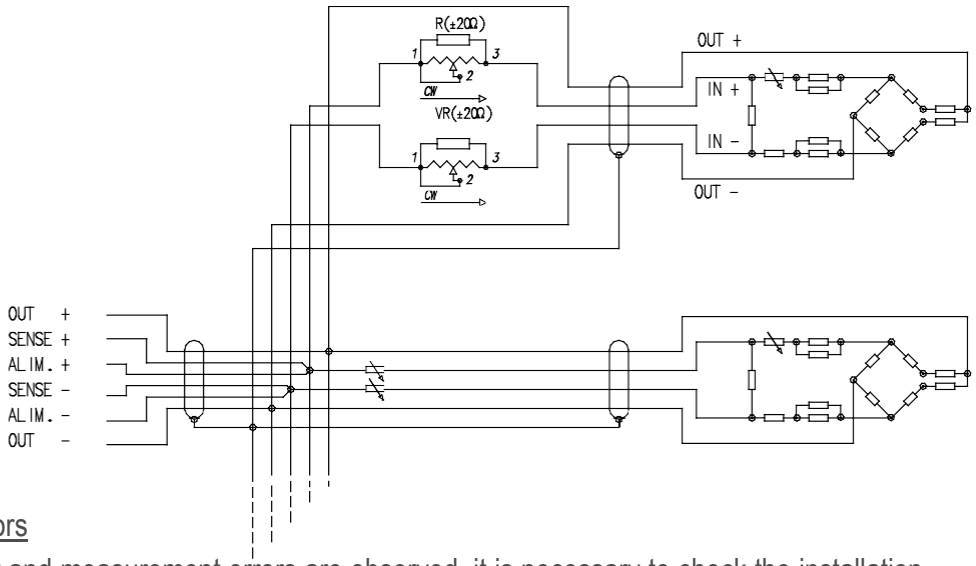
3.3. Parallel wiring

The cells must be installed in parallel, with the stranded mass wire joined to it. The sense must be joined to the cell supply, before the points of parallel wiring and the stabilizing resistances.

3.4. Calibration

It must be done after the sensor has been turned on for a while (10-15 minutes) to obtain a uniform temperature of the installation. The cells do not usually need to be adjusted with each other. However, when greater precision is needed, it is sometimes necessary to stabilize the cells individually with the resistances in the junction box. Those resistances are of several ohms (±10Ω) and are installed in the supply circuit. A parallel adjustable resistance is mounted with a fixed resistance. The most sensitive cell will have its input resistance increased and the least sensitive will have its lowest input resistance. You will see that it is preferable to work on both supply cables: schematic mounting is given for your information and allows a variation of 0 to 20 ohms in series on the input impedance (2x10 ohms).

Note: A well-known weight of more than 20% of the nominal load of the system can be expected. The calibration error is always much higher than the error made on the evaluation of the load.



3.5. Measurement errors

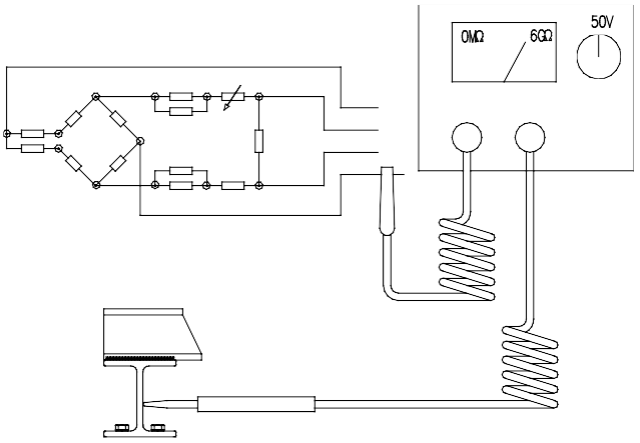
When the calibration is difficult and measurement errors are observed, it is necessary to check the installation. Mechanically, the cells must be free in the direction of the load and well positioned. Electrically, the connections must be securing, the junction boxes exempt from humidity and the cables intact. If there is no fault to be seen, it is necessary to verify the internal circuit.

SENSY can help to diagnose on the basis of the associated diagnosis sheet provided in the appendix and filled in beforehand.

