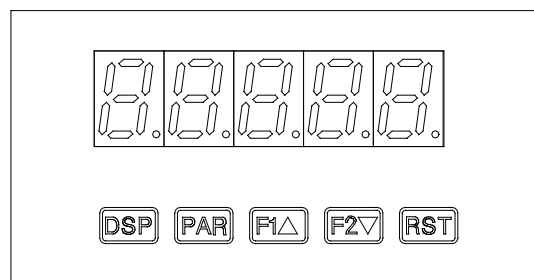


# CRANE-BOY INDICATOR LIMITER

OEM version name: INDI-BOY



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

### 1.1. Introduction

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

CRANE-BOY has a monitoring circuit to warn the crane operator of a possible break in the 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 in 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

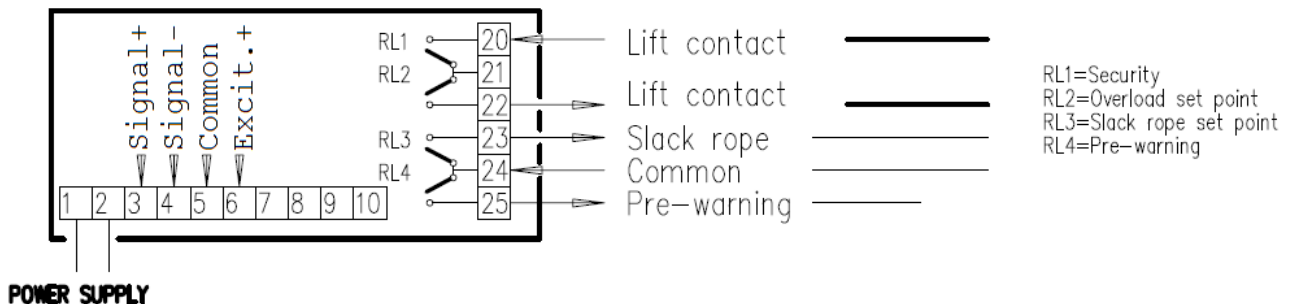
The CRANE-BOY is fitted with a 4-relay board that must be used according to the wiring diagram described below.

The relays are in the "open" position when the power is shut off (de-energised). When the CRANE-BOY is turned "on" and the applied load is within the safe operating range, the relays are activated in the "closed" position (SP1-SP2-SP3-SP4 are displayed in the front panel).

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

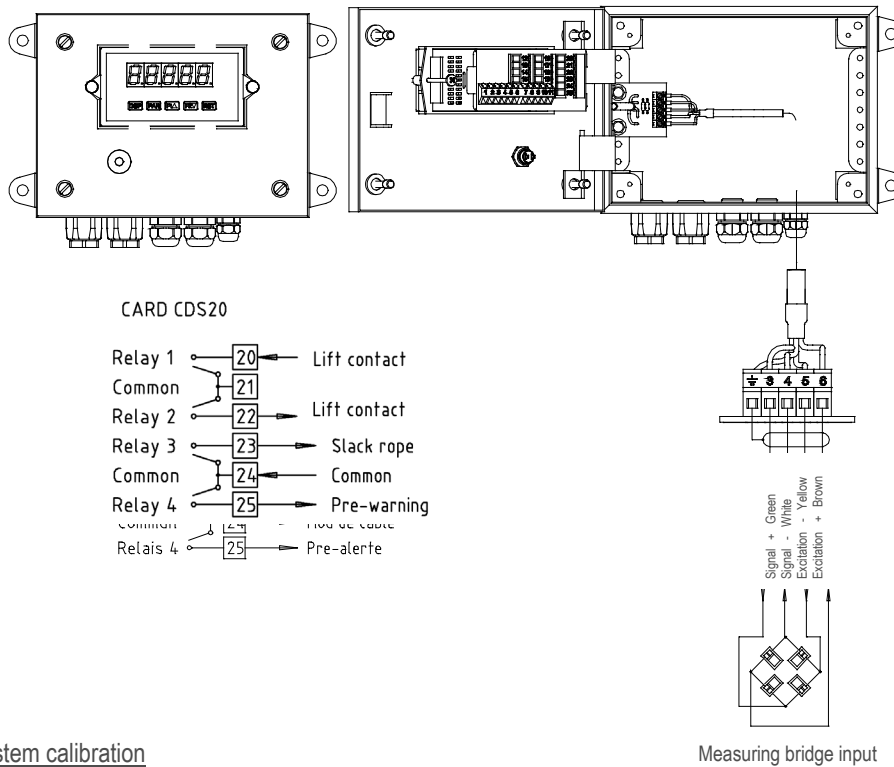
The CRANE-BOY is connected and adjusted in compliance with the information contained in this manual.

