

DYNAMOMETRIC AXLE FOR HOISTING

TYPES 5000, 5050, 5300 and 5600



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APPENDIXES :

- For models 5000: Control + diagnostic data sheet
- For models 5050 : Control + diagnostic data sheet
- For models 5300: Certificate of verification + diagnostic data sheet
- For models 5600: Control + diagnostic data sheet

Rev.	Date	Reason
1	24/09/2014	Insertion des certifications IECEX et CSA (in preparation) et ATEX d
2	16/03/2015	Modifications of the paragraphs 1 and the DOC for ATEX T2 & CSA
3	4/11/2015	Modifications of the paragraph 1.7 for Standards revision
4	10/04/2018	Update of the DECLARATION OF CE CONFORMITY
5	13/09/2018	Modifications of the paragraph 1.5 and 1.6 for an operating temperature range from -55°C in IECEX
6	18/03/2019	Insertion of an EU Declaration Of Conformity
7	15/11/2019	Labels modification on pages 4 and 5 (CE0 518 becomes CE 2813)
8	07/12/2021	Adding of specific conditions of use indicated in certificate SIRA 13ATEX2365X
9	06/10/22	Adding of UKCA and EU + new certificate, update of conditions accordingly

1. OPERATING CONDITIONS OF DYNAMOMETRIC AXLE IN HOISTING DEVICES

1.1. Setting

1. The delivered axle must be used in the defined conditions of its technical data's and according to described conditions.
2. The effort on the axle has to be applied according to its preferential direction materialized by the arrow. A variation of $\pm 3^\circ$ is tolerated.
3. Verify that the effort on the centre of the axle is well done in the direction shown by the arrow placed on the dynamometer. The provided data sheet mentions this information too.
4. The axle has to be installed freely in its seating (tolerance H9/h9 sufficient for load limitation; tolerances H7/h7 better for load measurements). In case of rotary applications, we firmly recommend mounting with bearings (tolerance h6 required in option on load pins 5000/5050/5600, standard on 5300), mounting with bushing could be good for low rotation speeds (tolerance h7 in option). In this case, constructor's specific pressures recommendations have to be respected.
5. The axle has to work only in shearing. It should not normally be subject to parasitic strains such as: torsion, flexion, traction or axial compression. It is therefore necessary to uncouple efforts by an appropriate setting (ex: use of rolls, or rings of well lubricated bronze).
6. The setting of the axle cannot be done by using force or by giving violent knocks. Nevertheless, you can use a wooden mallet to insure the adjustment.
7. After blocking the axle, it cannot keep a clearance on its axis of more than 1° compared to its blockage position.
8. The delivered cable cannot be lengthened; but well shortened. It is mandatory to connect the axle to its electronic device according to the colour codes specified on the axle data sheet, exclusively and conform to the specifications of the used electronic device. The technician in charge of installation will insure the integrity of the cable after setting on site. All injury of this cable or one of the conductors implies its replacement by SENSY.
9. The load is uniformly distributed on at least 80% of the distance between the junction plates. A written agreement by the manufacturer is mandatory for particular utilization conditions.

1.2. Utilization

1. A dynamometric axle is designed to support an occasional static overload, without damage, up to 2 x the Nominal Load (case of the test load of an overhead crane). In any case, a superior overload is (static or dynamic) not acceptable.
2. In case of rotation of the bore on the axle (pulley), precautions will be taken to avoid the jamming of the axle:
 - self lubricated rings;
 - greasing;
 - placing a ball bearing.

In case of jamming, the axle has to be returned to us for control.

3. Make sure that the deformation of the axle is not restrained.
4. The handled load must be free and adapted to the nominal load of the system:
 - no anchorage to the ground or support;
 - no collision with another load or structure;
 - no jamming;
 - no shock produced by the fall of an other load on the handled load.
5. The axle should not undergo shocks linked to the conditions of utilisation: case of a balancing single-tree crashing against the chassis of the winch in the swing of the pulley block.

1.3. Periodic inspections

1. Make sure by appropriate means that the axle has not been jamming (annually).
2. Check output for zero load (annually)

Output signal	Min acceptable	Max. acceptable
mV/V / 4 wires	-0.15 mV/V	0.15 mV/V
(4-20 mA / 2 wires)	3 mA	6 mA
(4-20 mA / 3 wires)	3 mA	6 mA
(1-5 V / 3 wires)	0.5 V	1.5 V
(1-10 V / 3 wires)	0.5 V	1.5 V

3. Make sure that the axle beam has not been knocked (markings) or chemically attacked (some corrosive greases). If points 2 and 3 are not accounted for, just take preventive measures. (annually)
4. In case of doubt, reply to the diagnostic questionnaire available on Web: www.sensy.com/support.
5. Verify the integrity of the cable.
6. After any serious functioning incident, repeat operations 1 to 4

1.4. Calibration

If lifting, for calibration purpose, a load equal to the nominal load is not possible, a load of minimum 60% of the nominal load can be used.

