CS 430RC
Solid De-icer Controller Configuration and Set-up Manual
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1 System Modes of Operation

The CS-430RC Controller allows for 7 modes of operation.

**Manual Mode**
This mode allows the driver to manually control the spread rate. Each setting on the spinner/Conveyor Dial is a percentage of maximum null setting. There are 9 configurable application rate settings. The display will show “M” on the screen.

**12 Volt Triggered Manual Mode**
In addition to manual mode operation, this mode allows the controller to start and stop the spreader based on a 12V signal. The display will show “V” on the screen.

**Ground Speed Triggered Manual Mode**
In addition to manual mode operation, this mode will start and stop the spreader based on ground speed input. The display will show “G” on the screen.

**Open Loop Mode**
This mode utilizes the ground speed sensor only to regulate the amount of material that will be dispensed off the vehicle. There are 9 configurable application rate settings available. The display will show “O” on the screen.

**Closed Loop Mode**
This mode utilizes both the conveyor and ground speed sensors to regulate the amount of material that will be dispensed off the vehicle. There are 9 configurable application rate settings available. The display will show “C” on the screen.

**Fixed Mode (liquid only)**
In this mode the liquid output will be an on/off signal. When the liquid dial is set to any position other than 0 there will be an output. (Used for fixed ratio wet power units.)

**Anti-ice (liquid only)**
In this mode the liquid will be closed loop and displayed in gallons/liters per mile/kilometer. The conveyor dial and display is disabled but the spinner remains active.
2 System Features

The CS-430RC features include:

- ON-OFF switch with Power indicator
- Spinner rate control
- Conveyor/Auger application rate control
- Conveyor feedback “closed loop” control
- Liquid application rate control
- Liquid feedback “closed loop” control
- Conveyor and liquid auto-nulling
- Programmable spinner operation during selected operational modes
- Blast function
- Pause function
- Remote Pause/Blast
- Stationary Unload function
- Auger/Conveyor Reverse Function
3 System Description

The CS-430RC is an advanced three knob control system that utilizes the Rexroth RC-2/2 electronic mobile controller to drive Spinner/Conveyor outputs. The RC-2/2 features current and voltage compensation of output signals preventing output fluctuations.

In addition, a separate remote user interface incorporating a backlit LCD display offers visual indication of 5 selectable operating modes, spread-width, vehicle speed and application rates.

Audible and Text based error messages provide live operating status of the controller and auxiliary system functions. This includes auto-detection of cable, valve and/or sensor malfunction.

Detented/latched control knobs and tactile buttons allows for user-friendly operation. Configuration is easily accomplished with 2 front mounted tactile buttons allowing easy menu navigation of the set-up parameters. The set-up menu is accessible using a key-switch.

The Auto-nulling feature allows for easy valve set-up. Manual nulling is also available.
4 System Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions (approx.):</strong></td>
</tr>
<tr>
<td>Display W – 7” (180mm)</td>
</tr>
<tr>
<td>H – 4.75” (120mm)</td>
</tr>
<tr>
<td>D – 2.75” (70mm)</td>
</tr>
<tr>
<td>Microcontroller W – 8” (204mm)</td>
</tr>
<tr>
<td>H – 1.6” (41mm)</td>
</tr>
<tr>
<td>L – 4.5” (114mm)</td>
</tr>
<tr>
<td><strong>Weight:</strong></td>
</tr>
<tr>
<td>Display 3.3 LB (1.5 kg)</td>
</tr>
<tr>
<td>Microcontroller 1.2 LB (0.5 kg)</td>
</tr>
<tr>
<td><strong>Input Voltage</strong></td>
</tr>
<tr>
<td>8-28 Volts</td>
</tr>
<tr>
<td><strong>Proportional Valve Outputs</strong></td>
</tr>
<tr>
<td>3 (Spinner, Conveyor, and Liquid)</td>
</tr>
<tr>
<td><strong>On/Off Valve Outputs</strong></td>
</tr>
<tr>
<td>1 (Auger Reverse)</td>
</tr>
<tr>
<td><strong>Speed Inputs</strong></td>
</tr>
<tr>
<td>3 (Vehicle Speed, Conveyor Speed and Liquid Flow)</td>
</tr>
<tr>
<td><strong>Max Current per Output</strong></td>
</tr>
<tr>
<td>2.3 AMPS</td>
</tr>
<tr>
<td><strong>PWM Dither Frequency</strong></td>
</tr>
<tr>
<td>100 Hz</td>
</tr>
<tr>
<td><strong>Speed Input Limits</strong></td>
</tr>
<tr>
<td>PNP, NPN and Hall effect – 0...10k Hz &gt; 1V rms.</td>
</tr>
</tbody>
</table>

