DENSO

first time fit®

AUTOMOTIVE CATALOG

2017

ENGINE MANAGEMENT CATALOG

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For over ***50 Years****, when the*
Top Auto Makers World-Wide
build their vehicles, they rely
on DENSO*.*

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ABOUT DENSO

An OE Heritage

DENSO is one of the world's largest automotive component suppliers with over $40.2 billion in annual sales. We supply every major auto manufacturer in the world, providing them with the quality and innovation they need to remain on the leading edge of automotive technology. In addition to our automotive customers, we also supply components to virtually all OE manufacturers worldwide. For decades we have helped all of our customers to become giants in their industries.

Unsurpassed Quality

At DENSO we know that one of the major keys to success for our company and our customers is an unwavering commitment to quality. We strive for, and achieve, zero defects for parts manufactured in the millions in DENSO facilities that are ISO9000 and ISO14000 certified. This dedication to quality is clearly recognized by the industry as DENSO has received such prestigious awards as the Deming Award for Quality, the J.D. Power and Associates Chairman's Award and numerous supplier awards for quality from companies like Toyota, Lexus, General Motors and Chrysler.

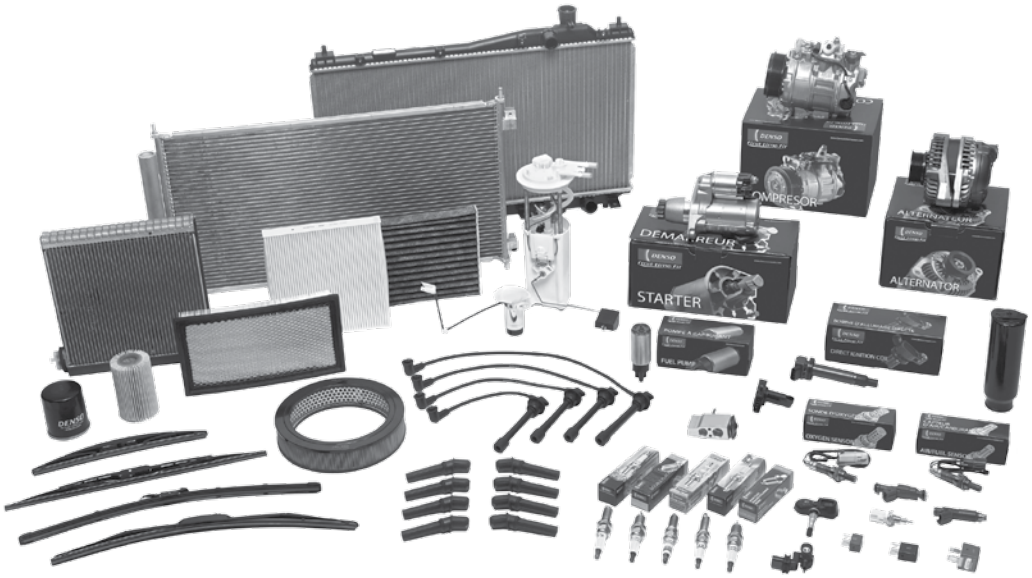
Bringing It All To The Aftermarket

In the 1980s, DENSO became the first to mass-produce the platinum spark plug and offer it in the aftermarket. A decade later we introduced the world's most advanced spark plug, Iridium Power®, which revolutionized the concept of the aftermarket performance plug. By the late 1990s, the world watched with great interest as DENSO unveiled a line of OE-standard premium replacement components under the First Time Fit® brand. Today, the First Time Fit line of products includes A/C compressors, cabin air filters, condensers, evaporators, radiators, receiver driers, expansion devices, starters, alternators, oxygen sensors, fuel pumps, oil and air filters, ignition wire sets, tire pressure monitoring system sensors, engine management sensors and wiper blades.

DENSO is one of the world's largest automotive component suppliers with over $40.2 billion in annual sales.

Better By Design

As you can see, we've spent decades perfecting our craft — a claim few automotive component manufacturers can make. Clearly the DENSO commitment to quality, innovation, and advanced technology is the reason our automotive and heavy-duty components truly are better by design.



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SAFETY PRECAUTIONS

- Mixtures of gasoline and air can result in combustion when exposed to an ignition source. Maintain a suitable work environment for gasoline fuel system repairs to reduce the chance for combustion.
- Always wear safety goggles.
- Avoid skin contact with gasoline.
- Always work in a well-ventilated area.
- Never perform the fuel pump replacement procedures where fuel vapors may come in contact with an ignition source including static electricity.
- Always use OSHA approved gasoline storage containers.
- Always use an OSHA approved transfer pump for gasoline.
- When performing fuel system repairs, always have a class ABC Multipurpose Dry Chemical fire extinguisher within easy reach at all times.
- Do not smoke or work near an open flame or sparks when working on the fuel system.
- The fuel system may be under pressure. Opening a fuel system under pressure may allow fuel and fuel vapor to reach a possible ignition source or come in contact with you.
- Follow the vehicle manufacturer's recommended procedures to relieve pressure in the fuel system. Be sure that pressure has been relieved from the delivery side of the fuel system as well as the return side.
- Disconnect the negative (-) cable from the battery and position it so it cannot accidentally make contact with the negative (-) battery post during the fuel pump replacement procedure.
- It may not be possible to relieve fuel pressure completely. When opening the fuel system, always take precautions to reduce the chance of fuel or fuel vapor reaching a possible ignition source or coming in contact with you.
- **NOTE:** Some vehicles require "Idle Learn Procedure." The ECM needs to relearn the IAC valve position. Refer to the appropriate workshop manual for the necessary procedures.

LIMITED WARRANTY POLICY

DENSO Products and Services Americas, Inc. ("DENSO") warrants to the end user that the DENSO First Time Fit® brand automotive products contained in this catalog and identified below, shall be free of defects in materials and workmanship and will function in accordance with DENSO's published specifications, under ordinary intended use and service, for a period of twelve (12) months, unlimited miles, after delivery to the end-user. DENSO shall replace any defective Product covered by this warranty. Such remedy shall be the end-user's sole remedy with respect to any covered defect in the Products.

This warranty does not cover defects or malfunctions, which result from causes beyond DENSO's control, including, without limitation, (i) unusual physical or electrical stress; (ii) accident, neglect, abuse, misuse or other abnormal use; (iii) failure to perform routine maintenance in accordance with specific vehicle manufacturer's recommended procedures; (iv) normal wear and tear; (v) Product repairs or attempted Product repairs by an unauthorized person; (vi) alterations or modifications to the Product; (vii) improper installation or servicing, (viii) applications for which the product was not intended, (ix) defects or malfunctions caused by other vehicle components or, (x) defects or malfunctions caused by the vehicle itself. This warranty shall extend only to the original end-user and shall be void if any labels or other identifying marks, permanently affixed to Products when shipped from DENSO, are removed, altered, defaced or obliterated.

The aforesaid warranty is the only warranty made by DENSO with respect to the Products and is in lieu of all obligations or liabilities on the part of DENSO for damages arising out of or in connection with the sale, use or performance of the Products, including, without limitation, any lost profits or any other consequential, incidental, special or exemplary damages of any kind. DENSO DISCLAIMS ALL OTHER WARRANTIES WITH REGARD TO THE PRODUCTS, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION CONTAINED HEREIN.

This warranty does not cover labor costs incurred in the diagnosis of defect or in the removal or reinstallation of any product, nor does it cover any other contingent expenses such as car rental or towing. A dated proof of purchase receipt may be required to validate any warranty claim. This warranty supersedes any other warranty statement and may also give you specific legal rights which may vary from state to state.

THE WARRANTABLE PRODUCTS IN THIS CATALOG ARE:

- Camshaft / Crankshaft Position Sensors
- Coolant Temperature Sensors
- Direct Ignition Coils (C.O.P.)
- Fuel Injectors
- Mass Air Flow Sensors
- Manifold Absolute Pressure Sensors

DIRECT IGNITION COIL

DENSO has masterfully designed and built OE components for over 60 years and is the leader in direct ignition coil technology. DENSO developed the world's first stick coil that employed a cylindrical ignition coil. The stick coil eliminates ignition wires and utilizes wasted space by fitting in the plug hole. Also, a newly developed small-size driving circuit has been integrated into the top of the coil and diagonal windings eliminate sectioned bobbin — reducing the size and weight.