1.5. Use features

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

Output signal:	mV/V	4-20 mA 2 wires	4-20 mA 3 wires	1-5 V 3 wires	1-10 V 3 wires
Compensated temp. range*	-10...+45°C				
Operating temperature range*	-30°C 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	
Load impedance (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
Saturation	> 3 mV/V	> 24 mA	> 24 mA	> 11 V	

⁰ Min value depends on option

EX-D option: min = -35°C, others on request non Ex d: -55°C

¹ Max +60°C for EX-I T4, T6 and C6 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 options

⁴ 15 to 27VDC with a 1000 Ω bridge

* The compensated and operating temperature ranges may be extended with the right option for your environment.

See the control sheet delivered with your load cell for the exact temperature ranges and certificate for option chosen if applicable.

2. USE IN POTENTIALLY EXPLOSIVE ATMOSPHERE (OPTION)

2.1. 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:

EU ATEX certificate number :	CML UKEX certificate number :
CML 22ATEX2429X	CML 22UKEX2430X
Sira13ATEX2365X	

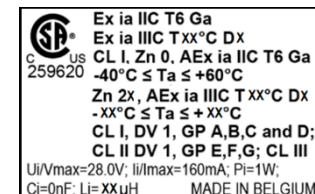
CSA: Master Contract 259620

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	IECEX
EN 60079-0	CAN/CSA-C22.2 No. 0	IEC 60079-0
EN 60079-26	CAN/CSA C22,2 61010	IEC 60079-11
EN 60079-11	CAN/CSA-C22.2 No. 60079-0	IEC 60079-26
	CAN/CSA-C22.2 No. 60079-11	
	ANSI/UL 508	
	ANSI/UL Standard 913	
	ANSI/UL 60079-0	
	ANSI/UL 60079-11	



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.

2.2. 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 sparking material (see certificate).

In rare cases, ignition sources due to impact and friction sparks could occur.

This shall be considered during installation.

2.3. Explosion-proof safety (Ex d)

SENSY has developed an IP6X explosion-proof ATEX d load pins to operate in zones 1 & 2 and in rough environments. The use of Ex d sensors can only be done with Ex d marked sensors delivered with the official certificates.

For more information, please refer to our certificate, issued by an accredited organization:

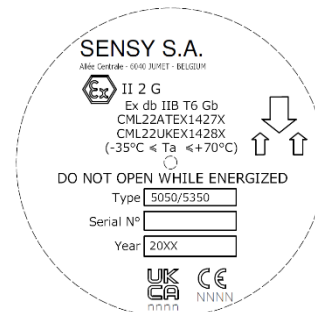
EU ATEX certificate	UKEX Certificate Number
CML22ATEX1427X	CML22UKEX1428X

Ex d explosion-proof load cells comply with the following standards:
EN IEC 60079-0 and EN-IEC 60079-1

SENSY can also supply explosion-proof junction boxes to operate in hazardous zones.

3. GUARANTEE

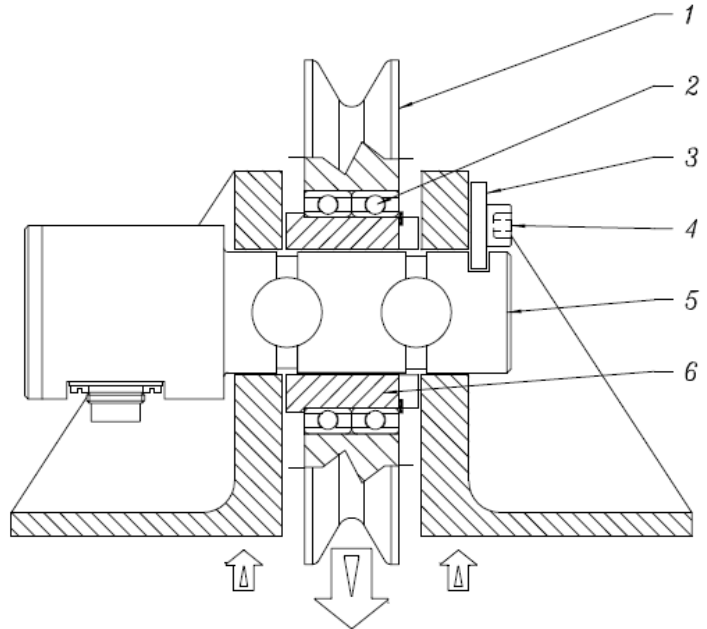
The constructor guarantee is applicable if mounting recommendations and general use principles are respected. Any particular use not described in the present document should be subject to a prior written agreement from SENSY S.A., mandatory for preserving its conformity.