To move around and through the CRANE-BOY's menus, use the buttons or keys on the front panel of the display.

- The PAR key to accept, confirm or enter.
- The F1 and F2 keys to go up/down and increase/decrease.
- The RST key, in combination with 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" and "Pro" will then appear. You can move from one menu to another using the F1 and F2 keys.

### 2.1. Specific CRANE-BOY 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 appearing in menus 1 and 6.

Calibration is carried out in 2 steps:

- 1° display configuration
- 2° threshold configuration

The CRANE BOY programming menu can be accessed via the PAR key. This is organised 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 authorised in any circumstance.**

#### 2.2.1. 1° Configuring the display and commissioning the limiter

To configure the display, you must have a known load of at least 70% of the 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 (using SENSY access code = "7") and carry out the following operations, using the PAR key to move on to the next parameter:

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
rANGE	INPUT RANGE	0.02u	. . . . 0.02. . . . .
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 from the crane (in apply mode, the CRANE-BOY measures the signal of the load cell).	KEY	. . . APPLY. . .
INP 1	INPUT VALUE 1	1300	<i>Reading at zero (no load)</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.	11300	<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>

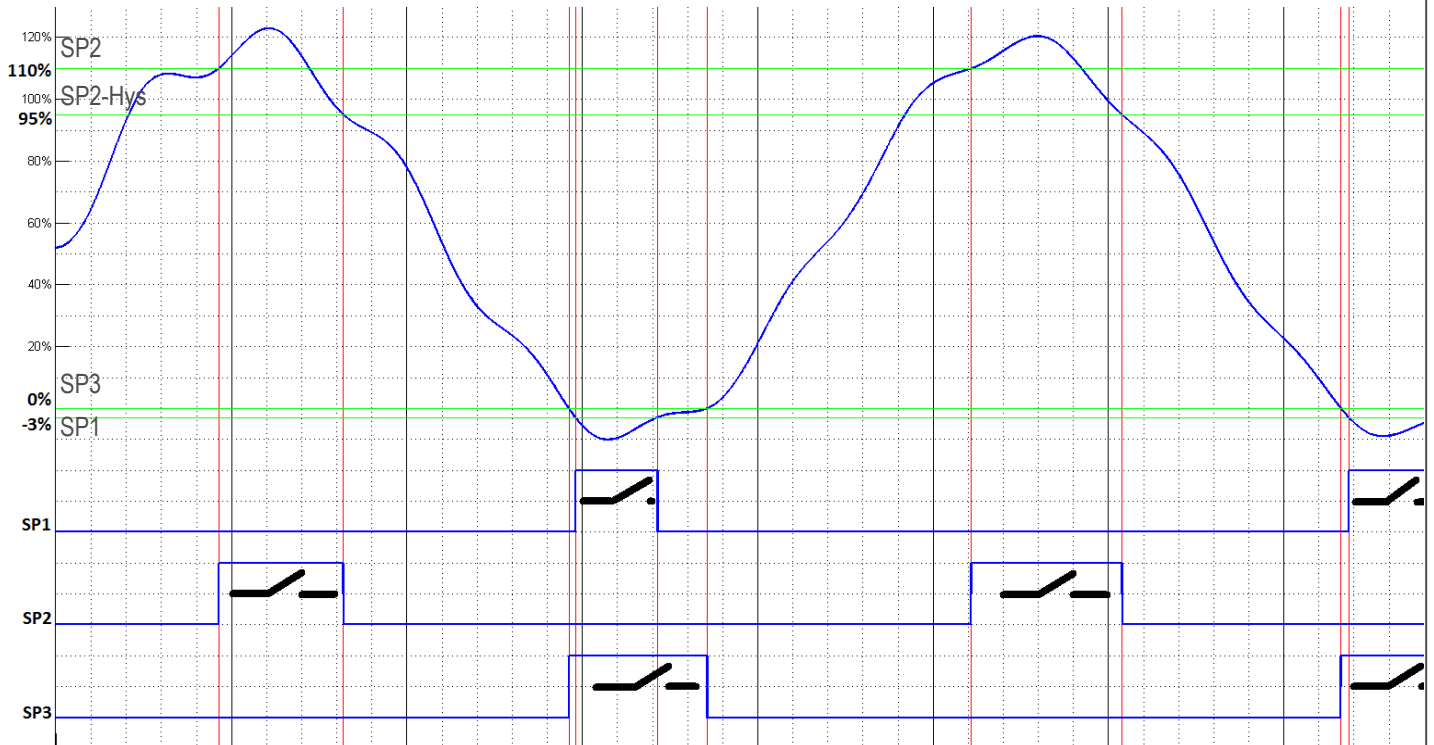
Notes:

- 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-BOY, 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 lifted at the time of adjustment.

- SP1 is reserved for safety in case either the yellow or brown wire breaks.
- SP2 must 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 transducer's Wheatstone 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 -SP1" (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 (security)		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 HYSTERESIS	<b>0.1%*</b>	0.1	<b>15.0%*</b>	15%* (3)	<b>0.1</b>	0.1
tON-n	ON TIME DELAY	<b>0.0</b>	<b>0,0</b>	0.1	0.1 (4)	0.0	0.0
tOF-n	OFF TIME DELAY	<b>0.0</b>	<b>0.0</b>	0.0	0.0	<b>0.0</b>	<b>0.0</b>
out-n	OUTPUT LOGIC	<b>Rev</b>	<b>Rev</b>	<b>Rev</b>	<b>Rev</b>	<b>Nor</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) 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 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.

(5) Load below which lowering must be prohibited (the SP3 relay opens).

After configuring and validating the parameters of your CRANE-BOY, 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 take 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) OLOL must be seen on the display and the SP2 overload relay is off (lifting is impossible)
- Disconnect the white wire (- output) OLOL must be seen on the display and the SP2 overload relay is off (lifting is impossible)
- Disconnect the brown wire (+ excitation) -xxxx must be seen on the display and the SP1 and SP3 relays are off (raising and lowering loads are impossible)
- Disconnect the yellow wire (- excitation) -xxxx must be seen on the display and the SP1 and SP3 relays are off (raising and lowering are impossible)

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

To verify the overload, first overload and then 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 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 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 recorded 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 the DSP key will allow you to visualise the 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), those 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!



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### **3. TROUBLESHOOTING**

<b>PROBLEMS</b>	<b>REMEDIES</b>
NO DISPLAY	CHECK: Power level, power connections
PROGRAM LOCKED-OUT	CHECK: Active (lock-out) user input  ENTER: Security access 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 of the microprocessor and/or the input circuit has been detected. Return the CRANE-BOY 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 the error remains, return meter for repair.
Err-3	Calibration memory fault: Verify calibration accuracy of meter. If out of tolerance, re-calibrate the meter. Otherwise, to clear error, enter and exit parameter set-up mode and cycle power to meter. If the error remains, return meter for repair.
Err-4	Analogue output calibration memory fault: Verify calibration accuracy of analogue output. To clear error, enter and exit parameter set-up mode and cycle power to meter. If the error remains, replace output card.
Err-5	Defective keypad: The meter has detected one of the keypad switches is defective. Inspect keypad for signs of damage or sticking. Cycle power to meter to clear error. If the error remains, return meter for repair.

For more information, contact SENSY's helpdesk.

### **4. EQUIPMENT REFERENCE AND OPTIONS**

Supply voltage	- 85 to 250 VAC	Ref.: CRANE-BOY
	- 48 VAC	Ref.: CRANE-BOY+ option ALIM-48VAC
	- 24 VAC	Ref.: CRANE-BOY24
	- 10 to 30 VDC	Ref.: CRANE-BOY24
Supply voltage	- 85 to 250 VAC (OEM)	Ref.: DISP-BOY
	- 48 VAC (OEM)	Ref.: DISP-BOY+ option ALIM-48 VAC
	- 24 VAC (OEM)	Ref.: DISP-BOY24
	- 10 to 30 VDC (OEM)	Ref.: DISP-BOY24
4-20 mA or 0-10 V Options		Ref.: CARD-CDL-10
RS-232 options		Ref.: CARD-CDC-20
RS-485 options		Ref.: CARD-CDC-10

