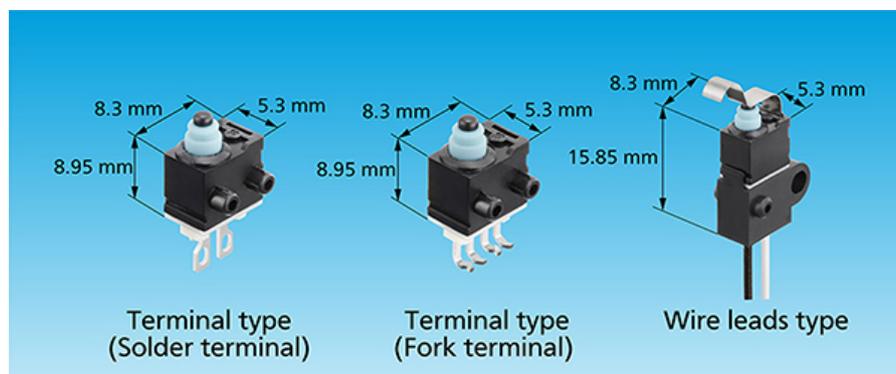


Dec 15, 2020

Panasonic Commercializes Small Waterproof Switches with Wiring Failure Detection Function: Turquoise Stroke Mini Switches with Built-in Resistors

The new switches help improve the safety of automobiles, as well as enabling the use of fewer components and smaller mounting area



**Turquoise Stroke Mini Switches with Built-in Resistors
 (December 2020, Panasonic)**

Osaka, Japan – Panasonic Corporation announced today that in December 2020, its Industrial Solutions Company ("Panasonic") will launch mass production of Turquoise Stroke Mini Switches with Built-in Resistors, which are small waterproof switches with a wiring failure detection function that will improve the safety of automobiles.

With progress in the electrification of vehicles and signs of the widespread use of autonomous driving and self-parking in recent years, automobiles require a higher level of safety than ever before. Automotive switches, which detect the state of door opening and closing and the shift lever position, are also required to improve their performance in detecting wiring disconnections and short circuits caused by vibrations, as well as detecting the target objects. Since resistors, which were conventionally mounted in the vicinity of switches, are now built into the body, the newly developed switches are capable of detecting wiring failures, in addition to their original functions. This will improve the safety of automobiles and enable the use of fewer components and smaller mounting areas. The switches are applicable not only to automobiles but also to industrial robots, electric mobility, home appliances, etc., which operate continuously and are susceptible to disconnections due to vibrations.

Panasonic's new Turquoise Stroke Mini Switches with Built-in Resistors have the following features:

1. The built-in wiring failure detection function detects disconnections and short circuits in addition to switch ON/OFF.
2. The high operating-position precision over long strokes while being small improves design flexibility.
3. The very quiet operation and waterproof performance make the switches applicable to various uses.

Suitable applications:

Automotive: Opening/closing detection of side doors, hood latches, flush door handles, recharge outlets, and shift lever position detection, etc., of hybrid vehicles (HEVs), electric vehicles (EV), gasoline cars, etc.

Industrial: Joint part detection in robots, movable part detection in forklifts, lock detection in electric bicycles, etc.

Home appliances: Air conditioner panel detection, washing machine lid detection, vacuum cleaner robot position detection, toilet lid/seating detection, etc.

Turquoise Stroke Mini Switches with Built-in Resistors:

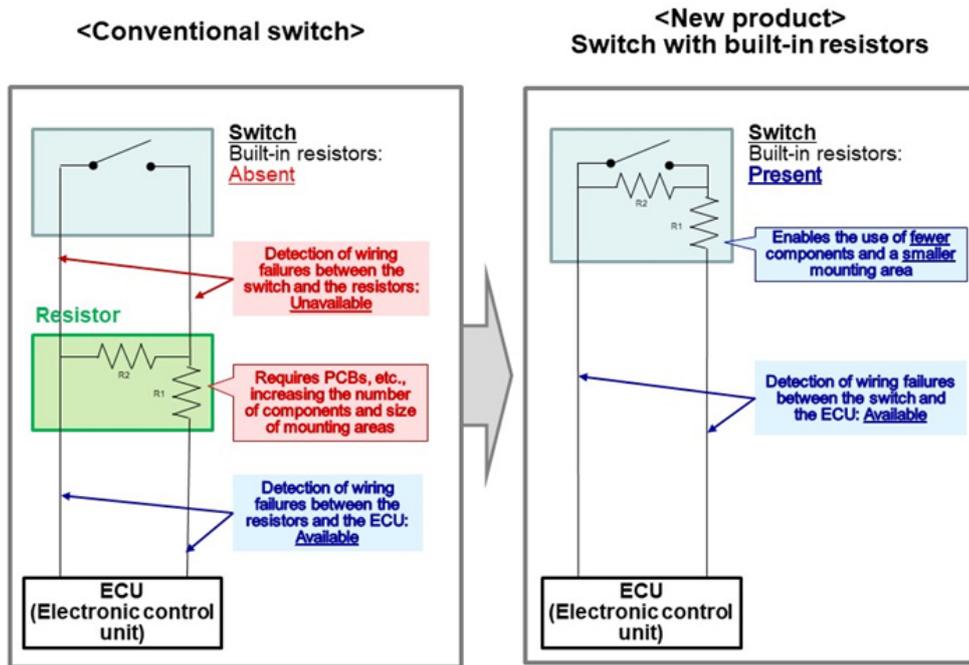
https://www3.panasonic.biz/ac/e/control/switch/micro-seal/tarcoizmini_asqmr/index.jsp?ad=press20201215

[Product features]

1. The built-in wiring failure detection function detects disconnections and short circuits in addition to switch ON/OFF.

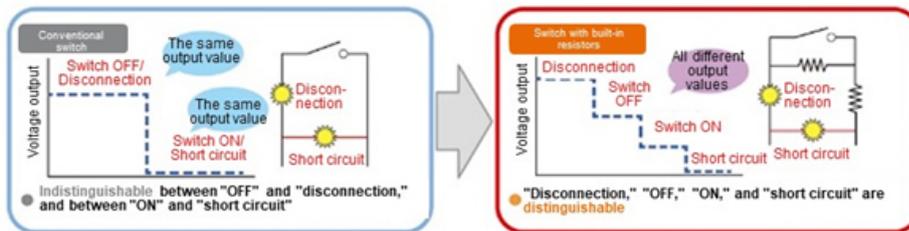
Automotive switches are required to reliably detect anomalies and failures due to vibrations, such as wiring disconnections and short circuits, in addition to detecting signals related to door opening and closing, shift lever positions, the insertion state of charging connectors, etc. The conventional mainstream method of detecting wiring failures was to identify the wiring state based on the voltage changes of resistors mounted in the vicinity of switches. The newly developed switches are equipped with internal resistors by adopting Panasonic's unique compact contact structure and built-in resistor method. Adding a wiring failure detection function to the switches has enabled the reductions in the number of components and mounting area. The switches also enable wiring failure detection between the switch and resistors, which was not possible with conventional resistors mounted externally, thereby improving automobile safety.

[Fig.1] Schematic Diagrams of Switches and Resistors

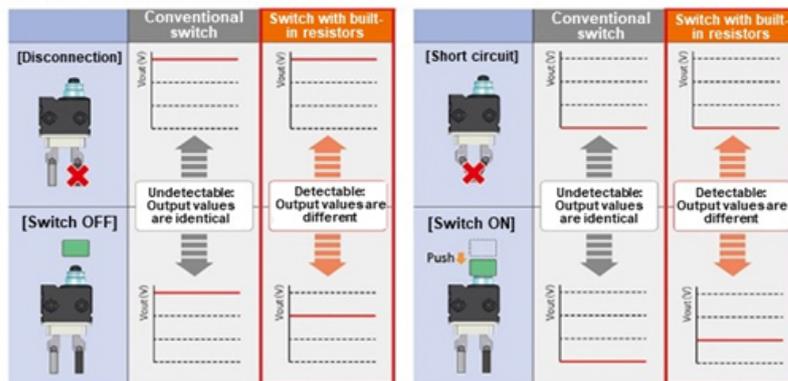


[Fig. 2]