MOUNTING 5000

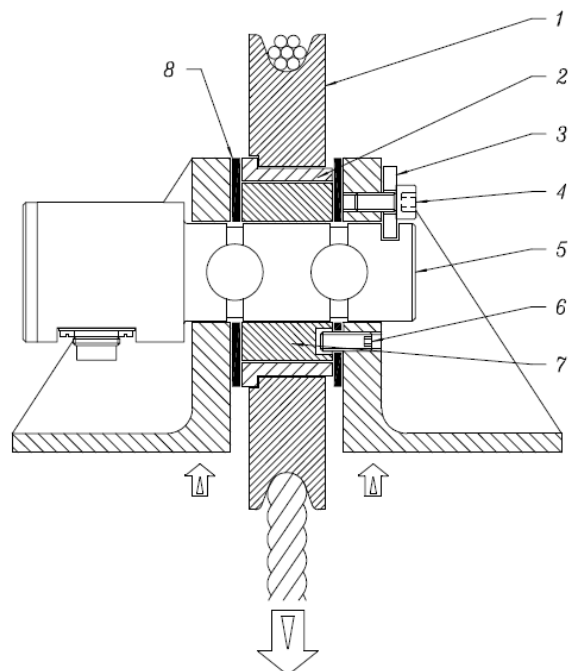
MOUNTING ON BEARING

1. Pulling
2. Ball bearing
3. Small plate
4. screw (stuck or brake washer)
5. Dynamometric axle
6. Ring to hold bearing



MOUNTING WITH SELF-LUBRICATING BRONZE RING

1. Sheave
2. Self-lubricating bronze ring
3. Small plate
4. Screw (stuck or brake washer)
5. Dynamometric axle
6. Anti-rotating screw rake with glue)
7. Case-hardened steel ring
8. Anti-friction washer (TEFLON...)



4. DRAWINGS AND WIRING DIAGRAMS

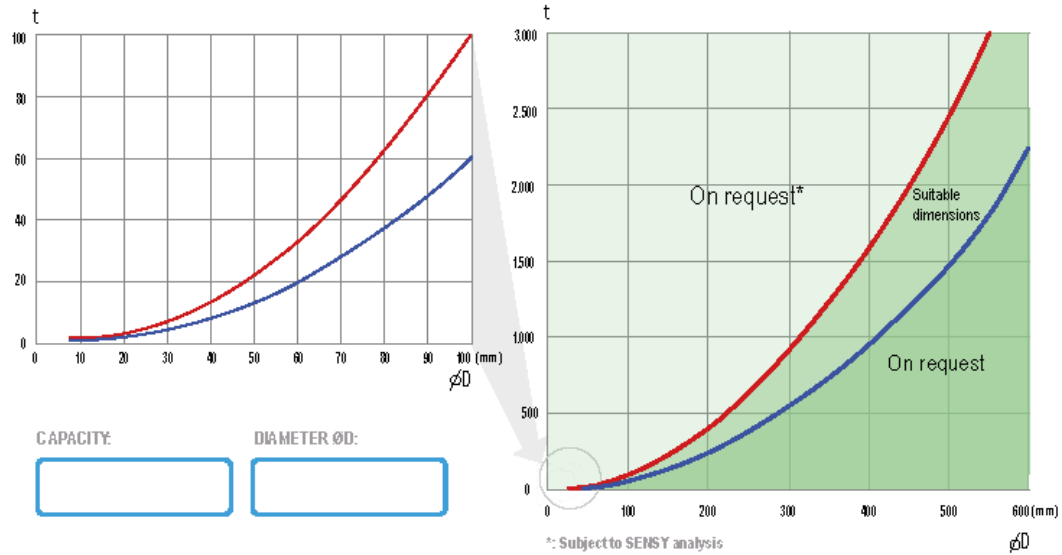
TECHNICAL DRAWINGS: CUSTOM-MADE LOAD PINS

→ 5000 > **TECHNICAL SPECIFICATIONS**

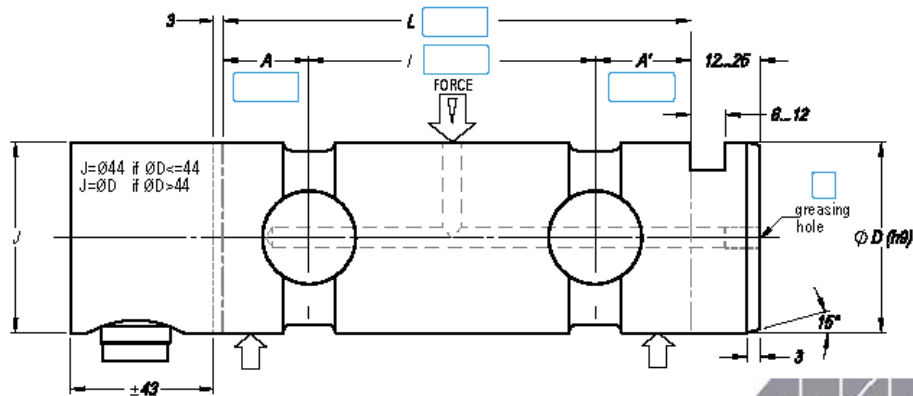
Load pins range



Load-diameter relationship



Mechanical dimensions



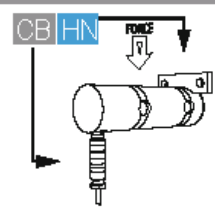
TECHNICAL DRAWINGS: CUSTOM-MADE LOAD PINS

→ 5000 > OPTIONS

Configuration

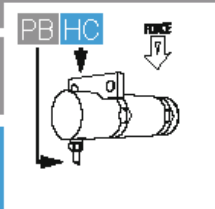
Example: CB HN

C: Connector
B: Cable entry: 180°
H: Fixing plate: 0°
N: Position code



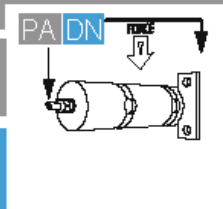
Example: PB HC

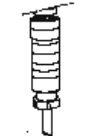

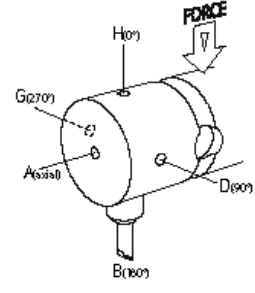
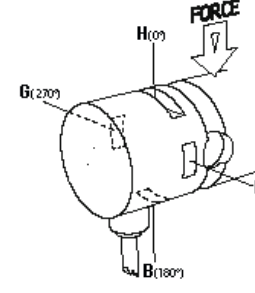



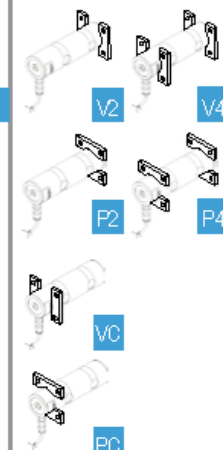
P: Cable gland
B: Cable entry: 180°
H: Fixing plate: 0°
C: Position code



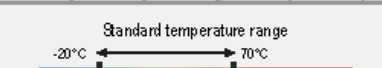

Example: PA DN

P: Cable gland
A: Cable entry: axial
D: Fixing plate: 90°
N: Position code



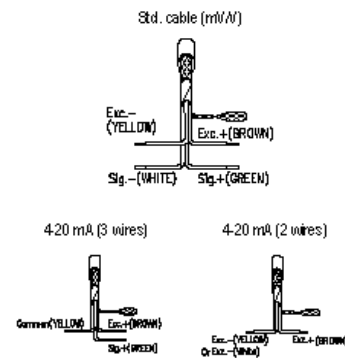
Cable entry:	Connector		Cable Gland	
	C	P	C	P
				
				
			Fixing plate nr if ØD ≤ 100 1:  N 2:  C	if ØD > 100 2:  2 4:  V2, V4, P2, P4, VC, PC

Options

Type of application	FORCE (BL* 500-59)		HOISTING (BL* 500-59)		LIFT (BL* 500-59)	
	static	dynamic				
Environment	IP65	IP66	IP67	IP67 MARINE	IP68	
	NORMAL	INDUSTRIAL	NUCLEAR	AERONAUTICS	Other:	
	SUBSEA		Immersion depth:		Immersion time:	
Output signal	mV/V	4-20 mA 2 / 3 wires	0-10 V (force)	1-5 V (hoisting)	RS-485	WIRELESS
Service temperature range	Standard temperature range  Temperature range available (option) 					
Dual bridge circuit	NO		YES		Redundancy Safety SIL / P/L Biaxial load pin, directions X and Y	
Cable length (m)	6	12	20	50	100	Other:
Intrinsically safe	Not applicable	ATEX	IECEX/ATEX	CSA (US/Canada)		Triple certification

