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1. DESCRIPTION AND MAIN FEATURES

**RCU_210** Unit control is a Load Weighing device of the New devices from Dinacell Electronic.

The Main features of RCU_210 are:

- Measures and limits load in elevators.
- Works with Belt, Rope, and under cabin Sensors.
- 2 Alarms Limits levels, Full Load and Over Load.
- 2 Relays output for Full load and Over Load alarms, (Configurable by software).
- Analog Output 0-10v.
- Hold Input (inhibit measures when elevator is moving)
- Chain compensation Function.

2. DIMENSIONS CONNECTIONS AND DISPLAY CONTROL KEYS

**Functions of control keys:**
The unit is equipped with a menu by which the individual setting parameters can be displayed or modified.

a. By Pressing this key for 2 Seconds Enter/exit the menu
b. By Pressing this key inside the menus will navigate through parameters.
   c. Accept and save modified values when modifications are on progress.

a. During menu navigation: Enter to modify a parameter.
   b. While modifying a parameter: Chose digit to change.

a. During menu navigation: Show the stored value of the selected parameter.
   b. While modifying a parameter: Change the blinking digit incrementally from 0 to 9.

**Note:** After two minutes without any operation, the unit automatically returns to the total weight measure display, independent of the menu item previously selected.
3. MENU STRUCTURE

The menu has the cyclic structure shown in the following figure. Press **M** key for 2 seconds to enter and then press it repeatedly to move from a parameter to another. Press it for 2 seconds to exit to weight indication.

- Weight indication. Display the value of the measured load
- Press Menu for 2 Seconds to access main Manu
- Shows Identification Data of the unit
- System calibration. These menus shows all parameters related with the load cell Configuration.
- Alarm Limits configuration.
- Chain compensation options
- Analog Output (Only shown in RCU models with analog option)

Pressing Menu for 2 seconds inside the internal navigation menu will end the menu navigation and return to measure Display.

4. HOW TO VISUALIZE OR CHANGE PARAMETERS

Once inside any Sub-menu and displaying the parameter to be checked or changed:

- Press **Up** to display the current value.
- Press **R** to select the parameter to be modified:
- Press **L** to select the digit position to be changed (Flashing)
- Press **Up** to change the value of the Current Flashing digit position. (if there’s no flashing digit, change the value with **Up** key directly)
- Press **M** twice to save the value.

If **M** key is not pressed again before display Flashing ends (10 seconds), the parameter value will not be changed.

After any of these operations, the display will show the current parameter.
5. DEVICE INFO

Menu Info stores some important information for the identification of the unit.

Submenu Info:

<table>
<thead>
<tr>
<th>Press to enter</th>
<th>Check value</th>
<th>Enter to modify</th>
</tr>
</thead>
<tbody>
<tr>
<td>Info</td>
<td>Ver:</td>
<td>Firmware Version of Unit RCU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valid Values: 1.00 and above</td>
</tr>
<tr>
<td></td>
<td>V_Har:</td>
<td>Hardware Version of Unit RCU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valid Values: 1.00 and above</td>
</tr>
<tr>
<td></td>
<td>VOLt:</td>
<td>Internal Power supply Voltage of unit RCU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valid Values: around 24 volts</td>
</tr>
<tr>
<td></td>
<td>rESE:</td>
<td>Reset all parameters value to Factory defaults. All calibration data will be lost</td>
</tr>
</tbody>
</table>

6. SYSTEM CONFIGURATION

This section describes how to configure the Unit to get the best measure accuracy. The configuration is done in Menu.

<table>
<thead>
<tr>
<th>Press to enter</th>
<th>Check value</th>
<th>Enter to modify</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALLb</td>
<td>Zero:</td>
<td>Zero point adjustment with empty elevator. It stores a countdown value for Zero and load calibrating parameters to let installers go out of the cabin.</td>
</tr>
<tr>
<td></td>
<td>Load:</td>
<td>Well known weight applied inside the elevator to adjust the unit with the best measuring precision. (It is recommended to set up to 60% of the nominal load of the elevator).</td>
</tr>
<tr>
<td></td>
<td>Cell:</td>
<td>Nominal load cell sensibility. This value is calculated when LOAD operation is done. User should not modify this value. Only modify this value if you are sure about the Nominal Cell value of the Sensor you are installing on the RCU Unit. (If this parameter is modified the previous calibration settings will be overwritten).</td>
</tr>
</tbody>
</table>

