



SOUTHERN
TECHNOLOGIES
CORPORATION

**Frauscher Zero-Speed Wheel Transducers
Installation and Setup
For the SmartScan NG²**



INTRODUCTION

This instructional presentation was created to prepare maintenance personnel for the installation and setup of Frauscher zero-speed Gating Transducers for use with the SmartScan NG² Defect Detector.

Please click on the document image to the right for a technical bulletin from Southern Technologies Corporation containing additional detailed information.



Technical Bulletin

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Bulletin Number: TB 20170150-BW01 **Date Published:** 05/30/2017

Summary: Instructions to mounting, aligning and setting up the 2100-696 Frauscher Zero-Speed Dual Gating Assembly for use with the SmartScan NG²

Critical (Affects safe operation of system) **Informational**

Distribution List:

SmartScan NG² / Frauscher Zero-Speed Transducers – Installation & Setup

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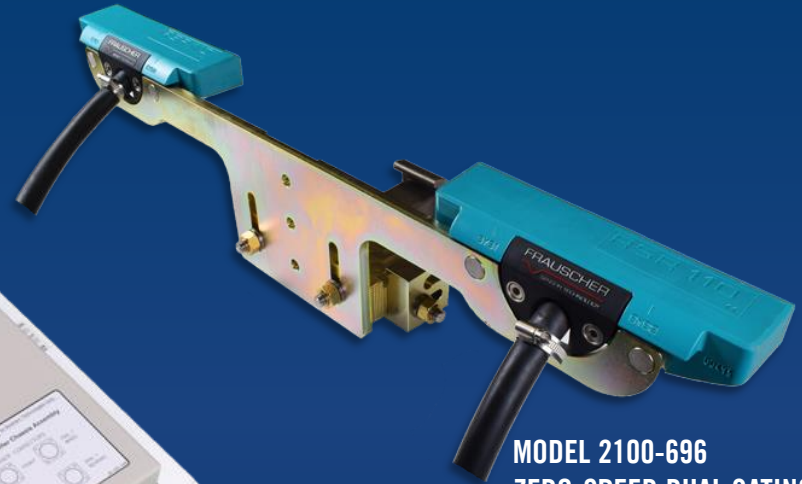
COMPONENTS REFERENCED IN PRESENTATION



**FRAUSCHER ADJUSTMENT
MAINTENANCE BOX (AMB)**



**FRAUSCHER WHEEL SIGNAL
CONVERTER (WSC)**



**MODEL 2100-696
ZERO-SPEED DUAL GATING
ASSEMBLY**



**FRAUSCHER PB200
WHEEL SENSOR TARGET**

ZERO-SPEED TRANSDUCER OVERVIEW

FRAUSCHER RSR 110 ZERO-SPEED TRANSDUCER

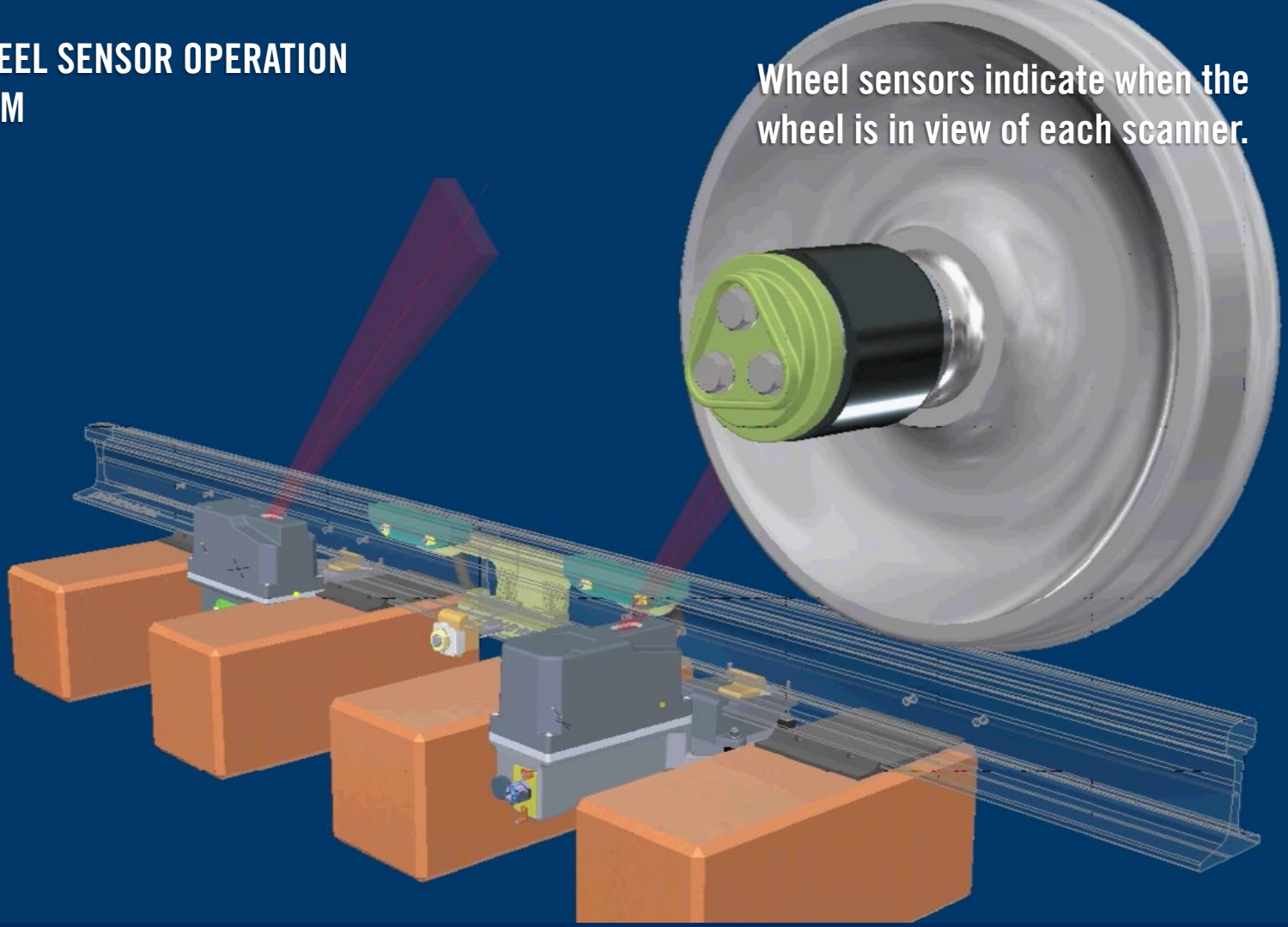
- ❑ SINGLE SENSOR LOCATED AT POSITION “SYS1”.
 - Transducer is identical in appearance to the dual sensor transducer head.
- ❑ INDUCTIVE PROXIMITY SENSOR
 - Internal sensing coil & electronic circuitry
- ❑ OPERATES FROM 0-MPH TO +100-MPH
 - Signal stays active while wheel is parked over sensor.
 - Produces An Electrical Pulse as a Wheel Passes.
- ❑ HIGH IMMUNITY TO:
 - Locomotive traction motor radiated noise emissions.
 - Locomotive dynamic braking radiated noise emissions.
 - Noise generated from rail currents in high voltage rails.
 - Noise generated by light rail transit vehicles.



Certified to European Standard EN50121-4 for Railway Applications, which defines electromagnetic compatibility requirements regarding electrical emissions and noise immunity of signaling and telecommunications apparatus.

ZERO-SPEED WHEEL SENSOR OPERATION IN AN HBD SYSTEM

Wheel sensors indicate when the wheel is in view of each scanner.



RELOCATING EXISTING WHEEL SCANNER

The photo to the right represents the standard Wheel Scanner and Wheel Transducer configuration using Magnetic Gating Transducers.

The Wheel Scanner installed on the rail with the Gating Transducers must be moved into another crib to accommodate the Zero-Speed Transducer Mounting Bracket.



STANDARD SCANNER CONFIGURATION

INSTALLING THE WHEEL SCANNERS

You can install Wheel and Bearing Scanners up to two hundred inches to either side of the center of the Gating Transducer mounting bracket.

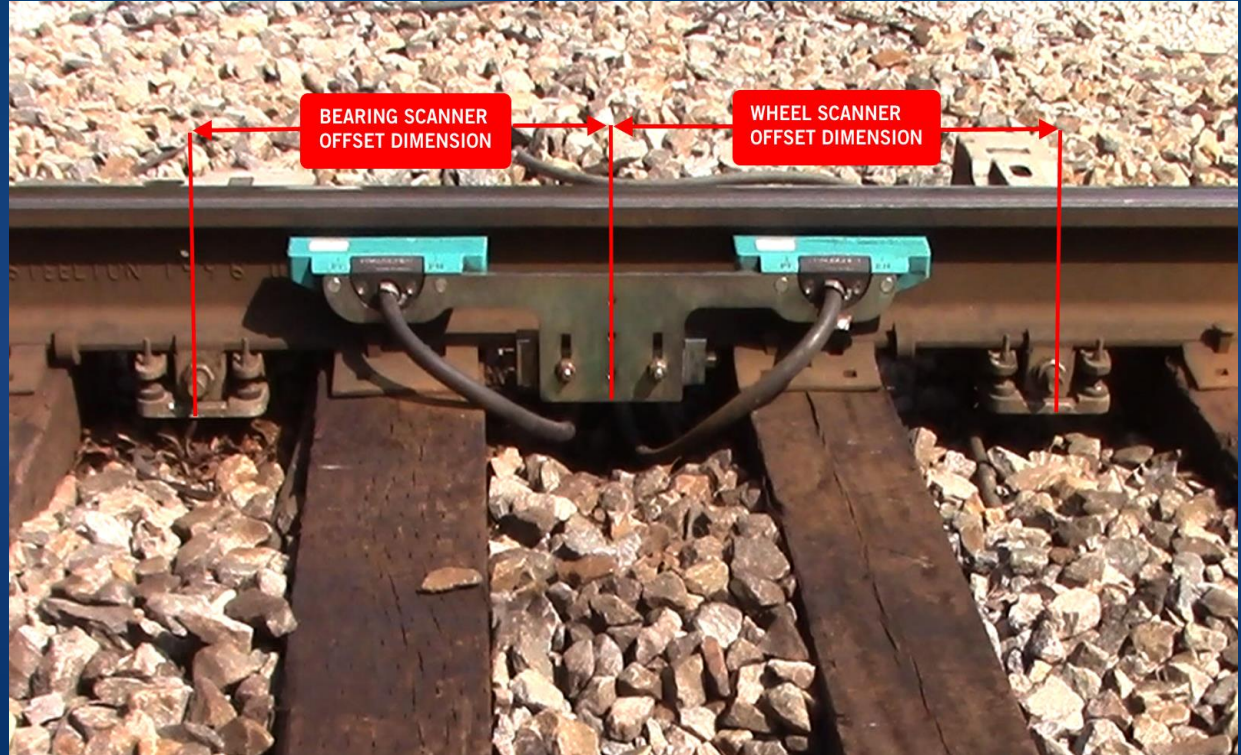
- ❑ It is not necessary to install both Wheel Scanners in the same crib.
- ❑ Aim the Bearing Scanners in the direction of the Gating Transducers.
- ❑ As pictured right, install a Wheel Scanner on the same rail with the Wheel Transducer Assembly, but in separate cribs.



SCANNER CONFIGURATION WITH FRAUSCHER TRANSDUCERS

GETTING DIMENSIONS OF THE TRACK HARDWARE LAYOUT

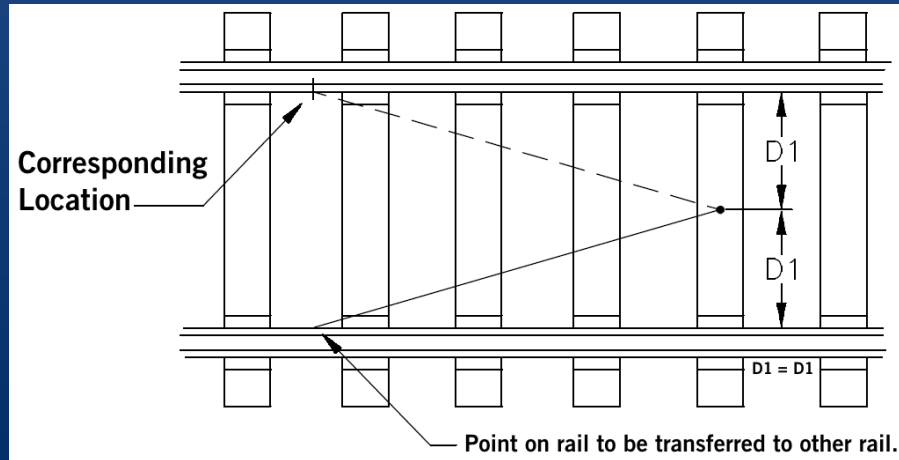
1. Measure the offset dimensions from the center of the Wheel Transducer mounting bracket to the center of each scanner's mounting bracket.
2. Transfer the center point of the wheel transducer mounting bracket to the other rail to use as the reference point for measuring offset dimensions for the remaining two scanners.
3. Write down the Offset Dimensions to enter as setup data into the SmartScan NG².



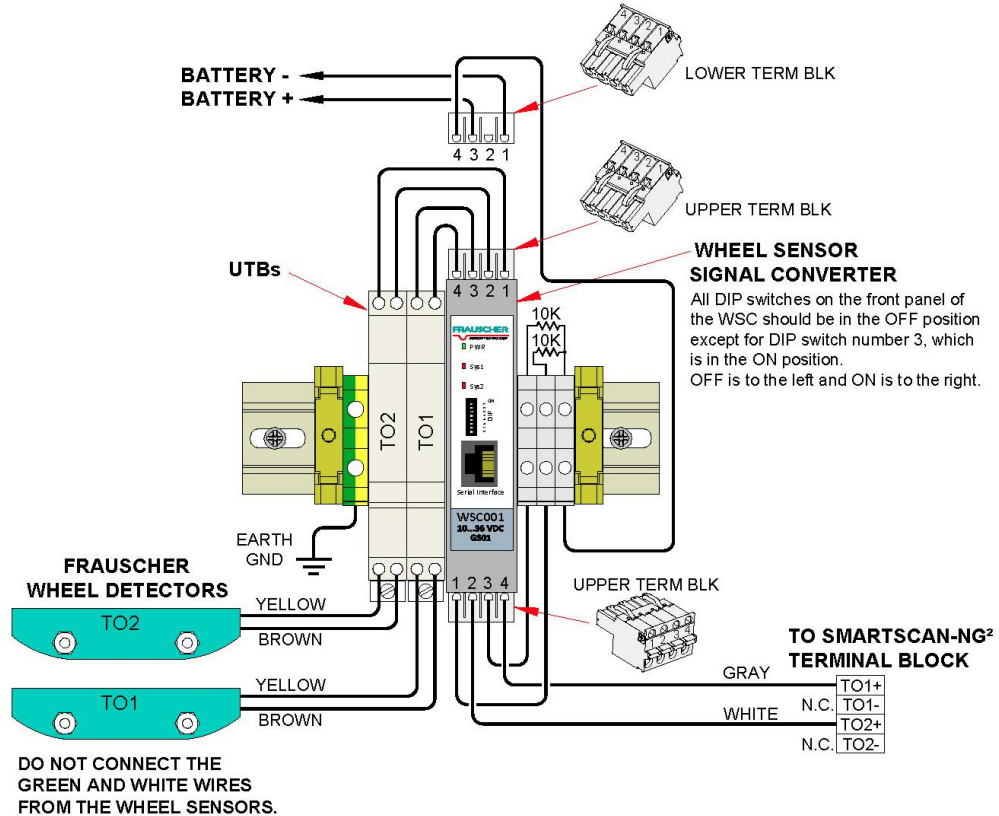
METHOD FOR TRANSFERRING A LOCATION TO THE OPPOSITE RAIL

Refer to the illustration below.

1. At equal distances between the rails place a mark on the fourth crosstie from the point to be transferred, as represented in the figure below between the two D1 dimensions.
2. Measure from the mark that you made on the crosstie to the point on the rail that you need to transfer to the other rail. Use this dimension in the next step.
3. Measure the same distance from to the mark in the center of the crosstie to the “Corresponding Location” on the other rail. Mark the corresponding location on the rail.

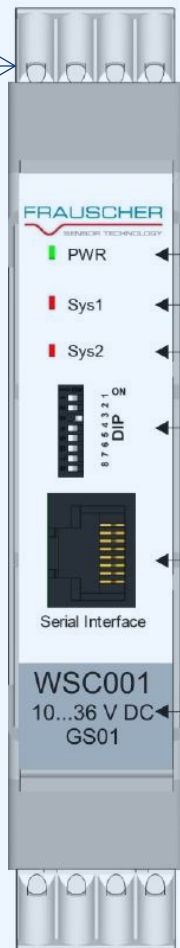


WIRING FOR 2300-547 FRAUSCHER SIGNAL CONVERTER KIT



NOTE: This supplemental kit is applicable ONLY for those SmartScanNG² systems equipped with SICM Board Version 1.2 or older. Newer designs have the Frauscher interface circuitry built-in and are easily identified by a **Compatible with Frauscher Wheel Sensors** label on the cover.

WHEEL SIGNAL CONVERTER



Element

Description

PWR (LED)

status indicator of power supply

Sys1 (LED)

status indicator of system 1 (Transducer TO-1)

Sys2 (LED)

status indicator of system 2 (Transducer TO-2)

DIP-switches

set DIP switch number 3 to the ON position and all others to the OFF position

Serial Interface (RJ45-socket)

connection socket for diagnostic interface (ASD)

Type key

WSC001

board identification

10...36 V DC

permissible supply voltage

GS01

equipment version (beginning with 01)

AUTOMATED ADJUSTMENT

The transducers must be calibrated by running the Automated Adjustment Function before being placed into service. Following are three ways to initiate the Automated Adjustment Function, which is a feature of the transducers.

- ❑ Use the Wheel Signal Converter (WSC) by setting DIP switch number eight to the ON position for two seconds and back OFF again before six seconds as detailed later in this PowerPoint presentation. See details on the next slide.
- ❑ Use the Adjustment and Maintenance Box (AMB) and a voltmeter as described in the video presentation at the following internet link. <https://youtu.be/OQEqp5GRHjk>
- ❑ Reverse the polarity of the transducer by swapping its signal wires and then allow sixty seconds for the Auto Adjustment to finish. Connect the wires back in the original positions. Use this method as a last resort if either of the previous two techniques is not available. This method does not provide confirmation of correct calibration.

Verify valid wheel occupancy after calibration with the Frauscher PB200 Wheel Sensor Target tool by observing the corresponding Sys1 and Sys2 LEDs on the WSC, which should mirror the transducer LEDs on the SmartScan NG².

RUNNING THE AUTOMATED ADJUSTMENT FEATURE FROM THE WHEEL SIGNAL CONVERTER (WSC)

1. Connect the zero-speed transducers to the Wheel Signal Converter using standard wiring as provided in the wiring diagram.
 2. Apply power to the system.
 3. Confirm that the wheel sensors are mounted and aligned correctly.
 4. Be sure that no metal objects are laying on either sensor.
 5. Located on the WSC are a bank of DIP switches. To start the Automated Adjustment Function, flip DIP switch number eight to the ON position for between two and six seconds. Turn the switch OFF before six seconds has passed.
- The Sys1 and Sys2 LEDs light up while the Automated Adjustment Process is running.
 - The WSC adjusts both sensors simultaneously over the next forty seconds.
 - The Sys1 and Sys2 LEDs turn off when the session is over, indicating successful calibration.
 - A blinking Sys LED after the calibration process means that the associated sensor(s) did not successfully calibrate.
 - If one or both sensors failed to calibrate, check the wiring, check the wheel sensor alignment, or there may be a faulty wheel sensor.

After successful calibration of both transducers, use the PB200 Test Wheel Sensor Target to test for occupancy detection. Verify that the Sys1 and Sys2 LEDs indicate the position of the wheel sensor target. The Smart Scan NG²'s T01 and T02 LEDs should mirror the operation of the Sys1 and Sys2 LEDs.

OCCUPANCY DETECTION

After successful automated adjustment of both transducers, use the PB200 Test Wheel Sensor Target (pictured right) to test for occupancy detection as follows.

1. Place the Sensor Target on the Sys1 sensor of transducer T01. Align the notch on the bottom of the Sensor Target with the hash mark on the top of the SYS1 transducer. The Sys1 LED located on the WSC and the T01 LED on the SmartScan NG² should light up.
2. Repeat the procedure with transducer T02. The Sys2 LED on the WSC and the T02 LED on the SmartScan NG² should light up.



Installation Video



SETTING UP THE VIRTUAL GATE

Drilling Down to the “Transducer / Scanner Offset Menu”

Main Menu

Setup Menu

Equipment Settings


Advanced

```
SmartSCAN NG2, MP/KP:1234.6, Track:Track 2
05/24/2017 13:32:57, 13.9V, 65°F
Transducer / Scanner Offset Menu
-----
[A] - Transducer Type ..... Frauscher
[B] - Rail Size ..... 136 (67.46)
[C] - East Rail Scanner Offset ..... 0 inches (TO2)
[D] - West Rail Scanner Offset ..... 0 inches (TO2)
[E] - East Wheel Scanner Offset ..... 0 inches (TO1)
[F] - West Wheel Scanner Offset ..... 0 inches (TO1)
[X] - Exit
```

SETTING UP THE VIRTUAL GATE

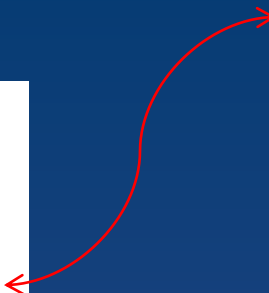
```
SmartSCAN NG2, MP/KP:1234.6, Track:Track 2
05/24/2017 13:32:57, 13.9V, 65°F
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[D] - West Rail Scanner Offset ..... 0 inches (TO2)
[E] - East Wheel Scanner Offset ..... 0 inches (TO1)
[F] - West Wheel Scanner Offset ..... 0 inches (TO1)
[X] - Exit
```

**Press 'A' to toggle between
Magnetic and Frauscher
transducers.**



SETTING UP THE VIRTUAL GATE

```
SmartSCAN NG2, MP/KP:1234.6, Track:Track 2
05/24/2017 13:32:57, 13.9V, 65°F
Transducer / Scanner Offset Menu
-----
[A] - Transducer Type ..... Frauscher
[B] - Rail Size ..... 136 (67.46)
[C] - East Rail Scanner Offset ..... 0 inches (TO2)
[D] - West Rail Scanner Offset ..... 0 inches (TO2)
[E] - East Wheel Scanner Offset ..... 0 inches (TO1)
[F] - West Wheel Scanner Offset ..... 0 inches (TO1)
[X] - Exit
```



```
Select a Rail Size:
lbs/yd (kg/m)
[A] - 100 (49.62)
[B] - 115 (57.05)
[C] - 122 (60.52)
[D] - 127 (63.00)
[E] - 132 (65.48)
[F] - 136 (67.46)
[G] - 141 (69.94)
```

SETTING UP THE VIRTUAL GATE

```
SmartSCAN NG2, MP/KP:1234.6, Track:Track 2
05/24/2017 13:32:57, 13.9V, 65°F
Transducer / Scanner Offset Menu
-----
[A] - Transducer Type ..... Frauscher
[B] - Rail Size ..... 136 (67.46)
[C] - East Rail Scanner Offset ..... 0 inches (TO2)
[D] - West Rail Scanner Offset ..... 0 inches (TO2)
[E] - East Wheel Scanner Offset ..... 0 inches (TO1)
[F] - West Wheel Scanner Offset ..... 0 inches (TO1)
[X] - Exit
```

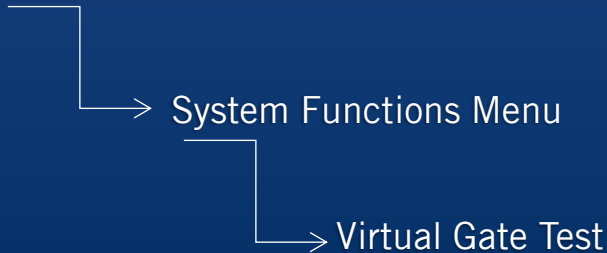
Enter the Offset Dimension and select the Wheel Transducer in which each scanner is closest.

VERIFYING VIRTUAL GATE OPERATION

Definition of Virtual Gate: The Smart Scan NG² permits relocation of Wheel Scanners and Bearing Scanners up to one hundred inches to either side of their original respective locations. To measure temperatures outside of the physical gate, the system records a continuous stream of data samples from each scanner. After the axle has crossed the transducers, the correct samples are picked out based on the speed and direction of the axle and the offset position of the scanner.

Drilling Down to the “Virtual Gate Test”

Main Menu



VERIFYING VIRTUAL GATE OPERATION

While in Virtual Gate Test Mode, the goal is to simulate a wheel that passes over the Gating Transducers and then continues moving to the scanner under test. The system notifies you when the simulated wheel is in the Virtual Gate area by cycling the shutters. The following steps describe how to use the Virtual Gate Test Mode.

Virtual Gate Test Menu

```
Select a scanner:
```

- [1] - East Rail
- [2] - West Rail
- [3] - East Wheel
- [4] - West Wheel

```
Are you sure? (y/n)  
You have 2 minutes to test.  
Test running, press any key  
to abort the test...  
Train Arrival
```

```
Virtual gate test complete.  
*** Train Is Present ***
```

From the Virtual Gate Test Mode menu, select a scanner in which you want to see its Virtual Gate position.

1. Swipe across the Gating Transducers with a metal object in the direction of the scanner under test. Maintain a speed faster than 1.6 seconds between sensors.
2. Swipe across the sensors again. However, this time continue moving the metal object to the scanner under test while maintaining a constant speed.
3. The shutters rapidly cycle one time to indicate when the system is looking for heat in the virtual window located at the scanner, which should be at the time that the metal object (simulated axle) passes the scanner. *If the shutters do not cycle, the entry for closest transducer (T01 or T02) may be incorrect.*
4. Repeat step number four, simulating various axle speeds, as needed to confirm settings.

The test mode runs for two minutes before timing out. Otherwise, any keypress ends the session. Rapid shutter flutter is an indication that two minutes have expired and the test has ended automatically. The event log records a canceled train at the end of the testing session.

VERIFYING VIRTUAL GATE OPERATION

Virtual Gate Test Mode Video



TRANSDUCER TROUBLESHOOTING

Preventive Maintenance

Periodically perform the following maintenance work, adapted to the conditions of the track, but at least every two years.

- A visual and mechanical check.
- Check wheel sensor for excessive dirt build up.
- Check wheel sensor for external mechanical damages.
- Check mounting bracket for correct fit.
- Check rubber conduit tube for damage.
- Check cable connection terminals for correct fit.

TRANSDUCER TROUBLESHOOTING

Checking the Sensor for Correct Current Flow

There are approximately 5 milliamps of current flow through the sensor when it is working properly, and it is not sensing a target.

Tools Needed:

- A digital Volt/Ohm meter with a milliamp setting.
- Small bladed straight slot screwdriver approximately 1/8" wide.

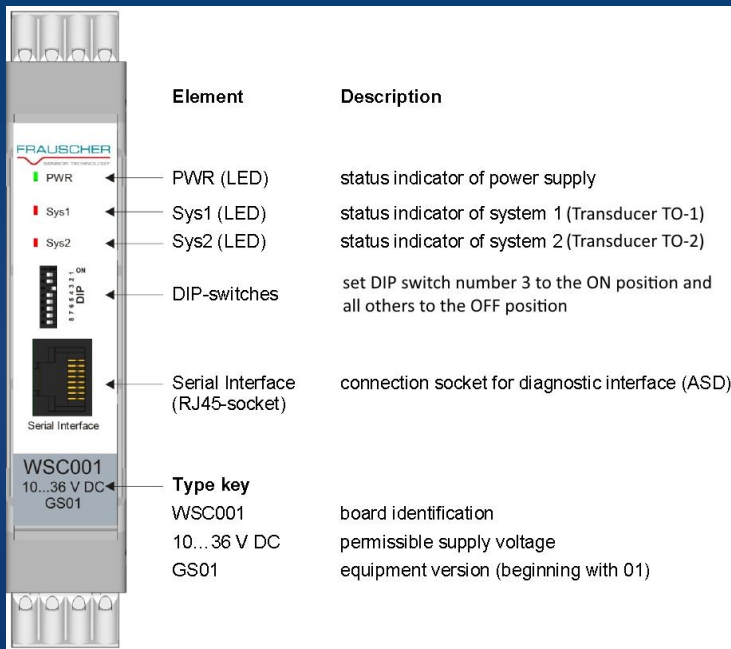
Connect the ammeter in series with the yellow transducer wire as follows.

1. Verify that the sensor is powered up by measuring the voltage across the brown (positive) and yellow (negative) sensor wires going to the WSC for 24 Volts DC.
2. Set the digital voltmeter to measure DC milliamperes and unplug the red meter lead from the voltage jack and plug it into the milliamps jack on the meter.
3. Remove the yellow sensor wire from the WSC and replace it with the black meter probe.
4. Touch the red meter probe to the yellow sensor wire that you removed from the WSC in the last step. The milliamp meter is now in series with the negative sensor wire.
5. Check for positive 5 milliamps, within a tolerance of +/- 5%.
6. The current measurement should go down as a metal target comes near the sensor.

If the current flow is not correct, try the following.

- Run the Automated Adjustment function.
- Check for breaks in the sensor wiring.
- Replace sensor.

TRANSDUCER TROUBLESHOOTING



PWR LED Off

MEANING	POSSIBLE SOLUTIONS
No power supply	Apply power supply
Wrong polarity	Reverse polarity
Open fuse	Replace WSC

Sys1 / Sys2 LED Flashes Slowly

MEANING	POSSIBLE SOLUTIONS
WSC did not initiate Automated Adjustment correctly	Run Automated Adjustment Function
Wire break in the wheel sensor circuit	Check wiring for open circuit
Overcurrent in wheel sensor circuit	Check wiring for short circuit



SMARTSCAN | NG²

**Thank you for watching this presentation on
Frauscher Zero-Speed Wheel Transducer
Installation and Setup
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