Rexroth
Bosch Group

CS 440RC

Solid De-icer Controller Closed-Loop Gate Control

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1 Overview

The closed-loop gate control system is designed to minimize the variations in conveyor RPM, to keep the RPM roughly at the midpoint of its range. The default range of RPM that is used is from 40% to 60% of the maximum RPM. Any RPM outside this range will trigger a gate movement up or down, to try to stabilize the RPM. The correction will continue until it either succeeds or the gate reaches its maximum or minimum allowed position. The range of allowed RPM can be adjusted in the desktop software using the item 'Sensors & Valves' ->'Closed-Loop RPM Range'. The range of allowed gate positions is determined when calibrating the gate read-back sensor.

On startup the gate will normally be at the minimum allowed position and will start monitoring the conveyor RPM to see if any action is needed. As the ground speed increases or the application rate increases, the gate will open automatically. If the truck slows down, or the application rate goes to zero, or the controller goes into PAUSE mode, the gate will return to the minimum allowed position. During an UNLOAD event the gate will move to the maximum position. During a calibration event the gate will move to the specified gate calibration position for that material. The controller will not close the gate if the truck is stationary, for safety reasons.

In addition to the automatic control described above, the gate position can be manually adjusted using the Up and Down buttons on the user interface. This is useful when commissioning the system. When in normal operating mode this can be done if the truck is stationary, by pushing the Escape button to display the trip summary, and then using the Up and Down buttons. When in Program mode, use the 'Sensors & Valves'->'Gate Setup' screen to initiate manual gate adjustment using the Up and Down buttons.

2 Hardware Set-up

The outputs to control the gate position are:

G1 Gate Raise
Connects to the optional gate raise valve solenoid.

G2 Gate Lower
Connects to the optional gate lower valve solenoid.

Note: The stroke limiters on the valve may need to be adjusted in to limit the flow to the cylinder. This will provide smooth and slow gate movement. The best way to judge this is to manually adjust the gate position using the Up and Down buttons, to confirm that you can reliably reproduce a desired gate height.

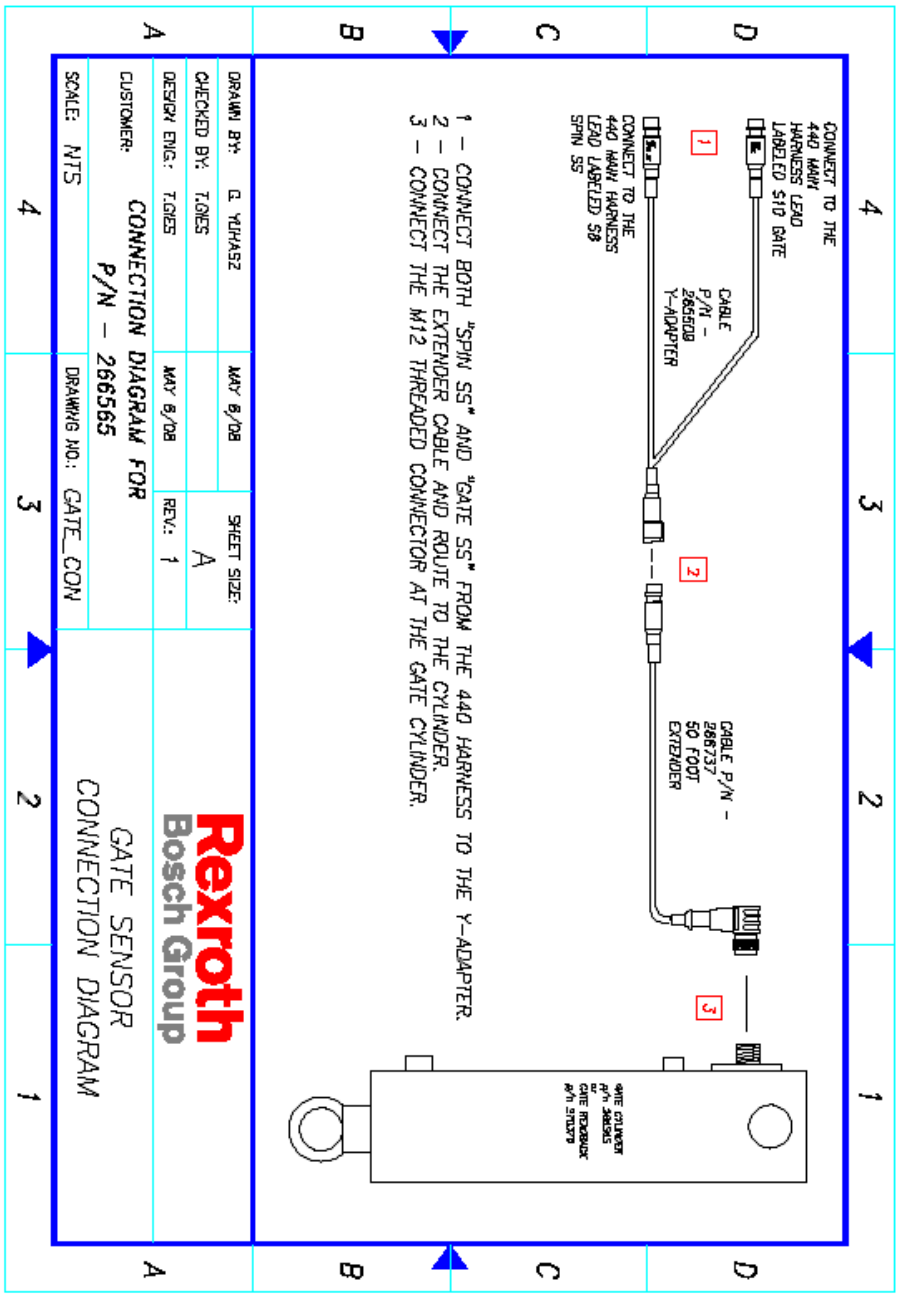
The read-back sensor to measure the gate position is connected as shown:

Gate Cylinder with Read-back
The cylinder has 1” rod and base eyes for mounting and #6 ORB ports.
See the connection diagram for wiring details (next page).

Sensor Wiring
Connect the y-adapter to the CS-440 main harness. Match the connector ends that read S8 SPINNER SS with the S8 connector on the 440 harness. Also match the connectors that are labeled S10 GATE. Connect the 50” extender to the other end and route the extender to the sensor. Push on the M12 connector and tighten the locking ring. Tie all cabling so it does not interfere with any moving parts.

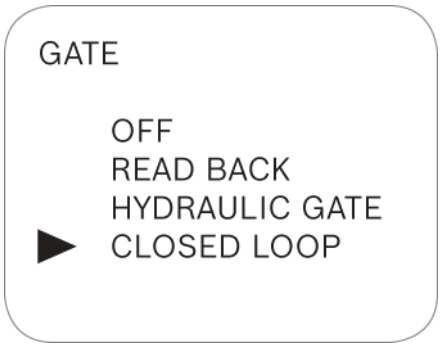
See the connection diagram for clarification.

The gate read-back sensor will have to be calibrated as part of the set-up. See below.


CONNECT TO THE 440 MAIN HARNESS LEAD LABELED S10 GATE
CABLE P/N - 265508 Y-ADAPTER
CONNECT TO THE 440 MAIN HARNESS LEAD LABELED S8 SPIN SS
CABLE P/N - 266737 50 FOOT EXTENDER
1 - CONNECT BOTH "SPIN SS" AND "GATE SS" FROM THE 440 HARNESS TO THE Y-ADAPTER.
2 - CONNECT THE EXTENDER CABLE AND ROUTE TO THE CYLINDER.
3 - CONNECT THE M12 THREADED CONNECTOR AT THE GATE CYLINDER.
DRAWN BY: G. YUHASZ
MAY 6/08
SHEET SIZE: A
CHECKED BY: T.GNES
MAY 6/08
REV.: 1
DESIGN ENG.: T.GNES
CUSTOMER:
CONNECTION DIAGRAM FOR P/N - 266565
SCALE: NTS
DRAWING NO.: GATE_CON
Rexroth
Bosch Group
GATE SENSOR CONNECTION DIAGRAM

3 System Configuration

3.1 Selecting the Gate Mode of Operation



Insert the programming key, select “SYSTEM SETUP”, select “CONTROL MODE” and select “GATE”. The screen to the left will appear.

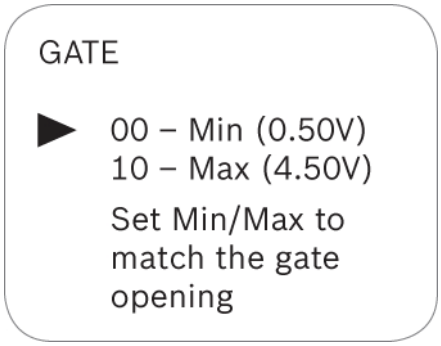
Gate mode “OFF” means that the gate is moved manually and the position is measured manually.

Use Gate mode “READ BACK” if the gate is equipped with a position sensor, but is moved manually.

Use Gate mode “CLOSED LOOP” if the gate has a position sensor, and if the gate position is manipulated hydraulically using output solenoids G1 and G2. This mode is only available in Version x.18 and higher.

Using the navigation buttons, move the cursor to the desired option and press the enter button. The screen will return to the previous screen.

3.2 Calibrating the Gate “Read-back” Sensor



Insert the programming key, select “SENSORS AND VALVES” and select “GATE SETUP”. The screen shown on the left will appear.

3.3 Setting the Minimum Calibration

1. Close the gate to its minimum opening. (If you are using “CLOSED LOOP” gate control this can be done using the ‘Down’ button on the display.)
2. Measure this opening of the gate (see note below).
3. Using the navigation buttons, move the cursor to the “00-Min” option and press the Enter button. The volts reading will change to reflect the actual reading from the sensor.
4. Use the right or left navigation button to move the cursor under the number to be changed.
5. Using the up or down navigation buttons change the setting to match the gate opening.
6. Once the numbers have been changed to match the gate opening, press the enter button.

3.4 Setting the Maximum Calibration

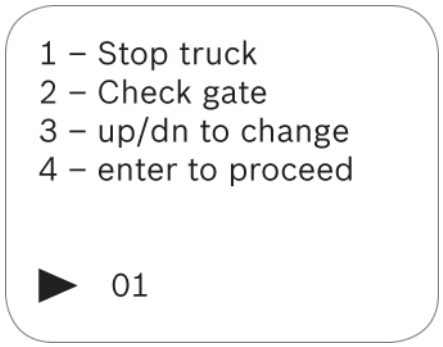
1. Close the gate to its minimum opening. (If you are using “CLOSED LOOP” gate control this can be done using the ‘Down’ button on the display.)
2. Measure this opening **(see note below).**

3. Using the navigation buttons, move the cursor to the “10 Max” option and press the Enter button. The volts reading will change to reflect the actual reading from the sensor.
4. Use the right or left navigation button to move the cursor under the number to be changed.
5. Using the up or down navigation buttons change the setting to match the gate opening.
6. Once the numbers have been changed to match the gate opening, press the enter button.

Press the Escape button twice to return to the first screen.

Note: The measurement is from the bottom of the metal gate to the chain/conveyor. Not from the bottom of the rubber flap (if equipped). Inaccurate gate regulation will result if the gate measurement isn’t correct.

4 Error Configuration



When in closed-loop gate control mode there are no configurable errors. The zero gate warning (code 18) can occur if the gate is stuck in the shut position. If there is a gate sensor failure, the gate position will be frozen, and error code 16 (NO GATE SENSOR) will be displayed. This can only be caused by an open circuit or a short circuit. The operator will be prompted to stop the vehicle, check the gate position and enter the gate setting before continuing. The screen shown on the left will appear.

After completing this procedure the gate control mode will be in manual. Once the gate sensor fault has been corrected, the gate mode must be changed back to closed loop with the programming key.

Notes: