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Hitachi VTS0003

Hitachi VTS0003 Engine Variable Valve Timing (VVT) Solenoid

User Instruction Manual
Model: **VTS0003** | Brand: **Hitachi**

Product Overview

The Hitachi VTS0003 Variable Timing Solenoid (VTS) is a critical component designed to precisely regulate oil flow to the Variable Timing Gear. This regulation allows the engine to adjust valve timing for optimal performance and fuel economy. Hitachi VTS units feature optimally designed electromagnets that require less energy to maintain operating positions, ensuring consistent oil flow. Precision-machined ports and high-quality seals minimize pressure drop, while an additional O-ring in the solenoid housing prevents water damage to electrical components, enhancing dependability. Designed to meet the exact needs of specific vehicles, Hitachi Variable Timing Solenoids are a premium choice for automotive replacement parts.

Key Features:

- O-Ring/Gaskets included when applicable, ensuring a complete seal for proper function.
- Manufactured by a Tier 1 OE supplier for variable timing solenoids, guaranteeing original equipment quality.
- 100% NEW, never remanufactured, providing reliable and consistent performance.
- Meets the OE performance and durability standards for this application, ensuring long-lasting operation.
- Additional O-ring located in the solenoid housing prevents water from damaging electrical components, increasing product lifespan and reliability.

What's in the Box

Upon opening the package, you should find the following items:

- One (1) Hitachi VTS0003 Engine Variable Valve Timing (VVT) Solenoid
- Product Documentation (this instruction manual and any other included leaflets)

Please inspect all components for any signs of damage during shipping. If any items are missing or damaged, please contact your retailer or Hitachi customer support immediately.

Setup and Installation

Installation of the Hitachi VTS0003 Variable Timing Solenoid requires mechanical knowledge and specific tools. It is highly recommended that installation be performed by a qualified automotive technician. Improper installation can lead to engine damage or malfunction.

Safety Precautions:

- Always disconnect the vehicle's battery before beginning any work on the engine.
- Ensure the engine is cool to the touch to prevent burns.
- Wear appropriate personal protective equipment (PPE), including safety glasses and gloves.
- Refer to your vehicle's specific service manual for detailed, model-specific installation procedures and torque specifications.

General Installation Steps (Consult Vehicle Manual for Specifics):

1. Locate the existing VVT solenoid on your engine. Its position varies by vehicle make and model.
2. Carefully disconnect the electrical connector from the old solenoid.
3. Remove any retaining bolts or clips securing the old solenoid. A 10mm socket and extension are commonly used.
4. Gently extract the old solenoid from its housing. Be prepared for a small amount of oil to drain.
5. *Important Note:* Some VVT solenoids, including certain Hitachi models, may utilize small filter screens at the tip. If your original solenoid has these screens and the new Hitachi VTS0003 does not, it is crucial to carefully remove the screens from the old solenoid and transfer them to the new one. These screens prevent debris from entering the engine's oil passages. Use a dental pick or similar small tool to carefully pry them off.
6. Ensure the new solenoid's O-rings are properly seated and lubricated with clean engine oil.
7. Insert the new Hitachi VTS0003 solenoid into the engine housing, ensuring it seats correctly.
8. Secure the solenoid with its retaining bolts/clips, tightening to the vehicle manufacturer's specified torque.
9. Reconnect the electrical connector, ensuring a secure connection.
10. Reconnect the vehicle's battery.
11. Start the engine and check for any leaks or abnormal operation. It may take a few drive cycles for the engine control unit (ECU) to adapt to the new solenoid and clear any related diagnostic trouble codes (DTCs).



Figure 1: Side view of the Hitachi VTS0003 Solenoid, showing the main body and electrical connector.



Figure 2: Angled view of the Hitachi VTS0003 Solenoid, highlighting the internal components and filter screens (if present).



Figure 3: Hitachi VTS0003 Solenoid with an example mounting bracket, illustrating its typical installed appearance.

Operating Principles

The Variable Valve Timing (VVT) system in modern engines optimizes engine performance across various RPMs and loads by adjusting the timing of the intake and/or exhaust valves. The Hitachi VTS0003 solenoid is a crucial part of this system.
The engine's Powertrain Control Module (PCM) or Engine Control Unit (ECU) sends electrical signals to the VVT solenoid. Based on these signals, the solenoid precisely controls the flow of engine oil pressure to the VVT actuator (also known as the cam phaser or variable timing gear). By varying the oil pressure, the VVT actuator can advance or retard the camshaft's position relative to the crankshaft.
This dynamic adjustment of valve timing allows for:

- Improved fuel efficiency by optimizing valve overlap.
- Increased engine power and torque across the RPM range.
- Reduced exhaust emissions.
- Smoother idle and better throttle response.

The Hitachi VTS0003 ensures accurate and responsive oil flow control, contributing directly to the efficient and reliable operation of your vehicle's VVT system.

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Video 1: An informational video from Hitachi Astemo explaining the function and importance of Variable Timing Solenoids in automotive systems. This video provides a visual overview of how these components contribute to engine performance and efficiency.

Maintenance

The Hitachi VTS0003 Variable Timing Solenoid is designed for long-term reliability and typically does not require routine maintenance. However, its proper function is highly dependent on the overall health of your engine's lubrication system.

Recommendations:

- **Regular Oil Changes:** Adhere strictly to your vehicle manufacturer's recommended oil change intervals and use the specified oil type and viscosity. Dirty or low-quality oil can clog the solenoid's internal passages and affect its operation.
- **Oil Filter Replacement:** Always replace the oil filter with each oil change to ensure clean oil circulation.
- **Engine Cleanliness:** Keep the engine bay clean to prevent dirt and debris from entering sensitive components during service or inspection.
- **Check for Leaks:** Periodically inspect the area around the VVT solenoid for any signs of oil leaks. Address any leaks promptly.

If the solenoid was replaced due to a previous failure, it is advisable to investigate the root cause of the failure, especially if it was related to oil contamination or pressure issues, to prevent recurrence.

Troubleshooting

Issues with the Variable Valve Timing (VVT) solenoid can manifest in various ways. If you experience any of the following symptoms, it may indicate a problem with the VVT system, potentially including the solenoid:

Common Symptoms of a Faulty VVT Solenoid:

- **Check Engine Light (CEL) Illuminated:** This is often the first indicator. Diagnostic Trouble Codes (DTCs) related to VVT system performance (e.g., P0010, P0011, P0020, P0021) will typically be stored.
- **Rough Idle or Stalling:** Incorrect valve timing can lead to an unstable idle or cause the engine to stall, especially when cold.

- **Reduced Fuel Economy:** The engine's inability to optimize valve timing will result in less efficient combustion.
- **Decreased Engine Performance:** Noticeable loss of power, poor acceleration, or hesitation during driving.
- **Engine Noise:** A rattling or ticking noise, particularly at startup or low RPMs, can indicate issues with oil pressure control to the VVT actuator, often linked to the solenoid.

Troubleshooting Steps:

1. **Scan for DTCs:** Use an OBD-II scanner to retrieve any stored diagnostic trouble codes. This will help pinpoint the specific area of concern.
2. **Check Oil Level and Quality:** Ensure the engine oil is at the correct level and is clean. Low or dirty oil is a common cause of VVT system malfunctions.
3. **Inspect Electrical Connection:** Verify that the electrical connector to the VVT solenoid is securely attached and free from corrosion or damage.
4. **Inspect Solenoid Filter Screens:** As noted in the installation section, some VVT solenoids have small filter screens. These can become clogged with debris, restricting oil flow. If accessible, inspect and clean or replace them if necessary.
5. **Test Solenoid Operation:** A qualified technician can perform electrical tests on the solenoid (e.g., resistance check, applying voltage to check for clicking) and monitor its operation using a diagnostic scan tool to verify proper function.
6. **Consider Professional Diagnosis:** If symptoms persist or you are unsure about the diagnosis, consult a certified automotive technician. They have specialized tools and expertise to accurately diagnose and repair VVT system issues.

Note: If you recently replaced the solenoid and are still experiencing issues, double-check the installation, especially the transfer of any necessary filter screens from the old unit to the new one, as this is a common oversight.

Specifications

Attribute	Detail
Brand	Hitachi
Model Number	VTS0003
Manufacturer Part Number	VTS0003
OEM Part Numbers	23796-6N200, 23796-6N201, 23796-EA000, 23796-ZE00A, 23796-ZE00C
Valve Type	Solenoid Valve
Material	Aluminum, Stainless Steel, or Carbon Steel
Exterior Finish	Machined
Inlet Connection Type	National Pipe Tapered
Outlet Connection Type	NPT
Number of Ports	2
Specification Met	OE (Original Equipment)
Item Weight	7.2 ounces

Attribute	Detail
Country of Origin	Japan
UPC	840151003129
Global Trade Identification Number	00840151003129

Warranty and Support

Hitachi stands behind the quality of its products. Specific warranty terms and conditions for the VTS0003 Variable Timing Solenoid are typically provided with your purchase documentation or can be found on the official Hitachi Automotive Systems website. For technical assistance, warranty claims, or general inquiries, please contact Hitachi customer support through their official channels. When contacting support, please have your product model number (VTS0003) and proof of purchase readily available. You can often find additional resources, FAQs, and contact information by visiting the official Hitachi Automotive Systems website or the retailer from whom you purchased the product.

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