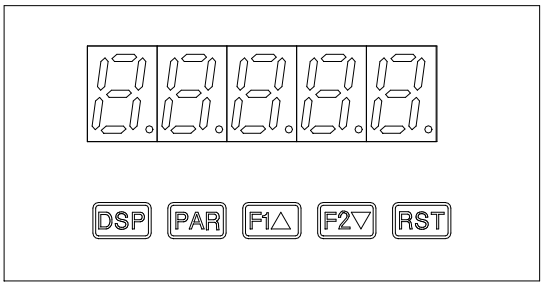
CRANE-SUMD LOAD SUMMATION AND LIMITER

Name of OEM version: DISP-SUMD



This indicator is only authorised for use on hoist systems in compliance with the legislation in force and provided that these instructions are read carefully and strictly followed.

1. GENERAL

These instructions describe the procedure to follow in installing and setting the electronics for the CRANE-SUMD load summation and limitation device.

1.1. Introduction

The CRANE-SUMD is an electronic device designed for load limitation on the sum of a number of 0-20 mA signals from upstream load limiters with 0-20 mA output. The system has a digital display and configurable set points. The product has been modified, tested and certified by SENSY S.A. to operate as a safety mechanism for lifting equipment.

The CRANE-SUMD is a self-monitoring device. In the event of a break, cut or short circuit in the power supply and/or measure cable, the device switches instantly to positive safe mode.

An option is available to incorporate a 4-20 mA and 0-10 V output and a RS-232C or RS-485 communication system to transmit the value shown to a large display or an automated device.

1.2. Principle

The CRANE-SUMD is equipped with a card with 4 relays which must be used in accordance with the wiring system described below. When no voltage is supplied, the relays are in the “open” position.

When a voltage is supplied to the CRANE-SUMD and the load applied is within the operating range, the relays are activated in the “closed” position.

When operating within the nominal range, therefore, the relays are closed ((SP1-SP2-SP3-SP4) are displayed on the front).

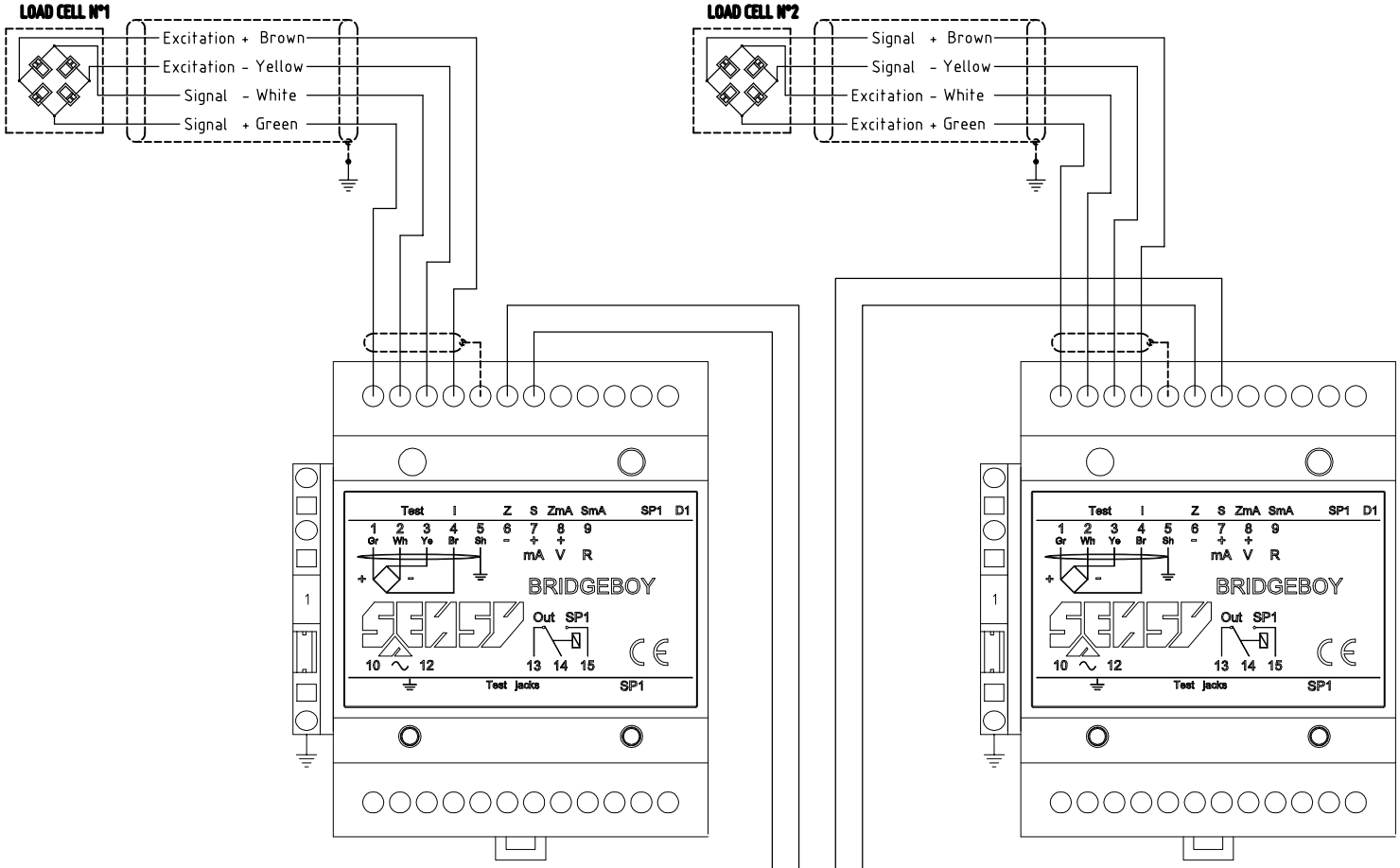
The correct assignment of the relays must be strictly observed:

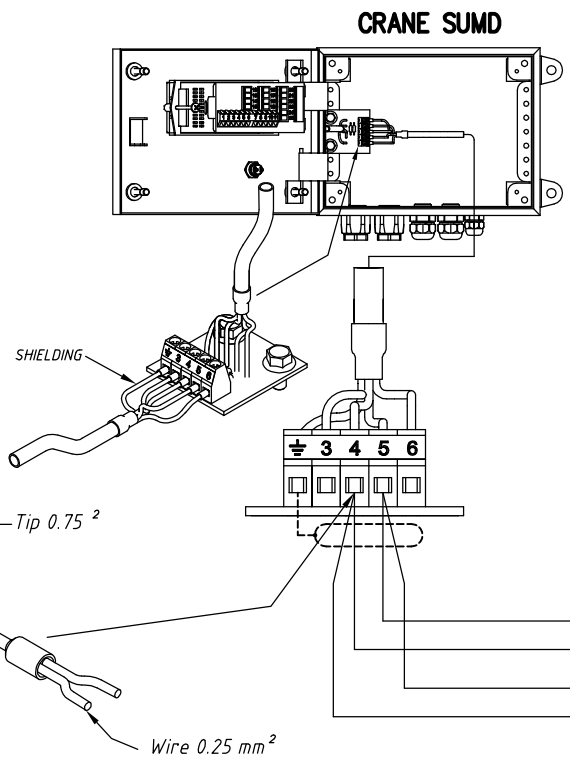
- SP1 (safety mechanism for measurement and force sensor power supply)
- SP2 (overload threshold)
- SP3 (function other than limitation)
- SP4 (function other than limitation)

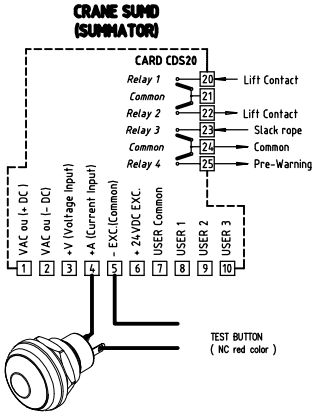
2. WIRING DIAGRAMS

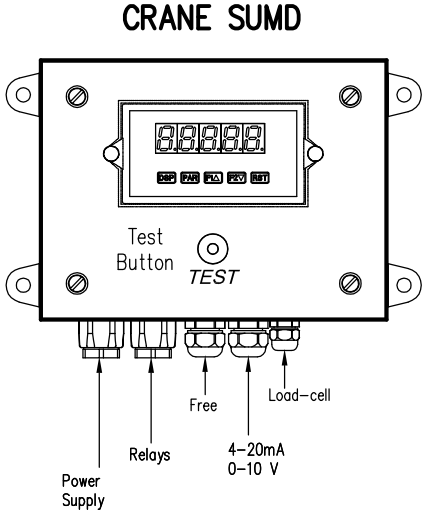
2.1. Wiring diagram of a CRANE-SUMD (DISP-SUMD) with 2 BRIDGE-BOY