IP65 protective cover options

Ref.: COVER-PAX

**5. SPECIFICATIONS**

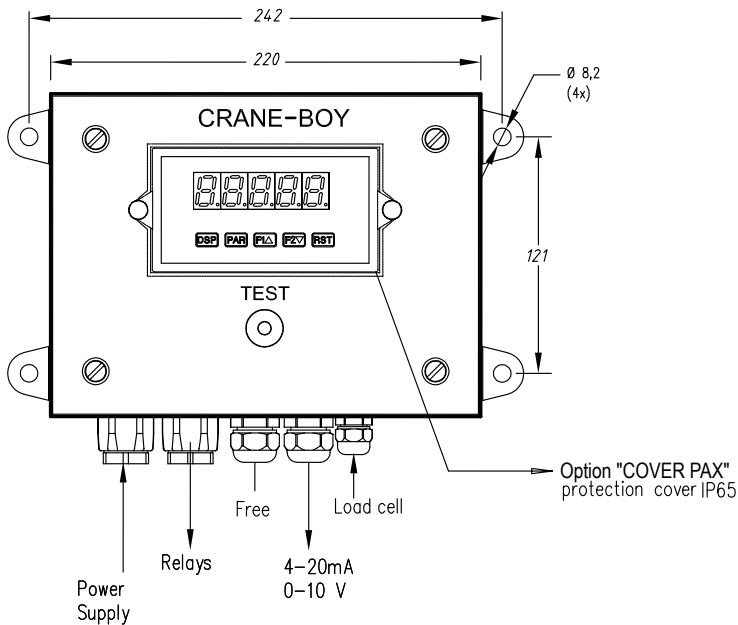
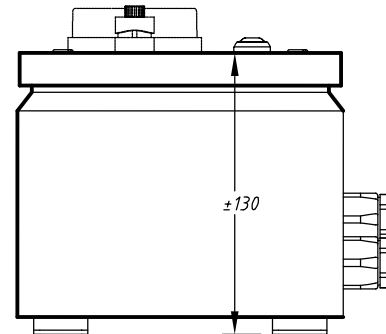
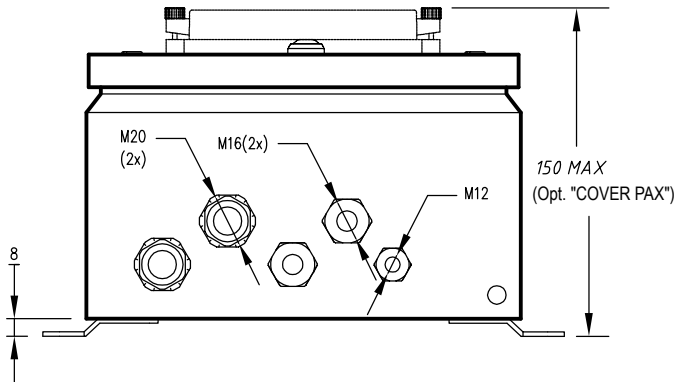
Display	5 red LED digits 14.2 mm (-19999 à 99999)	
AC Versions	85 to 250 VAC	50/60 Hz
		15 VA
	Isolation : 2300 Vrms for 1 min. to all inputs and outputs	
	Operating temperature : 0 to 50°C (45°C if 3 plug-in cards are installed)	
24 VAC	50/60 Hz	15 VA
		Isolation: 500 Vrms for 1 min. to all inputs and outputs
	Operating temperature: 0 to 50°C (45°C if 3 plug-in cards are installed)	
	Operating temperature below 40°C if the power supply is below 15 VDC and 3 plug-in cards are installed	
DC Version	11 to 36 VDC	11 W
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	EN 61000 - 4 - 2
	Electromagnetic RF fields	EN 61000 - 4 - 3
	Fast transients (burst)	EN 61000 - 4 - 4
	RF conducted interference	EN 61000 - 4 - 6
	<u>Electromagnetic emission:</u>	
	RF interference	EN 55011
	Conform to EN 50082-2	
	Level 3: 8 kV air	
	Level 3: 10 V/m 80 MHz to 1GHz	
Level 3: 2 kV power		
Level 4: 2 kV (I/O)		
Level 3: 10 Vrms de 150 kHz - 80 Mhz		
<p><i>Notes: Self-recoverable loss of performance during electromagnetic interference (EMI) 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 sheet-metal enclosure (Buckeye SM7013-0 or equivalent)</li> <li>- route power and I/O cables in metal conduit connected to earth ground.</li> </ul> <p><i>For more information, refer to guide treatment against 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**