CS-430RC Front Face Layout

- **Spinner Dial**
- **Pause indicator light**
- To activate pause, press the spinner dial
- **Blast indicator light**, to activate blast, press the conveyor dial
- **Blast dial**
- **Liquid dial**

Tactile select keys
To activate the reverse function, press both tactile select keys

Programming key on the side

Power switch
To activate stationary unload, press both the conveyor and spinner dials. The vehicle must be stopped before this function will operate.
4.1 CS-430RC Dial and Button Functions

On-Off Switch
Powers up the controller.

Spinner – Auger/Conveyor Dials – Liquid Dials
Control the rates of the Auger/Conveyor, spinner(s) and liquid pump. Both spinner and conveyor dials are used for parameter selection while in programming mode.

Blast Mode
Increases the spread rate for heavy duty application needs. Blast is activated by pressing the conveyor dial. The blast rate is user configurable.

Pause Mode
To temporarily pause the conveyor and/or liquid functions while spreading. Pause is activated by pressing the Spinner dial.

Stationary Unload
To unload remaining material after completion of the spreading operation, stationary unload may be activated by pressing both the conveyor and the spinner dials simultaneously. Conveyor, liquid and spinner functions can be adjusted between min and max output by adjustment of the appropriate function dial.

Tactile Buttons
These up and down select buttons are used in parameter adjustment and some operator functions. Push the up button to see actual conveyor rate, and press the down button for the conveyor set-point. The actual rate will show the conveyor fluctuations, while the set-point will display the dial setting in lb/mile or kg/km.

Reverse Function
To reverse the auger/conveyor while in the operational mode, press both Tactile Select keys at the same time.

Programming Key
A programming key is provided for controller set-up.

Remote Pause/Blast
A remote pause/blast activation switch can be connected from the rear of the controller using an available remote pause/blast cable kit.
4.2 Commissioning the CS-430RC

4.2.1 Commissioning Procedure

Once the programming key is inserted and turned, the controller will enter into programming mode and the screen will display the parameter numbers.

Parameter numbers are selectable by using the spinner and conveyor dials. (For example, setting the spinner dial to 3 and setting the conveyor dial to 5 will show parameter 35 on the screen.)

To edit the value of a parameter press the Conveyor dial to go into edit mode.

To edit the selected parameter value, press either the upper or lower selector button. The new parameter value will now be displayed on the screen.

Press the Conveyor Dial again to accept the new parameter and exit edit mode.
### 4.3 Parameter Description