3.6. Insulation test

The measuring of the insulating resistance is done with a multimeter. The standardized testing voltage is 10 V. It is applied to a conductor. It can be determined by disconnecting the measuring instrument and applying voltage between one of the conductors and the metallic mounting structure – or, individually, cell by cell, to locate the leakage with precision.

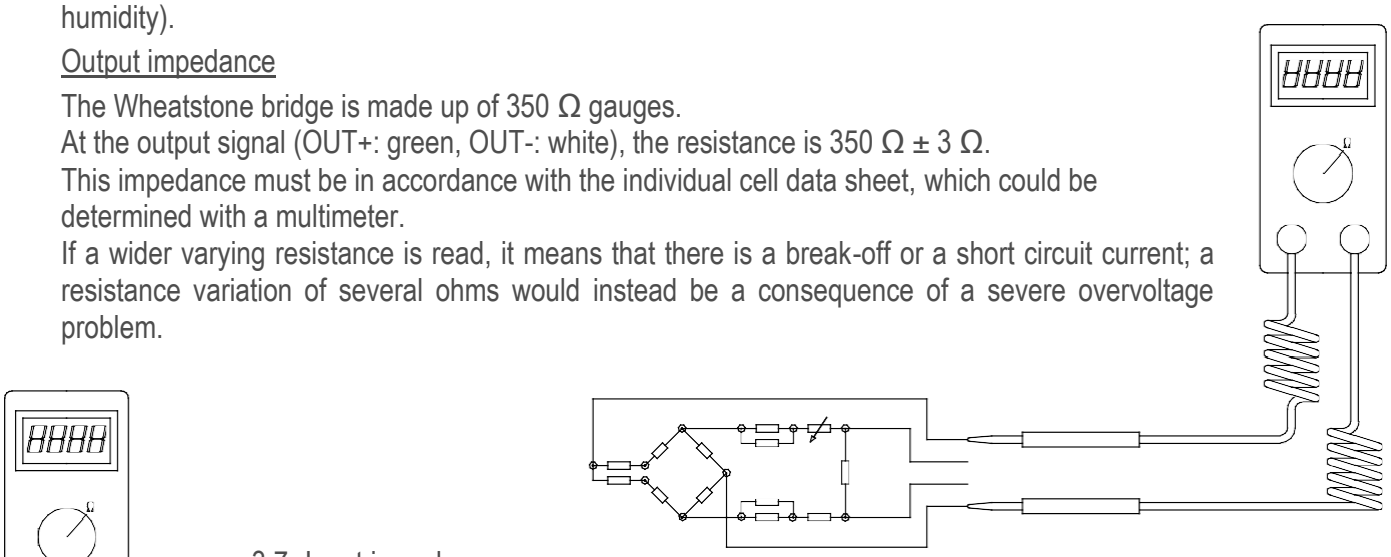
The insulation must not, in any case, be lower than 2 GΩ for a 10 V voltage. This insulation default will generate measurement errors if the insulation resistance is lower than several hundred MΩ. Insulation default can also be



generated by environmental conditions (temperature, humidity).

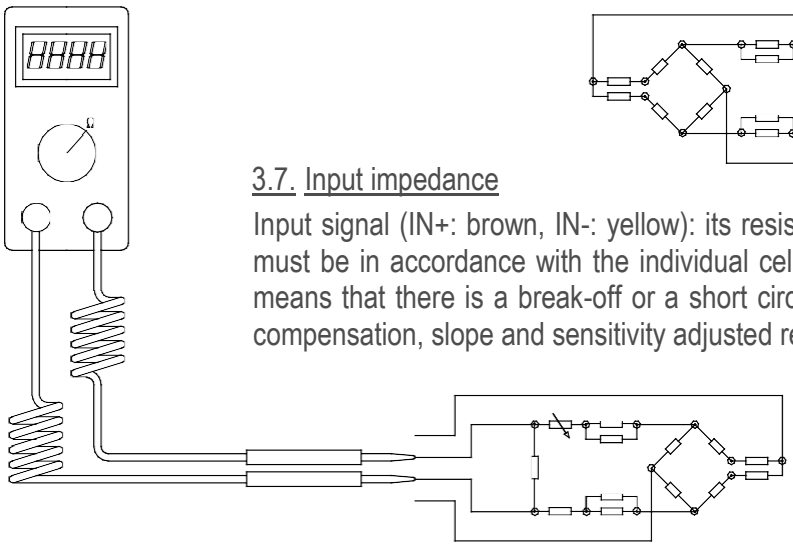
Output impedance

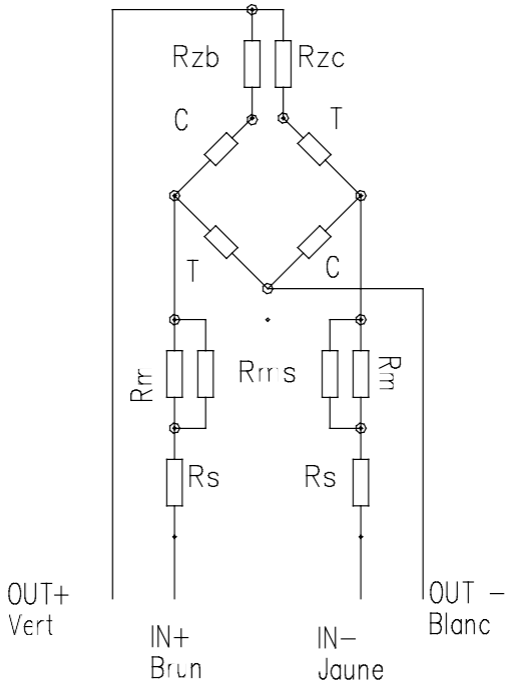
The Wheatstone bridge is made up of 350 Ω gauges.
At the output signal (OUT+: green, OUT-: white), the resistance is 350 Ω ± 3 Ω.
This impedance must be in accordance with the individual cell data sheet, which could be determined with a multimeter.
If a wider varying resistance is read, it means that there is a break-off or a short circuit current; a resistance variation of several ohms would instead be a consequence of a severe overvoltage problem.



3.7. Input impedance

Input signal (IN+: brown, IN-: yellow): its resistance is usually of 350Ω ± 3Ω. Its impedance must be in accordance with the individual cell data sheet. If a different resistance is read, it means that there is a break-off or a short circuit current. It is at the input that one finds drift compensation, slope and sensitivity adjusted resistance.





Rm *Sensitivity drift compensation*

Rms *Sensitivity drift adjustment*

Rs *Sensitivity calibration*

Rzb *Zero calibration*

Rzc *Zero drift compensation*

4. WEAK DILATATION MOUNTING

4.1. Mounting of 3 cells

For weak dilatation: (<1 mm per 4500 cell 0.5 - 3 t)
(<1.5mm per 4500 cell 5 - 7.5 t)
(<2 mm per 4500 cell 10 - 20 t)

The base plates are solidly fixed and the threaded support pins are removed after mounting and replaced by smaller ones. For a better bedding, the cells can be installed facing the outside. *(Fig. 2)*

FIG.1

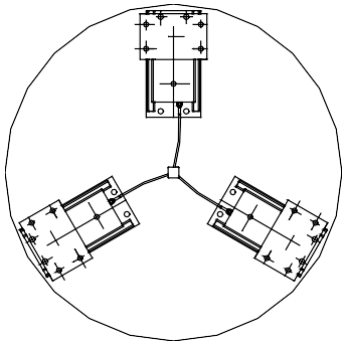
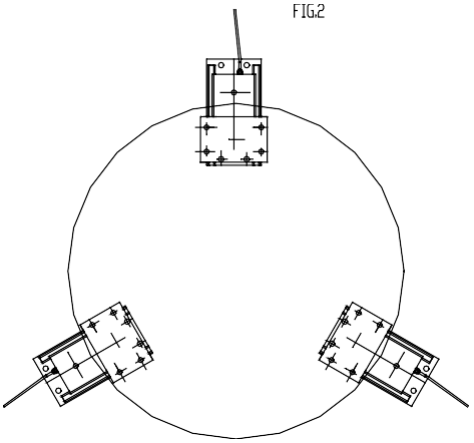
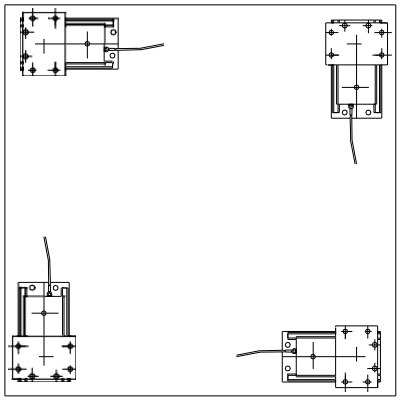


FIG.2



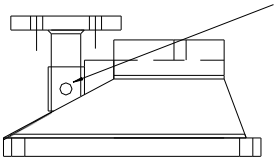
4.2. Mounting of 4 cells

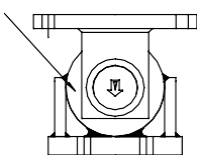


For weak dilatation:
(<1mm per 4500 cell 0.5 - 3 t)
(<1.5 mm per 4500 cell 5 - 7.5 t)
(<2mm per 4500 cell 10 - 20 t)

The base plates are solidly fixed and the threaded support pins are either removed, either replaced by smaller ones after mounting.

After mounting, remove the threaded rod or replace it with a smaller section rod.





5. MEAN DILATATION MOUNTING

5.1. Mounting of 3 cells

For mean dilatation: (<1/2 mm per 4500 cell 0.5-3 t)
(<1.5 mm per 4500 cell 5-7.5 t)
(<2 mm per 4500 cell 10-20 t)

The base plates are solidly fixed and the cells are equipped as follows:

1 - removed pin
2 - removed pin
3 - sliding pin (see page 4)

For a better bedding, the cells can be installed facing the outside *(Fig. 2)*

FIG.1

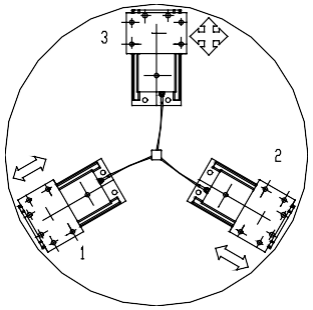
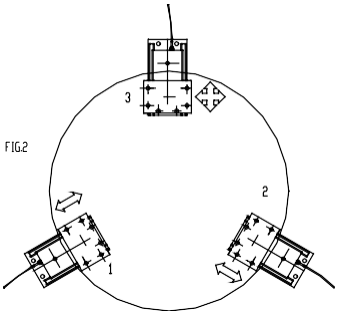


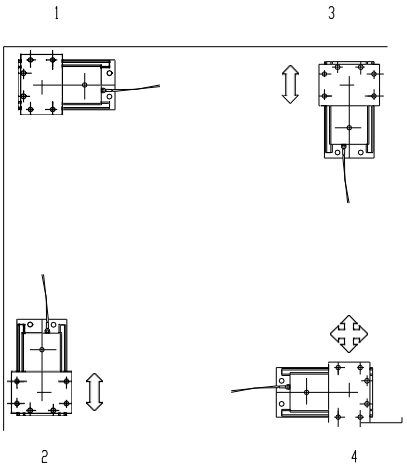
FIG.2



5.2. Mounting of 4 cells

For mean dilatation:
(<1/2 mm per 4500 cell 0.5 - 3 t)
(<1.5 mm per 4500 cell 5 - 7.5 t)
(<2/4 mm per 4500 cell 10 - 20 t)

1 - fixed support and base plate
2 - removed support pin
3 - removed support pin
4 - sliding mounting (see page 4)



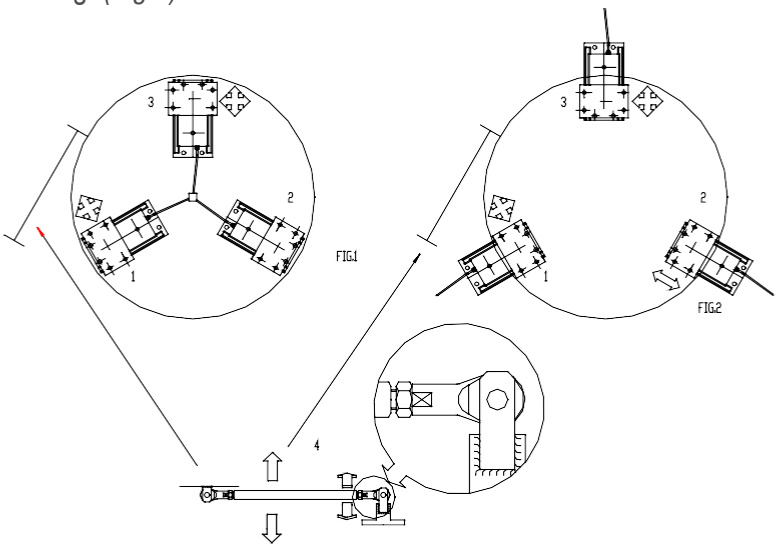
6. GREAT DILATATION MOUNTING

6.1. Mounting of 3 cells

For great dilatation, the base plates are solidly fixed and the cells are equipped as follows:

1 - sliding mounting (see page 4)
2 - fixed support and base plates
3 - sliding mounting
4 - draw-ball (1 or 2)

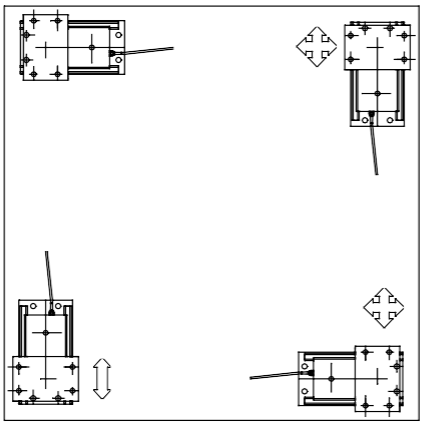
For a better bedding, the cells can be installed facing the outside *(Fig. 2).*
If there is a risk of it getting knocked over (violent wind), it is necessary to provide a counter -force rod in the front of the sliding mounting. *(Fig.3).*

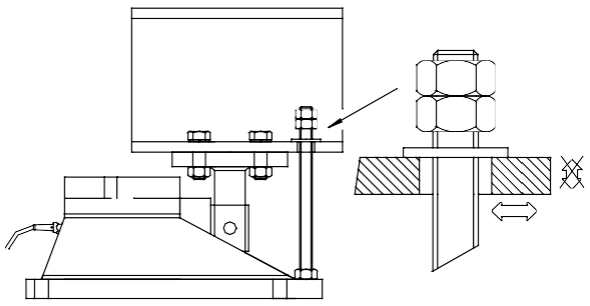


6.2. Mounting of 4 cells

The base plates are solidly fixed and the cells are equipped as follows:

1 - fixed support and base plate
2 - removed support pin
3 - sliding mounting (see page 4)
4 - sliding mounting (see page 4)





7. USE IN POTENTIALLY EXPLOSIVE ATMOSPHERE (OPTION)

Sensors 4500 are also available with intrinsic safety protection in potentially explosive atmosphere if requested.

Refer to document "LOAD CELLS USER'S GUIDE APPENDIX" for specific conditions of use and refer to ATEX/HAZLOC certificate and conformity certificate of your product in accordance with label information mentioned on your product. Standards used for certifications are mentioned on certificate. For further information, contact sales department.

8. 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.

9. 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… +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			

[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

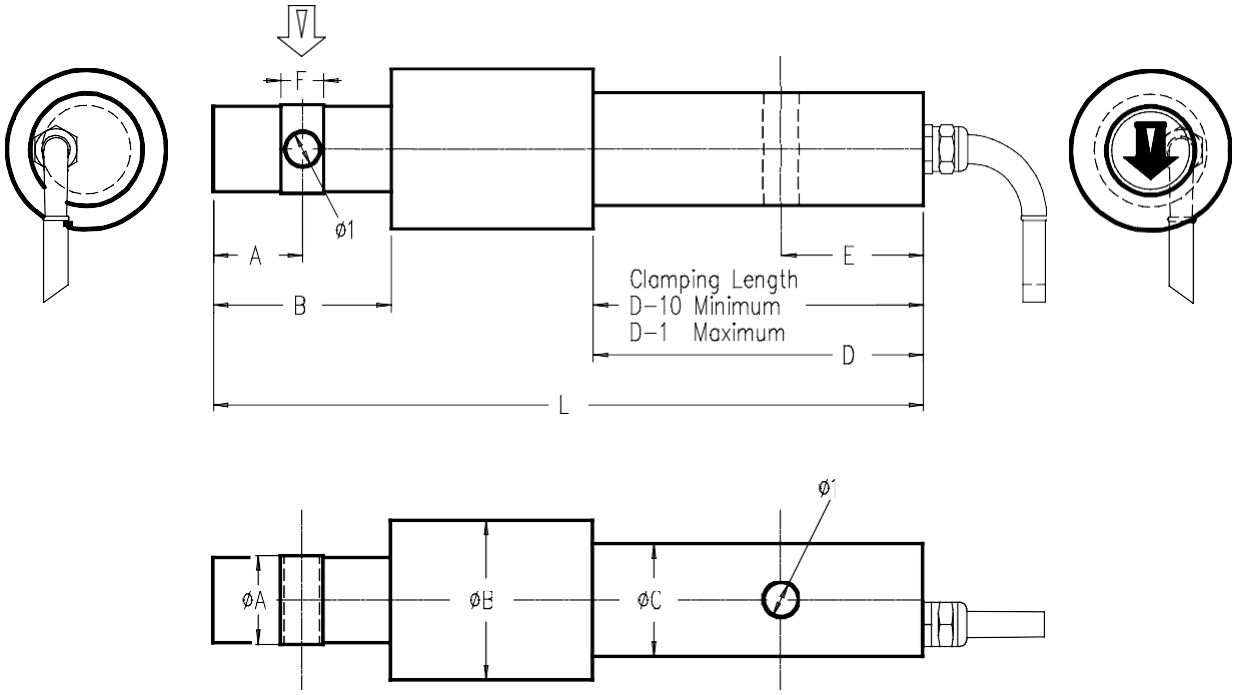
[4] 15 to 27VDC with a 1000Ω bridge

10.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.

11. DRAWINGS AND WIRING DIAGRAMS

4500 > STANDARD DIMENSIONS

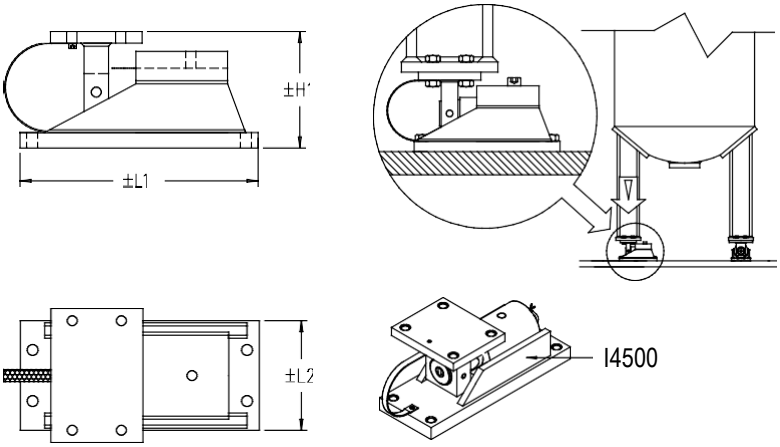


Ref. Item	Capacities	A	B	D	E	F	L	Ø1	ØA	ØB (MAX)	ØC	CL (m)	H1	L1	L2	Weight (kg)
4500-A	0.5 - 3 t	25	50	93	40	8	200	10	25	40	31.75	6	125	285	120	1.48
4500-B	5 - 7.5 t	25	50	93	40	12	200	10	40	49	49	6	125	285	120	3
4500-C	10 - 15 t	25	50	105	20	24	200	16	60	62	62	12	174	405	150	3.4
4500-D	20 t	25	50	145	60	24	240	16	60	62	62	12	174	405	150	4.3
4500-E	30 t	25	50	145	60	30	240	16	60	78	78	12	206.5	450	200	8

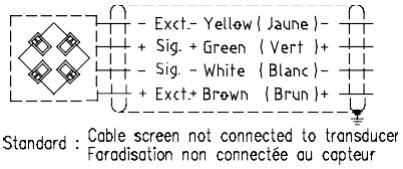
→ Other capacities and dimensions available on request

