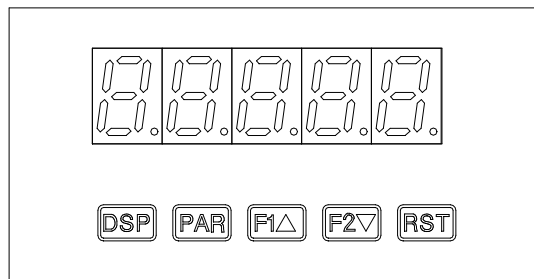


# CRANE BOYDP INDICATOR LIMITER

OEM version name : DISP-BOYDP



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**This indicator can only be used for lifting if these instructions are carefully read, strictly applied and if the legislation in force is respected.**

## 1. GENERAL INFORMATION

This manual describes the procedure to be followed to install and to adjust the CRANE BOYDP, an electronic load system. The information in this manual is applicable for both CRANE-BOYDP and DISP-BOYDP. CRANE-BOY is an INDI-BOY mounted in an IP65 enclosure.

### 1.1. Introduction

The CRANE-BOYDP is an electronic system with a digital display and configurable thresholds-based triggers. It has been modified, tested and qualified by SENSY S.A.

The CRANE BOYDP is a self-monitoring device. In case of a broken wire, a power cut or a short-circuit in the supply cable and/or transducer measuring cable, the device instantly switches into positive safety mode.

It is possible to incorporate as options an analogue output (4-20 mA and 0-10 V) and serial communication (RS-232). All the available options are listed at the end of the manual.

### 1.2. Principle

The CRANE-BOYDP has two different inputs which enable it to work with 2 different load cells. It can display separately the two different loads (dSP-A and dSP-b) and the result of a mathematical formula applied to the inputs (dSP-C). To select which load cell to display, press the DSP button.

The CRANE BOYDP is fitted with a 4-relay board that must be used according to the wiring diagram described below.

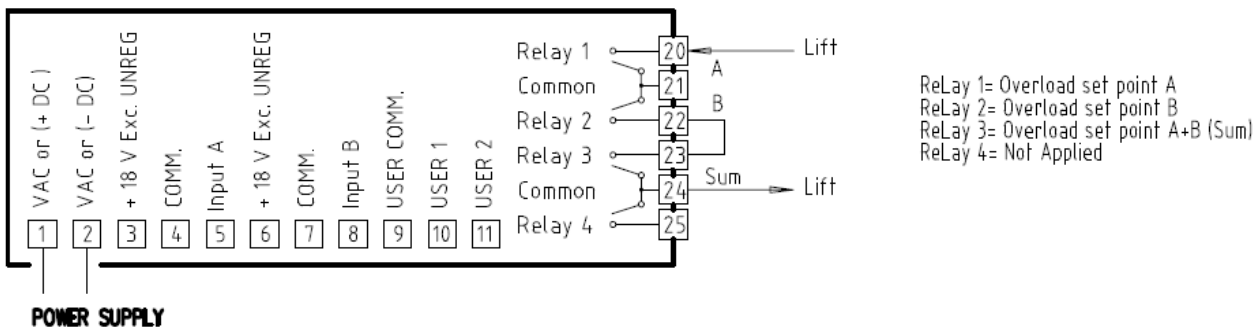
The relays are in the « open » position when the power is shut off (de-energised). When the CRANE-BOYDP is turned "on" and the applied load is within the operating range, the relays are activated in the « closed » position.

In normal operation, the relays are closed (SP1-SP2-SP3-SP4) are displayed in the front panel).

#### Relay allocation must be strictly respected:

- **SP1 (overload and safety threshold on the measurement and the supply of the first load cell)**
- **SP2 (overload and safety threshold on the measurement and the supply of the second load cell)**
- **SP3 (overload threshold on the summation of the load measurements of the two load cells)**
- **SP4 (optional threshold)**

Note: It is not applicable for detecting a slack cable.



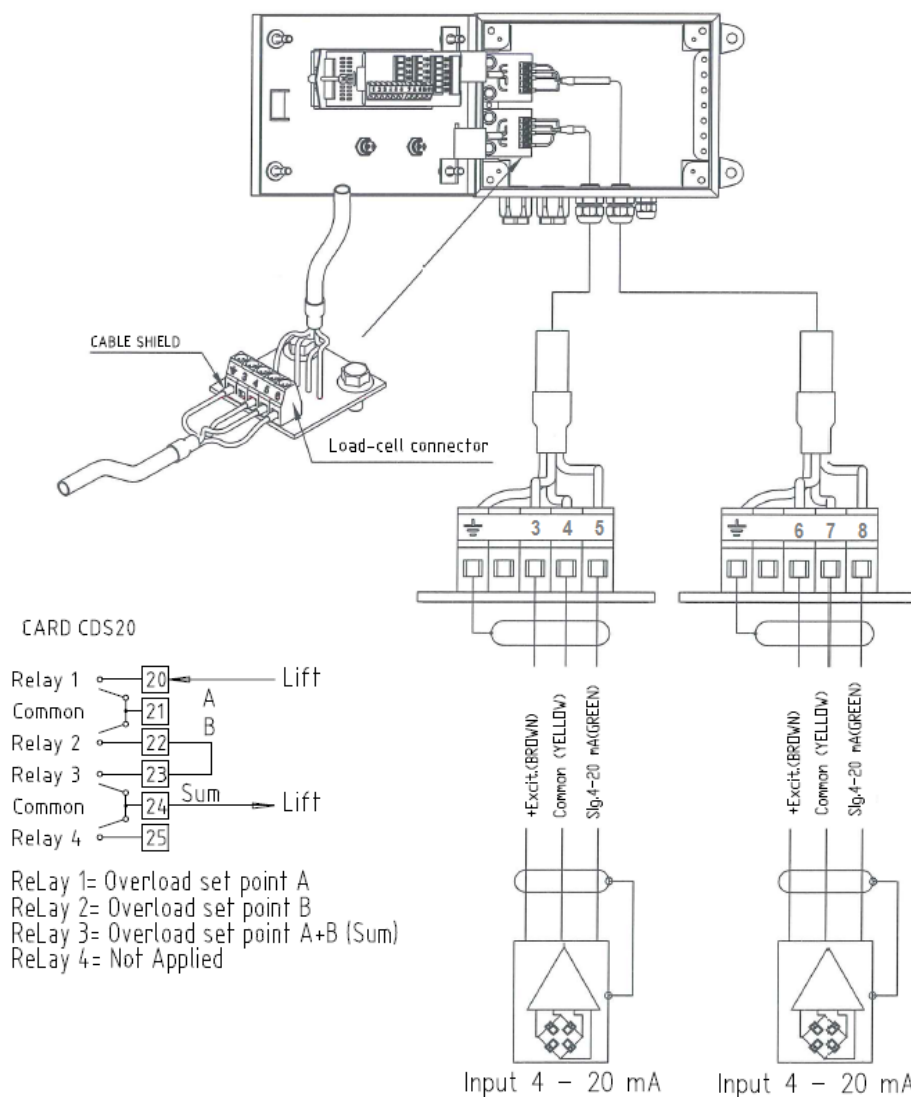
## 2. INSTALLATION AND ADJUSTMENTS

The CRANE-BOYDP is connected and adjusted in compliance with the information contained in this manual. To move around and through the CRANE-BOYDP's menus, use the buttons or keys on the front panel of the display.

- The PAR key to accept/confirm/enter
- The F1 and F2 keys to go up/down and increase/decrease.
- The RST key, in combination with F1 and F2 to increase/decrease in steps of 1000 (direct action on the fourth digit)
- The DSP key to quit.

To enter the menus, press the PAR key several times, until "CodE" appears. Then, using the F1 key, enter the value "7", then press the "PAR" key. No Pro will then appear. You can move from one menu to another using the F1 and F2 keys.

### 2.1. Specific CRANE-BOYDP connections



### 2.2. System calibration

As the relays that are driven by the different thresholds depend directly on the display, you can only change some numerical values listed in menus 1, 4 and 6.

Calibration is carried out in 3 steps:

- 1° display configuration
- 2° calculation of the sum configuration
- 3° threshold configuration

The CRANE BOYDP programming menu can be accessed via the PAR key. This is organized into function modules (menus) that group together the parameters associated with each function.

*To guarantee that the starting-load limitation is correctly followed, the calibration sheet must be duly completed, dated and signed.*  
**Resetting the display is not authorized in any circumstance.**

2.2.1. 1° Configuration of the display and commissioning the limiter

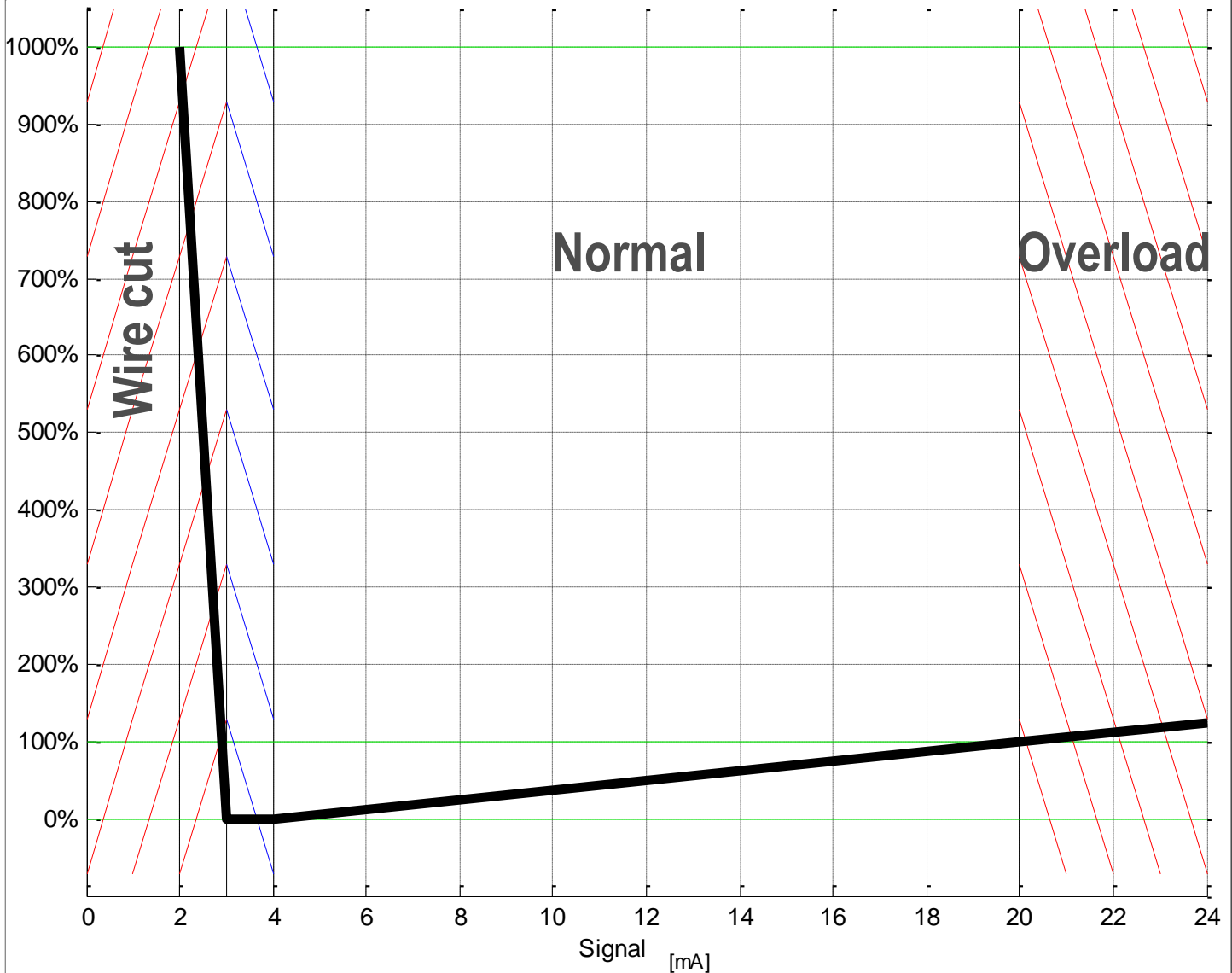
Enter menu 1- InA (using SENSY access code = "7") and carry out the following operations. Use the PAR key to move on to the next parameter.

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
rANGE	INPUT RANGE	Curr	. . . Curr . . .
rAtE	UPDATE RANGE	19.8	. . . . .
dECPT	DISPLAY RESOLUTION	0.0	. . . . .
round	DISPLAY ROUNDING INCREMENT	0.1	. . . . .
FILtr	FILTER SETTING	1.0	. . . .1.0 . . . .
bANd	FILTER ENABLE BAND	5.0	. . . .5.0 . . . .
Pts	SCALING POINTS	4	. . . . .4 . . . .
StyLE	SCALING STYLE Select "APPLY" and remove all loads from the crane (in apply mode, the CRANE-BOYDP measures the force transducer signal)	KEY	. . . KEY . . .
INP 1	INPUT VALUE 1 Positive safety (broken wire detection)	2.000	. . . 2.000 . . .
dSP 1	DISPLAY VALUE 1 The augmented value enables the CRANE-BOYDP to detect a broken wire and put itself into a safety mode	1000.0	<b>10 * nominal load of the transducer's Wheatstone bridge</b>
INP 2	INPUT VALUE 2	3.000	. . . 3.000 . . .
dSP 2	DISPLAY VALUE 2	0.0	. . . .0.0 . . . .
INP 3	INPUT VALUE 3 Zero calibration	4.000	. . . 4.000 . . .
dSP 3	DISPLAY VALUE 3 Without a load, the display value is 0.0	0.0	. . . .0.0 . . . .
INP 4	INPUT VALUE 4 Input signal at maximum load	20.000	. . . 20.000 . . .
dSP 4	DISPLAY VALUE 4 Maximum load display	100.0	<b>Nominal load of the the transducer's Wheatstone bridge</b>

Notes:

- The dSP 1,2,3 and 4 values are calculated as a % of the maximum load of the transducer's Wheatstone bridge.

- The INP 1,2,3 and 4 values are in mA.
- After configuring and validating the parameters of your CRANE-BOYDP, return to the display mode (press the “PAR” key until “END” appears).
- Check that when there is no load, the display is equal to zero and that when the crane is loaded, the display corresponds to the load that is being lifted.
- After calibrating the first input, repeat the procedure for 1- InB.
- Creating a non-linearity of the display values enables operating with a positive safety (wire break) AND overload while triggering on a single threshold value (SP-1 for input A and SP-2 for input B).

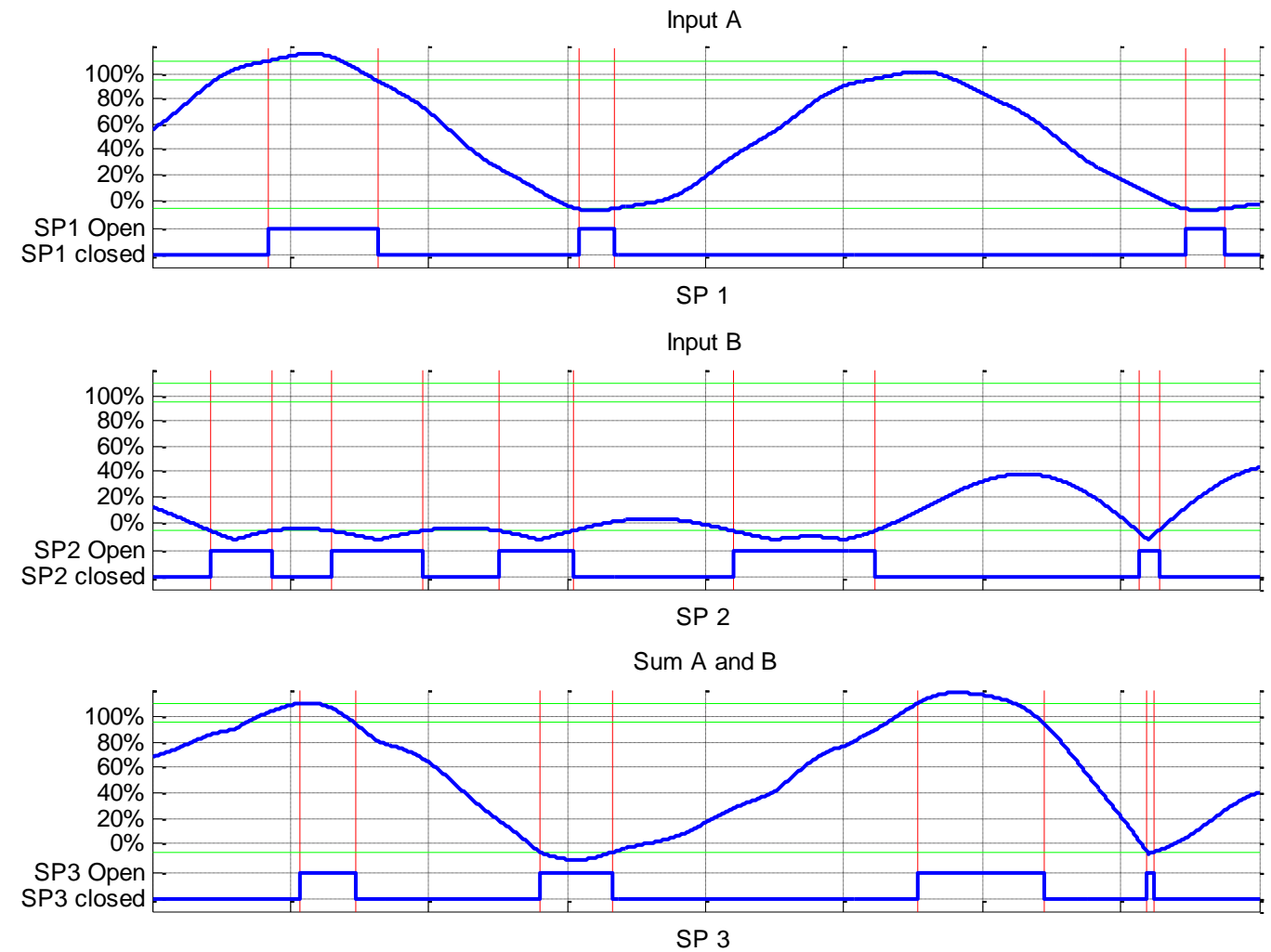


### 2.2.2. 2° Summation configuration

With the menu 4- SEC you can configure a mathematical function. The result can be displayed and this value will be used to trigger the SP-3 threshold.

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
OFS-A	INPUT A OFFSET VALUE	0.0	... 0.0 ...
OFS-b	INPUT B OFFSET VALUE	0.0	... 0.0 ...





Enter menu 6 -SPt (SENSY access code = 7) and configure the parameters as shown in the table below.

The SENSY adjustments (factory setting) are such that a lifting system with a force transducer that supplies a 20 mA signal at nominal capacity (100%) operates in the following way:

- 110% limitation (relay SP1/SP2 opens)
- 110% sum limitation (SP3 opens)
- 15% hysteresis (after opening, SP1/SP2/SP3 close at 95 %)

The data that must be changed is written in bold letters.

DISPLAY	PARAMETER	SP1 (input A overload)		SP2 (input B overload)		SP3 (sum)	
		FACTORY SETTING	USER SETTING	FACTORY SETTING	USER SETTING	FACTORY SETTING	USER SETTING
ASN-n	SETPOINT ASSIGNMENT	A-Abs	A-Abs	B-Abs	B-Abs	Calc	Clac
Act - n	SETPOINT ACTION	<b>AU-HI</b>	<b>AU-HI</b>	<b>AU-HI</b>	<b>AU-HI</b>	<b>AU-HI</b>	<b>AU-HI</b>
SP -n	SETPOINT VALUE (main)	110%*	Input A overload value (1)	110.0%*	Input B overload value (1)	110.0%*	Summation (A + B) overload value (1)
HyS-n	SETPOINT HYSTERESIS	15.0%*	15%*(2)	15.0%*	15%*(2)	15.0%*	15%*(2)
tON-n	ON TIME DELAY	<b>0.1</b>	<b>0.1 (3)</b>	<b>0.1</b>	<b>0.1 (3)</b>	0.1	0.1 (3)
tOF-n	OFF TIME DELAY	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	0.0	0.0
out-n	OUTPUT LOGIC	<b>Rev</b>	<b>Rev</b>	<b>Rev</b>	<b>Rev</b>	<b>Rev</b>	<b>Rev</b>
rSt-n	RESET ACTION	<b>AUto</b>	<b>AUto</b>	<b>AUto</b>	<b>AUto</b>	<b>AUto</b>	<b>AUto</b>
Stb-n	STANDBY OPERATION	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Lit-n	SETPOINT ANNUNCIATORS	<b>Nor</b>	<b>Nor</b>	<b>Nor</b>	<b>Nor</b>	<b>Nor</b>	<b>Nor</b>

\* of the nominal capacity

- (1) Value at which lifting must be prohibited, according to the legislation in force and the bridge manufacturer's data.
- (2) The hysteresis value may be modified according to the operating conditions. SP1/SP2/SP3 open as soon as overloading is reached and only close when the load is less than the threshold value minus the hysteresis value.
- (3) tON (SP1/SP2/SP3 activation delay) may be modified if the action of lifting a load that is less than the limit load generates forces (dynamic movements of the load or the "yo-yo" effect- that are greater than those generated by the static limit load.

After configuring and validating the parameters of your CRANE-BOYDP, return to display mode (press the PAR key until END appears).

### 2.3. Correct operation test

The operating tests check that the different relays operate and that the wiring is correct, given that the load limiter must have priority over the commands from the lifting device to prevent any condition that would increase the overload.

In nominal operation, SP1, SP2, SP3 are displayed on the front panel.

#### 2.3.1. Verification of safety if one of the transducer wires breaks

**For correct verification:**

- Disconnect the green wire of force transducer 1 (signal +)      xxxxx on display A, SP1 and SP3 are off (lifting is impossible)
- Disconnect the green wire of force transducer 2 (signal +)      xxxxx on display B, SP2 and SP3 are off (lifting is impossible)
- Disconnect the brown wire of force transducer 1 (exc+)      xxxxx on display A, SP1 and SP3 are off (lifting is impossible)
- Disconnect the brown wire of force transducer 2 (exc+)      xxxxx on display B, SP2 and SP3 are off (lifting is impossible)

#### 2.3.2. Overload and load verifications

To verify the overload, first overload and check that the relays SP1, SP2 and SP3 open and that lifting is prohibited. You have to exceed the threshold of force transducer 1 (SP1 opens). Repeat this test again with the force transducer 2 (SP2 opens). And finally, by distributing the load on the two sensors (only SP3 opens).

For example, 60% of SP3 on sensor 1, 60% of SP3 on the sensor 2 and therefore 120% on SP3 that switches into safe mode.



Check that the displayed value and the load are the same.

### 2.3.3. Periodic verification

In compliance with the legislation in force, the lifting force limiter must be regularly checked during periodic inspections.

This inspection includes a functional test for the triggering limit and the correct condition of the sub-assembly, along with the connections and links. The inspection must be carried out when the equipment is commissioned then, unless indicated otherwise, at least once a year.

To check the operation of the overload triggering relays (SP1, SP2 and the summation SP3) and the display, two test buttons (\*) are fitted on the load limiter, which cuts the excitation of the force transducer.

The display offsets generated by those test buttons must be identical to the offsets that were obtained when the equipment was installed and noted on the calibration sheet.

(\*) Push-button in the OEM version: connect the special push-button supplied by SENSY to the positive (+) terminals of the excitation or power supply (brown transducer wire, as standard wire colour).

### 3. TROUBLESHOOT

<b>PROBLEM</b>	<b>REMEDIES</b>
NO DISPLAY	CHECK: Power level, power connections
PROGRAM LOCKED-OUT	CHECK: Active (lock-out) user input ENTER: Security code requested
MAX, MIN, TOT LOCKED-OUT	CHECK: Module 3 programming
INCORRECT INPUT DISPLAY VALUE	CHECK: Module 1A or 1B programming, position of the jumper for the input scale, input connections, input signal level, Module 4 Display Offset is zero, DSP is on Input Display PERFORM: Calibration (If the above does not correct the problem.)
"LOL" in DISPLAY (SIGNAL LOW)	CHECK: Module 1A or 1B programming, input connections, position of the jumper for the input scale, input signal level
"ULUL" in DISPLAY (SIGNAL HIGH)	CHECK: Module 1A or 1B programming, input connections, position of the jumper for the input scale, input signal level
JITTERY DISPLAY	INCREASE: Module 1A or 1B filtering, rounding, input scale CHECK: Wiring is per EMC installation guidelines
MODULES or PARAMETERS NOT ACCESSIBLE	CHECK: Corresponding plug-in card installation
ERROR CODE (Err -n)	PRESS: RST
Err -1	Internal hardware fault: A fault in the microprocessor and/or the input circuit has been detected. Return the CRANE-BOYDP for repair.
Err-2	Parameter list memory fault: One or more of set-up parameters has changed value due to possible electrical glitch or loss of power during parameter save operation (during "End" display). Verify all set-up parameters, exit parameter set-up mode and cycle the power to the CRANE-BOYDP to clear the error. If the error remains, return it for repair.
Err-3	Calibration memory fault: Verify calibration accuracy of the CRANE-BOYDP meter. If out of tolerance, re-calibrate it. Otherwise, to clear the error, enter and exit the parameter set-up mode and cycle the power to CRANE-BOYDP. If the error remains, return it for repair.
Err-4	Analogue output calibration memory fault: Verify calibration accuracy of analogy output. To clear the error, enter and exit the parameter set-up mode and cycle the power to the CRANE-BOYDP. If the error remains, replace the output card.
Err-5	Defective keypad: The CRANE-BOYDP has detected one of the keypad switches is defective. Inspect keypad for signs of damage or sticking keys. Cycle the power to the CRANE-BOYDP in order to clear the error. If the error remains, return it for repair.

For more information, contact SENSY's helpdesk.

### 4. EQUIPMENT REFERENCE AND OPTIONS

Supply voltage	- 85 to 250 VAC	Ref.: CRANE-BOYDP
	- 48 VAC	Ref.: CRANE-BOYDP+ option ALIM-48VAC
	- 24 VAC	Ref.: CRANE-BOYDP24
	- 10 to 30 VDC	Ref.: CRANE-BOYDP24
Supply voltage	- 85 to 250 VAC (OEM)	Ref.: DISP-BOYDP
	- 48 VAC (OEM)	Ref.: DISP -BOYDP+ option ALIM-48VAC
	- 24 VAC (OEM)	Ref.: DISP -BOYDP24
	- 10 to 30 VDC (OEM)	Ref.: DISP -BOYDP24
4-20 mA or 0-10 options V		Ref.: CARD CDL10
RS-232 options		Ref.: CDC20
RS-485 options		Ref.: CDC10
IP65 protective cover options		Ref.: COVER-PAX

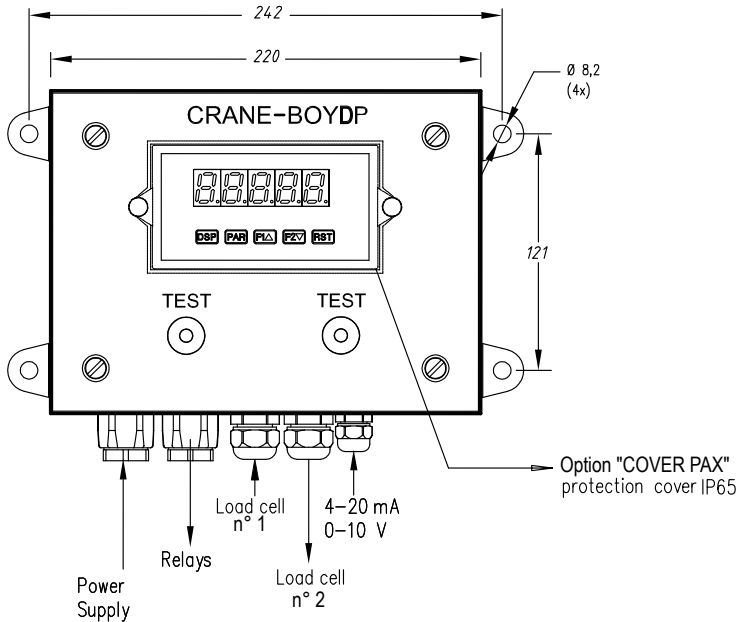
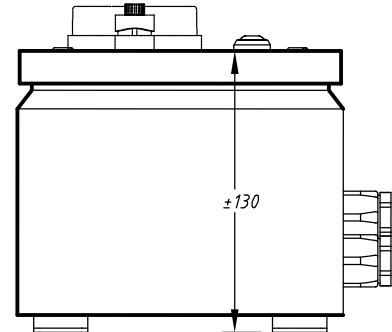
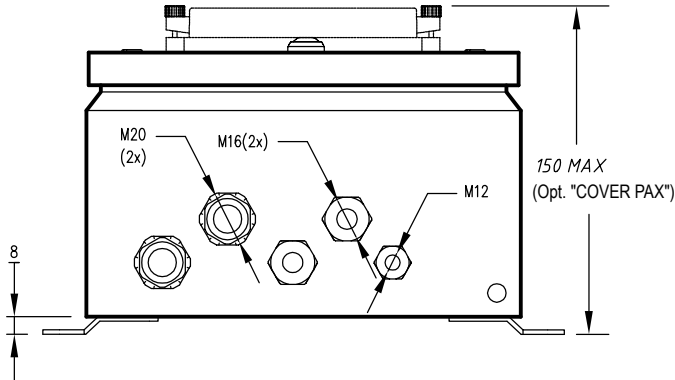
**5. SPECIFICATIONS**

Display	5 red LED digits 14,2mm (-19999 à 99999)			
AC Versions	85 to 250 VAC	50/60Hz		
		21VA		
	Isolation: 2300 Vrms for 1 min. to all inputs and outputs			
	Operating temperature: 0 to 50°C (45°C if 3 plug-in cards are installed)			
24 VAC	50/60 Hz	16 VA		
		Isolation: 500 Vrms for 1 min. to all inputs and outputs		
	Operating temperature: 0 to 50°C (45°C if 3 plug-in cards are installed)			
DC Version	11 to 36 VDC	13W	Operating temperature below 40°C if the power supply is below 15VDC and 3 plug-in cards are installed	
Analogue/digital converter	16bits resolution			
Load cells excitation	18VDC, 70mA max by inputs, +/-20%, not regulated Temperature coefficient: 20 ppm/°C max			
Custom linearization	Data point pairs	Selectable from 2 to 16		
	Display range	from -19999 to 99999		
	Decimal point	0 to 0.0000		
Memory	Non-volatile EEPROM retains all programmable parameters and display values.			
Certifications and compliances	<u>Electromagnetic immunity:</u>		<u>Conform to EN 61326</u>	
	Electrostatic discharge	EN 61000 - 4 - 2	Criterion A 4 kV contact discharge 8 kV air discharge	
	Electromagnetic RF fields	EN 61000 - 4 - 3	Criterion A 10 V/m	
	Fast transients (burst)	EN 61000 - 4 - 4	Criterion A 2 kV power 1 kV signal	
	Surge	EN 61000 - 4 - 5	Criterion A 1 kV L-L, 2 kV L&N-E power	
	Voltage dip/interruption	EN 61000 - 4 - 11	Criterion A 0.5 cycle	
	RF conducted interference	EN 61000 - 4 - 6	Criterion A 3 V/rms	
	<u>Electromagnetic emission:</u>		<u>Conform to EN 61326</u>	
	AC powered	EN 55011	Class B	
	DC powered	EN 55011	Class A	
<u>Notes:</u> Criterion A: Normal operation within specified limits. Criterion B: Temporary loss of performance from which the system self-recovers. For more information, refer to the EMC guide for ways of reducing the effects of EMC.				

Note:

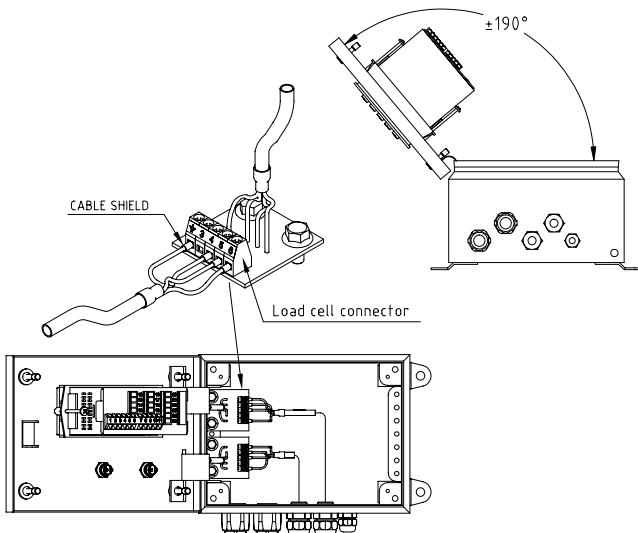
- In load limitation operation, always lock the device configuration with an access code (the access code set at the SENSY factory is "7").

CRANE-BOYDP > STANDARD DIMENSIONS

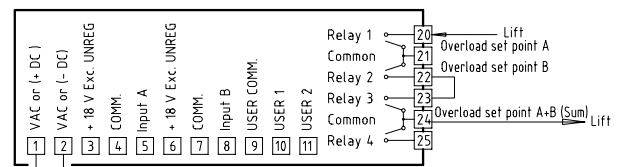


Dimensions in mm

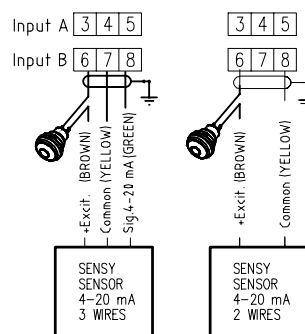
Other view



Terminals



POWER SUPPLY



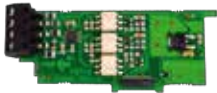
TEST BUTTON  
( NC Contact )



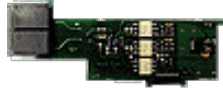
# OPTION CARDS

## Communication cards (max. 1 choice)

### CARD-CDC10

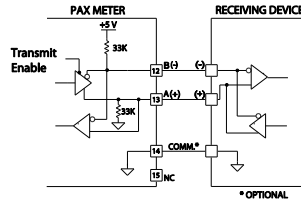


### CARD-CDC1C

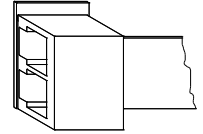
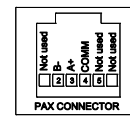


- RS-485 field bus communication interface  
Available with crew terminals or DB9 connector

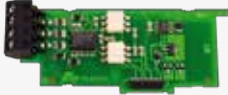
### CARD-CDC10



### CARD-CDC1C



### CARD-CDC20

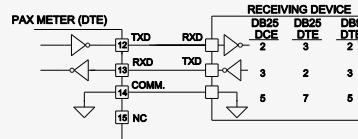


### CARD-CDC2C

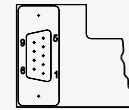


- RS-232 half-duplex communication interface  
Available with crew terminals or DB9 connector

### CARD-CDC20



### CARD-CDC2C



FEMALE  
PIN 2 TXD  
PIN 3 RXD  
PIN 5 COMMON

### CARD-CDC30



### CARD-CDC40



- DeviceNet communication interface
- Modbus communication interface

### CARD-CDC50 / CARD-CDC50-CRANE\*



- Profibus-DP (EN 50170) communication interface

\* As the CARD-CDC50 is too long for the housing of the CRANE-BOY, the CARD-CDC50-CRANE is supplied with a spacer to be inserted between the front of the electronics and the housing.

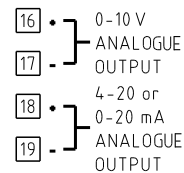
## Analogue output card

### CARD-CDL10



- Analogue output signal: 0-20 mA, 4-20 mA, 0-10 VDC

### CARD-CDL10



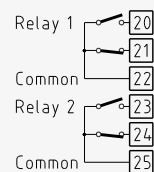
## Relay cards (max. 1 choice)

### CARD-CDS10 & CARD-CDS20

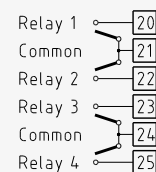


- 2 or 4 set-points activating each an independent relay

### CARD-CDS10



### CARD-CDS20



## Cards already included

- Analogue output card:  
**CARD-CDL10**

- Models:  
CABIN-2xB1SUMD; CABIN-4xB1SUMD

- Relay card:  
**CARD-CDS20 (4 set-points)**

- Models:  
INDI-BOY DISP-BOYP; CRANE-BOY CRANE-BOYP; DISP-BOYDP  
CRANE-BOYDP; CRANE-SUMD DISP-SUMD; CRANE-BOY-Exd;  
CABIN-2xB1SUMD; CABIN-4xB1SUMD.