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Availability: ISIS, FleetISIS
Major System: EXHAUST
Current Language: English
Other Languages: NONE
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Author: Keith Kierzek

Title: N9/N10/N13 Aftertreatment Fault Codes Caused by Incorrect DPF Differential Pressure Sensor Orientation

Applies To: All Navistar Powered SCR Vehicles

CHANGE LOG

11/18/2015 - Added "Claim Comments Suggestion"
09/15/2015 - Revised wording for diagnostic step 2 "yes" decision
04/17/2015 - Fixed images
04/16/2015 - Initial Article Release

DESCRIPTION

The aftertreatment DPF differential pressure sensor can be installed in an incorrect orientation (**Figure 1**). This orientation of the sensor allows moisture to be trapped inside the sensor and/or sensor tubes. The trapped moisture affects the signal processing of the sensor when reading the pressure inside the DPF, leads to incorrect pressure readings, and Fault Code(s) 3251-2, 3251-16, 3251-0, 3936-15, 3251-15, 3610-2, and 3936-16 being set.

NOTE: For Cummins powered vehicles, refer to TSB 140105 located on QuickServe Online.

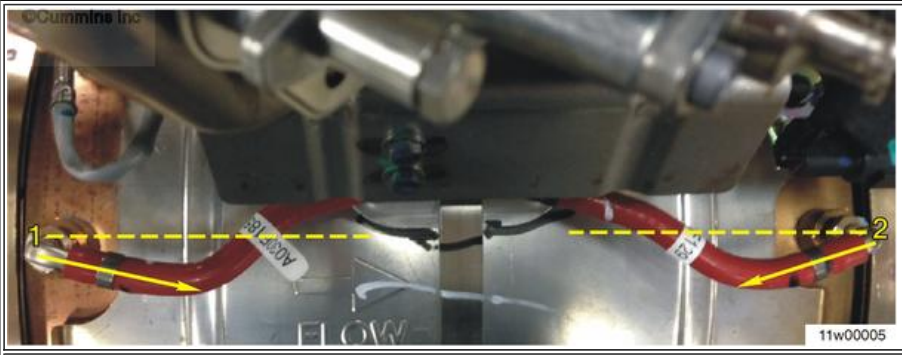


Figure 1: Incorrect DPF differential pressure sensor orientation

SYMPTOMS

Diagnostic Trouble Codes:

SPN	FMI	Cummins FC	Description	Lamp
3251	2	1883	DPF DP Signal Erratic, Intermittent, or Incorrect	Amber

3251	16	1921	DPF Soot Load - Moderately Severe Level	Amber
3251	0	1922	DPF DP Excessively High	Red
3936	15	1981	DPF System Above Warning Pressure	Amber
3251	15	2639	DPF Soot Load - Least Severe Level	None
3610	2	3135	DPF OP Signal Erratic, Intermittent, or Incorrect	Amber
3936	16	3168	DPF System Above Maximum Pressure	Amber

SPECIAL TOOLS / SOFTWARE

Not Applicable

SERVICE PARTS INFORMATION

No parts necessary

DIAGNOSTIC STEPS

Step	Action	Decision
1	**VERIFY CONCERN:** Reference electronic service tool to read the fault codes. Check for Fault Code (s) 3251-2 (1883), 3251-16 (1921), 3251-0 (1922), 3936-15 (1981), 3251-15 (2639), 3610-2 (3135), 3936-16 (3168). Are any of the listed fault codes active or inactive?	**Yes**. Go to step 2. **No**. Exit this article and diagnose appropriate fault codes.

Step	Action	Decision
2	**VISUAL INSPECTION:** Visually inspect the aftertreatment DPF differential pressure sensor to confirm its orientation. 0 to 10 degrees is acceptable (**Figure 2**). Any amount of droop below 0 degrees is not acceptable (**Figure 3**). Is the DPF differential pressure sensor installed in the correct orientation? **NOTE: 0 degrees is acceptable**	**Yes.** Return to appropriate Fault Code Action Plan (FCAP) to continue troubleshooting fault codes. **No.** Follow the steps below in the *Repair Steps* section.

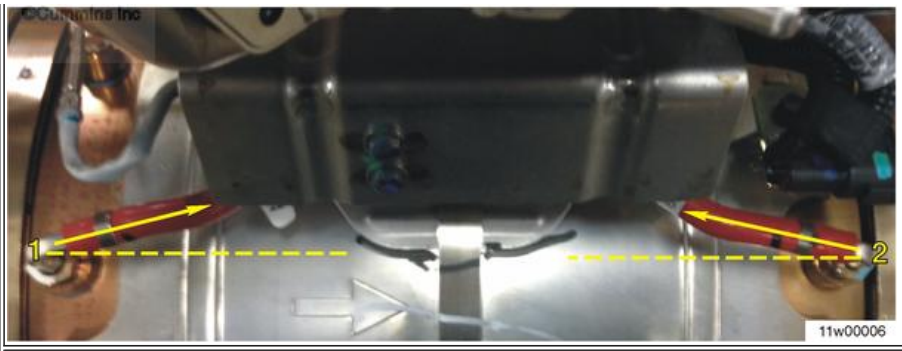


Figure 2: Correct Orientation - Between 0 and 10 degrees

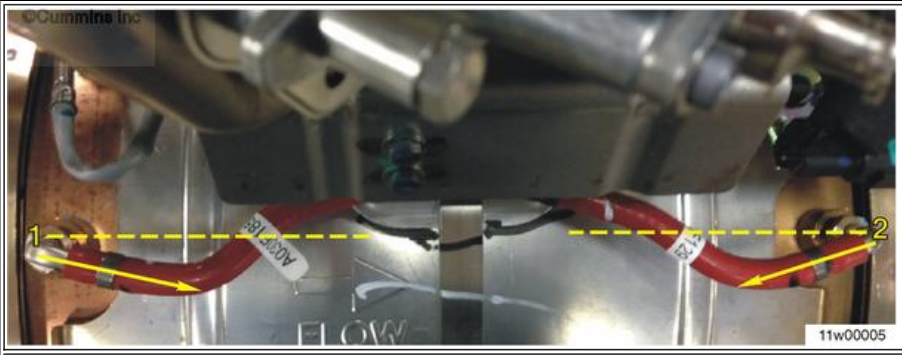
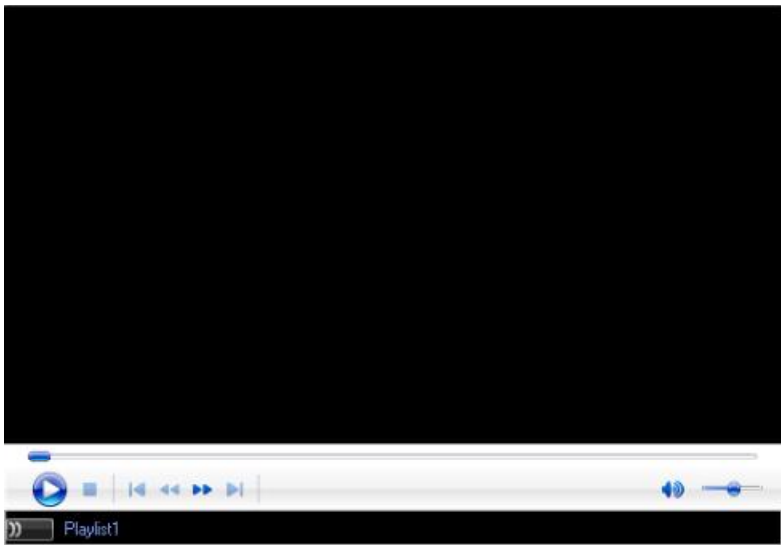


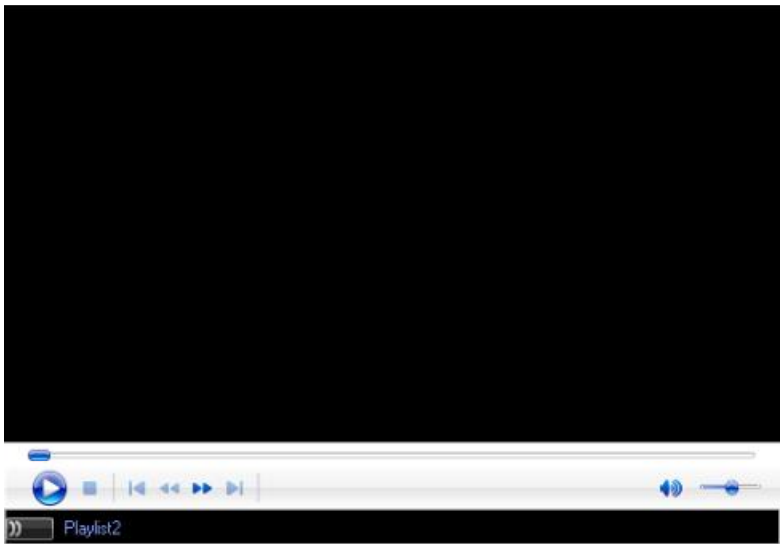
Figure 3: Incorrect Orientation - Below 0 degrees

REPAIR STEPS

The DPF differential pressure sensor tubes should have a 0-10 degree downward slope away from the sensor ports whether in a vertical or horizontal aftertreatment configuration. A 0-10 degree sensor tube downward angle is recommended to make sure that no cavity exists in the tubes to collect moisture.

A video has been created to help illustrate the following adjustment procedure. Watch the two videos below to view the repair from start to finish.





REPAIR PROCEDURE:

Align the temperature coupling on the diesel oxidation catalyst (DOC) inlet (stamped T1) and the temperature coupling on the DPF (stamped T2). If they are not aligned, loosen the band clamps and align the temperature sensor probes by rotating the aftertreatment DPF canister. **Figure 4** below shows the difference in mounting between a canister mounted and remote mounted DPFDP sensor. **Refer to appropriate section for repair steps below.**

NOTE: Reference Section 9 for switchback/horizontal or Section 10 for vertical/vertical exhaust configurations of the Exhaust Aftertreatment System with DPF and SCR Service Manual for assistance.

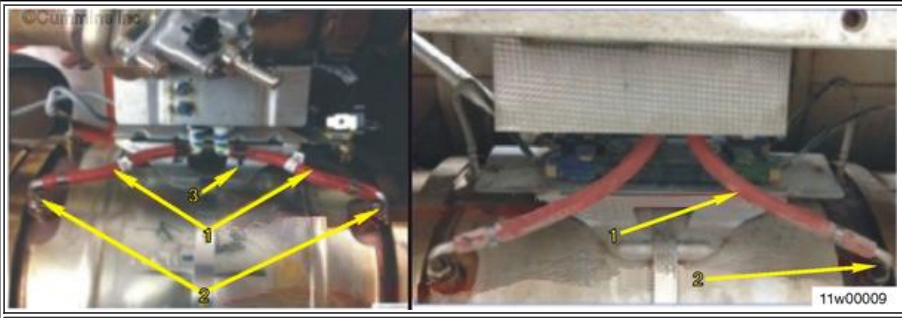


Figure 4: Canister mounted (left) versus remote mounted (right) DPFDP sensor

Left Image Item 1: DPF DP Tubes Left Image Item 2: DPF DP Sensor Port Fittings Left Image Item 3: DPF DP Tube P-Clips	Right Image Item 1: DPF DP Tubes Right Image Item 2: DPF DP Sensor Port Fittings

For canister mounted aftertreatment DPF differential pressure sensors on horizontally mounted DPF applications:

1. Loosen the DPF differential pressure sensor mounting bracket strap and allow the DPF differential pressure sensor tubes to locate the aftertreatment DPF differential pressure sensor bracket on the aftertreatment DPF Canister.
2. Mark the location of the DPF differential pressure sensor bracket on the aftertreatment DPF canister by pressing the DPF differential pressure sensor bracket against the DPF canister and tracing along the bottom of the DPF differential pressure sensor bracket (**Figure 5**).

Figure 5: Correct DPF differential pressure sensor orientation with marking from previous incorrect orientation

3. Rotate the DPF differential pressure sensor bracket by moving it toward the top of the DPF canister to achieve a 0-10 degree sensor tube downward angle. Do **not** move the sensor mounting bracket more than 19 mm [3/4 in] above the reference mark.

NOTE: When rotating the sensor mounting bracket, make sure to allow for clearance with surrounding components. A minimum clearance of one inch is required around the sensor mounting bracket and any surrounding components in order to prevent damage.

4. Tighten the aftertreatment DPF differential pressure sensor mounting bracket strap to 7 N•m [5 ft-lb].
5. Adjust the DPF Differential pressure sensor port fittings to match the 0-10 degree downward angle (Figure 4). Tighten the upstream DPF differential pressure sensor port fitting after adjustment to 31 N•m [23 ft-lb]. Tighten the downstream DPF differential pressure sensor port fitting after adjustment to 17 N•m [13 ft-lb].
6. Loosen the tube retention clips located at the aftertreatment DPF differential pressure sensor elbow fittings. Rotate the DPF differential pressure sensor tubes to achieve a 0-10 degree sensor tube downward angle.
7. If needed, shorten the tubes to achieve a 0-10 degree sensor tube down angle. Up to 9.5 mm [3/8in] can be cut off the aftertreatment DPF differential pressure sensor elbow fitting end of each DPF differential pressure sensor tube. Remove the same amount of material from both tubes. Use a cutting tool that will make sure of a clean cut.

For canister mounted aftertreatment DPF differential pressure sensors on vertically mounted DPF applications:

1. Mark the location of the DPF differential pressure sensor bracket on the aftertreatment DPF canister by pressing the DPF differential pressure sensor bracket against the DPF canister and tracing along the bottom of the DPF differential pressure sensor bracket.
2. Loosen the DPF differential pressure sensor mounting bracket strap and the p-clip holding the upstream aftertreatment DPF differential pressure sensor tubes.
3. Adjust the downstream sensor port fittings to achieve a 0-10 degree downward angle. Tighten the upstream DPF differential pressure sensor port fitting after adjustment to 31 N•m [23 ft-lb]. Tighten the downstream DPF differential pressure sensor port fitting after adjustment to 17 N•m [13 ft-lb].
4. Move the DPF differential pressure sensor bracket toward the top of the DPF canister to achieve a 0-10 degree downward angle on downstream sensor tube. Do not move the sensor mounting bracket more than 16 mm [5/8 in] above the reference mark.

NOTE: When rotating the sensor mounting bracket, make sure to allow for clearance with surrounding components. A minimum clearance of one inch is required around the sensor mounting bracket and any surrounding components in order to prevent damage.

5. Tighten the aftertreatment DPF differential pressure sensor mounting bracket strap to 7 N•m [5 ft-lb]. Tighten the p-clip to 14 N•m [10 ft-lb].
6. If needed, shorten the upstream sensor tube to achieve a continuous down angle. Up to 9.5 mm [3/8in] can be cut off the differential pressure sensor elbow fitting end of upstream sensor tube. Do **not** shorten the downstream sensor tube. Use a cutting tool that will make a clean cut.

For remotely mounted aftertreatment DPF differential pressure sensors:

1. Adjust the DPF differential pressure sensor port fittings to match the 0-10 degree downward angle. Tighten the upstream DPF differential pressure sensor port fitting after adjustment to 31 N•m [23 ft-lb]. Tighten the downstream DPF differential pressure sensor port fitting after adjustment to 17 N•m [13 ft-lb].
2. If needed, shorten the tubes to achieve a 0-10 degree sensor tube downward angle. Up to 24 mm (1 in) can be cut off the aftertreatment DPF differential pressure sensor elbow fitting end of each DPF differential pressure sensor tube. Remove the same amount of material from both tubes. Use a cutting tool that will make sure of a clean cut.

WARRANTY INFORMATION

Warranty Claim Coding:

Group:	12000 - Engine
Noun:	575 - Sensor, DPF Differential Pressure Sensor

Claim Comment Suggestion:

It is recommended this iKNow article number (IK0700082) is included in the claim comments when the differential pressure sensor tube orientation procedure is completed.

Standard Repair Time(s):

Use the SRT Code to verify up the repair time in the Standard Repair Time Manual

SRT Code	Description	Chassis	Engine	Hours
A18-1651-UT-20	DPF Delta P Tubes	All Models	N13 Update s/n: 4400000 and up	0.7
N18-1651US-20	DPF Delta P Tubes	7600	N13	0.7
Q18-1651US-20	DPF Delta P Tubes	8600	N13	0.7
R18-1651US-20	DPF Delta P Tubes	ProStar	N13	0.7
T18-1651US-20	DPF Delta P Tubes	5000	N13	0.7
GY18-1651TS	DPF Delta P Tubes	CE/ BE	N9/10	0.3
KL18-1651TS	DPF Delta P Tubes	4300, 4400	N9/10	0.3
M18-1651TS	DPF Delta P Tubes	7300, 7400, 7500	N9/10	0.3

OTHER RESOURCES

Master Service Information Site

Exhaust Aftertreatment System with DPF and SCR Service Manual EPA 2010

Cummins TSB 140105

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Helpful: 9
Not Helpful: 0

No Feedback Found