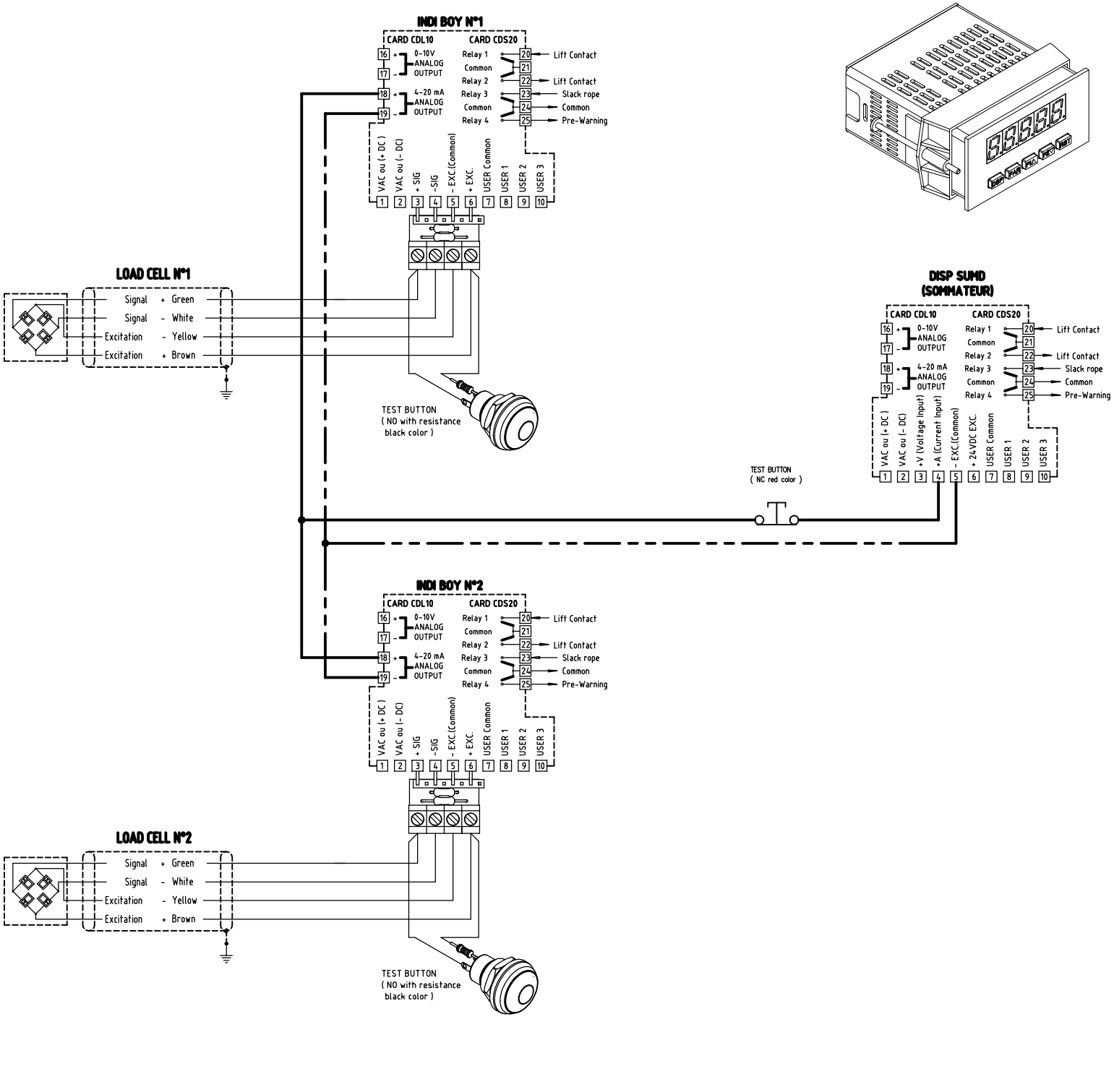
2.2. Wiring diagram of a CRANE-SUMD (DISP-SUMD) with 2 CRANE-BOY (INDI-BOY)


LOAD CELL N°1
Excitation + Brown
Excitation - Yellow
Signal - White
Signal + Green
LOAD CELL N°2
Signal + Brown
Signal - Yellow
Excitation - White
Excitation + Green
Test I Z S ZmA SmA SP1 D1
1 2 3 4 5 6 7 8 9
Gr Wh Ye Br Sh
mA V R
BRIDGEBOY
Out SP1
10 12 13 14 15
Test jacks SP1


CRANE SUMD
SHIELDING
3 4 5 6
Tip 0.75 ²
Wire 0.25 mm²


CRANE SUMD
(SUMMATOR)
CARD CDS20
Relay 1
Common
Relay 2
Relay 3
Common
Relay 4
20 Lift Contact
21
22 Lift Contact
23 Slack rope
24 Common
25 Pre-Warning
VAC ou (+ DC)
VAC ou (- DC)
+V (Voltage Input)
+A (Current Input)
- EXC.(Common)
+ 24 VDC EXC.
USER Common
USER 1
USER 2
USER 3
1 2 3 4 5 6 7 8 9 10
TEST BUTTON
(NC red color)