<table>
<thead>
<tr>
<th>Function</th>
<th>Parameter No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting the spread rates</td>
<td>1 to 9</td>
<td>Nine spread rates can be configured. The rate programmed under Parameter 1 will be the rate under position 1 of the conveyor dial in operation mode. Parameter 9 is position 9 of the conveyor dial.</td>
</tr>
<tr>
<td>Setting the spinner speed</td>
<td>11 to 19</td>
<td>Nine spinner speeds can be configured. The rate programmed under Parameter 11 will be the rate under position 1 of the spinner dial in operation mode. Parameter 19 is position 9 of the spinner dial.</td>
</tr>
<tr>
<td>Selection of Solid control mode</td>
<td>20</td>
<td>Allows the selection of one of five control modes: “Manual”, “12V triggered”, “Ground speed triggered”, “Open Loop” and “Closed loop”. See page 3 for a more in-depth description of operation. • <em>Toggle the power on and off to accept the control mode change.</em></td>
</tr>
<tr>
<td>Conveyor Autonull</td>
<td>21</td>
<td>Used to automatically set the minimum and maximum valve setting on the conveyor. Available in closed loop mode.</td>
</tr>
<tr>
<td>Calibrating solid material</td>
<td>22</td>
<td>Material calibrations. See “calibration procedure” on page 14.</td>
</tr>
<tr>
<td>Weight per minute at max speed</td>
<td>23</td>
<td>The result of the calibration process in LBS or Kg per minute is shown here. This value represents the maximum material dispensed per minute. Available in open loop mode.</td>
</tr>
<tr>
<td>Weight per revolution of conveyor</td>
<td>24</td>
<td>The result of the calibration process in LBS or Kg per revolution is shown here. Available in closed loop mode.</td>
</tr>
<tr>
<td>Selection of Liquic control mode</td>
<td>25</td>
<td>Allows the selection of one of five control modes: “Manual”, “12V triggered”, “Ground speed triggered”, “Open Loop”, “Closed loop”, “Fixed” and “Anti-ice”. See page 3 for a more in-depth description of operation. • <em>Toggle the power on and off to accept the control mode change.</em></td>
</tr>
<tr>
<td>Liquid autonulling</td>
<td>26</td>
<td>Used to automatically set the minimum and maximum valve settings of the liquid pump. Available in closed-loop mode.</td>
</tr>
<tr>
<td>Liquid calibration</td>
<td>27</td>
<td>Material calibrations. See “Calibration procedure” on page 14.</td>
</tr>
<tr>
<td>Pulses per liquid volume</td>
<td>28</td>
<td>The result of the calibration process gallons or litres per revolution is shown here. Available in closed-loop and anti-ice mode.</td>
</tr>
<tr>
<td>Blast Alarm - seconds</td>
<td>33</td>
<td>This parameter set the time allowed in Blast mode before an alarm sounds. 0 = disabled 0-300 seconds, default = 15 seconds.</td>
</tr>
<tr>
<td>Function</td>
<td>Parameter No.</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Blast mode               | 34            | Sets the mode for the Blast feature  
**Manual** – The conveyor will output a percentage of maximum as set in **P39**.  
**Auto** – The conveyor will output the rate set in **P38**.  
**Note:** The blast mode will be the same as the control mode set in **P20**. |
| Spinner stop or no stop  | 35            | Sets the action of the spinner.  
**Never** – Spinner will always turn when the dial is set.  
**Speed** – Spinner will start and stop with ground speed.  
**Pause** – Spinner will only stop when the pause button is pressed.  
**Speed & Pause** – Spinner will stop with ground speed and the pause button. |
<p>| Conv. Pulses per rev.    | 36            | This value is the number of pulses generated by the conveyor motor feedback sensor with every rotation.                                        |
| CLP blast                | 38            | Determines the conveyor output in LB’s/mile or kg/km while the conveyor is in closed loop mode. Do not exceed maximum application rate setting. (Parameter 9) |
| Blast mode rate          | 39            | The number shown here is the percentage of maximum conveyor output speed at which the system will operate while in manual Blast mode.          |
| Calibrating the ground speed | 44          | Ground speed calibration – see calibration procedure on page 13.                                                                              |
| Ground Speed pulses per Km or Mile | 45     | The number of Pulses per Kilometer or Mile produced by the ground speed sensor. This parameter is calculated by the controller during the calibration process and requires no adjustment. (Please see page 14 for further discussion.) |
| Over-speed alarm         | 46            | A warning buzzer will sound when the vehicle speed exceeds set value in MPH or KM/H. (Set the parameter to 0 to turn function off.)             |
| System Units             | 57            | This parameter selects either metric (0) or imperial (1) operation.                                                                            |
| System language          | 58            | This parameter selects the language; (0) for English and (1) for French.                                                                     |
| Resetting all parameters | 59            | Resets all parameters to factory default settings.                                                                                          |</p>
<table>
<thead>
<tr>
<th>Function</th>
<th>Parameter No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting the liquid rates</td>
<td>70 to 79</td>
<td>Nine liquid rates can be configured. (L/Tonne or Gal/Ton as per P57.) The rate programmed under Parameter 70 will be the rate under position 1 of the liquid dial in operation mode. Parameter 79 is position 9 of the liquid dial.</td>
</tr>
<tr>
<td>Enhancing Conveyor start up</td>
<td>80</td>
<td>Conveyor Forward Gain provides an additional output to the conveyor on startup. This feature overcomes initial inertia and friction at startup, allowing for an even distribution of material from a stopped position.</td>
</tr>
<tr>
<td>Setting the minimum conveyor speed</td>
<td>81</td>
<td>Nulling of the conveyor solenoid to set the minimum controller output amperage required to start the conveyor. Required to get a smooth startup of the conveyor. Page 12.</td>
</tr>
<tr>
<td>Setting the maximum conveyor speed</td>
<td>82</td>
<td>Nulling of the conveyor solenoid to set the maximum controller output amperage required for maximum conveyor speed. Required to reduce over-amperage to the coil to extend its life.</td>
</tr>
<tr>
<td>Setting the minimum spinner speed</td>
<td>83</td>
<td>Nulling of the spinner solenoid to set the minimum controller output amperage required to start the spinner. Required to get a smooth startup of the spinner.</td>
</tr>
<tr>
<td>Setting the maximum spinner speed</td>
<td>84</td>
<td>Nulling of the spinner solenoid to set the maximum controller output amperage required for maximum spinner speed. Required to reduce the over applied amperage to the coil to extend its life.</td>
</tr>
<tr>
<td>Setting the minimum liquid speed</td>
<td>85</td>
<td>Nulling of the liquid solenoid to set the minimum controller output amperage required to start the liquid pump. Required to get a smooth startup.</td>
</tr>
<tr>
<td>Setting the maximum liquid speed</td>
<td>86</td>
<td>Nulling of the spinner solenoid to set the maximum controller output amperage required for maximum spinner speed. Required to reduce the over applied amperage to the coil to extend its life.</td>
</tr>
</tbody>
</table>
5 Programming and Setting Up the System

5.1 Quick Set-up Guide

- Insert programming key and turn to activate program mode
- Set the units of measure – either imperial or metric using P57
- Set the desired material application rates using P1 through 9
- Set the desired liquid rates using P70-79
- Set the desired operating control mode of the solid using P20 – toggle the power on and off to accept the control mode change
- Set the desired operating control mode of the liquid using P25 – toggle the power on and off to accept the control mode change
- Set the desired material output while in the BLAST mode using P38 or 39
- Set the desired “Spinner Stop” mode using P35

5.2 Nulling of the Solenoids

5.2.1 Nulling the Solenoids and Engine RPM

Note: Depending on hydraulic pump size, it may be necessary to increase the engine RPM to approximately 1500 RPM during the nulling procedure, in order to ensure sufficient oil flow.

If the conveyor is in closed loop mode and equipped with a feedback sensor, use of the auto-nulling feature in P21 is desired.

- Set the controller to P21
- Press the Conveyor Dial to activate this parameter
- Press the UPPER SELECT KEY and the auto null sequence will begin
- When finished (approximately 90 seconds) press blast to exit and store this parameter

5.2.2 Manually Nulling the Solenoid and Setting the Minimum Conveyor Speed

- Set the controller to P81
- Press the Conveyor Dial to activate this parameter
- Press the UPPER SELECT KEY until the conveyor starts to turn
- Press the LOWER SELECT KEY in small increments until the conveyor stops
- Press the Conveyor Dial to lock in the setting

5.2.3 Manually Nulling the Solenoid and Setting the Maximum Conveyor Speed

- Set the controller to P82
- Press the Conveyor Dial to activate this parameter
- Press the UPPER or the LOWER SELECT KEY until the conveyor is running at the maximum hydraulic motor speed. Observe RPM in closed loop mode displayed on the screen
• Press the Conveyor Dial to lock in the setting

5.2.4 Nulling the Solenoid and Setting the Minimum & Maximum Spinner Speeds
• Following the same procedure above for the conveyor, set the minimum and maximum spinner speed using P83 and 84

5.2.5 Nulling the Solenoid and Setting the Minimum & Maximum Liquid Speeds
If the liquid pump is in closed loop mode and equipped with a feedback sensor, use the auto-nulling feature in P26.

• Set the controller for P26
• Press the Conveyor Dial to activate this parameter
• Press the UPPER SELECT KEY and the auto null sequence will begin
• When finished (approximately 90 seconds) press blast to exit and store this parameter

Follow the same procedure as the spinner if no sensor is present using P85 and 86.

5.3 Ground Speed Calibration
5.3.1 Overview
The CS-430RC Controller determines ground speed by monitoring the pulses it receives from the ground speed sensor mounted in the vehicle transmission. This sensor is the same sensor providing the vehicle’s odometer with the necessary input for the odometer to have the ability to indicate speed and distance.

In order for the CS-430RC to have the ability to calculate ground speed and distance it must first be accurately calibrated. The process of calibration tells the CS-430RC exactly how many pulses per KM or Mile it will receive from the transmission mounted sensor.

The process of calibration needs to be completed for each vehicle, as each vehicle’s system is not exactly the same. Discrepancies may occur due to sensor mounting differences, tire sizes differences etc. thus calibrating each vehicle independently is the only way of ensuring accuracy.