Calibration process:

1) Install the RCU_210 unit with the information of the RCU INSTALLATION chapter.
2) Power up the unit with the correct voltage (see the SPECIFICATIONS chapter).
3) Install sensors on the Ropes(SWK) or Belts(SWC) or at the bottom of cabin(TCA).
4) Go to CALLb Submenu.
5) Detail calibration procedure:
Follow next steps to set a precise Load Measuring system

5.1) **Zero adjustment:**
   a) Select Submenu Zero by pressing.
   b) Change countdown value if desire.
   c) Press menu \( M \) and display will start flashing.
   d) Make sure elevator is empty and confirm operation by pressing \( M \) again.
   e) The countdown will start. During these periods of time the cabin must by empty.

5.2) **Load Point adjustment:** With This function the Unit will be adjusted with the best accuracy. Put a well known weight inside the cabin. It is recommendable to set up to 60% of elevator duty load. To make the Load point adjustment:
   a) Select Submenu Load by pressing.
   b) Set the value with the total Load in kilograms added into the elevator (for instance, if you put 400kg inside the cabin, then 400 should be set on Load value ).
   c) Press menu \( M \) and display will start flashing.
   d) Confirm operation by pressing \( M \) again.
   e) The new countdown will start. During this period of time, the weight inside the cabin must not change.

5.3) **Cell Value:** Cell value is automatically calculated after a Load Point adjustment, so users don’t need to adjust it. This parameter stores the Sensor Sensibility. If Cell Value is changed by the user, the previous calibrating process will be overwritten. Contact your local distributor if you need to modify this parameter.

7. **ALARMS CONFIGURATION**

   The alarms values correspond to the load thresholds or limit at which each relay change its state.
   The relays allow to be configured individually as make (Normally Close) or break contact (Normally Open).

   Alarms are activated when their thresholds are exceeded. The Unit RCU_2Ra has 2 different alarms:
   **AL1-F** (Full Load, Relay #1):
   Change of state when exceeding the load programmed in \( RL1-F \).
   **AL2-O** (Over Load, Relay #2):
   Change of state when exceeding the load programmed in \( RL2-O \).
   The working procedure of the relays as a make or break contact can be changed for each alarm output using the \( RST \) parameter. **Valid values are (Close) for the operating mode MAKE and (Open) for the operating mode BREAK.** Alarm LEDs indicators will be activated when the display measured value overload corresponding alarm level.
How to configure alarm settings:

Go to Submenu  

Press to enter  

Check value  

Enter to modify  

<table>
<thead>
<tr>
<th>AL Ar</th>
<th>AL 1-F</th>
<th>Level: Alarm 1 Level Threshold for Full load alarm.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>rStA: Set the desired Relay Status when alarm 1 is deactivated (Idle Mode)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Level: Alarm 2 Level Threshold for Over load alarm.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>rStA: Set the desired Relay Status when alarm 2 is deactivated (Idle Mode)</td>
</tr>
</tbody>
</table>

**Note:** In order to stop the elevator when alarms are activated:

*Output Relays must be wired to your control board system.*

**Important:** When an error appears, all alarms are activated and relay Status is set to the active state. For example if rStA idle mode is set to Close, the Relay status will change to Open when any error appears.
8. CHAIN COMPENSATION FUNCTION

8.1. Chain Compensation

The RCU\textsuperscript{NG} Weighing Device has an optional Software chain compensation. In this Submenu, the user can choose between two options, no compensation, or software compensation. Hold Input must be wired to use the Chain compensation Function. (See Hold Function section 11)