*BL = Breaking load

Wiring



Load direction



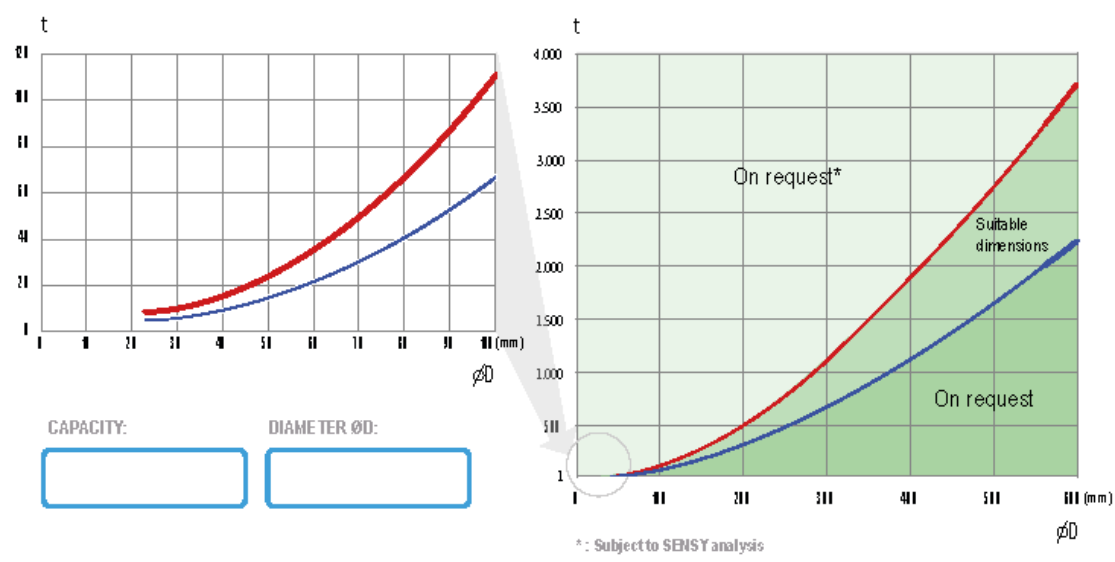
TECHNICAL DRAWINGS: SUBSEA / SUBMERGED LOAD PINS

5050 > TECHNICAL SPECIFICATIONS

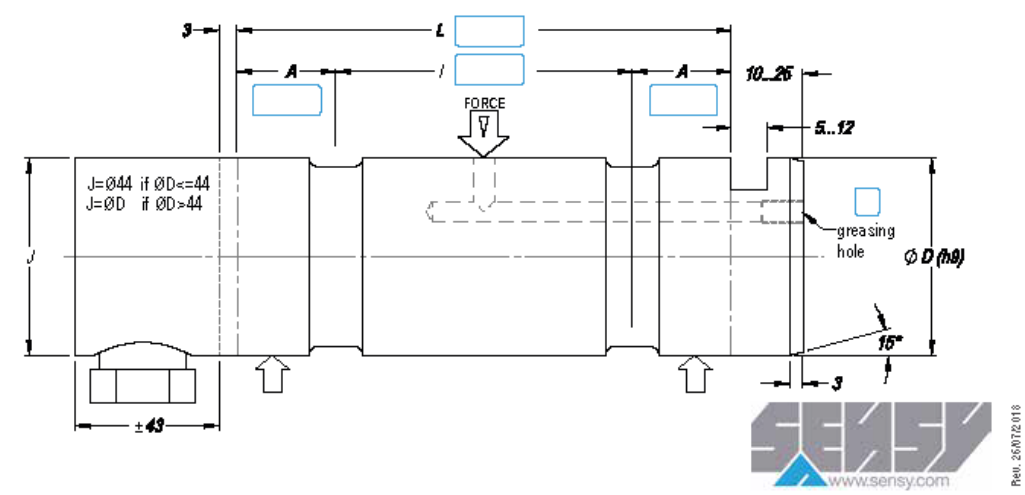
Load pins range

			
5000 (1 to 2000 t) CUSTOM-MADE LOAD PIN	5050 (1 to 2000 t) SUBSEA LOAD PIN	5300 (0.5 to 125 t) STANDARD LOAD PIN	5600 (0.5 to 14 t) ECONOMICAL LOAD PIN
TOOLS CONFIGURATOR www.sensy.com/load-pins-configurator/5050		LOAD PIN DESIGN www.sensy.com/load-pins-configurator/load-pin-design	