■ Conceptual image of output and circuit diagrams



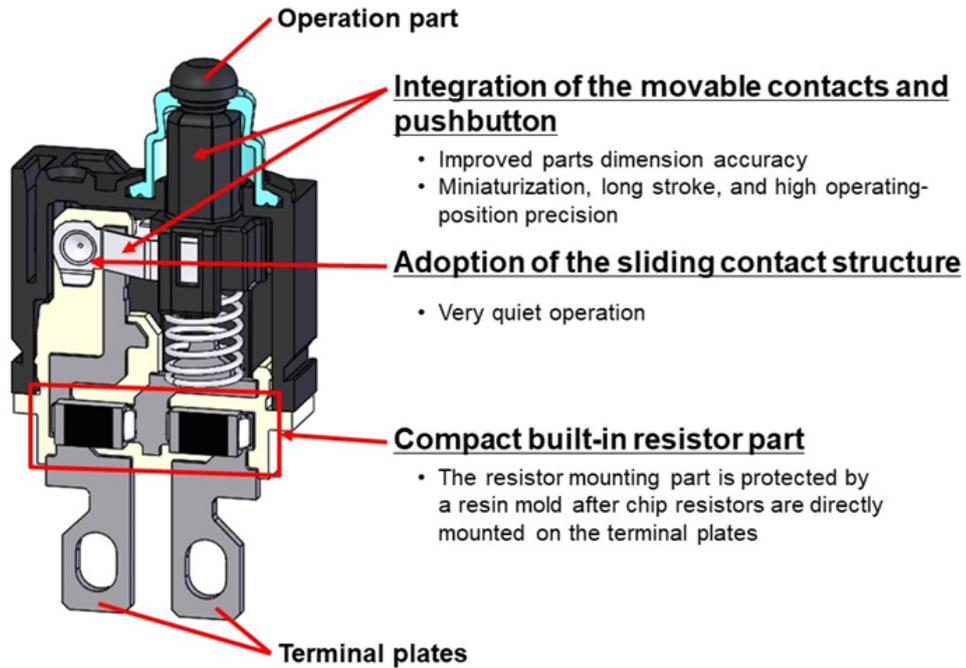
■ Differences in the detection results of conventional switches and switches with built-in resistors



2. The high operating-position precision over long strokes while being small improves design flexibility.

Switches require high operating-position precision over long strokes to absorb variations in mounting position and push-in amount due to mounting. The newly developed switches have improved the parts dimension accuracy through the integration of the movable contacts and pushbutton (actuator). The switches have also achieved high operating-position precision over long strokes while being small, improving design flexibility for switch mounting.

[Fig.3] Product Structure



3. The very quiet operation and waterproof performance make the switches applicable to various uses.

Because HEVs driving in electric mode and EVs are quiet inside the vehicle without engine noise, switches must operate quietly as well. By adopting Panasonic's unique sliding contact structure, the switches have achieved a very quiet operation. Furthermore, with the highly effective sealing structure of the components and resin case inside, the switches are applicable to industrial and home appliance uses that require high waterproof performance, in addition to automotive uses.

Product specifications:

[Product Specifications]

Turquoise Stroke Mini Switches with Built-in Resistors		
Dimensions		Terminal type (Solder terminal, Fork terminal) : 8.3 mm × 5.3 mm × 8.95 mm
		Wire leads type: 8.3 mm × 5.3 mm × 15.85 mm
Rating	Rated power	Environmental temperature: -40°C ≤ T ≤ 70°C 0.50 W
		Environmental temperature: 70°C < T ≤ 75°C 0.45 W
		Environmental temperature: 75°C < T ≤ 85°C 0.40 W
	Voltage	4.5 V DC to 16 V DC
	Min. current	1 mA
Performance	Electrical switching life	4.5 V DC to 5.5 V Min. 3 × 10 ⁵
		8 V DC to 16 V Min. 2 × 10 ⁵
	Heat resistance	85°C 500 hours
	Cold resistance	-40°C 500 hours
	Humidity resistance	40°C 95% RH 500 hours
	Protection grade	IP67 (except the exposed terminal part of the terminal type)

Detail Information:

Panasonic Turquoise Stroke Mini Switches with Built-in Resistors

https://www3.panasonic.biz/ac/e/control/switch/micro-seal/tarcoizmini_asqmr/index.jsp?ad=press20201215

Media Contact:

Panasonic Corporation Brand Strategy Division Global Communications Office

<https://news.panasonic.com/global/contacts/>

Inquiries:

https://www3.panasonic.biz/ac/e/user/new_question/?ad=press20201215

About Panasonic

Panasonic Corporation is a worldwide leader in the development of diverse electronics technologies and solutions for customers in the consumer electronics, housing, automotive, and B2B businesses. The company, which celebrated its 100th anniversary in 2018, has expanded globally and now operates 528 subsidiaries and 72 associated companies worldwide, recording consolidated net sales of 7.49 trillion yen for the year ended March 31, 2020. Committed to pursuing new value through innovation across divisional lines, the company uses its technologies to create a better life and a better world for its customers. To learn more about Panasonic:

<https://www.panasonic.com/global>.

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