8.2. Submenu Chain

Submenu Press to enter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Type of chain compensation applied. User can choose between SOFT (Software) compensation and NONE compensation.</td>
<td>SOFT</td>
</tr>
<tr>
<td><strong>Value</strong></td>
<td>Max Chain value to compensate at installation, Valid Values: 0 to 600</td>
<td>100</td>
</tr>
<tr>
<td><strong>C_Sof</strong></td>
<td>These parameters show the kilograms that the unit is compensating by software due to the weight of the chain and travelling cables. This is a read-only value and change on each stop with every activation/deactivation of Hold Input.</td>
<td></td>
</tr>
<tr>
<td><strong>Time 1</strong></td>
<td>Starting Time to hold the weight before Hold input is activated. It is an optional correction on installations where the Hold Input is activated too fast. (Units are Decs of seconds).</td>
<td>2 (0.2secs)</td>
</tr>
<tr>
<td><strong>Time 2</strong></td>
<td>Delay time to release hold weight after Hold input is deactivated. It is an optional correction on installations where the Hold Input is deactivated too fast. (Units are Decs of seconds).</td>
<td>4 (0.4secs)</td>
</tr>
</tbody>
</table>

T1 and t2 options are only shown if Type is set to SOFT compensation. See section 11 Hold Function to adjust these parameters.

8.3. Software Compensation

This function compensates the weighting difference between floors produced by the extra weight of the chain and travelling cables. The unit needs the HOLD signal to be active when the doors closed to compensate the weight during the elevator movement.

To configure the software compensation:

- **TYPE** Set Type to SOFT value.
- **VALUE** Set the estimated weight of the chain. This parameter will be the maximum value compensated by software compensation. (200kg is the recommended value)
- **C_Sof** In this parameter you can check the value that the RCU is compensating by software each time the HOLD signal is deactivated.
9. HOLD FUNCTION

During the elevator travel, the measured loads can heavily fluctuate due to friction in the rails, loads movements, etc. The Hold Input inhibits the measure while the elevator is travelling, so this ensures that the movement of the cabin will not affect the weighing process and therefore, no alarms or relay will be activated during elevator travel.

How Hold Input Function works:
- When a voltage in the range 24-125V (DC or AC) is applied in this input, the unit holds the last stable measure of weight acquired.
- The voltage must be applied when the doors close and it must be removed as the doors open.

The RCU_210 has an internal register that stores all previous weighting measures of the last 3 seconds.

As some installations set the HOLD input at the same time the doors close, it may happen that the last measure obtained could not be as stable as desired. The same issue might happen when removing the HOLD input as the doors Open.

To improve the hold of a stable measure, two parameters have been added at the menu; and .

For example:
- Time in tenth of seconds to take the measure before the hold Signal is active.
- Time in tenth of seconds to update the measure after the hold Signal is released.

Note: With T_1 = 10 and T_2 = 15:

In this case, if hold signal is activated, then the RCU will take as a valid measure the last stable weighing value that was stored 1 second before hold was activated. In the same way, when hold is released the first stable value will be taken 1.5 seconds after the hold signal is deactivated.

This option offers great flexibility to resolve problems in some critical installations.

10. AUTO-ZERO COMPENSATION

The Auto_Zero compensation is designed to automatically eliminate small measurement errors lower than parameter of submenu.

The Auto-Zero function will happen whenever the RCU measures a static offset of ± for a period of at least 120 seconds. During this time the measured load must not change by more than 20kg. The RCU will apply an internal compensation value equal to the inverse value of the currently measured offset.

The Auto_Zero compensation value is stored in internal memory. After power cycling the unit the measure in the display should not change therefore. To eliminate the stored Auto_Zero compensation, a Zero operation should be done.

If is set to “00000” Auto_Zero compensation will be automatically disabled.

11. ANALOG OUTPUTS

The unit is provided with one analog output (Voltage output).
Analog High: Load Value for which the unit will deliver the maximum analog output (10v)

Analog Low: Load Value for which the unit will deliver the minimum analog output (0v)

This function reflects the Display measure over the range between analog Low and analog High values

<table>
<thead>
<tr>
<th>Voltage Output</th>
<th>An_Low Value</th>
<th>An_High Value</th>
<th>Range</th>
<th>Voltage Output Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 volts</td>
<td>0Kg</td>
<td>100Kg</td>
<td>When weight ≤ 0kg (empty elevator)</td>
<td>0 V</td>
</tr>
<tr>
<td></td>
<td>100Kg</td>
<td>0Kg</td>
<td>When weight ≥ 100kg</td>
<td>10 V</td>
</tr>
</tbody>
</table>

When hold (inhibit) input is activated the analog output will not change during elevator travel, until hold input deactivation.

12. ERROR CODES AND TROUBLESHOOTING

When the unit detects some anomaly it will show an error code from the following table:

<table>
<thead>
<tr>
<th>Error description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Err 1 Load cell is not properly connected, or its cable is damaged.</td>
<td>Check the load cells connection.</td>
</tr>
<tr>
<td>Err 2 Negative overflow. The load cell is giving a too high negative signal.</td>
<td>Check the load cell connection. It should be no negative charge.</td>
</tr>
<tr>
<td>Err 3 Positive overflow. Load cell is holding a higher load than its nominal value.</td>
<td>Change the load cell by another with higher nominal load.</td>
</tr>
<tr>
<td>Err 6 Wrong Data in memory. Note: When this error appears, All relays will change to Break(OPEN) state.</td>
<td>Power cycle the unit. If err6 remains, then reset the unit to its default values from Menu INFO-&gt;Reset-&gt;(All)</td>
</tr>
<tr>
<td>Err 7 The unit was not properly adjusted.</td>
<td>Adjust the zero and Load again.</td>
</tr>
<tr>
<td>Err 7 Load cell with very low sensibility.</td>
<td>Replace the load cell by another one with lower nominal load.</td>
</tr>
</tbody>
</table>

Important: When an error appears, all alarms are activated and relays state are set to the alarm active status. To configure relays status check in Section 9.

Important: When Err6 appears or if power supply is lost, All Relay Contact will stay OPENED.
RESTORING THE FACTORY SETTINGS (Only in case of configuration problems)

Just go to menu **InFo** and set **RSET** option to **ALL**:

13. ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Power supply characteristics</th>
<th>Short-circuitable. It is not necessary to replace any fuse.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>12-40 Vdc</td>
</tr>
<tr>
<td>Maximum current</td>
<td>&lt;65mA</td>
</tr>
<tr>
<td>Relays Contacts (Maximum Switching Voltage)</td>
<td>1A - 125V AC 30 W (DC), 37.5 V A (AC) (resistive load)</td>
</tr>
<tr>
<td>(Maximum Switching Power)</td>
<td></td>
</tr>
<tr>
<td>HOLD Input</td>
<td>24V-125V AC/DC</td>
</tr>
<tr>
<td>Analog Output</td>
<td>0-10v</td>
</tr>
<tr>
<td>Box</td>
<td>IP-50 V0 fireproof plastic.</td>
</tr>
</tbody>
</table>

14. RCU INSTALLATION

1) Place the RCU_210 in an appropriate area.
2) Connect Relays and analog outputs to your Elevator control board (See section 3 Dimensions and Connections).
3) Install the Sensors on the Ropes or belts. Install the sensors at least 10 cm separated from hitch point sockets.
4) Connect a 24 VDC Power Supply to the **RCU_210** Power input.
5) Now the Unit is ready to be adjusted.
15. QUICK CONFIGURATION GUIDE

- Parameters checking or modification

Press repeatedly to find the desired parameter

Press 2 sec. to enter → M → Check value → Enter to modify → Change digit → Choose digit → Press x2 to save value

Quick System configuration

1. Install the RCU® in an appropriate location.
2. Connect all necessary wires for power supply, relays, hold input, and analog outputs if necessary.
3. Press M for 2 seconds to enter Menu.
4. Go to CALib submenu and access its parameters pressing:
   5. Empty the elevator and set the countdown value for calibrating operations. Confirm the value for Empty elevator Operation. A countdown will start.
5.  
6. Set a well-known weight inside the cabin (60% of the nominal load at least) and set parameter with the weight added. A countdown will start.
7. Go to ALAr submenu and access its parameters pressing :
   8. Set the Full load alarm limit and set the deactivated state for the full load relay.
9. Set the Overload load alarm limit and set the deactivated state for the Overload load relay.
10. Go to CHAr submenu if chain compensation is desired, select the type of compensation to Soft.
11. Auto Zero Function: Set approximately the Chain weight value in and auto zero function corrections and Chain compensation. (default value is 100). If value is set to 00000, auto zero function will be disabled.