CRANE SUMD
Test
Button
TEST
Free
Load-cell
Relays
4-20mA
0-10 V
Power
Supply


INDI BOY N°1
CARD CDL10
CARD CDS20
16 + 0-10V ANALOG OUTPUT
17 -
18 + 4-20 mA ANALOG OUTPUT
19 -
Relay 1 20 Lift Contact
Common 21
Relay 2 22 Lift Contact
Relay 3 23 Slack rope
Common 24 Common
Relay 4 25 Pre-Warning
1 VAC ou (+ DC)
2 VAC ou (- DC)
3 + SIG
4 - SIG
5 - EXC.(Common)
6 + EXC.
7 USER Common
8 USER 1
9 USER 2
10 USER 3
LOAD CELL N°1
Signal + Green
Signal - White
Excitation - Yellow
Excitation + Brown
TEST BUTTON
(NO with resistance
black color)
TEST BUTTON
(NC red color)
DISP SUMD
(SOMMATEUR)
CARD CDL10
CARD CDS20
16 + 0-10V ANALOG OUTPUT
17 -
18 + 4-20 mA ANALOG OUTPUT
19 -
Relay 1 20 Lift Contact
Common 21
Relay 2 22 Lift Contact
Relay 3 23 Slack rope
Common 24 Common
Relay 4 25 Pre-Warning
1 VAC ou (+ DC)
2 VAC ou (- DC)
3 +V (Voltage Input)
4 +A (Current Input)
5 - EXC.(Common)
6 + 24VDC EXC.
7 USER Common
8 USER 1
9 USER 2
10 USER 3
INDI BOY N°2
CARD CDL10
CARD CDS20
16 + 0-10V ANALOG OUTPUT
17 -
18 + 4-20 mA ANALOG OUTPUT
19 -
Relay 1 20 Lift Contact
Common 21
Relay 2 22 Lift Contact
Relay 3 23 Slack rope
Common 24 Common
Relay 4 25 Pre-Warning
1 VAC ou (+ DC)
2 VAC ou (- DC)
3 + SIG
4 - SIG
5 - EXC.(Common)
6 + EXC.
7 USER Common
8 USER 1
9 USER 2
10 USER 3
LOAD CELL N°2
Signal + Green
Signal - White
Excitation - Yellow
Excitation + Brown
TEST BUTTON
(NO with resistance
black color)

CALIBRATION OF THE SYSTEM

As the relays controlled by the different set points are a direct function of the display, only certain numerical values contained in menus 1 and 6 can be modified.

Calibration is carried out in 2 steps:
- 1° configuration of the display
- 2° configuration of the set points

The CRANE-SUMD programming menu is accessed using the PAR button. The menu is organised in modules which group the associated parameters in one function. Use the F1 and F2 arrows to select the module, then press the PAR button to go to it. The PAR button serves to memorise the value of the parameter, which can be modified using the F1 and F2 buttons, and to move on to the next parameter.

The F1 and F2 buttons also enable the numerical values of a parameter to be increased or decreased. Pressing on the RST and F1 or F2 buttons simultaneously enables the values to be increased or decreased in steps of 1000.

In order to ensure monitoring of the start-up of the load limitation, the calibration data sheet must be duly completed, dated and signed. **In no circumstances must a reset of the display to zero be authorised.**

3. CALIBRATION PRINCIPLE

The CRANE-SUMD is an electronic device with a 0-200 mA input, which enables it to accept several 0-20 mA signals from electronic load limiters located upstream of it. For example, if we have 2 CRANE-BOYs upstream each with a 0-20 mA output, the CRANE-SUMD will see a signal oscillating between 0 and 40mA. With 3 CRANE-BOYs upstream, the CRANE-SUMD input signal will oscillate between 0 and 60 mA, etc.

In the case of an overhead crane with two 10t hoists, each will have a load limitation system with a 0-20 mA output, and the CRANE-SUMD will see a 40mA signal proportional to the sum.

In the case of an overhead crane with one 10 t hoist and another 5 t hoist, it is imperative that each mA coming from the UPSTREAM load limiters represents the same load variation.

With regard to the configuration of the analogue outputs, we recommend working as follows:
0 mA for -32 % of hoist capacity
4 mA for 0
20 mA for 128 % of hoist capacity
In this way, it will be possible to detect a break in the wire and transmit to the load summation device an overload of up to 128%.

For two limiters the input to the load summation device must be configured as follows:
0 mA for -64 % of overhead crane capacity
40 mA for 256 % of overhead crane capacity

Examples:

1) Overhead crane with two 10t hoists and a load summation device limited to 24t
   a. Configuration of the **analogue output** of the 2 hoists:
      i. 0 mA for -0.32 x 10 t = -3.2 t
      ii. 20 mA for 1.28 x 10 t = 12.8 t
   b. Configuration of the **load summation input**
      i. 0 mA for -6.4 t
      ii. 40 mA for 25.6 t
   c. Configuration of the **overload set point** on the load summation device (SP2) = 24 t
2) Overhead crane with two 10 t hoists and a summation device limited to 11 t
   a. Configuration of the **analogue output** of the 2 hoists:
      i. 0 mA for -0.32 x 10 t = -3.2 t
      ii. 20 mA for 1.28 x 10 t = 12.8 t
   b. Configuration of the **load summation input**
      i. 0 mA for -6.4 t
      ii. 40 mA for 25.6 t
   c. Configuration of the **overload set point** on the load summation device (SP2) = 11 t
3) Overhead crane with one 5 t hoist and one 10 t hoist + a load summation device limited to 11 t
   a. Configuration of the **analog output** of the 2 hoists:
      i. 0 mA for -0.32*10 t = -0.32***the largest hoist capacity**
      ii. 20 mA for 1.28*10 t = 1.28* **the largest hoist capacity**
   b. Configuration of the **load summation input**
      i. 0 mA for -6.4 t
      ii. 40 mA for 25.6 t
   c. Configuration of the **overload set point** on the load summation device (SP2) = 11 t

4. CONFIGURATION OF THE UPSTREAM LIMITERS

After setting the limiters (BRIDGE BOY, INDI BOYS, CRANE BOY, etc.) in accordance with our instructions, configure the 4-20 mA outputs such that the sensitivity on each is identical. The benchmark is the highest limitation set point of one of the upstream limiters (e.g.: 1 hook with 10 t capacity 10 t (limitation set point at 110% i.e. 11 t) and 1 hook with 15 t capacity (limitation set point at 110% i.e.16.5 t)→benchmark= 20 mA for 16.5 t). Go to menu 8 -OUT (access code SENSY =7) and carry out the following operations:

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
tyPE	ANALOG TYPE	0-20	**0-20**
aSIN	ANALOG ASSIGNMENT	INP	INP
AN-LO	ANALOG LOW SCALE VALUE	-32.0%	-A* x 0.32
AN-HI	ANALOG HIGH SCALE VALUE	128.0%	A x 1.28
udt	ANALOG UPDATE TIME	0.0	**0.0**

* A = nominal capacity of the largest hoist

5. CONFIGURATION OF THE LOAD SUMMATION DEVICE (CRANE-SUMD OR DISP-SUMD)

Go to menu 1 -INP (access code SENSY =7) and carry out the following operations:

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
rANGE	INPUT RANGE	0.2A	**0.2A**
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	KEY	**KEY**
INP 1	INPUT VALUE 1	8000	8000
dSP 1	DISPLAY VALUE 1	0.0	0.0
INP 2	INPUT VALUE 2	40000	40000
dSP 2	DISPLAY VALUE 2	256.0	A x 2.56

6. CONFIGURATION OF THE SET POINTS

The settings in this section are independent of the load being lifted when the points are set.

SP1 is reserved for the safety mechanism in the event of a cut off between the upstream BRIDGE-BOY, INDI-BOY, CRANE-BOY and the CRANE-SUMD.

SP2 must be reserved for the load limiter: its SP-2 and HYS-2 values will, if necessary, be readjusted to the characteristics of the overhead crane, if that has not been done in the factory.

SP3 and SP4 are available for a function other than load limitation (relays not secured against a cable being cut).

Go to menu **6 -SPt** (access code SENSY =7) and configure the parameters as indicated in the table on the following page. **The data not to be modified are shown in bold type.**

		SP1 (safety)		SP2 (overload)	
DISPLAY	**PARAMETER**	**FACTORY SETTING**	**USER SETTING**	**FACTORY SETTING**	**USER SETTING**
Act - n	SET POINT ACTION	**Ab-LO**	**Ab-LO**	**AU-HI**	**AU-HI**
SP -n	SET POINT VALUE (main)	-3.0 %*	-DSP2 x 0.03	220	Overload value (1)
HyS-n	SET POINT HYSTERESIS	0.1 %	.	15.0	15% of the nominal capacity (2)
tON-n	ON TIME DELAY	**0.0**	**0.0**	0.1	0.1 (3)
tOF-n	OFF TIME DELAY	**0.0**	**0.0**	0.0	0.0
out-n	OUTPUT LOGIC	**Rev**	**Rev**	**Rev**	**Rev**
rSt-n	RESET ACTION	**AUto**	**AUto**	**AUto**	**AUto**
Stb-n	STANDBY OPERATION	**No**	**No**	**No**	**No**
Lit-n	SETPOINT ANNUNCIATORS	**Nor**	**Nor**	**Nor**	**Nor**

* of nominal capacity

(1) Value at which lifting must be prohibited, according to the legislation in force and the overhead crane manufacturer's data.

(2) The hysteresis may be modified depending on the circumstances of use. SP2 opens once the overload value is reached and does not close again until the load is below the set point less the hysteresis.

(3) tON (delay in SP2 activation) may be modified if the dynamic effects produced by lifting a load less than the limitation load result in forces which are greater than those produced by the limitation load when static. (Yoyo effect).

7. OPERATIONAL TESTS

The operational tests enable the opening of the various relays and their wiring to be checked, in the knowledge that the load limiter must have priority over the hoist controls in order to prevent any circumstance which would increase the overload. In nominal operation SP1, SP2, are shown on the front.

7.1. Safety check in the event of one of the wires from the DISP BOYs being cut

To perform a correct check:
Disconnect the wire (signal +)check that the displays shows –xxxxx, SP1 (lifting and lowering impossible)
Disconnect the wire (common-) check that the displays shows OLOL, SP2 overload is off (lifting impossible)

7.2. Check under overload and under load

Check with the overload load that the SP2 relay opens and lifting is prohibited.
Check the correspondence between the values displayed and the values of the actual loads handled.

7.3. Periodic checks

In accordance with the legislation in force, the lifting force limiter must be checked regularly as part of the periodic checks. This check comprises an operational test of the set point limit and the correct state of the sub-assemblies, connectors and linkages. The check must be carried out when the system is first put into service and subsequently at least once a year, unless indicated otherwise.

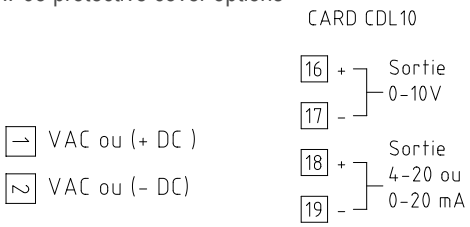
8. RECORDING OF MEASUREMENT EXTREMES

Pressing the DSP button shows the MIN and MAX values recorded in the system history. The current display is then characterised by the MAX or MIN LEDs illuminated on the left of the screen. When the load is displayed normally, these same LEDs on the left must not be illuminated.

WARNING: these MIN and MAX value can only be used provided that these MIN and MAX values have been reset to zero (F1 button) each time after the commissioning tests and the overload simulation tests using the test button.

9. EQUIPMENT REFERENCES AND OPTIONS

Power supply voltage	- 85 to 250VAC	Ref.: CRANE- SUMD
	- 48 VAC	Ref.: CRANE-SUMD + option ALIM-48VAC
	- 24 VAC	Ref.: CRANE- SUMD 24
	- 10 to 30 VDC	Ref.: CRANE- SUMD 24
Power supply voltage	- 85 to 250 VAC (OEM)	Ref.: DISP- SUMD
	- 48 VAC (OEM)	Ref.: CRANE-SUMD + option ALIM-48VAC
	- 24 VAC (OEM)	Ref.: DISP- SUMD24
	- 10 to 30 VDC (OEM)	Ref.: DISP- SUMD24
4-20 mA or 0-10 V options		Ref.: CARD CDL10
RS-232 options		Ref.: CDC20
RS-485 options		Ref.: CDC10
IP65 protective cover options		Ref.: COVER-PAX



