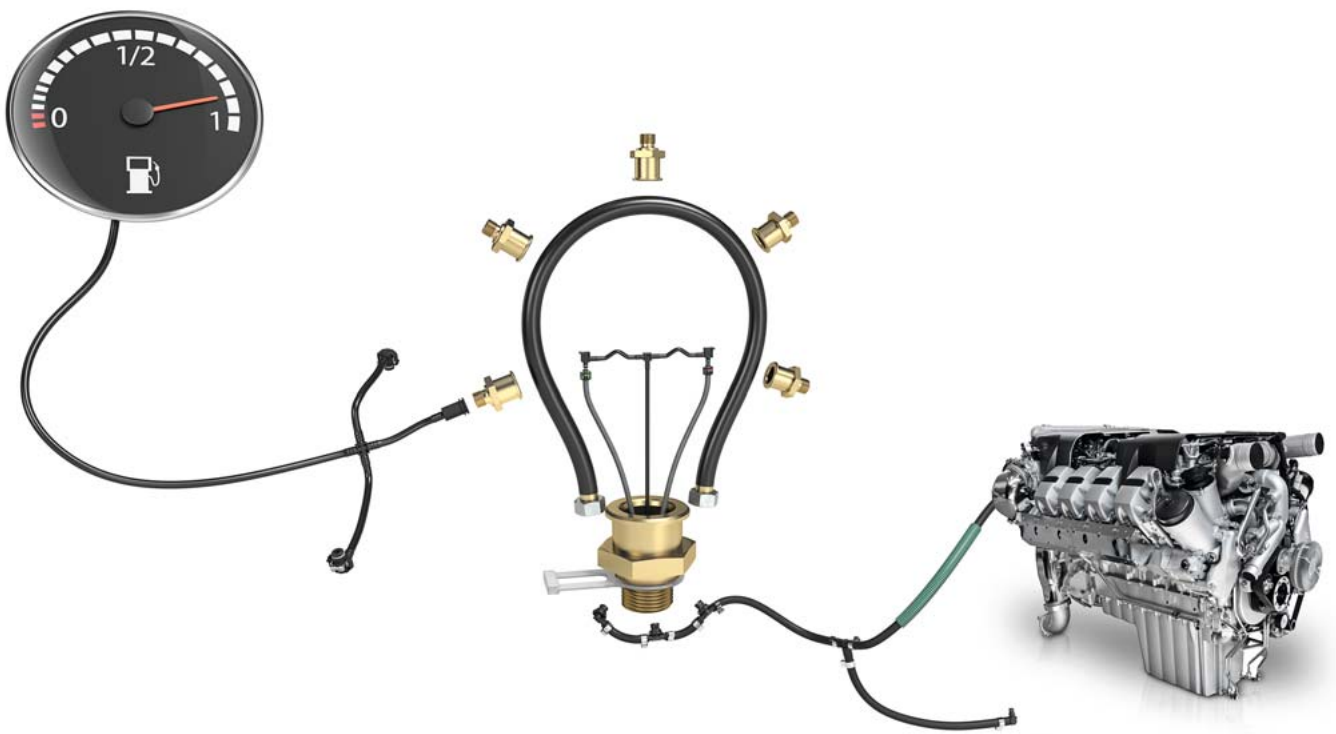




When designing your fuel lines, we infuse intelligence into every last corner.



VOSS Automotive

Line and connection system
technologies for your fuel line
applications





Sometimes the best route goes against the flow.

Fuel is something we at VOSS approach with passion, going beyond conventional thinking, common specifications, and standard product properties. We apply advanced technology to intelligently route your fuel lines, so you can efficiently use the available space as best suits your needs. Our line and connection solutions allow you to stay within your dimensional requirements and reduce component quantity, weight, and costs. When you're surprised and pleased by the suitability of our solution for your application, we're inspired.

The measure of greatness is tightness.

When things get tight – figuratively and literally – you need a reliable partner! VOSS fits the bill, delivering innovative space-efficient routing designs and lines with proven technology tailored to your specific needs. The highly complex inner workings of passenger vehicles are where we initially polished our expertise. But it wasn't long before our competence was in demand for commercial and agricultural vehicles and heavy construction machinery – first in Europe and later worldwide.

When the routing gets tough, our systematic approach delivers.

Your expectations are high if you come to us, and we don't disappoint, pushing our industry-leading standards even higher when it comes to fuel line tightness and durability. You can relax with our custom solutions, knowing, as the pressure maxes out and the temperature soars, our lines and fittings will keep your systems performing as they must.



Your circulatory expert for every automotive application.

