



Application Alley

Automotive - Reed Sensor

Brake Pedal Position Reed Sensor

Introduction

When depressing the brake pedal, the auto's hydraulics engage and slow or stop the vehicle. In addition, two other functions can also occur, one of which is critical to the operation of the vehicle—disengaging of the cruise control. The other function is to switch on the brake lights to alert other vehicles that the car is slowing down and/or is going to stop. In the past, these latter two items typically used electromechanical sensors to sense the brake pedal motion but failed to disengage the cruise control, allowing the engine to continue its race forward increasing the possibility of a potentially dangerous collision. Standex Electronics's automotive sensor designers have successfully solved the reliability problem by using reed sensor technology.

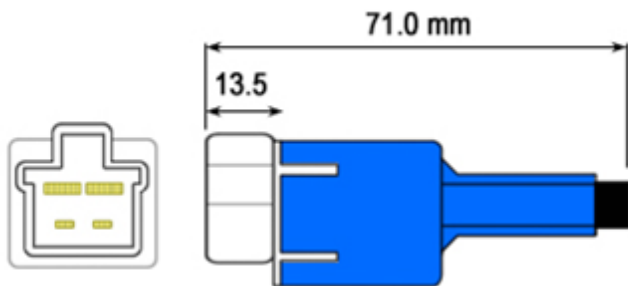


Figure 1. KSS Sensor physical layout

Features

- Ability to withstand harsh temperature swings
- Available in a Form A (normally open) and a Form B (normally closed)
- Designed to handle high shock environments
- Designed to operate in dirty environments
- Dynamically tested contacts
- Hermetically sealed
- Millions of reliable switching operations
- Not sensitive to ESD and EMI

Applications

- In a moving vehicle, monitor the movement or position of the brake pedal to directly activate brake lights and reliably turn off cruise control

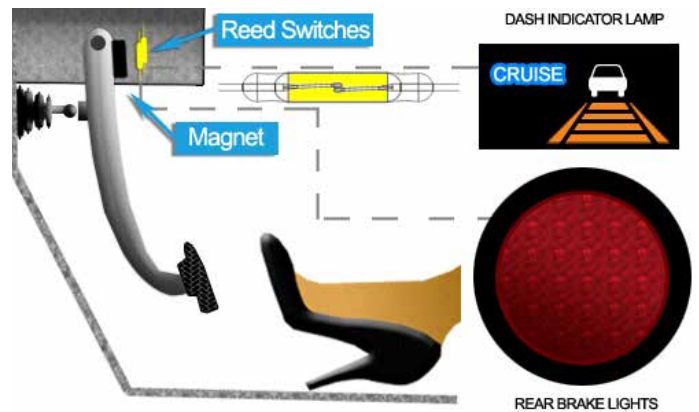


Figure 2. Brake Pedal is up and both Reed Switches are closed, Rear brake lights off and cruise control indicator is lit.

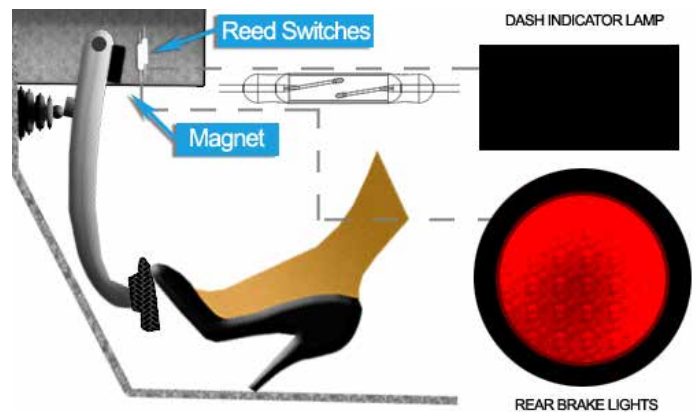


Figure 3. Brake Pedal is depressed, Reed Switches open activating rear brake lights and disengaging the cruise control.

Break Pedal Operation

Practically all motor vehicles have a brake pedal that is used to slow down or stop a vehicle. When the operator applies their foot to the brake pedal three events must happen:

1. The brake shoes need to immediately apply pressure to the brake pads lining the inner diameter of the wheel. This happens directly using hydraulics which activates the braking action slowing down or stopping the vehicle.
2. A sensor is activated turning on the brake lights. These lights alert other vehicles in the rear that this vehicle is either slowing down or stopping, reducing the possibility of a rear end collision.
3. Most vehicles today have cruise control as a standard option. When the brakes are applied a sensor must be activated that in turn, disengages the cruise control, automatically reducing gasoline flow to the engine, allowing the vehicle to slow or stop.

The brake pedal is generally located near the floor of the vehicle in one of the dirtiest environments in the cab of the vehicle. Also, a person's shoes pressing against the brake pedal may have water, dirt, grease, oil or grime being constantly applied to the pedal over long periods of time. Electromechanical sensors, being exposed to this environment will experience contamination adversely affecting their switching contacts producing unreliable brake switch operation. Electromechanical sensors can be the least costly approach. When only the brake lights were being sensed and the electromechanical sensor failed, although considered dangerous, was not necessarily an accident waiting to happen. However, with the advent of cruise control, if the sensor fails to sense the brakes being applied, and therefore does not disengage the cruise control, a very dangerous situation will develop. The engine will want to race forward while the operator is trying

Specifications (@ 20°C) KSS Series			
	Min	Max	Units
Operate Specifications			
Must close distance	ref	ref	mm
Must open distance	ref	ref	mm
Hysteresis			
Load characteristics			
Switching voltage		200	V
Switching current		0.5	Amps
Carry current		1.25	Amps
Contact rating		10	Watts
Static contact resistance		250	mΩ
Dynamic contact resistance		250	mΩ
Breakdown voltage	225		V
Operate time		0.5	msec
Release time		0.1	msec
Operate temp	-20	80	°C
Storage temp	-50	125	°C

to brake the vehicle.





Reed Switches are therefore reed sensors are hermetically sealed and are the perfect solution for dirty environments. Reed sensors are rated to successfully switch hundreds of millions of operations, and are now the competitive choice for automobile engineers where they are now the preferred technology. The engineers are now finding reliable braking operation when the braking sequence occurs using reed sensors.

Depending upon space availability, the sensor presented above will work very well. However, if space is limited our smaller MK15, MK16, or the MK17 series with their added over-molded protection are ideal. Other series may also be advisable depending upon the exact physical layout. The sensors can also be supplied as a single pole normally open and a single pole normally closed. In the second case, when the brake pedal is depressed, the normally closed contact will open automatically disengaging the cruise control.





Consult with our engineers for specific details for your exact application.

Consider some of the below options in surface mount, through hole, cylindrical and rectangular versions for the brake pedal sensor or other similar applications.









Through Hole Sensor Series

Series	Dimensions		Illustration	
	mm	inches		
MK06-4	W	3.3	0.130	
	H	3.3	0.130	
	L	12.06	0.475	
MK06-5	W	2.8	0.110	
	H	3.2	0.126	
	L	14.30	0.563	
MK06-6	W	3.3	0.130	
	H	4.2	0.165	
	L	17.24	0.679	
MK06-7	W	3.3	0.130	
	H	4.2	0.165	
	L	19.78	0.779	




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	




Surface Mount Sensor Series

Series	Dimensions		Illustration	
	mm	inches		
MK15	W	2.5	0.098	
	H	2.5	0.098	
	L	19.50	0.768	
MK16	W	2.3	0.091	
	H	2.3	0.091	
	L	15.60	0.614	
MK17	W	2.1	0.083	
	H	2.1	0.083	
	L	9.61	0.378	
MK22	W	2.7	1.060	
	H	2.3	0.091	
	L	15.60	0.614	
MK23-35	W	2.2	0.087	
	H	1.95	0.077	
	L	15.75	0.620	
MK23-66	W	2.2	0.087	
	H	2.7	1.060	
	L	19.60	0.772	
MK23-87	W	2.0	0.079	
	H	2.1	0.083	
	L	15.60	0.614	
MK23-90	W	2.54	0.100	
	H	3.05	0.120	
	L	24.9	0.980	

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	

Threaded Panel Mount Sensor Series

Series	Dimensions		Illustration
	mm	inches	
MK11	Thread / M5 x 0.5		
	L	25.0	
MK11/M8	Thread / M8 x 1.25		
	L	38.0	
MK11/B	Thread M6 x 1.00, M8 x 1.25, M10 x 1.00, M12 x 1.00		
	L	38.0	

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

Find out more about our ability to propel your business with our products by visiting www.standexelectronics.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 Electronics

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

Our magnetics offerings include planar, current sense, and conventional low- and high-frequency transformers and inductors. Reed switch-based solutions include Meder, Kent, and KOFU 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 range of product applications in the transportation, automotive, medical, test and measurement, military and aerospace, aviation, HVAC, appliance, security and safety, and general power and industrial markets.

Standex Electronics has a commitment to absolute customer satisfaction through a partner, solve, and deliver approach. With a global organization that offers sales support, engineering capabilities, and technical resources worldwide – we implement customer driven innovation that puts the customer first.

For more information on Standex Electronics, visit us on the web at standexelectronics.com.

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