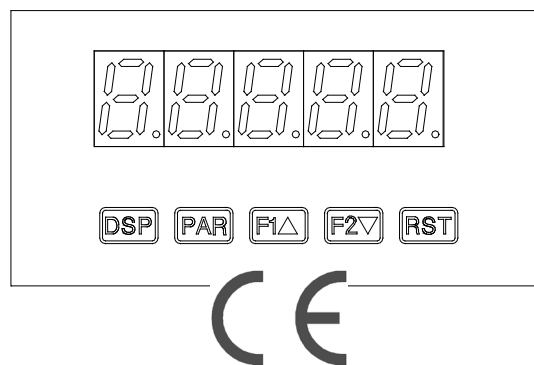


# CRANE-BOYP INDICATOR LIMITER

OEM version name: DISP-BOYP



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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-BOY electronic load system. The information in this manual is applicable for both CRANE-BOYP and DISP-BOYP. CRANE-BOYP is a DISP-BOYP mounted in an IP65 enclosure.

### 1.1. Introduction

The CRANE-BOYP is an electronic system with a digital display and some configurable threshold-based triggers. It has been modified, tested and qualified by SENSY S.A. to provide for a safe lifting operation.

CRANE-BOYP has a monitoring circuit to warn the crane operator of a possible break in measuring wires. Therefore, it is a self-monitoring device. In the case of a broken wire, a power cut or a short-circuit in either the supply cable and/or the transducer measuring cable, the device instantly switches into a positive safety mode.

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

### 1.2. Principle

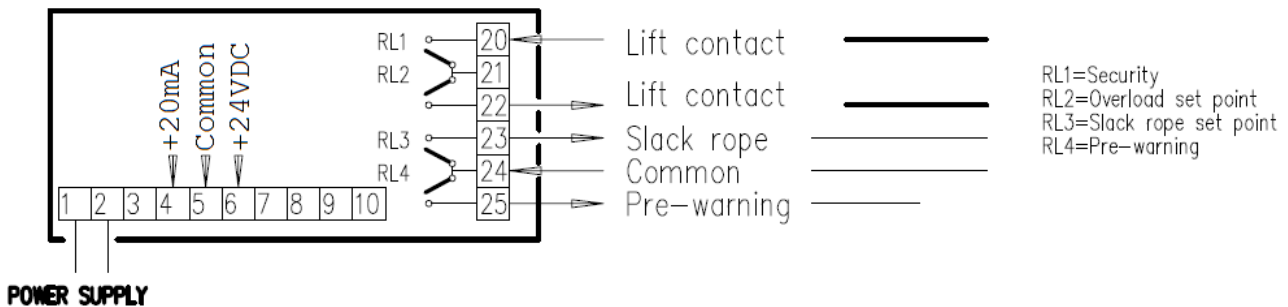
The CRANE-BOYP is fitted with a 4-relay board that must be used according to the wiring diagram described below. The relays are in the "open" position when the power is shut off (de-energised).

When the CRANE-BOYP 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 (measurement and transducer power supply safety)**
- **SP2 (overload threshold)**
- **SP3 (cable slack threshold or intermediate threshold)**
- **SP4 (optional threshold)**



## 2. INSTALLATION AND ADJUSTMENTS

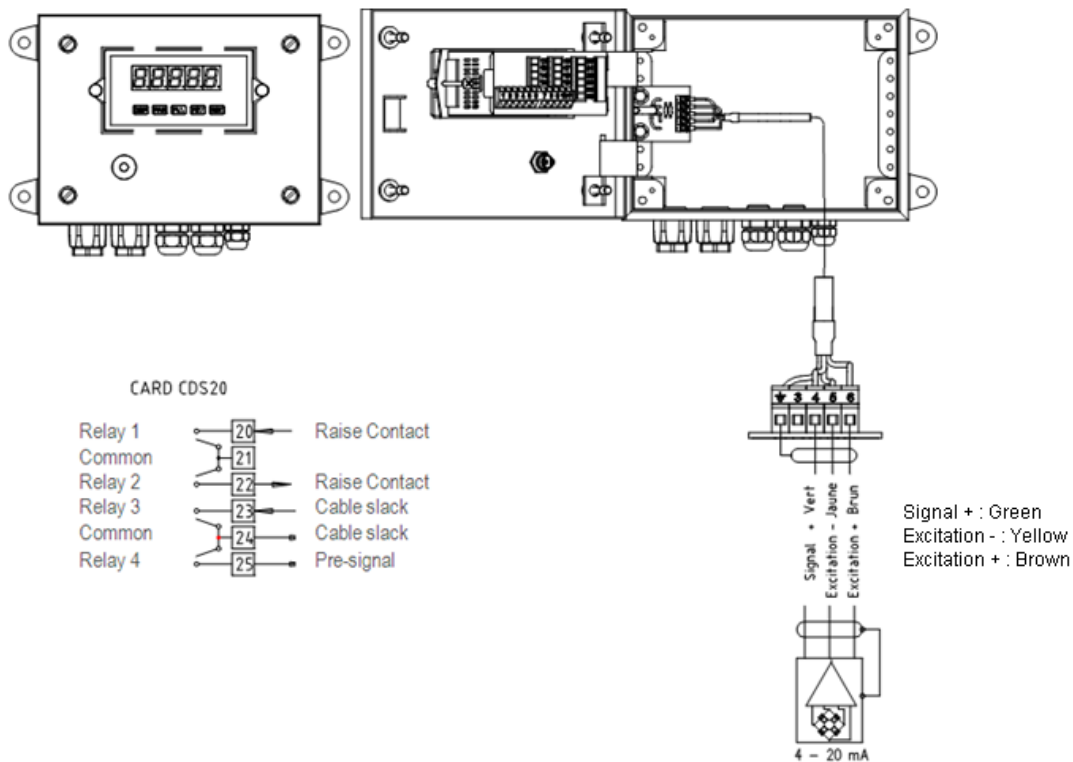
The CRANE-BOYP is connected and adjusted in compliance with the information contained in this manual.

To move in the CRANE-BOYP'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 the F1 and F2 keys 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 of "7", then press the PAR key. No Pro will then appear. You can move from one menu to another with using the F1 and F2 keys.

### 2.1. Specific CRANE-BOYP 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 contained in menus 1 and 6.

Calibration is carried out in 2 steps:

- 1° display configuration
- 2° threshold configuration

The CRANE-BOYP programming menu can be accessed via the PAR key. This is organised into function modules 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 authorised in any circumstance.***

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

To configure the display, you must have a known load of at least 70% of capacity of the transducer's Wheatstone bridge or its overload capacity. Turn the system "on" approximately 15 minutes before starting any adjustment. If possible, load the system several times to stabilise it mechanically.

Enter menu 1 -INP (SENSY access code =7) and carry out the following operations, use PAR to move to the next parameter:

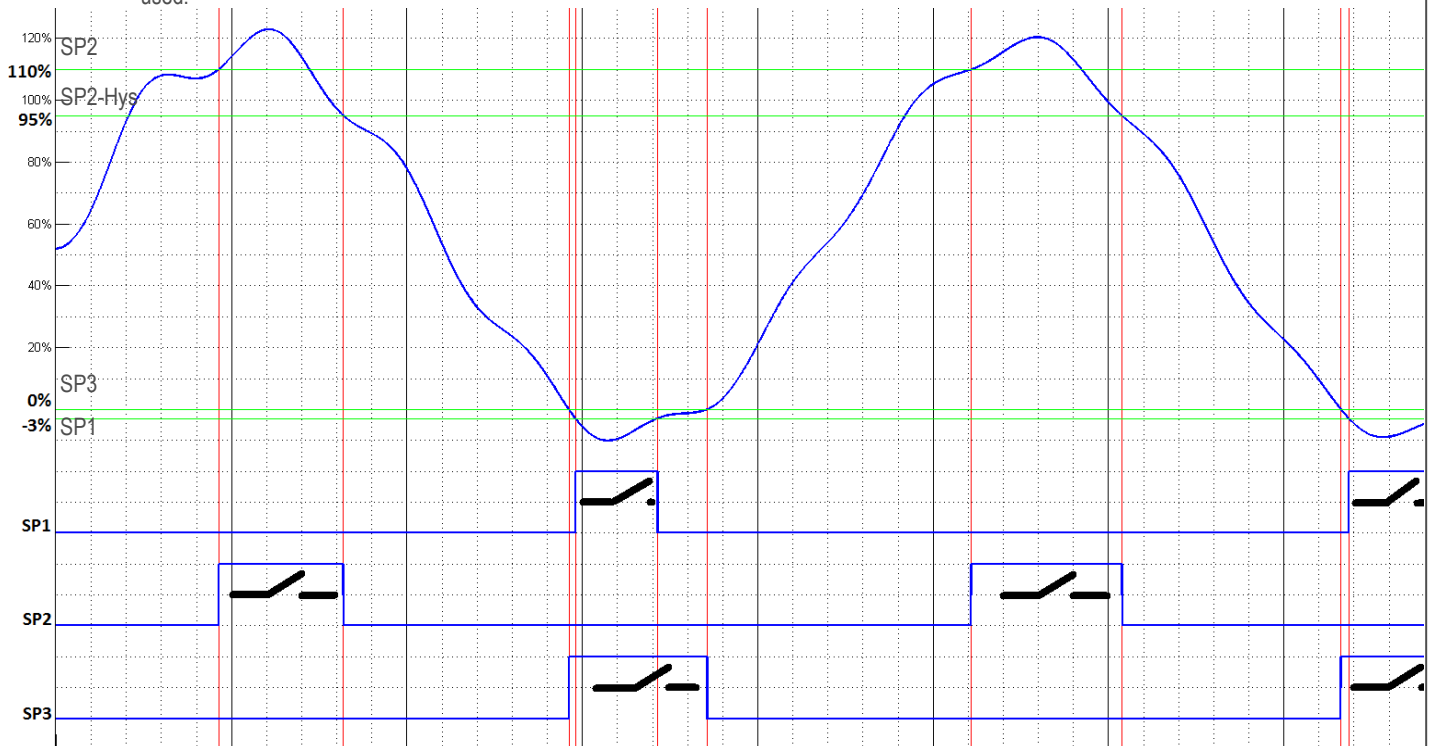
DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
rANGE	INPUT RANGE	0.02A	. . . 0.02 A . . .
dECPT	DISPLAY RESOLUTION	0.0	. . . . .
round	DISPLAY ROUNDING INCREMENT	0.1	. . . . .
FILtr	FILTER SETTING	1.0	. . . 1.0 . . .
bANd	FILTER ENABLE BAND	5.0	. . . 5.0 . . .
Pts	SCALING POINTS	2	. . . 2 . . .
StyLE	SCALING STYLE Select "APPLY" and remove all loads of the crane (in apply mode, the CRANE-BOYP measure the signal of the load cell)	KEY	. . . APPLY. . .
INP 1	INPUT VALUE 1	4.000	<i>Reading of the zero</i>
dSP 1	DISPLAY VALUE 1 Set to "0", the value to display when the crane is without a load (unloaded) by using the F1 and F2 keys, and validate with the PAR key.	0.0	<b>0</b>
INP 2	INPUT VALUE 2 Load the crane with a known load and validate with the PAR key.	20.000	<i>Reading of the signal under load</i>
dSP 2	DISPLAY VALUE 2 Set to the value to display for the known load and validate with the PAR key (quit programming mode and return to display mode)	100.0	<b>Value of the load</b>

- For each adjustment, INP2 > INP1 and DSP2 > DSP1. If this is not the case, check the mounting direction of the force transducer.
- A safe lifting operation is only ensured if the above condition has been satisfied.
- After configuring and validating the parameters of your CRANE-BOYP, return to 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.**
- The details of every parameter are available in the PAXS user guide.

2.2.2. 2° Configuration of the triggering thresholds (set points).

The adjustments in this section are independent of the load being lifted at the time of the adjustment.

- SP1 is reserved for safety in case either the yellow or brown wire breaks.
- SP2 has to be reserved for load limitation: its SP-2 and HYS-2 values will eventually be readjusted to the characteristics of the transducer's Wheatstone bridge, if this was not carried out at SENSY's factory.
- SP3 is factory-set to be used for cable slack: its SP-3 and HYS-3 values will eventually be readjusted to the characteristics of the bridge, if this was not carried out at SENSY's factory.
- SP4 is available to activate a function other than load limitation (but this relay is not protected against a broken wire). By default, this is not used.



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 supplying a 1 mV/V signal at nominal capacity (100%) operates in the following way:

- 110% limitation (relay SP2 opens)
- 15% hysteresis (after opening, SP2 closes at 95 %)
- 0% cable slack (SP3 opens)
- 0,1 hysteresis (after opening, SP3 closes at +0,1)

**The data that must not be changed is written in bold letters**

DISPLAY	PARAMETER	SP1 (safety)		SP2 (overload)		SP3 (slack cable)	
		FACTORY SETTING	USER SETTING	FACTORY SETTING	USER SETTING	FACTORY SETTING	USER SETTING
Act - n	SETPOINT ACTION	<b>Ab-LO</b>	<b>Ab-LO</b>	<b>AU-HI</b>	<b>AU-HI</b>	<b>Ab-HI</b>	<b>Ab-HI</b>
SP -n	SETPOINT VALUE (main)	<b>-3.0%*</b>	Value for a loose wire (1)	<b>110.0%*</b>	Value for an overload (2)	<b>0</b>	Value for a slack cable (5)
Hys-n	SETPOINT	<b>0.1%*</b>	0.1	<b>15.0%*</b>	<b>15%* (3)</b>	<b>0.1</b>	0.1

	HYSTERESIS						
tON-n	ON TIME DELAY	0.0	0.0	0.1	0.1 (4)	0.0	0.0
tOF-n	OFF TIME DELAY	0.0	0.0	0.0	0.0	0.0	0.0
out-n	OUTPUT LOGIC	Rev	Rev	Rev	Rev	Nor	Rev
rSt-n	RESET ACTION	AUto	AUto	AUto	AUto	AUto	AUto
Stb-n	STANDBY OPERATION	No	No	No	No	No	No
Lit-n	SETPOINT ANNUNCIATORS	Nor	Nor	Nor	Nor	Nor	Nor

\* of the nominal capacity

- (1) Sufficiently low value to detect a loose wire, by default, -3% of the nominal capacity.
- (2) Value at which lifting must be prohibited, according to the legislation in force and the bridge manufacturer's data.
- (3) The hysteresis value may be modified according to the operating conditions. The SP2 activation relay opens as soon as overloading is reached and only closes when the load is less than the threshold value minus the hysteresis value.
- (4) tON (SP2 activation delay) may be modified if the dynamic effects generated by lifting a load that is less than the limit load generate forces (dynamic movements of the load or the "yo-yo" effect) that are greater than those generated by the static limit load.
- (5) Load below which lowering must be prohibited (the SP3 relay opens)

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

### 2.3. Correct operation test

The operating test checks that the different relays work 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 and 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 (+ output) -xxxxx must be seen on the display, SP1 and SP3 is off (raising and lowering loads is impossible)
- Disconnect the brown wire (+ excitation) -xxxxx must be seen on the display, SP1 and SP3 are off (raising and lowering loads is impossible)

### 2.3.2. Overload, cable slack and load verifications

To verify the overload, check that the SP2 relay opens and that lifting is prohibited.  
Check that the SP3 relay opens in a slack cable situation and that lowering is prohibited.  
Check that the values displayed match the actual values of the loads being handled.

### 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 electrical connections and links. The inspection must be carried out when the equipment is commissioned, unless indicated otherwise, at least once a year.  
To check the operation of the SP2 overload triggering relay and the display, a test button (\*) is fitted on the load limiter, which destabilises the signal from the force transducer and simulates an overload.  
The display offset generated by this test button must be identical to the offset that was 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 between the signal + and power supply + terminals (green and brown transducer wires, respectively as standard wire colours).

### 2.3.4. Peak values registration

Pushing on DSP key will allow you to visualise MIN and MAX values the system has recorded while in operation since the last maintenance check. In this case, the red LEDs MAX or MIN are "ON" (on the left-hand side of the control panel).

During normal operation (load indication), these LEDs on the left-hand side of the front panel should be "off".

CAUTION: using these MIN and MAX values only make sense if you have reset the recorded values by using the F1 key after the first operation tests and after any subsequent overload simulation by means of the test button!

### 3. TROUBLESHOOT

<b>PROBLEMS</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 1 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.)
“OLOL” in DISPLAY (SIGNAL LOW)	CHECK: Module 1 programming, input connections, position of the jumper for the input scale, input signal level
“ULUL” in DISPLAY (SIGNAL HIGH)	CHECK: Module 1 programming, input connections, position of the jumper for the input scale, input signal level
JITTERY DISPLAY	INCREASE: Module 1 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-BOYP 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 power the meter to clear error. If error remains, return CRANE-BOYP for repair.
Err-3	Calibration memory fault: Verify calibration accuracy of the CRANE-BOYP 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-BOYP. If 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-BOYP. If the error remains, replace the output card.
Err-5	Defective keypad: The CRANE-BOYP has detected one of the keypad switches is defective. Inspect keypad for signs of damage or sticking keys. Cycle the power to the CRANE-BOYP to clear the error. If error remains, return it for repair.

For more information, contact SENSY’s helpdesk.

### 4. EQUIPMENT REFERENCE AND OPTIONS

Supply voltage	- 85 to 250VAC	Ref.: CRANE-BOYP
	- 48 VAC	Ref.: CRANE-BOYP+ option ALIM-48VAC
	- 24 VAC	Ref.: CRANE-BOYP24
	- 10 to 30VDC	Ref.: CRANE-BOYP24
Supply voltage	- 85 to 250VAC (OEM)	Ref.: INDI-BOYP
	- 48 VAC (OEM)	Ref.: INDI-BOYP+ option ALIM-48VAC
	- 24 VAC (OEM)	Ref.: INDI-BOYP24
	- 10 to 30VDC (OEM)	Ref.: INDI-BOYP24
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



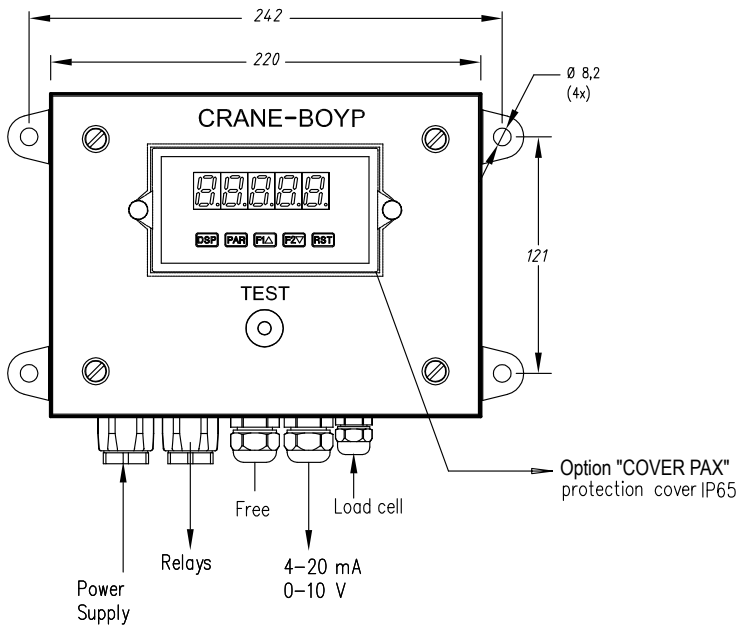
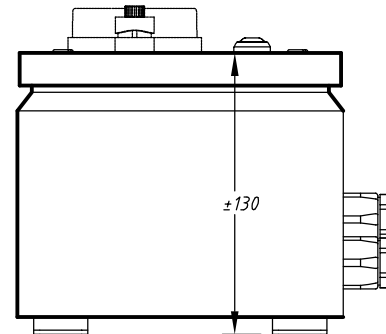
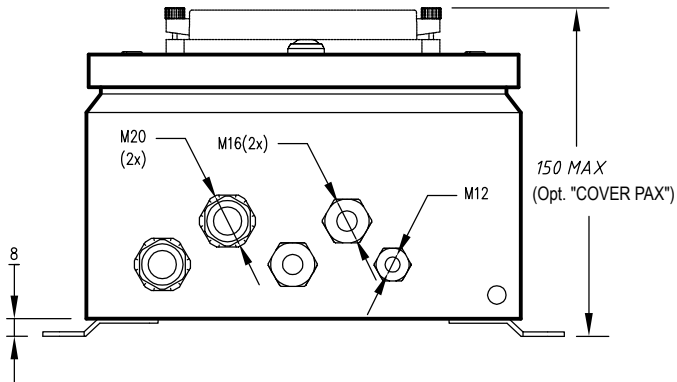
## 5. SPECIFICATIONS

Display	5 red LED digits 14.2 mm (-19999 à 99999)		
AC Versions	85 to 250 VAC	50/60 Hz	
		15 VA	
		Isolation: 2300 Vrms for 1 min. to all inputs and outputs	
	24 VAC	50/60 Hz	
		15 VA	
		Isolation: 500 Vrms for 1 min. to all inputs and outputs	
DC Version	11 to 36 VDC	11 W	
		Operating temperature below 40°C if the power supply is below 15VDC and 3 plug-in cards are installed	
Analog/digital converter	16 bits resolution		
Bridge excitation	Jumper selectable	5 VDC, 65 mA max, +/-2%	
		10 VDC, 125 mA max, +/-2%	
	Temperature coefficient (ratio metric): 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	Nonvolatile EEPROM retains all programmable parameters and display values.		
Certifications and compliances	<u>Electromagnetic immunity:</u> Electrostatic discharge Electromagnetic RF fields Fast transients (burst)	<u>Conform to EN 50082-2</u>	
		EN 61000 - 4 - 2	Level 3: 8 kV air
		EN 61000 - 4 - 3	Level 3: 10 V/m 80 MHz to 1GHz
		EN 61000 - 4 - 4	Level 3: 2 kV power
			Level 4: 2 kV (I/O)
	RF conducted interference	EN 61000 - 4 - 6	Level 3: 10 Vrms de 150 kHz - 80 Mhz
	<u>Electromagnetic emission:</u> RF interference	<u>Conform to EN 50081 -2</u>	
		EN 55011	Enclosure class A
			Power mains class A
	<p><i>Notes: Self-recoverable loss of performance during EMI disturbance at 10 V/m: measurement error exceeds unit specifications. For operation without loss of performance:</i></p> <ul style="list-style-type: none"> <li>- mount unit in a metal enclosure (Buckeye SM7013-0 or equivalent)</li> <li>- route power and I/O cables in a metal conduit connected to the ground (earth).</li> </ul> <p><i>For more information, refer to the EMC guide for ways of reducing the effects of EMC.</i></p>		

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

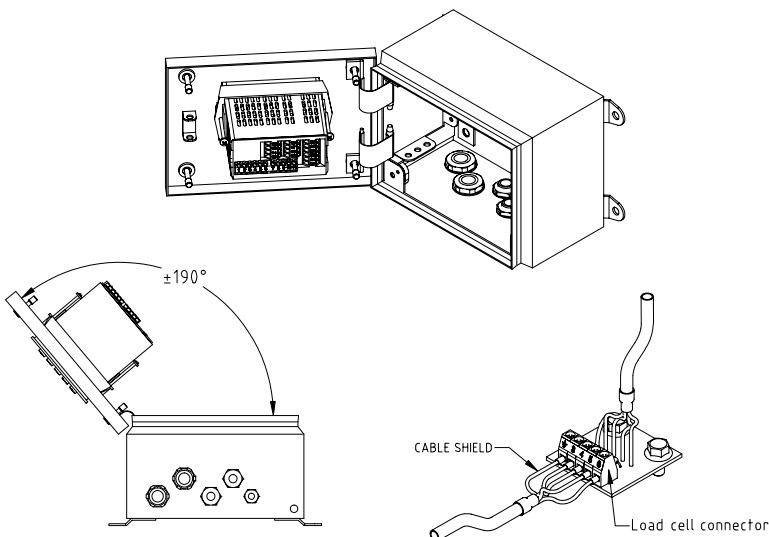
## 6. DRAWINGS

CRANE-BOYP > STANDARD DIMENSIONS

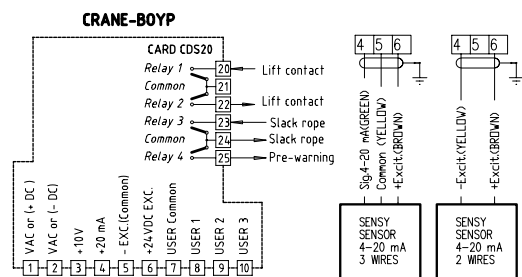


Dimensions in mm

Other views



Terminals



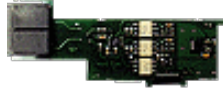
# OPTION CARDS

## Communication cards (max. 1 choice)

### CARD-CDC10

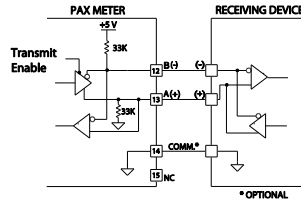


### CARD-CDC1C

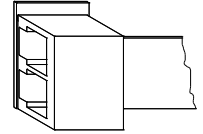
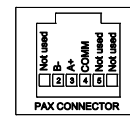


- RS-485 field bus communication interface  
Available with crew terminals or DB9 connector

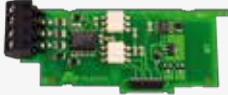
### CARD-CDC10



### CARD-CDC1C



### CARD-CDC20

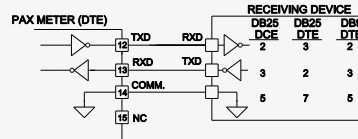


### CARD-CDC2C

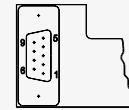


- RS-232 half-duplex communication interface  
Available with crew terminals or DB9 connector

### 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.

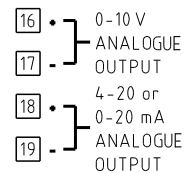
## Analogue output card

### CARD-CDL10



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

### CARD-CDL10



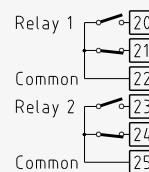
## Relay cards (max. 1 choice)

### CARD-CDS10 & CARD-CDS20

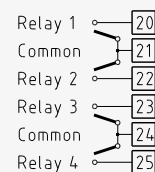


- 2 or 4 set-points activating each an independent relay

### CARD-CDS10



### CARD-CDS20



## Cards already included

- Analogue output card:

### CARD-CDL10

- Relay card:

### CARD-CDS20 (4 set-points)

- Models:

CABIN-2xB1SUMD; CABIN-4xB1SUMD

- Models:

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