



Application Alley

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Automotive - Reed Sensor

Automotive Exhaust Fumes Emissions Are Sensed and
Controlled By Reed Sensors



Custom
Engineered
Solutions for
Tomorrow

Introduction

Trying to find a sensor that will function on the underbelly of an automobile where ice, snow, oil, dirt, grime, very high temperatures and very low temperatures may exist at any given time represents a very difficult objective. The muffler system alone may have temperatures on part of its system in the several hundred degrees C range. Catalytic converters on the muffler system have a valve that must have its position sensed in order to automatically adjust the fuel mixture minimizing exhaust fumes. Auto designers have turned to Standex-Meder's Reed Sensors.

Dimensions (mm)

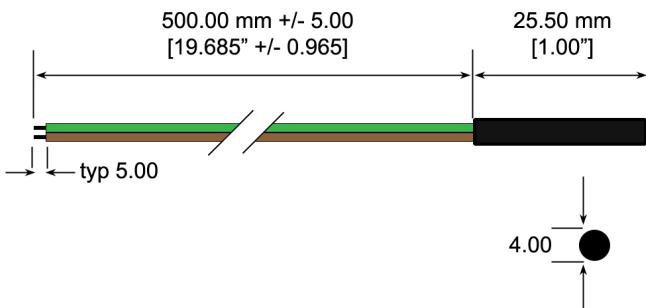


Figure 1. MK14 Sensor physical layout

Features

- The reed sensors reliably operate between -50°C to 150°C
- Magnet and Reed Sensor are isolated and have no physical contact by typically having the magnet mounted on the valve in the catalytic converter and the Reed Sensor mounted and positioned to accurately pick up the motion of the valve
- The reed switch used in the Reed Sensor is hermetically sealed and is therefore not sensitive to rough, wet, oily dirty environments that clearly exist on the body of the car exposed to the pavement

- High temperature plastic and Teflon leads used
- The magnet is not affected by its environment
- Tens of millions of reliable operations
- Cylindrical mounting and screw fastening mounting using high temperature lead wires
- Contacts dynamically tested

Sensor is attached to a moving valve with mounted magnet. High emissions will cause the valve to move into proximity, activating the reed switch.

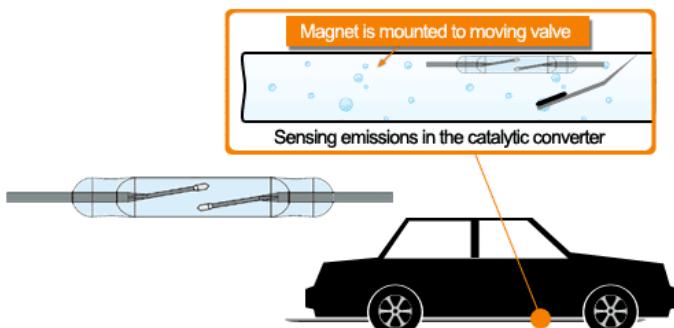


Figure 2. Normal amounts of exhaust fumes move through the catalytic converter slightly moving a valve but not enough to activate the reed sensor.

Sensor is attached to a moving valve with mounted magnet. High emissions will cause the valve to move into proximity, activating the reed switch.

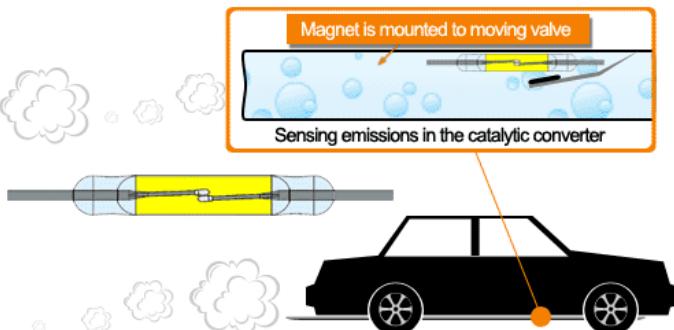


Figure 3. Excessive amounts of emissions will move the valve inside the catalytic converter into proximity with the reed switch sensor activating the electronics.

Applications

- Ideal for sensing the motion of a catalytic converter valve in the dirtiest, most temperature diverse environment on the bottom side of an auto

Reed Sensors Control And Minimize The Exhaust Emissions In Catalytic Converters

The world is now fully aware that we humans are affecting our planet in a negative way by adding vast volumes of pollution to the air we breathe. This has affected the ozone and CO₂ levels in our atmosphere. The biggest polluter has been singled out as coming from the exhaust fumes of our automobiles. Catalytic converters have been mandated worldwide on all automobiles to control the gas emissions in the auto exhaust. Following these gas emission back up into the engine, we find them occurring when air is mixed with the fuel and ignited by a spark. This produces a mini explosion that drives the pistons, directly affecting the drive train, in turn moving the car forward. This explosion can be efficient or inefficient. If it is inefficient, it will use more fuel and increase exhaust emissions.

Specifications (@ 20°C) MK14 Series

	Min	Max	Units
Operate Specifications			
Must close distance	5	25	mm
Must open distance	5	25	mm
Hysteresis	Typical 50%		
Load characteristics			
Switching voltage		200	V
Switching current		0.5	Amps
Carry current		1.5	Amps
Contact rating		10	Watts
Static contact resistance		150	mΩ
Dynamic contact resistance	200		mΩ
Breakdown voltage	320		V
Operate time		0.5	msec
Release time		0.1	msec
Operate temp	-20	85	°C
Storage temp	-20	85	°C

The exact balance of this explosion has many variables: octane level, air temperature, engine temperature, moisture in the air, etc. Since this is something that cannot be set at the factory, an adaptable approach that takes into consideration all the variables must be used. So to further reduce these gas emissions, auto design-

ers found that sensing the movement of a valve mounted in the catalytic converter that moves relative to the volume of emissions can feed back information to make adjustments. This moveable valve approach in the catalytic converter was chosen because it can take all the variables into consideration. However, how the problem became how to detect this movement in such a way to feed back that information to the on-board computer so that adjustments could be made to the air/fuel mixture. Standex-Meder's reed sensors were chosen.

Cylindrical Panel Mount Sensor Series

Series	Dimensions		Illustration
	mm	inches	
MK03	D 5.25	0.207	
	L 25.5	1.004	
MK14	D 4	0.157	
	L 25.5	1.004	
MK18	D 5	0.197	
	L 17	0.669	
MK20/1	D 2.72	0.107	
	L 10	0.394	

Because of the adverse environment the reed sensor needs to operate in, the hermetically sealed reed switch within the reed sensor is essential. Furthermore, only very high temperature plastic packaging along with teflon lead wire can be used. Also, the magnet used on the moveable valve must be a high temperature Alnico type capable of dealing with temperatures as high as 400°C. Essentially as the valve shifts its movement the reed sensor will activate sending a signal back to the on-board computer. sensing function.

Rectangular Panel Mount Sensor Series

Series	Dimensions		Illustration
	mm	inches	
MK04	W 13.9	0.547	
	H 5.9	0.232	
	L 23.0	0.906	
MK05	W 19.6	0.772	
	H 6.1	0.240	
	L 23.2	0.913	
MK12	W 14.9	0.587	
	H 6.9	0.272	
	L 32.0	1.260	

**Consult the factory for more options not listed above.

It will in turn make adjustments to the air/fuel mixture, thereby maximizing the burn efficiency, producing minimal exhaust emission.

The reed sensor is a excellent choice because it can operate reliably from -50°C to 150°C and represents an economical way to carry out the sensing function. Because Standex-Meder's sensors use hermetically sealed reed switches that are further packaged in strong high strength plastic, they can be subject to rough treatment and environmental concerns such as dirt, grease, and moisture found on the bottom side of a car.

Consider some of the below options in cylindrical and rectangular versions for end limit sensor or other similar applications.

Find out more about our ability to propel your business with our products by visiting www.standexmeder.com or by giving us a hello@standexelectronics.com today! One of our engineers or solution selling sales leaders will listen to you immediately.

About Standex-Meder Electronics

Standex-Meder Electronics is a worldwide market leader in the design, development and manufacture of standard and custom electro-magnetic components, including magnetics products and reed switch-based solutions.

Our magnetic offerings include planar, Rogowski, current, and low- and high-frequency transformers and inductors. Our reed switch-based solutions include Meder, Standex and OKI brand reed switches, as well as a complete portfolio of reed relays, and a comprehensive array of fluid level, proximity, motion, water flow, HVAC condensate, hydraulic pressure differential, capacitive, conductive and inductive sensors.

We offer engineered product solutions for a broad spectrum of product applications in the automotive, medical, test and measurement, military and aerospace, as well as appliance and general industrial markets.

Standex-Meder Electronics has a commitment to absolute customer satisfaction and customer-driven innovation, with a global organization that offers sales support, engineering capabilities, and technical resources worldwide.

Headquartered in Cincinnati, Ohio, USA, Standex-Meder Electronics has eight manufacturing facilities in six countries, located in the United States, Germany, China, Mexico, the United Kingdom, and Canada.

For more information on Standex-Meder Electronics, please visit us on the web at www.standexmeder.com.

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