Besides thermal durability, the mechanical properties of our fuel line components are distinguished by extraordinary toughness and tightness. For virtually any imaginable use, whether custom diesel, biodiesel, gasoline, ethanol, or hydrogen solution for passenger, commercial, or agricultural vehicles and heavy construction machinery, we build our products – even the smallest quick connector – to do exactly what you want them to do!

Trucks



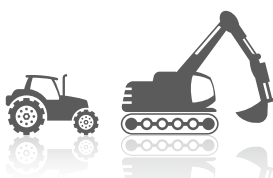
In contrast to passenger vehicles, trucks are built for work. They travel greater distances, use greater quantities of fuel, and require greater fuel line diameters. This requires more space. But space is often a rare commodity or inaccessible. No problem, that's VOSS' niche. We answer these needs with multiple bundling, intelligently designed quick connections, and sturdy products.

Cars



In passenger automobiles, the lines are shorter, but space is even more limited. Narrower lines with higher pressure and temperatures prevail. Here VOSS uses primarily nylon, which reduces weight and permits us to meet the most intricate requirements.

Agricultural and construction machinery



Whether hoisting or earthmoving machinery, road construction or agricultural machinery and vehicles, heavy-duty applications require extremely robust fuel line solutions. For this reason, we manufacture chiefly metal fittings, manufactured in small or custom lots with greater product variation.

Buses



Due to the nature of what they transport, namely people, buses have very different and strict regulations when it comes to the flame resistance of fuel lines. VOSS answers these demands with exactly the right system.

Stationary industrial engines



VOSS also designs and manufactures long-lasting and highly durable systems in small production runs for use in stationary industrial motors.



Your challenges fuel our passion.

Customer requirements and expectations vary greatly, as do the types of fuel that are in use today, which include diesel, ethanol, and hydrogen. The breadth of our expertise and our scrupulous attention to detail allow us to meet these complex challenges head on with individually designed fuel line solutions and innovative components. Take our new 246 NX quick connect system, for example.

Diesel

Fuel lines for diesel engines have long been one of our specialties. You'll notice the difference when the temperatures hit the deep-freeze zone.

Biodiesel

Since the introduction of fuel standards and stricter regulations, various bio-diesel fuels have appeared on the market, making the use of components manufactured from different materials, such as VA steel and nylon, necessary. VOSS is staying one step ahead of the market, providing O-rings, lines, and fittings manufactured from suitable materials.

Gasoline/Ethanol

VOSS also designs solutions specifically to handle gasoline and ethanol. For example, the 241 quick connect system, which complies with the SAE J2044 market standard, or a specially modified variant of the 246 quick connect system.

Hydrogen

Hydrogen is now a vision, but its realization is drawing closer and we're striving to facilitate it, developing the technologies necessary to ensure the tightness that volatile hydrogen requires.



New age materials yield new age solutions.

Looking for the ideal solution? Come to VOSS. Our solutions wouldn't be solutions if they didn't fully meet every customer's unique requirements for every application. It begins with selecting the most suitable material, which may be brass, steel, aluminum, or nylon, and it continues with the choice of manufacturing technique before finally ending with thorough testing. In fact, we even have our own in-house technical lab to ensure the fuel lines you get from us are nothing short of ideal, rugged, and ready for immediate installation.



Play it safe with your fuel lines – we do!

Once the prototypes have been approved, we put them through grueling tests, quite possibly the only time you'll regard VOSS as merciless. Only after having passed tests in our lab do we start regular production of new products.

Let us play the matchmaker for you.

Which components are most suitable for your specific application depends on the particular component configuration:

- **Single- and multilayer nylon tubes**
- **Hoses**
- **Connection elements**
- **Heat and abrasion protection**
- **Mounts**
- **Other components**



A VOSS specialty.

One of VOSS' specialties and an area which displays our drive to develop high-performance materials for our customers' unique applications is the extrusion of nylon tubing. Our competence center, comprised of facilities in São Paulo, Brazil, and soon in Poland and China, is passionately dedicated to advancing this uniquely useful manufacturing process.



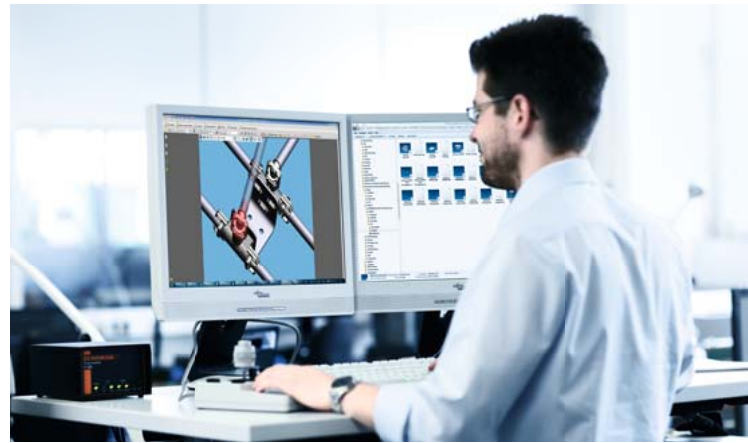
Carefully crafted solutions are expandable ones.

Although applications from motor vehicle to motor vehicle manufacturer are similar, no two are identical, which is why we work closely with you – from the idea to your manufacturing operations – tailoring our expertise to the point where it satisfies your particular needs. There's really nothing standard about our solutions except their compliance.

A single source is more direct.

Beginning with the analysis of your vehicle, our streamlined processes will get you to the product you envision more quickly and with greater efficiency:

- **Project management**
- **Engineering services**
- **Prototype building**
- **Quality management**
- **Close cooperation with our partners on-site**



You have the choice – we, the ideal solution.

Guaranteed, we'll surprise you with how thorough we are. From the analysis of your vehicle to the installation of our product, we're prepared to meet your challenges.

Designing new fuel systems.

With an experienced eye, we regard your entire system and provide you with comprehensive advice and a proposal for the routing of your fuel lines and choice of connections, including options to protect fuel lines near engines from heat.

Designed as specified in your product requirement documents.

You tell us precisely what you want and we'll provide you with the optimum solution.

Optimizing your existing systems.

Considering how you can make your existing fuel line more efficient, cut costs, size, component quantity, or weight while minimizing assembly, wear and tear, and safety problems? We'll provide the answer.

Prefabricated fuel lines, individually designed for a host of different applications.

More geometry goes into a fuel line than you might think. Regardless of the system requirements, it takes enormous precision, foresight, and versatility to get everything right for each system. Just how different the solution might be, you'll see in the following:

Pre-shaped fuel line

Prefab line connects tank, pump, rail, and engine.

- Polyamide line (8 x 1)
- 246 Standard NS 8, 90° fittings
- Coupling with flow stop
- Cross manifold
- Nylon connecting elements



Fuel line module

Low-pressure fuel line connects filter and pump.

- Hose lines for supply and return
- Dimensions: 11.5 x 3.25
- Die-cast aluminum connectors



Leak-off line

Prefabricated leak-off lines for connection to common rail engine injectors.

- Hose lines for the return line
- Nylon 249 LB connector system
- NS 6.9
- Nylon T-fitting with restriction
- Nylon elbow plug



Hydrogen fuel line

Hydrogen line for use in fuel cell systems. Features especially superb permeation performance and long-term resistance to hydrogen embrittlement.

- 12 x 1.5 multilayer tube with inner antistatic coating
- Stainless steel 246 AX (DS) NS 12 straight connectors



More than a connection.



It's indisputable that technological advances and stricter safety and environmental regulations represent a formidable challenge to both engineers and automotive parts, including the smallest package components. For this reason, since introducing the revolutionary VOSS quick connect system 246 on the market, we have continued to work tirelessly to improve this fuel line product. And this has given us a slight edge, helping to prepare for the future and even be ahead of it, sometimes. The next generation, VOSS 246 NX, for example, features an innovative release element, which is the new standard for all fuels, meeting the higher temperature and pressure requirements.

VOSS quick connect system **246**

VOSS' 246 is a quick connect system that easily and tightly connects the fuel line with units in the fuel system. It comes in several variants, each with its own set of advantages, which include easy installation and expandability, even for the tightest of spaces. Moreover, the connectors insert and seal in a single step. The 246 system is highly modular with flow stops and poka-yoke solutions, giving it extensive versatility, with which it easily meets your specific requirements.



- Straight and angular connectors
- NS 8 and NS 12
- Plug connector turns in connecting profile
- Unit connections, adapters, and quick connectors made from nylon and metal

Typical 246 connecting profile

246 **Standard**

- Very low heights of connectors, adapters, and unit connections
- Polyamide plug connectors
- For the connection of polyamide tubes
- Two arms allow the plug connector to clip into place under the connecting profile
- For diesel and biodiesel, supplied with one O-ring
- For gasoline and ethanol, supplied with two O-rings (246 DS)
- Detaches using release element or tool
- Permissible operating pressure: 5 bar
- Permissible temperature range: -40 °C to 100/120 °C
- Electrically heated variant available for SCR systems



246 **AX**

- Plug connectors constructed from metal
- Connects polyamide tubes and hoses
- Axial clip for tight sealing under connecting profile
- For diesel and biodiesel, supplied with one O-ring
- For gasoline, ethanol, and hydrogen, supplied with two O-rings (246 DS)
- Detaches manually
- Permissible operating pressure: 10 bar
- Permissible temperature range: -40 °C to 100/120 °C

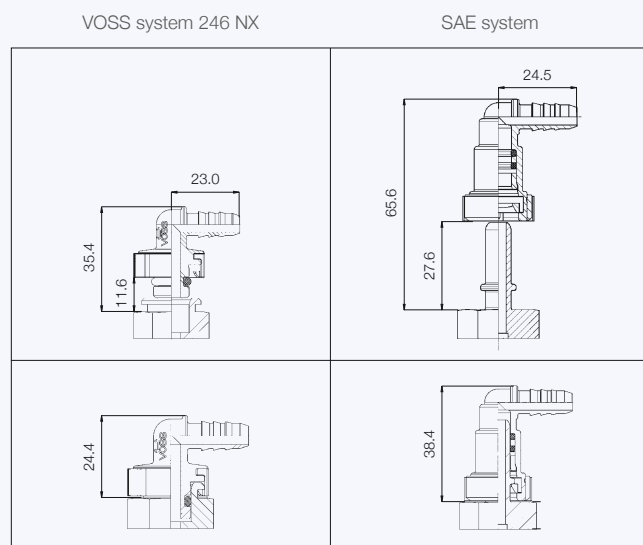


The new standard: **246 NX**

Quick connect system 246 NX features the advantages of both 246 Standard and 246 AX products. The higher seal under the connecting profile by the plug's profile allows higher pressures there. The plug profile also enables low heights of adapters and fuel system unit connections. Above all, the innovative release mechanism is extremely user-friendly.



- Polyamide plug connectors
- Connects polyamide tubes and hoses
- Straight and angular connectors
- NS 8 and NS 12
- Very low heights of connectors, adapters, and unit connections
- For diesel and biodiesel, supplied with one O-ring
- For gasoline, ethanol, and hydrogen, supplied with two O-rings
- Position of the release mechanism engages flexibly
- Release mechanism comes in various colors
- Detaches manually
- Nylon or metal connecting profile
- Permissible operating pressure: 10 bar
- Permissible temperature range: -40 °C to 120/140 °C
- Electrically heated variant for SCR systems



Comparison of 246 NX quick connect system and SAE J2044 system heights



Electrically heated line and 246 NX quick connection for SCR systems

Small but mighty: VOSS leak-off lines.



As a VOSS customer, you also benefit from our uncompromising commitment to providing you with the ideal complete solution when it comes to leak-off lines for common rail engines. Our 249 LA, 249 LB, and 250 systems are specially designed to meet your requirements here.

The ideal quick connect system for every leak-off line.

Injector connections vary from manufacturer to manufacturer. VOSS will provide you with the best-performing and most suitably designed connection system for your specific fuel injection system:

- **Connects polyamide tubes or hoses**
- **Metal flange**



Quick connect system **249 LA**

- Designed for overpressure applications
- Nylon or brass elbow and T-fittings
- NS 6.7
- For compact space dimensions
- Detaches manually or with tool
- Permissible operating pressure: 10 bar
- Permissible temperature range: -40 °C to 130 °C



Quick connect system **249 LB**

- Designed for overpressure applications
- Nylon or brass elbow and T-fittings
- NS 6.9
- For compact space dimensions
- Detaches manually or with tool
- Permissible operating pressure: 16 bar
- Permissible temperature range: -30 °C to 125 °C, short-term also to 140 °C



Quick connect system **250**

- Designed for negative pressure applications
- Nylon or brass elbow, T- and L-fittings
- NS 5.6
- For extremely compact space dimensions
- Detaches manually
- Permissible operating pressure: 0.3 to 5 bar
- Permissible temperature range: -30 °C to 150 °C

Quick connect system 241

A connection system designed to connect fuel lines to SAE J2044 ports. Suitable for fuel line units and line transitions.

- Polyamide couplings
- Straight and elbow connectors
- NS 5/16", 3/8", and 1/2"
- For diesel, biodiesel, gasoline, and ethanol
- Easily assembled by hand
- Detaches manually via integrated nylon clip
- Coupling turns in the port flange
- Connects polyamide tubes and hoses
- Permissible operating pressure: 8 to 12 bar
- Permissible temperature range: -40°C to 115/130°C
- Electrically heated variant for SCR systems



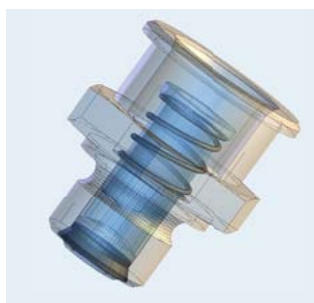
Valves crafted by VOSS.