Innovator for Stick Coil Technology

As the innovator and leader in stick coil technology, DENSO has conducted superior testing and inspection processes to insure the highest quality of DENSO's stick coil. Inferior aftermarket replacement coils do not meet the strict DENSO standards for reliability and durability, which cost time and money for warranty returns. So don't be fooled by imitations — look for the DENSO name to be sure you're getting the best.

Feature & Benefits

- Compact design
- High temperature reliability
- Superior materials create quality coils
- Integrated igniter eliminates high tension wiring
- Unsurpassed durability
- Outstanding RFI noise suppression
- OE Product adapted for the Aftermarket

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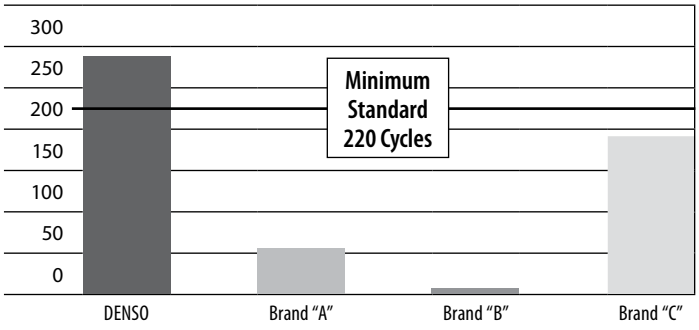
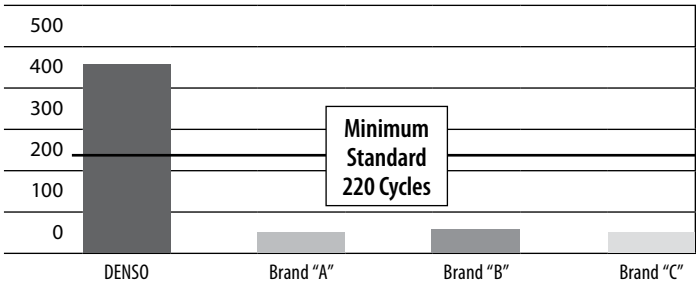
DIRECT IGNITION COIL

DURABILITY TEST RESULTS
Application: Toyota Camry Stick Coil

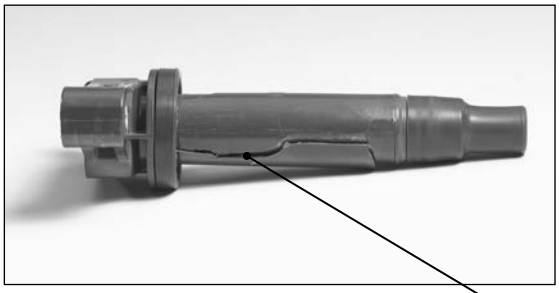


DURABILITY TEST RESULTS
Application: Ford Crown Victoria Coil-on-Plug

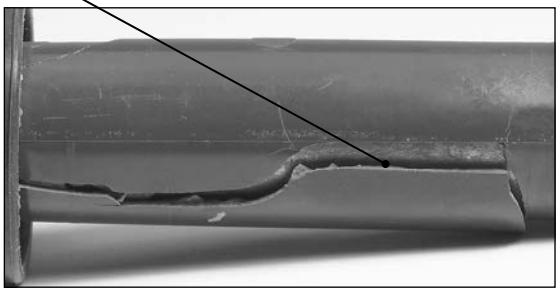


DENSO tested many aftermarket ignition coils and found that none of them meet DENSO's high standards for reliability and durability. Many aftermarket ignition coils can output the correct voltage but do not perform for the long haul. The difference comes with prolonged exposure to extreme temperature variations seen under the hoods of today's cars and trucks. Constant improvements in weight reduction, emission standards and fuel efficiency all contribute to increased demands on our vehicles engines. DENSO ignition coils are OE grade or better and are built to give you the performance and durability needed in today's vehicles. When the job needs to be done right the first time – you can rely on DENSO ignition coils.

IMITATORS IGNITION COILS



Fatal crack in housing, causes complete failure



Crack in the epoxy, causes internal shorting

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IGNITION WIRE SET

DENSO First Time Fit® ignition wire sets are identical in form, fit, color and performance to the factory-installed wire sets. Every part of each wire sets construction meets or exceed OE/OES standards.