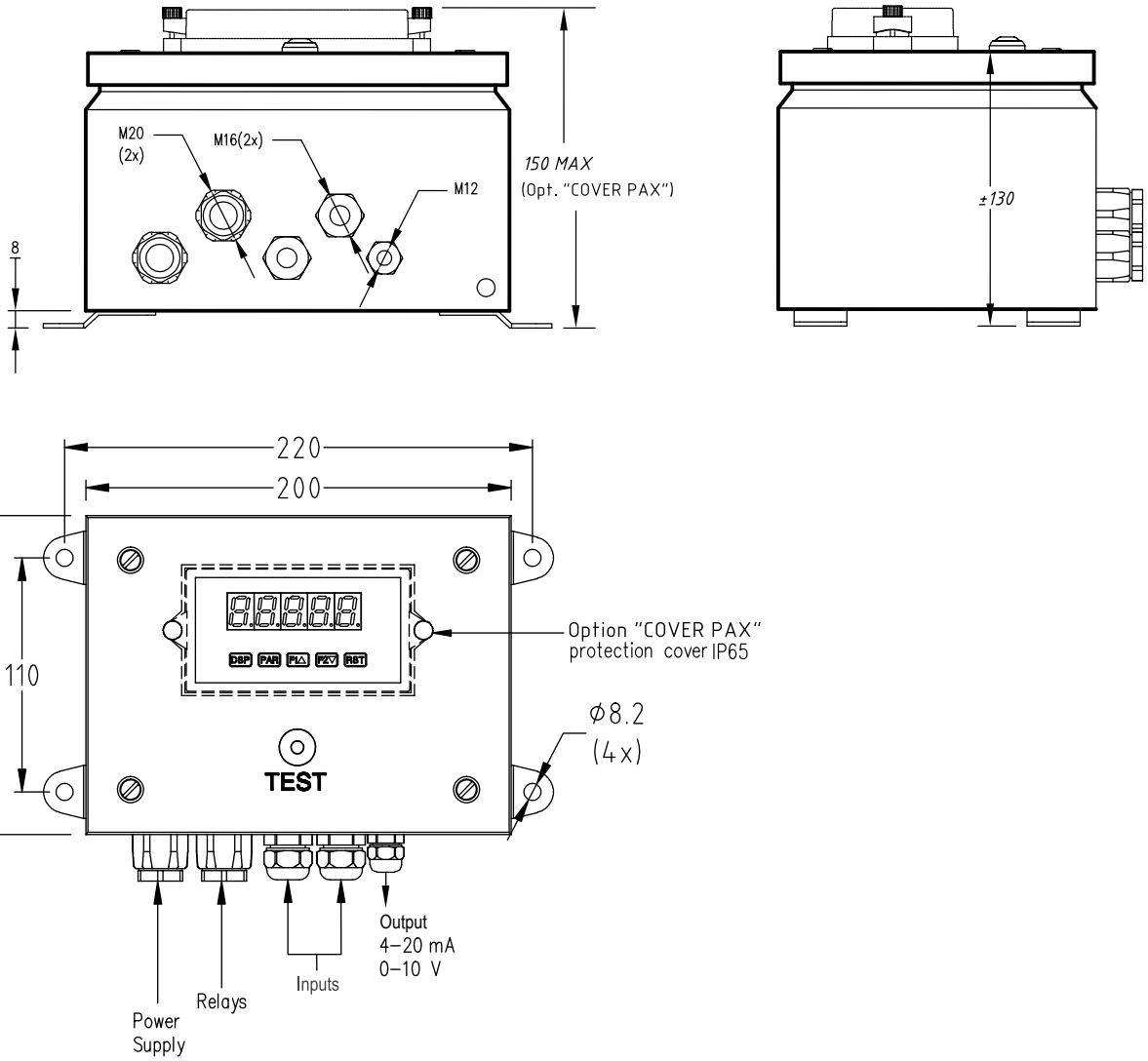
Key: ou = or; sortie = output

Comments:
When using the load limiter, always lock the equipment parameter configuration by using an access code (access code 7 when preset by SENSY)

For more specific use of the system, further information can be given on request: info@sensy.com
fax +32 71 37 09 11, tel. +32 71 25 82 00

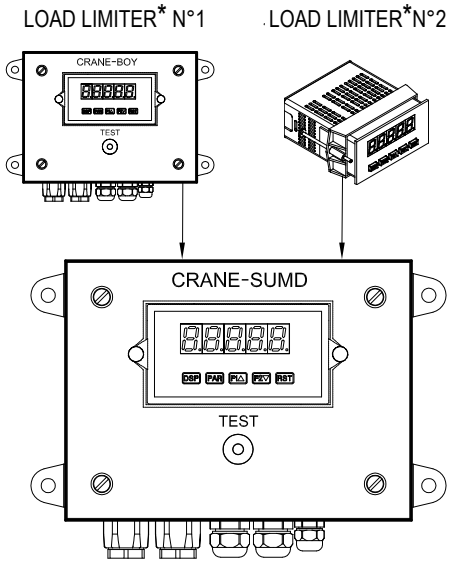
10. DRAWINGS

CRANE-SUMD > STANDARD DIMENSIONS



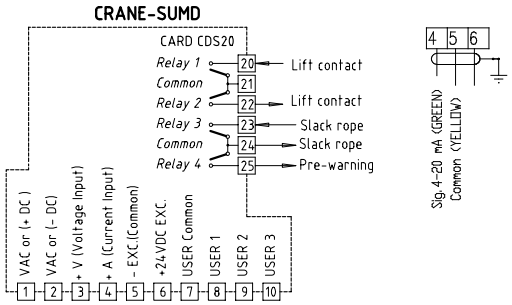
Dimensions in mm

Other view

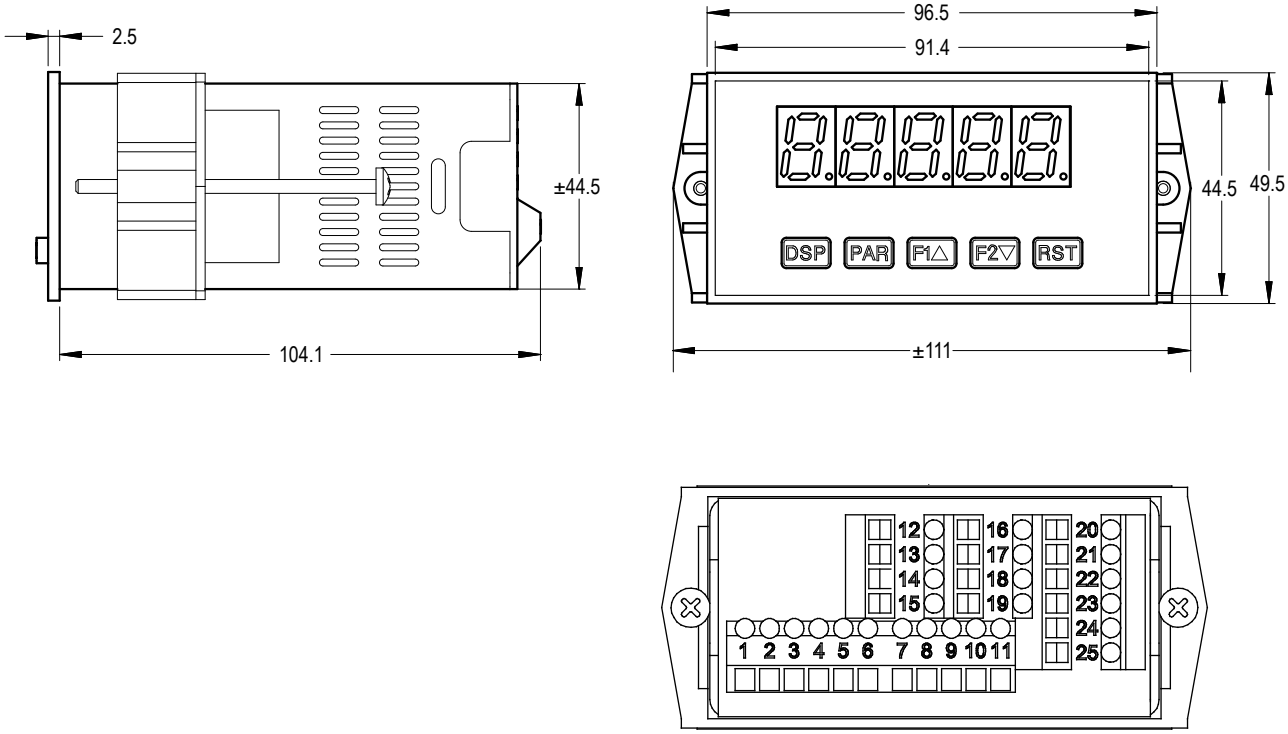


*: INDI-BOY, DISP-BOY, CRANE-BOY, ...

Terminals



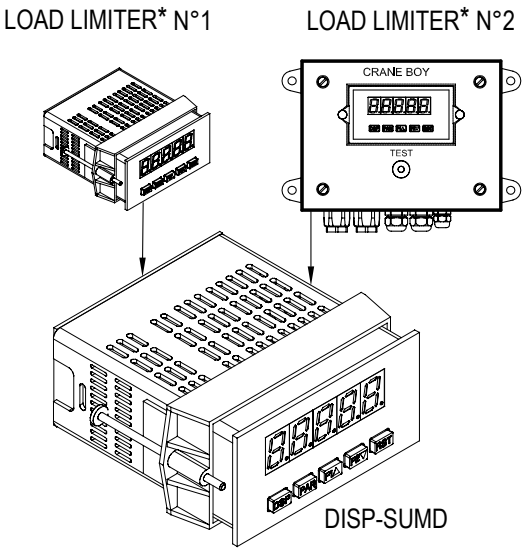
DISP-SUMD > STANDARD DIMENSIONS



Note:recommended min. clearance (behind the panel) formounting is 140 mm deep and 53.4 mm high. Panel cut-out 92 mm (-0+0.8) 45 mm (-0+0.5)

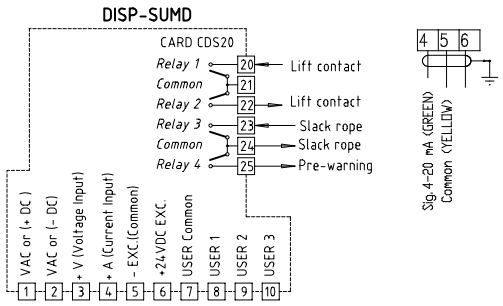
Dimensions in mm

Other view



*: INDI-BOY, DISP-BOY, CRANE-BOY, ...

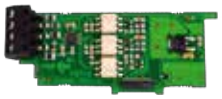
Terminals



OPTION CARDS

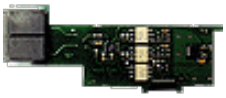
Communication cards (max. 1 choice)

CARD-CDC10

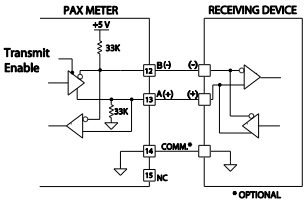


- RS-485 field bus communication interface
  Available with crew terminals or DB9 connector

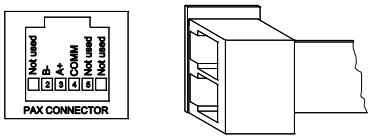
CARD-CDC1C



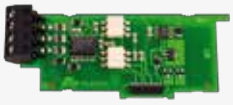
CARD-CDC10



CARD-CDC1C



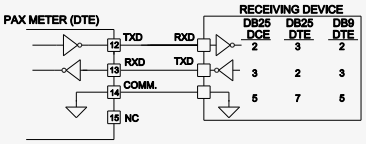
CARD-CDC20



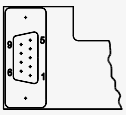
CARD-CDC2C

- 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

- DeviceNet communication interface

CARD-CDC40

- Modbus communication

CARD-CDC50 / CARD-CDC50-CRANE*

- Profibus-DP (EN 50170) communication interface

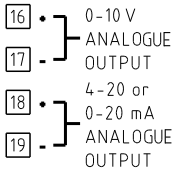
* As the CARD-CDC50 is too long for the housing of the CRANE-BOY, the CARD-CDC50-CRANE is supplied with a spacer to be inserted between the front of the electronics and the housing.

Analogue output card

CARD-CDL10

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

CARD-CDL10

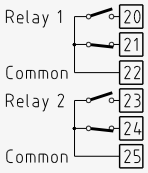


Relay cards (max. 1 choice)

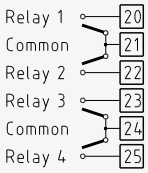
CARD-CDS10 & CARD-CDS20

- 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.