Load-diameter relationship



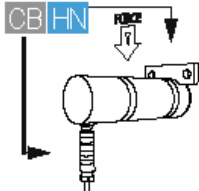
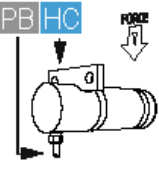
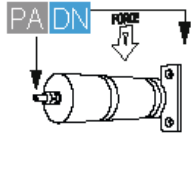
Mechanical dimensions





TECHNICAL DRAWINGS: SUBSEA / SUBMERGED LOAD PINS

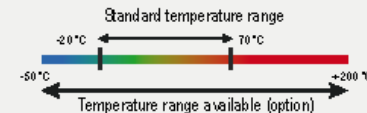
5050 > OPTIONS

Configuration

<p>Example:</p> <p>CBHN</p> <p>C: Connector B: Cable entry: 180°</p> <p>H: Fixing plate: 0° N: Position code</p> 	<p>Example:</p> <p>PBHC</p> <p>P: Cable gland B: Cable entry: 180°</p> <p>H: Fixing plate: 0° C: Position code</p> 	<p>Example:</p> <p>PA DN</p> <p>P: Cable gland A: Cable entry: axial</p> <p>D: Fixing plate: 90° N: Position code</p> 
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Cable entry	Connector	Cable Gland	Fixing plate nr if Ø D ≤ 100		if Ø D > 100	
			1	2	2	4
	C	P	N	C	V2	V4
					P2	P4
					VC	
					PC	

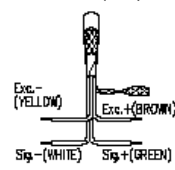
Options

Type of application	FORCE (BL > 1000 kg)		HOISTING (BL > 1000 kg)		LIFT (BL > 1000 kg)	
	static / dynamic					
Environment	NORMAL	INDUSTRIAL	NUCLEAR	AERONAUTICS	Other: _____	
	SUBSEA		Immersion depth: _____		Immersion time: _____	
Output signal	mV/V	4-20 mA (2 / 3 wires)	0-10 V (force)	1-5 V (hoisting)	RS-485	WIRELESS
					Other: _____	
Service temperature range	<p>Standard temperature range: -20°C to 70°C</p> <p>Temperature range available (option): -50°C to +200°C</p> 					
Dual bridge circuit	NO		YES		Redundancy Safety SIL / PL	
					Biaxial load pin, directions X and Y	
Cable length (m)	6	12	20	50	100	Other: _____
Intrinsically safe	Not applicable	ATEX	IECEX / ATEX	CSA (US/Canada)		Triple certification

*BL = Breaking load

Wiring

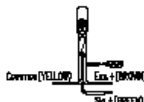
Std cable (m/VV)



Exc- (YELLOW) Exc+ (BROWN)

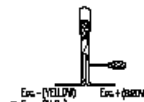
Sig- (WHITE) Sig+ (GREEN)

4.20 mA (3 wires)



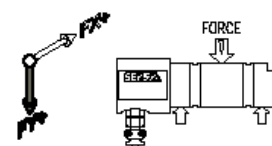
Common (YELLOW) Exc+ (BROWN) Sig+ (GREEN)

4.20 mA (2 wires)



Exc- (YELLOW) or Exc- (White) Exc+ (BROWN)

Load direction



TECHNICAL DRAWINGS: STANDARD LOAD PINS

5300 > TECHNICAL SPECIFICATIONS

Load pins range



5000 (1 to 2000 t)
CUSTOM-MADE LOAD PIN



5050 (1 to 2000 t)
SUBSEA LOAD PIN

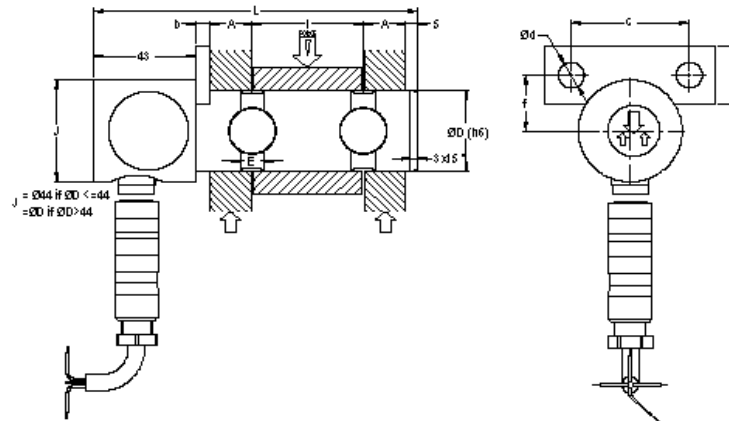


5300 (0.5 to 125 t)
STANDARD LOAD PIN



5600 (0.5 to 14 t)
ECONOMICAL LOAD PIN

5300 drawing



Ref. Item	Capacities			δD	A	E	L	a	b	c	δd	f	L	Weight (kg)
	Force > 300 %*	Hoist > 500 %*	Lift > 1000 %*											
5300-A	0.75 t	0.5 t	0.25 t	25	13.5	8	31	25	6	50	11	20.5	112	0.5
5300-B	1.5 - 3 t	1 - 2 t	0.5 - 1 t	25	13.5	8	31	25	6	50	11	20.5	112	0.6
5300-C	5 - 7.5 t	3 - 5 t	1.5 - 2.5 t	35	18	10	47	25	6	50	11	24	137	1
5300-D	16.6 t	10 t	5 t	50	27	14	66	30	8	70	13	33	176	2.4
5300-E	30 t	20 t	10 t	65	32.5	18	90	30	8	70	13	38	211	5
5300-F	50 t	30 t	15 t	75	40	18	100	40	10	100	17	47	241	7.5
5300-G	75 t	50 t	-	85	49	20	117	40	10	100	17	50.5	271	11.2
5300-H	100 t	75 t	-	100	72.5	35	155	40	10	100	17	56	354	21
5300-I	125 t	100 t	-	120	72.5	35	155	50	12	140	21	65	354	31

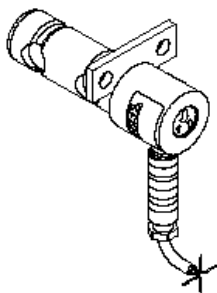
*Breaking load (% full scale)

Other capacities and dimensions available on request

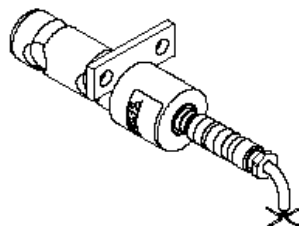
Dimensions in mm

Other views

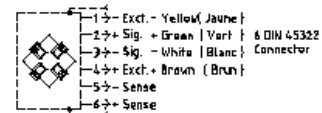
RADIAL OUTPUT (STANDARD)



AXIAL OUTPUT (5300A-) - OPTION

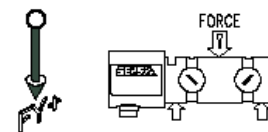


Wiring



Standard: Doble screen not connected to transducer / Foradisation non connectée au capteur

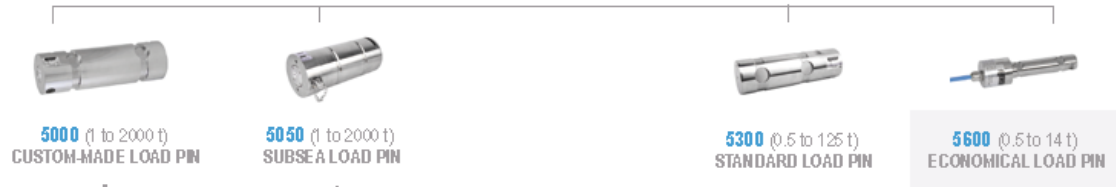
Load direction



TECHNICAL DRAWINGS: ECONOMICAL CUSTOM-MADE LOAD PINS

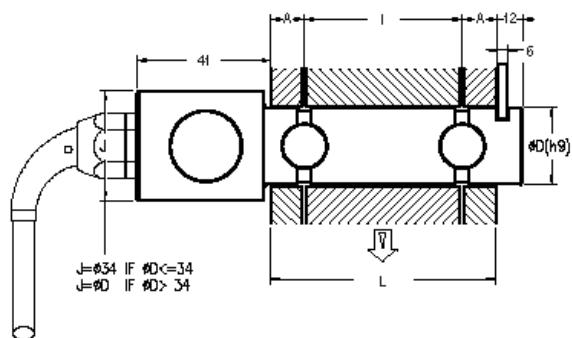
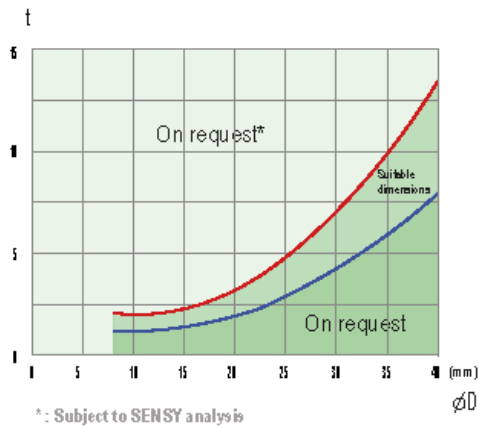
5600 > TECHNICAL SPECIFICATIONS