Dimensions in mm

Accessories

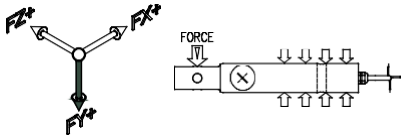


Wiring

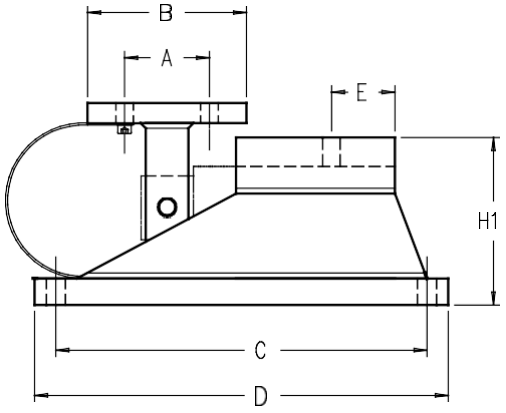


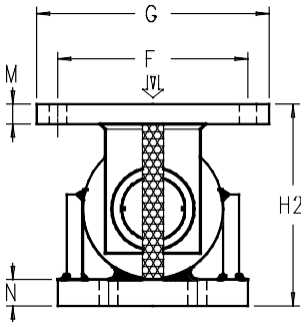
Standard : Cable screen not connected to transducer
Faradisation non connectée au capteur

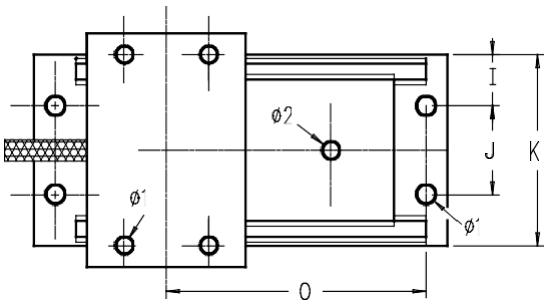
Load direction



I4500-I4505 > STANDARD DIMENSIONS







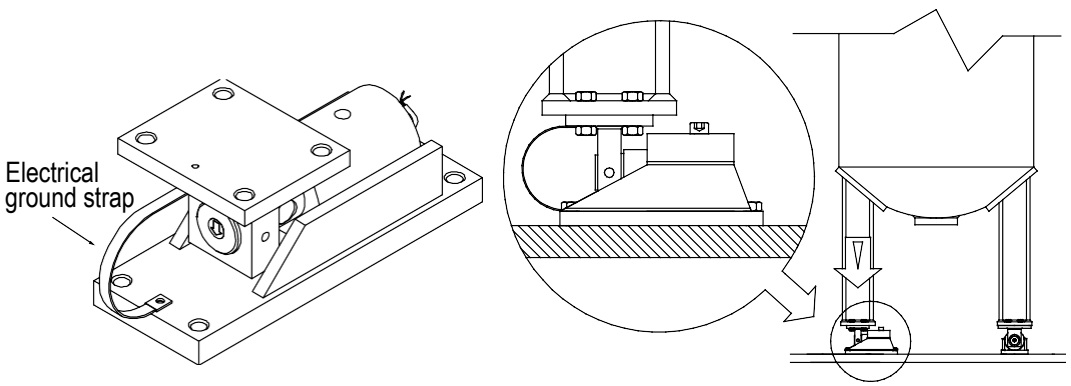
Ref. Item*	Capacities	A	B	C	D	E	F	G	I	J	K	M	N	O	Ø1	Ø2	H1	H2	Weight (kg)
I450x-A	**0.5 - 3 t**	60	90	255	285	40	90	120	15	90	120	15	20	200	12.5	10.5	100	125	10.6 (I4505 Ni plated)
I450x-B	**5 - 7.5 t**	60	90	255	285	40	90	120	15	90	120	15	20	200	12.5	10.5	100	125	11.2 (I4505 Ni plated)
I450x-CD	**10 - 20 t**	110	150	365	405	60	140	180	20	110	150	20	30	260	17	16.5	134	174	23.5 (I4505 painted)
I450x-E	**30 t**	110	150	407	450	60	157	200	30	157	200	30	30	273.5	21.5	16.5	160	206.5	48 (I4505 painted)

***x=Material: I4500 - stainless steel; I4505 - alloy steel**

→ **Other capacities and dimensions available on request**

Dimensions in mm

Other views



12. 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: 4500, 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

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 EN/IEC 60079-0 per 2014/34/EU directive of 26/02/2014.

Jumet
24-05-2023

Ir Delcambe Sylvia
Technical manager

13. 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: 4500, 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

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 (EN/IEC 60079-0) in compliance with Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016, "SI 2016 No. 1107(as amended)"

Jumet
24-05-2023

Ir Delcambe Sylvia
Technical manager