Tell us what you need and we'll design and manufacture the ideal mechanical valve for your fuel's system requirements, including:

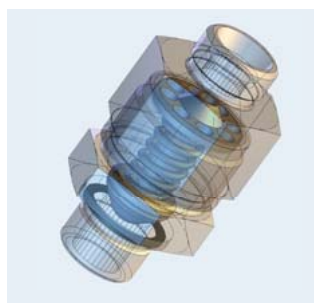
- **Flow-stop valves**
- **Non-return valves**
- **Multiport valves**
- **Custom-manufactured valves**



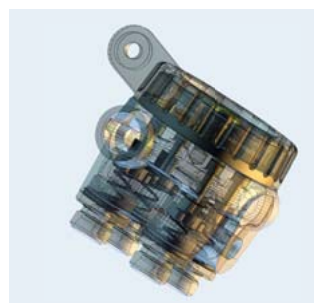
Individually manufactured valve
(SAE fuel fill connection)



Flow-stop valve



Non-return valve



Multiport valve



Individually custom-manufactured valve

The most important thing one can offer the customer is proximity.

Our customers' vehicles travel on every road on earth – and off-road as well. Consequently, their production facilities and development offices are located around the globe.

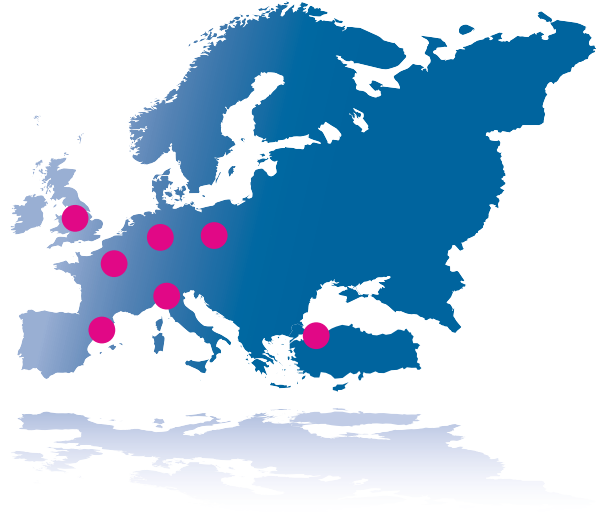
We can accompany you as an international partner, and with regard to production, development, and technical support we are positioned internationally to match your needs. Our 2,500 employees at 16 locations support our worldwide presence. VOSS has a locally established team in all countries: Europe, the US, and Japan just as much as Brazil, China, and India. VOSS manufactures prototypes and series production within the reach of customers – in internationally networked plants with standardized production lines.

We continue to build on this worldwide presence; positioning us to perform our role as a system partner to the international automobile industry with even greater skill going forward.



Europe

The VOSS central facility for production and development is Germany. The headquarters in Wipperfürth is the central point from which we manage the company's business affairs – expanded by a number of subsidiaries and sales offices since the 70s. With more than 500 employees our plant in Poland is of distinguished importance in our production network. Manufacturing processes for line assemblies serve as a model for our plants in Mexico and China.



North America

VOSS has been operating subsidiaries in Fort Wayne and Seattle, USA, since 1996, and also in Saltillo, Mexico, since 2011. These handle development, technical support, and production of line assemblies, especially for SCR and fuel applications on trucks and off-road vehicles.



South America

The competence center for extrusion of nylon tubes is situated in São Paulo. Two factories produce line assemblies and quick connect systems for pneumatic, fuel, and SCR applications.



Asia

In 2007, VOSS started a factory and development center in Jinan, and a sales center in Shanghai. These cover the entire product spectrum. Going forward, SCR technology will be a primary focus. VOSS is represented in Japan by way of a sales center with technical support for the entire product range. VOSS has been represented in India for years by way of a joint venture. All Indian truck manufacturers use VOSS products in their compressed-air brakes.

VOSS



VOSS Automotive, Inc.
4640 Hillegas Road
Fort Wayne, IN 46818
USA
Phone: +1 260-373-2277
customersvc@us.voss.net
www.vossusa.com

VOSS Automotive GmbH
P.O. Box 15 40
51679 Wipperfürth
Leiersmühle 2-6
51688 Wipperfürth
Germany
Phone: +49 2267 63-0
Fax: +49 2267 63-5982
automotive@voss.net
www.voss.net