Load pins range



TOOLS	CONFIGURATOR	LOAD PIN DESIGN
	www.sensy.com/load-pins-configurator/5600	www.sensy.com/load-pins-configurator/load-pin-design

Load-diameter relationship



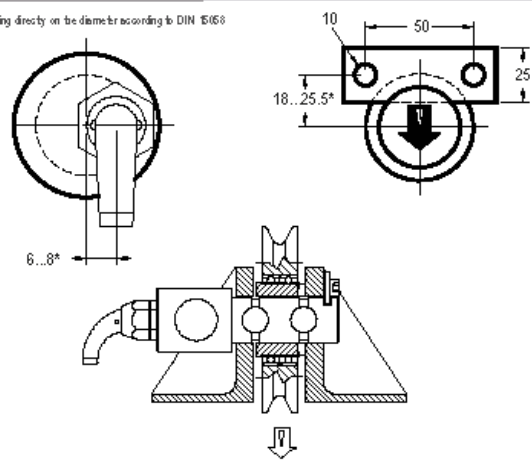
*: Subject to SENSY analysis

CAPACITY: DIAMETER Ø D:

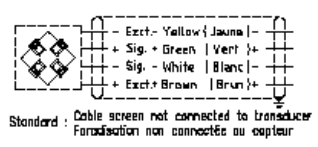
A: L:

Mechanical dimensions

* Depending directly on the diameter according to DIN 5168

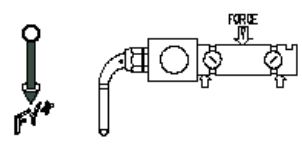


Wiring



Standard : Cable screen not connected to transducer
 Norme : Câble blindé non connecté au capteur

Load direction



5. EU DECLARATION OF CONFORMITY

SAFETY COMPONENTS PUT ON THE MARKET SEPARATELY

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

- Models 5000, 5050, 5300, 5350, 5600 (resistive load cell)
Electronics associated: CRANE-BOY, BRIDGE-BOY, INDI-BOY, SAFETY-BOY
- Models 5000-C, 5000-J, 5050-C, 5050-J and 5300-C, 5300-J (amplifier 4 – 20 mA integrated)
Electronics associated: CRANE-BOYP, DISP-BOYP

These load cells have been designed for hoisting devices and may be used with other electronic load limiters. In this case, to be in accordance with the EU requirements the customer has to verify the right compatibility between the electronic (in accordance with referred directives in industrial environment) and SENSY load cells.

Load cells for hoisting have been proof-loaded at twice the nominal capacity in our factory (200 % nominal capacity) as mentioned in their dimensional control certificate. This information is written on the individual control certificates.

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 Restriction of the use of certain hazardous substances in the electrical and electronic equipment (RoHS)
amended by
directive
2017/2102/EU

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 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 2014/34/EU directive..



Jumet
July – 19 - 2022

Ir Delcambe Sylvia
Technical manager

6. UK DECLARATION OF CONFORMITY

SAFETY COMPONENTS PUT ON THE MARKET SEPARATELY

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

- Models 5000, 5050, 5300, 5350, 5600 (resistive load cell)
Electronics associated: CRANE-BOY, BRIDGE-BOY, INDI-BOY, SAFETY-BOY
- Models 5000-C, 5000-J, 5050-C, 5050-J and 5300-C, 5300-J (amplifier 4 – 20 mA integrated)
Electronics associated: CRANE-BOYP, DISP-BOYP

These load cells have been designed for hoisting devices and may be used with other electronic load limiters. In this case, to be in accordance with the EU requirements the customer has to verify the right compatibility between the electronic (in accordance with referred directives in industrial environment) and SENSY load cells.

Load cells for hoisting have been proof-loaded at twice the nominal capacity in our factory (200 % nominal capacity) as mentioned in their dimensional control certificate. This information is written on the individual control certificates.

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.

UK legislation equivalent to 2014/30/EU Electromagnetic Compatibility Regulations 2016

UK legislation equivalent to 2006/42/CE Supply of Machinery (Safety) Regulations 2008

UK legislation equivalent to 2011/65/EU The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

UK legislation equivalent to 2014/35/EU Electrical Equipment (Safety) 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 "Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016".



Jumet
July – 19 - 2022

Ir Delcambe Sylvia
Technical manager