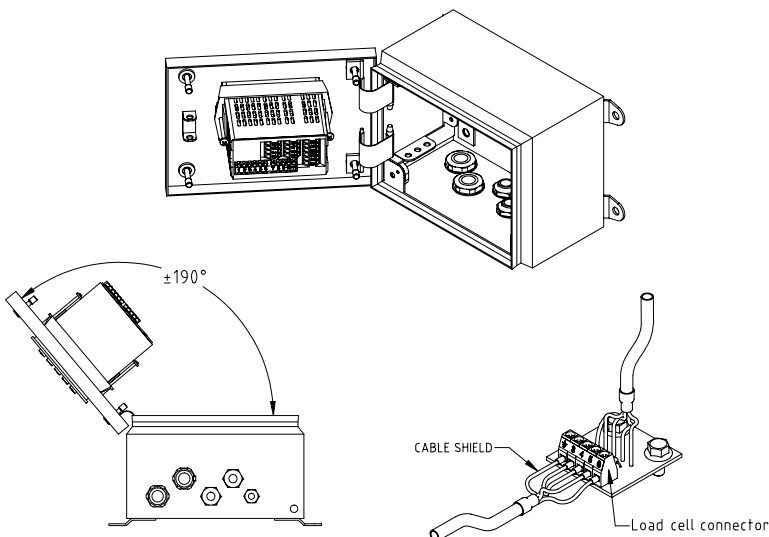


CRANE-BOY > STANDARD DIMENSIONS

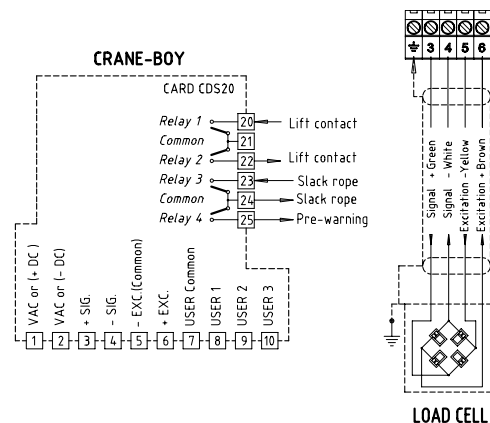


Dimensions in mm

Other views



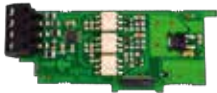
Terminals



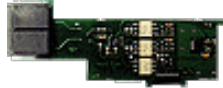
# OPTION CARDS

## Communication cards (max. 1 choice)

### CARD-CDC10

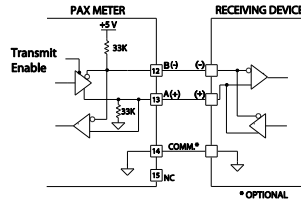


### CARD-CDC1C

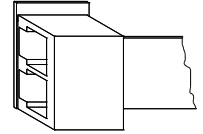
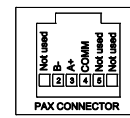


- RS-485 field bus communication interface  
Available with crew terminals or DB9 connector

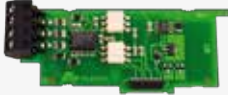
### CARD-CDC10



### CARD-CDC1C



### CARD-CDC20

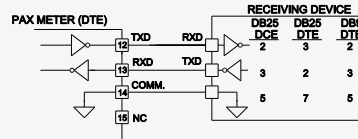


### CARD-CDC2C

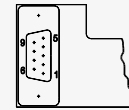


- RS-232 half-duplex communication interface  
Available with crew terminals or DB9 connector

### 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.

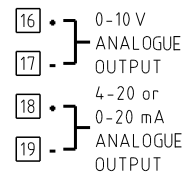
## Analogue output card

### CARD-CDL10



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

### CARD-CDL10



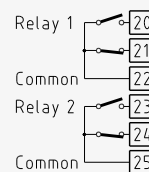
## Relay cards (max. 1 choice)

### CARD-CDS10 & CARD-CDS20

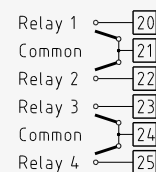


- 2 or 4 set-points activating each an independent relay

### CARD-CDS10



### CARD-CDS20



## Cards already included

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

- 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**.