Listed below are the most common techniques for calibrating the ground speed input.

1. Auto-calibration to the vehicle’s speedometer. By driving the vehicle at a predetermined speed using the vehicle’s speedometer as the speed indicator. The accuracy level is only as accurate as the speedometer calibration. During the calibration process the CS-430RC will determine the pulses per KM or Mile; this count will be reflected on the “Speed input” screen once the auto calibration process has been completed.
If the speedometer is inaccurate you may use a GPS unit to determine vehicle speed as described below.

2.  Auto-calibration to a hand held GPS unit. By driving the vehicle at a predetermined speed using a handheld GPS unit as the speed indicator. Using a hand held GPS unit will result in greater accuracy then using the vehicle speedometer. The accuracy level is only as accurate as the GPS Unit’s calibration. During the calibration process the CS-430 will determine the pulses per KM or Mile; this count will be reflected on the “Speed input” screen once the auto calibration process has been completed.

5.3.2  Auto-calibration Using the Vehicle’s Speedometer
• Follow the auto calibration procedure below, hold the vehicle speed to the speed indicated on the vehicle’s speedometer

5.3.3  Auto-calibration Using a Hand Held GPS Unit
• Follow the auto calibration procedure below, hold the vehicle speed to the speed indicated on the GPS unit

5.3.4  Auto-calibration of Ground Speed
• Set the controller to P44
• Press the Conveyor Dial
• Set the speed at which the vehicle will be moving during the calibration process using the SELECT keys. For example 30 mph or km/h
• Drive the vehicle at the speed set above
• Once the vehicle speed is stable, press the conveyor dial
• The setting will be locked in

If verification of the controller ground speed reading indicates that the controller ground speed does not closely match, an adjustment in the Pulses per Kilometer or Pulses per Mile can be made using P45.

5.4  Material Calibration
• Load the vehicle hopper with the material to be calibrated
• Set the Hopper Gate to the desired opening
• Operate the vehicle engine at 1500 RPM
• Set the controller to P22 and Press the Conveyor Dial
• Press the UPPER SELECT key to start the calibration process
• Allow the material to discharge for 1 minute
• Press the UPPER SELECT key to stop the material discharge
• Weigh the material discharged during the calibration process, and enter this weight using the SELECT keys
• Press the Conveyor Dial to accept the value entered
The resulting “Weight per minute” calibration measurement can be seen in P23 (open loop control).
The resulting “Weight per revolution” calibration measurement can be seen in P24 (closed loop control).

If verification of the “Material calibration” indicates that the calibration is inaccurate, an adjustment can be made using P23 or P24. If the discharge weight is lower than expected set P23/P24 lower, if the discharge weight is higher than expected set P23/P24 higher.

5.5 Liquid Calibration

- Fill the liquid reservoir with the liquid to be calibrated
- Operate the vehicle engine at 150 RPM
- Set the controller to P27 and Press the Conveyor Dial
- Press the UPPER SELECT key to start the calibration process
- Allow the liquid to discharge for exactly one (1) minute
- Press the UPPER SELECT key to stop the liquid discharge
- Measure the liquid discharged during the calibration process and enter the volume using the SELECT keys
- Press BLAST to accept this value

If verification of the “Material calibration” indicates that the calibration is inaccurate, an adjustment can be made using P28. If the discharge weight is lower than expected set P28 lower, if the discharge weight is higher than expected set P28 higher.
6 Error Messages

The error message will be displayed on the screen and a buzzer will sound for a few seconds, and will automatically disappear without operator input.

- Set Dials to zero – This prevents accidental start-up of the system once the controller is powered up. The operator needs to set all dials to zero before power-up.
- Speed calibration – An error occurred during the ground speed calibration process. (No feedback signal detected.)
- Spinner calibration – The minimum and maximum null settings are too close for proper operation or the maximum value is lower than the minimum.
- Conveyor calibration – The minimum and maximum null settings are too close for proper operation or the maximum value is lower than the minimum.
- Liquid volume calibration – No feedback detected or the volume is set to zero.
- Liquid calibration – The minimum and maximum null settings are too close for proper operation or the maximum value is lower than the minimum.
- Weight calibration – No feedback detected or the weight is set to zero.
- Potentiometer failure – The spinner, conveyor or liquid dials are malfunctioning; or the cable is damaged.
- Auto-null error – No feedback detected or controller not in closed loop mode.
Notes: