

CS 425RC

Solid De-icer Controller Configuration and Set-up Manual



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1 System Modes of Operation

The CS-425RC Controller allows for 5 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.

2 System Features

The CS-425RC features include:

- ON-OFF switch with Power indicator
- Spinner rate control
- Conveyor/Auger application rate control
- Conveyor feedback “closed loop” control
- Conveyor 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-425RC is an advanced three knob control system that utilizes the Rexroth RC-4/4 electronic mobile controller to drive Spinner/Conveyor/joystick outputs. The RC-4/4 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.

The 4-axis Hall effect joystick allows control over 4 truck functions while the additional switches and indicators complete the package.

4 System Specifications

	Specifications
Dimensions (approx.): Display	W – 7.5” (190mm) H – 6.25” (160mm) D – 3.5” (90mm)
Microcontroller	W – 8” (202mm) H – 1.6” (41mm) L – 7.1” (182mm)
Weight: Display Microcontroller	5 LB (2.3 kg) 1.5 LB (0.7 kg)
Input Voltage	8-28 VOLTS
Proportional Valve Outputs	2 (Spinner and Conveyor) 8 (Raise, Right, Lower & Left) x 2 Modes
On/Off Valve Outputs	1 (Auger Reverse)
Speed Input Limits	2 (Vehicle Speed and Conveyor Speed)
Max Current per Output	2.3 AMPS
PWM Dither Frequency	100 Hz
Speed Input Limits	PNP, NPN and Hall Effect – 0...10kHz > 1V rms.

CS-425RC Front Face Layout



4.1 CS-425RC Dial and Button Functions

On-Off Switch

Powers up the controller.

Spinner and Auger/Conveyor Dials

Control the rates of the Auger/Conveyor and spinner(s) and 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.

Proportional Joystick

To activate hydraulic functions (i.e. plow lower/left, hoist raise, etc.).

Deadman Button

A momentary push button for enabling the joystick outputs.

Joystick Mode Switch

A rocker to change between plow and hoist mode (optional).

4.2 Commissioning the CS-425RC

4.2.1 Commissioning Procedure

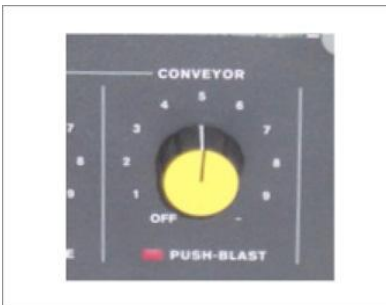
Once the programming key is inserted and turned, the controller will enter into programming mode and the screen will display the parameter numbers.



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

Function	Parameter No.	Description
Setting the spread rates	1 to 9	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.
Setting the spinner speed	11 to 19	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.
Selection of Solid control mode	20	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. <ul style="list-style-type: none"> • Toggle the power on and off to accept the control mode change.
Conveyor Autonull	21	Used to automatically set the minimum and maximum valve setting on the conveyor. Available in closed loop mode.
Calibrating solid material	22	Material calibrations. See “calibration procedure” on page 16.
Weight per minute at max speed	23	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.
Weight per revolution of conveyor	24	The result of the calibration process in LBS or Kg per revolution is shown here. Available in closed loop mode.
Blast Alarm - seconds	33	This parameter set the time allowed in Blast mode before an alarm sounds. 0 = disabled 0-300 seconds, default = 15 seconds.
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.

Function	Parameter No.	Description
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 15.
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 15 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).
Joystick type	50	This sets if the joystick will be used for proportional or on/off control. 0 = proportional 1 = on/off with 5 degrees of joystick deflection 2 = on/off with 10 degrees 3 = on/off with 15 degrees
4-axis mode	51	This selects the operation of the mode switching: Off – disables mode switching. Momentary – switches modes when the joystick button is used. Toggle – switches modes when the modes selection rocker is used.
Trigger mode	52	This turns the deadman feature On or Off where the joystick button is required to enable outputs. This is set to Off when mode switching is done on the handle switch.
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.
Joystick nulling	60	Parameter for setting the minimum and maximum outputs for the joystick functions.

Function	Parameter No.	Description
Enhancing Conveyor start up	80	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.
Setting the minimum conveyor speed	81	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 13.
Setting the maximum conveyor speed	82	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.
Setting the minimum spinner speed	83	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.
Setting the maximum spinner speed	84	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.

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 operating control mode of the solid using P20 – **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
- Set the joystick minimum and maximum outputs with P60

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

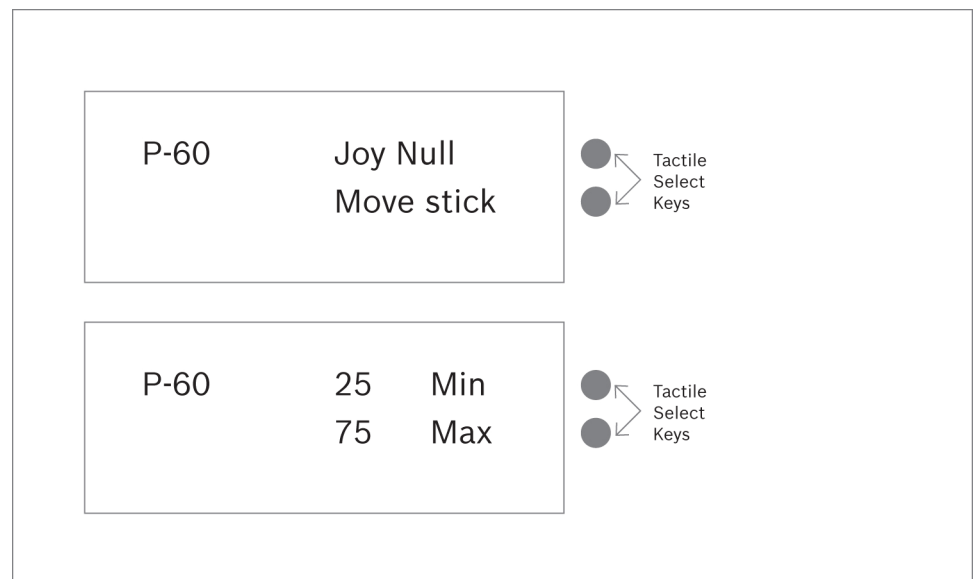
- Set the controller to **P82**
- Press the Conveyor Dial to activate this parameter
- Press the UPPER or the LOWER SELECT KEY until the conveyor is running at the maximum hydraulic motor speed. Observe RPM in closed loop mode displayed on the screen
- Press the Conveyor Dial to lock in the setting

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 Joystick and Setting the Minimum and Maximums

- Set the controller to **P60**
- Press the conveyor knob to start the calibration procedure
- Select the mode of operation with the rocker switch
- Move the joystick slightly in the desired direction and observe the function movement (i.e. plow raise)
- When the stick is moved, the values in the center of the screen represent the valve output percentage
- Press the upper arrow button to accept the minimum value
- Move the joystick further to obtain the desired maximum speed of the function
- Press the lower arrow button to accept the maximum value
- Repeat steps 3 to 8 for all other directions and modes
- Press the conveyor knob to exit the parameter



If the valve bank to be controlled is not proportional, P50 can be used to select the on/off feature.

5.3 Ground Speed Calibration

5.3.1 Overview

The CS-425RC 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-425RC to have the ability to calculate ground speed and distance it must first be accurately calibrated. The process of calibration tells the CS-425RC 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-425RC 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-425RC 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.

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.
- 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.
- Joystick calibration error – The minimum joystick null is larger than the maximum – re-calibration is necessary.

Notes: