

**\*\* SOLUTION \*\***

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Title	Particulate Matter (PM) Sensor Diagnostic Trouble Codes (DTC) Illuminating The Malfunction Indicator Lamp (MIL) - US14+OBD16, US17+OBD16 And Newer Emissions, Model Year 2017 And Newer - To Be Used For EVERY Visit
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**Mack Models**

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Mack Model	LR , MRU - TerraPro , TE - TerraPro , AN - Anthem , CHU - Pinnacle, Axle back , C XU - Pinnacle, Axle front , GR - Granite , GU - Granite , PI - Pinnacle , TD - Titan
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**Volvo Models**

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Volvo Model	VNL , VNM , VNR , VNX , VAH , VHD
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**Emission Standard**

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Emission Standard	US14+OBD16 , US17+OBD16 , US17+OBD18 , US17+OBD19
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**Engine family**

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Engine family	11L Engine , 13L Engine , 16L Engine , MP7 , MP8 , MP10
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**\*\* SOLUTION \*\***

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Cause	With the implementation of US14+OBD16 Emissions controls (Model Year 2017), a new sensor was required to monitor particulate matter (PM)—soot—levels in exhaust that has already passed through the Emissions Aftertreatment System. Excessive particulate levels at this stage can indicate a damaged or failed Diesel Particulate Filter (DPF). The PM sensor's only purpose is monitoring and is not used in any EATS (regeneration and NOx conversion) functions. Codes set by the sensor <u>will not affect performance or cause a Derate.</u>
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The PM sensor is located after the exhaust muffler (SCR) and very close to NOx sensor after the SCR (NOx2).

**Solution**

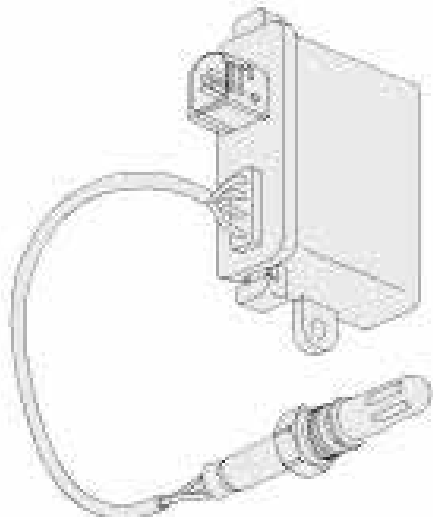
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**This Solution is relevant regardless of previous visits and sensor replacements. At this time, multiple sensor failures are not uncommon, regardless of how new the sensor is. The same procedure should be followed for every instance.**

**PLEASE NOTE: Instructions have been updated as of 20 June 2019. If diagnostics indicate that sensor replacement is required, please follow FSB 284 - 068 Exhaust Particulate Sensor, Repair ( 2016 ) or FSB 284 - 069 ( 2017 ) Exhaust Particulate Sensor, Repair. An eService case is not required**

**Precautions**

1. The PM sensor is a smart sensor (12V supply and CAN lines) **with an orientation tab as seen below:**



**Installation torque of 50 Nm +/- 5**

**Nm**

**2. PM sensors need to be handled carefully.** Dropping them most likely results in permanent damage to the sensor. Keep cap on the sensor until ready to install the sensor to avoid any contamination.

**3. NEVER (DO NOT) apply anti-seize to install the PM sensor.** *If for some reason someone applied it before this repair, thoroughly clean the threads and sealing surfaces while replacing the sensor.*

**4.** A removed PM sensor should be capped immediately (cap from replacement sensor) and packaged carefully, if returning to warranty or investigation purposes.

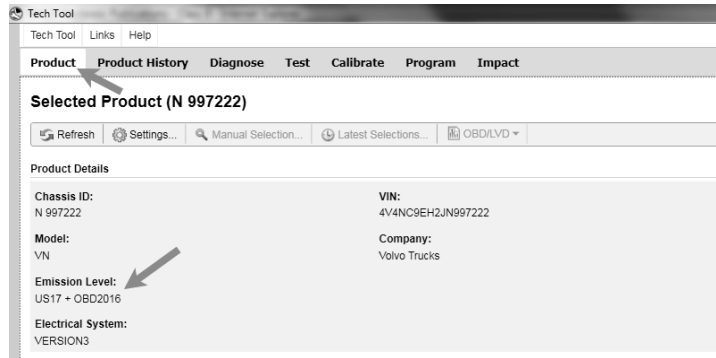
## **Repair**

### **IMPORTANT:**

- **If a chassis arrives with a derate warning active, the PM sensor is not the source of the derate and there is a separate existing issue.**
- **Prior to installing a new sensor for any of the steps below, gently shake the sensor and ensure it does not rattle. If noise is heard, another sensor should be used.**

### **1. Verify the chassis emissions level**

- Details can be found in the Product Details box on the Product tab in PTT as seen below:



• **For US17+OBD16 (Common Rail Fuel System) Chassis setting DTCs P24DA or P1031 ONLY:**

- Software improvements have been released to address this code. Refer to CBR Solution [K00527512](#).

• **For US17+OBD16 Chassis setting any other codes for the PM Sensor, Proceed with instructions below.**

• **For US14+OBD16 (Commonly 2017 model year): Proceed with instructions below.**

## 2. Check the DTC Status

Only troubleshoot PM sensor faults if the fault is *Active* or *Confirmed* as shown below.

Detailed status information	
Title ▲	Value
Confirmed DTC	True
Ready DTC	False

## 3. Follow the set of instructions for the relevant DTC(s):

• **P1033, P1034, P24D0 or U02A3 fault codes (*Confirmed* or *Active*)**

- These PM sensor fault codes require connections and wiring harness checks for power supply and CAN communications.

- **If any of the above faults are present:**

1. Ensure that there is no damage to the sections of the DPF the wiring harness that the PM sensor wires run through.
2. Disconnect the PM sensor connector and the FCEIC connector.
3. Ensure there is no damage to the pins in either connector, and check that there is good pin tension (drag test).
4. Thoroughly clean both connectors and reconnect them.
5. Test drive the vehicle to ensure the issue does not return.

• **P1031 and P24DA (both fault codes and only these fault codes Active)**

- **If the vehicle has PM sensor part number 22733524 or older:**

1. Replace the PM sensor with the latest part. Gently shake the new sensor to ensure it does not rattle.

**NOTE:** A sensor that rattles should **not** be installed.

2. Update the Engine Control Module (EMS) software and clear all codes.
3. Release the vehicle.

- **If the PM sensor is the current part number:**

1. Verify that the EMS software is current.
2. Remove the sensor from the exhaust.
3. Obtain a new sensor. Gently shake the new sensor to ensure it does not rattle.

**NOTE:** A sensor that rattles should **not** be installed.

4. Install the new sensor.
5. Clear the DTCs and release the vehicle.

• **All other PM sensor fault codes (Confirmed or Active)**

**P24B3, P24AF, P2AB0, P24B1, P24B0, P24DA, P24B7, P24B5, P24D1, P24FC, P24AE, P24B4, and P1032.** (Highlighted are common faults).

1. Verify that the EMS software is current.
2. Remove the sensor from the exhaust.
3. Obtain a new sensor. Gently shake the new sensor to ensure it does not rattle.

**NOTE:** A sensor that rattles should **not** be installed.

4. Install the new sensor.
5. Clear the DTCs and release the vehicle.

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Internal comments (BO)

• **If a Diagnostic Monitor fails, DO NOT PERFORM A REGEN . Perform the following steps:**

1. Turn the vehicle's ignition OFF.
2. Restart Premium Tech Tool.
3. Reconnect to the vehicle with PTT.
4. Start the engine.
5. Rerun the Diagnostic Monitor.

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NA\_Sister solutions [K00527512](#), [K14122525](#), [K59554255](#)

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Campaign code FSB284-067

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Solution visibility [Dealer distribution](#)

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**Function(s)/component(s) affected**

Function affected 1 1 0 EMS , 2 1 0 ACM , TT , DPF , SCR

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**Function Group**

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Function Group 254 catalytic converter; exhaust emission control equipment , 258 emissions after-treatment , 2846 Sensor

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### Customer effect

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Main customer effect soot , diagnostics/methodology , fault code/display

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### Fault Codes And Error Codes

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OBDDII Diagnostic Trouble P1031 , P1032-00 , P1033-00 , P1034-00 , P249C-00 , P24AE-13 , P24AF-00 , P24B  
Codes (P, U, B Format) 0-00 , P24B1-00 , P24B3-13 , P24B4-92 , P24B5-00 , P24B7-00 , P24D0-00 , P24D  
1-00 , P24DA-00 , P24FC-00 , P2AB0-47

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### Administration

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Author ut01793

Last modified by RU4469V

Creation date 09-12-2016 22:12

Date of last update 01-04-2020 22:04

Review date 15-04-2018 00:04

Status Published

Average score 2.3636362552642822

Number of scores 11

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**\*\* SOLUTION \*\***

Title Mack Chassis - Vehicles Equipped With A Vertical Selective Catalytic Reduction (SCR) System - Diagnostic Trouble Codes ( DTC ) P1031 With Possible P24DA Lighting The Malfunction Indicator Lamp ( MIL ) - US17+OBD16 (GHG17, Common Rail Fuel System) Emissions, Commonly Model Year 2018

**Mack Models**

Mack Model LR , MRU - TerraPro , CHU - Pinnacle, Axle back , CXU - Pinnacle, Axle front , GU - Granite

**Emission Standard**

Emission Standard US17

**Engine family**

Engine family MP7 , MP8

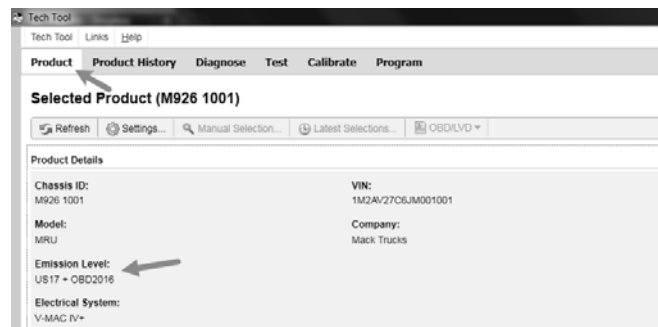
**\*\* SOLUTION \*\***

Cause Fault Code P1031 - Particulate Matter (PM) Sensor Clogged Tip may occur in GHG17 vehicles that are equipped with a vertical SCR catalyst. P1031 may be accompanied by P24DA - PM Sensor Exhaust Sample Error. When the Confirmed DTC status is checked in Detailed Fault Information from the Diagnose screen in Premium Tech Tool (PTT), status will show True.

Solution **DO NOT** Replace the PM sensor for P1031 and/or P24DA on vehicles configured as described above prior to performing the steps below.

**Verify the chassis emissions level**

- Details can be found in the Product Details box on the Product tab in PTT as seen below:



**Review the Detailed Status Information for the relevant code on the DTC Readout.**

DTC List (2 Items)

Control Unit	DTC	Status
Brake ECU (MID 136)	SID 69: Axle load sensor, FMI 2: Data erratic, intermittent, or incorrect	Active
Engine Control Modulus (EMS)	P225F64: NOx Sensor Gas Outlet Removed, Signal Plausibility Failure	Active

NOx Sensor Gas Outlet Removed

Detailed status information

Title	Value
Confirmed DTC	True
Pending DTC	False
Test failed	True
Test failed since last clear	True
Test failed this operation cycle	True
Test not completed since last clear	False
Test not completed this operation cycle	False
Warning indicator requested	False

**Once the chassis is confirmed to be US17+OBD16 or US17+OBD18:**

Software improvements have been made that address this DTC. There are two documents that should be reviewed:

**1. Product Improvement PI0883 Engine Control Module (ECM) and Aftertreatment Control Module (ACM), Software Updates** was released July 2018. This product improvement should appear under the Campaigns section of the Product screen of Premium Tech Tool (PTT) when first connecting to the vehicle. **Applicability to this campaign should be checked first.**

- The Service Program document can be found on the dealer [Mack Trucks eMedia](#).
  - **Note:** There will be a prompt to sign in to the Trucks Dealer Portal site if necessary.
  - Searching for PI0883 will return a link to the bulletin.
- **If the PI applies to the product it is not necessary to proceed to the Field Service Bulletin below.**

**2. Field Service Bulletin FSB 284-067 Engine Control Module (ECM) and Aftertreatment Control Module (ACM), Reprogramming** has been released and should be reviewed if the Product Improvement does not apply to the vehicle.

- The FSB document can be found on [Mack Trucks eMedia](#) or under the Service tab in [Impact](#).
  - Searching for 284-067 will return a link to the document in either application.

**3. If either of the above documents applied and there are no other issues present, the vehicle should be released when software updates have been completed.**

**If software is current according to the bulletin,** refer to CBR Solution [K59554 255](#) for more information.

**If other symptoms or related codes are present,** normal diagnostics will need to be performed to determine the cause.

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NA\_Sister solutions [K14122525](#), [K47547856](#), [K59554255](#)

Campaign code FSB284-067

Solution visibility Dealer distribution

### Function(s)/component(s) affected

Function affected 1 1 0 EMS , 2 1 0 ACM , Diagnostic tool , FSB , DPF , SCR

### Function Group

Function Group 254 catalytic converter; exhaust emission control equipment , 258 emissions after-treatment , 284 control system, fuel supply

### Customer effect

Main customer effect soot , calibration/programming/pairing/missing operation , diagnostics/methodology , fault code/display

### Fault Codes And Error Codes

OBDII Diagnostic Trouble Codes (P, U, B Format) P1031 , P1031-00 , P24DA-00

### Conditions

Vehicle operating mode when driving , when stationary

Frequency of occurrence of problem random

### Administration

Author RU4469V

Dealer ID RU4469V

Last modified by RU4469V

Creation date 30-04-2018 16:04

Date of last update 13-07-2018 21:07

Review date 31-03-2019 00:03

Status Published

Average score 0

Number of scores 2

NA\_Reviewer ut0031h

NA\_Author\_Group GTT

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**\*\* SOLUTION \*\***

Title Volvo Chassis - Vehicles Equipped With A Vertical Selective Catalytic Reduction (SCR) System - Diagnostic Trouble Codes ( DTC ) P1031 With Possible P24DA Lighting The Malfunction Indicator Lamp ( MIL ) - US17+OBD16 (GHG17, Common Rail Fuel System) Emissions, Commonly Model Year 2018

**Volvo Models**

Volvo Model VNL , VNR , VNX , VAH , VHD

**Emission Standard**

Emission Standard US17

**Engine family**

Engine family 11L Engine , 13L Engine

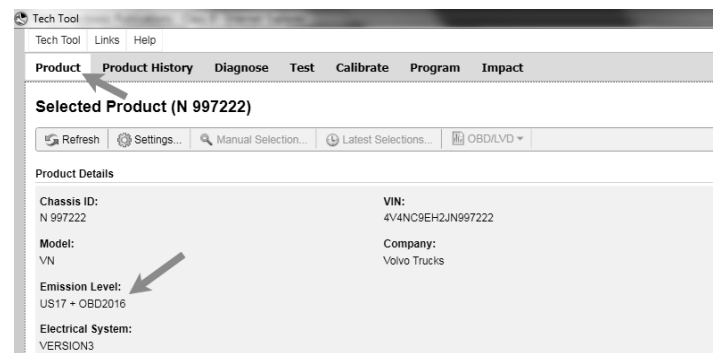
**\*\* SOLUTION \*\***

Cause Fault Code P1031 - Particulate Matter (PM) Sensor Clogged Tip may occur in GHG17 vehicles that are equipped with a vertical SCR catalyst. P1031 may be accompanied by P24DA - PM Sensor Exhaust Sample Error. When the Confirmed DTC status is checked in Detailed Fault Information from the Diagnose screen in Premium Tech Tool (PTT), status will show True.

Solution **DO NOT** Replace the PM sensor for P1031 and/or P24DA prior to performing the steps below.

**Verify the chassis emissions level**

- Details can be found in the Product Details box on the Product tab in PTT as seen below:



**Review the Detailed Status Information for the relevant code on the DTC Readout.**

DTC List (2 Items)		
Control Unit	DTC	Status
Brake ECU (MID 136)	SID 69: Axel load sensor, FMI 2: Data erratic, intermittent, or incorrect	Active
Engine Control Module (EMS)	P229F64: NOx Sensor Gas Outlet Removed, Signal Plausibility Failure	Active

NOx Sensor Gas Outlet Removed	
Detailed status information	
Title	Value
Confirmed DTC	True
Pending DTC	False
Test failed	True
Test failed since last clear	True
Test failed this operation cycle	True
Test not completed since last clear	False
Test not completed this operation cycle	False
Warning indicator requested	False

**Once the chassis is confirmed to be US17+OBD16 or US17+OBD18:**

- Software improvements have been released to address this code.
  - Refer to FSB 284-067 Engine Control Module (EMS) and Aftertreatment Control Module (ACM), Reprogramming.
- The bulletin can be found under the Service tab in Impact by searching for either the FSB number, or by reviewing the articles under Function Group 284.
  - If the article does not appear when searched with either VIN or Chassis information entered, search by model:

1. Clear any chassis information from the Search box.
2. Select or enter VN as the model.

The screenshot shows a search interface with the following fields:
 

- Search (with a clear button)
- Chassis series (input field)
- Chassis No. (input field)
- VIN (input field)
- VN (input field with a dropdown arrow, indicated by a curved arrow pointing to it)
- Function group (dropdown menu with a search icon, set to '284')

3. Make sure Title is selected in the Search By field. Enter "FSB 284-067" in the text entry field.

The screenshot shows a search interface with the following fields:
 

- Additional search values (dropdown menu)
- Search by: (dropdown menu set to 'Titles', indicated by a curved arrow pointing to it)
- Text entry field containing 'FSB 284-067' (indicated by a curved arrow pointing to it)

4. Press the Search button. The operation will appear in the results window.

Fgrp ▲	Title ↓	Info type ↓	ID/Operation ↓
284	FSB 284-067, Engine Control Module (ECM) and Aftertreatment Control Module (ACM), Reprogramming	Repair	2841-22-09-19

5. Multiple article choices will appear. Find the Operation for the correct Chassis.

**Note:** It is possible that more than one choice will have the same title (as shown below). Despite having the same title, the Operations are different and should be reviewed to locate the correct procedure.

FSB 284-067, Engine Control Module (ECM) and Aftertreatment Control Module (ACM), Reprogramming

Description	ID	Date
<input type="checkbox"/> VN, ENG-VE11, EM-USA17, Assembly Date 2017-01-01 - 2018-03-01		06/08/2018
<input type="checkbox"/> VN, ENG-VE13, EM-USA17, Assembly Date 2017-01-01 - 2018-03-01		
<input type="checkbox"/> VN, ENG-VE16, EM-USA17, Assembly Date 2017-01-01 - 2018-03-01		

6. Following software updates, perform Operation 2589-08-03-17 After-treatment Particulate Sensor, Diagnostic Monitor found under the Test tab in Premium Tech Tool (PTT) to verify that there are no further issues.

**If software is current according to the bulletin,** refer to CBR Solution [K47547856](#) for further information.

**If other symptoms or related codes are present,** normal diagnostics will need to be performed to determine the cause.

NA_Sister solutions	<a href="#">K00527512</a> , <a href="#">K59554255</a> , <a href="#">K47547856</a>
Campaign code	FSB284-067
Solution visibility	Dealer distribution
<b>Function(s)/component(s) affected</b>	
Function affected	1 1 0 EMS , 2 1 0 ACM , Diagnostic tool , FSB , DPF , SCR
<b>Function Group</b>	
Function Group	254 catalytic converter; exhaust emission control equipment , 258 emissions after-treatment , 284 control system, fuel supply
<b>Customer effect</b>	
Main customer effect	soot , calibration/programming/pairing/missing operation , diagnostics/methodology , fault code/display
<b>Fault Codes And Error Codes</b>	
OBDII Diagnostic Trouble Codes (P, U, B Format)	P1031 , P1031-00 , P24DA-00
<b>Conditions</b>	
Vehicle operating mode	when driving , when stationary
Frequency of occurrence of problem	random

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**Administration**

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Author UT0031H

Dealer ID UT0031H

Last modified by RU4469V

Creation date 27-04-2018 16:04

Date of last update 18-06-2018 15:06

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Status Published

Average score 3

Number of scores 1

NA\_Reviewer ut0031h

NA\_Author\_Group GTT

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