All-silicone wires

The 7 and 8mm ignition wires are SAE J2031 Class E rated, the highest quality wire used in the industry. These wires can withstand temperatures from -40º to 428º F and pass tests covering everything from electrical properties to shrinkage to chemical resistance and accelerated life testing.

SAE Wire Classification	C	D	E
Thermal Overload Test Temp.	155° C / 311° F	180° C / 356° F	220° C / 428° F
Low Temperature Test	-30° C / -22° F	-30° C / -22° F	-40° C / -40° F
High Temperature Test Temp.	120° C / 248° F	155° C / 311° F	180° C / 356° F
Low Temp. Resistivity Test	20° C / -4° F	-20° C / -4° F	-30° C / -22° F

Pre-cut to exact lengths

Each wire in the set is pre-cut to exact length so the wire sets are ready to install right out of the box.

Identical OE end caps

Designed to "click" into place for easy installation and a secure fit. This allows the installer to "feel and hear" that a solid connection has been made, even when the connection is in a difficult-to-see location.

Strong connections

Through a patented process, the terminals are attached to provide an extremely strong connection ensuring the cable and boot will not separate during removal and installation.

1. Carbon impregnated fiberglass core for superior conductivity.
2. Fiberglass braid for maximum strength.
3. Conductive silicon layer for high temperature performance and EMI/RFI noise suppression.
4. Silicone insulation for superior dielectric and heat performance.
5. Reinforcing member for added strength and terminal retention.
6. High temperature "Class E" silicone jacket to withstand heat, cold, chemicals and moisture.
7. Core reinforced with KEVLAR®.
8. Ferrite impregnated layer.
9. Wire-wound layer to suppress EMI/RFI noise.

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FUEL INJECTORS

As a leading OE supplier, DENSO's advanced fuel injector technology provides the highest dynamic range and the smallest droplet size. Built with all-new components used in OE production, DENSO gives you the best injector for the vehicle. DENSO fuel injectors do away with clogged nozzles, worn internal parts and faulty electrical components left by a rebuilt injector.

Application Coverage

- Part Numbers: 62
- Makes: Acura, Ford, Honda, Hyundai, Infiniti, Jeep, Kia, Lexus, Lincoln, Mazda, Mercury, Mitsubishi, Nissan, Scion, Subaru, Suzuki and Toyota
- Over 34% coverage of Toyota/Lexus applications with just 15 part numbers.

Features & Benefits

- Smooth engine operation – improves gas mileage and produces fewer emissions.
- Versatile dynamic range and droplet size:
  Droplet size – the smaller the particle, the easier the fuel is to ignite providing a cleaner more fuel efficient burn in the combustion chamber.
  Dynamic range – the wider the dynamic range, the more versatile the injector can be providing the fuel demand for high output engines and stable idle.

The DENSO Difference

- First Time Fit philosophy.
- OE technology adapted for the aftermarket.
- Brand name synonymous with quality.
- Lowest return rate in the industry.

ENGINE MANAGEMENT SENSORS

In an effort to reduce emissions, in the late '90s, manufacturers started adding sensors to engines to monitor various functions and emissions. DENSO was one of the first companies to produce these sensors, and still today, continues to bring new technology to the industry.

Mass Air Flow Sensors

The Mass Air Flow Sensor detects the amount of air drawn into the engine.

- DENSO created the world's first plug-in mass air flow sensor in 1996 – this sensor was inserted into the air intake pipe, which was smaller, lighter and easier to mount than previous sensors.
- In 1997, DENSO introduced a new sensing element air bypass structure – this reduced the exposure of the sensing unit to contaminants for higher reliability and improved detection accuracy.
- Today, DENSO's fine platinum wire sensing element is coated with a glass film to further protect it from contaminants, resulting in the highest reliability.

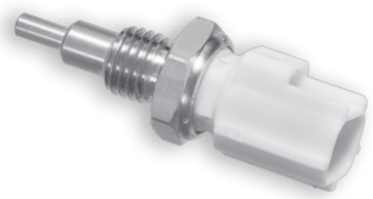
Count on DENSO Mass Air Flow Sensors to deliver the highest reliability, durability and precision in real world driving conditions.

Camshaft / Crankshaft Position Sensors

Camshaft and Crankshaft Position Sensors detect camshaft and crankshaft rotation during one engine-combustion cycle. DENSO produces both Magnetic Resistant Element (MRE) type and Magnetic Pick-Up (MPU) type sensors.

- DENSO MRE sensors have a pair of MREs on an Integrated Circuit (IC) chip – this unique design is extremely accurate, even just after an engine is started.
- The molded IC chip is installed inside a cylindrical magnet so it is positioned closer to the gears that rotate with the cam or crank shaft – this design is almost 10 times more sensitive than Hall element type sensors.
- DENSO uses a Polyphenylene Sulfide resin coating over the molded IC chip and cylindrical magnet for greater strength and superior resistance to substances like fuel, engine oil and emission byproducts.

ENGINE MANAGEMENT SENSORS



Coolant Temperature Sensors

The Coolant Temperature Sensor detects the temperature of the engine coolant. This sensor is located on the engine or in one of the coolant passages in the cylinder head.

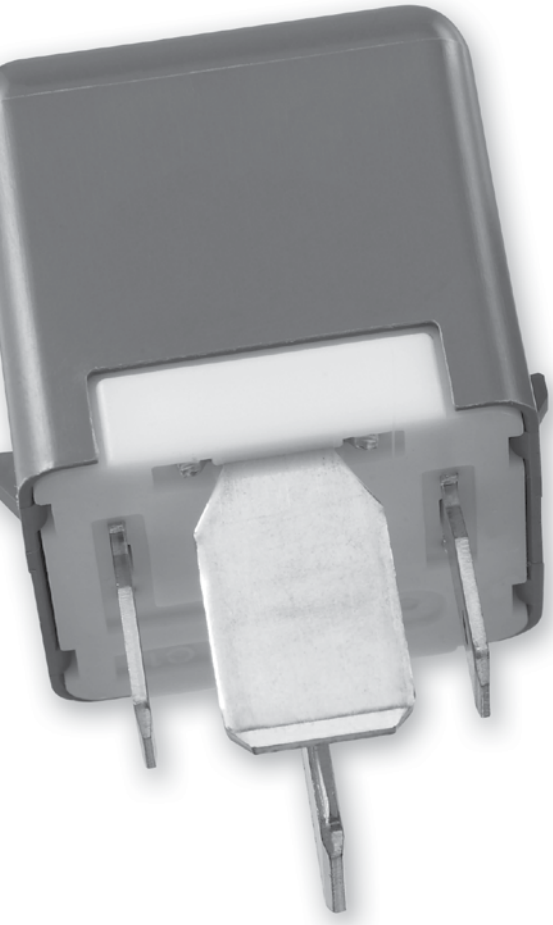
- It senses changes in coolant temperature, which gives the ECU vital information to help control fuel injection, ignition timing and transmission shifting.
- A failing sensor can cause the engine to run rich or lean, cause the transmission to shift incorrectly, or cause the Check Engine Light to illuminate.

At DENSO, we're committed to being the innovator to help reduce emissions while improving performance.

Manifold Absolute Pressure Sensors

- The manifold absolute pressure sensor measures the pressure of the intake manifold.
- Most engines use MAF or MAP but some engines use both to help lower emissions.
- DENSO MAP senosrs offer leading edge sensing technology.
- Made from superior materials, which controls fuel injection more precisely.

RELAYS



DENSO's First Time Fit relays are no different from the OE relays DENSO has manufactured for over 60 years — built to be quiet, efficient and reliable. Designed and manufactured to outlast the closest competitor by a minimum of ten times more life cycles, DENSO's First Time Fit Relays will most likely out last your car.

Efficiency

DENSO's First Time Fit relays are built to be efficient and produice little to no h eat. The high magnetic efficiency coil reduces heat generated from the relay extending the life. Designed with the shortest current path, power consumption is nonexistent.

Premium Design

Engineered with a non-solder process, DENSO's First Time Fit relays are more resistant to heat-shock, and arcing. The precision controlled contact force and self-adjusting air gap increase longevity of the internal parts and ensures consistent relay performance to nearly half a million cycles.

Features & Benefits

- Controlled contact force
- Automatically adjust gap for precise contact
- Low-heat generation
- Non-Soldered increases heat resistance
- Shortest distance for electrical current to travel

The Denso Difference

- First Time Fit philosophy
- OE technology adapted for the aftermarket
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- Lowest return rates in the industry