

## TURQUOISE SWITCHES: IMPORTANT NOTES REGARDING USE

### 1. Fastening of the switch body

1) Fasten the switch body onto a smooth surface using the correct screw as shown in the chart below and tighten it with the prescribed torque. Be careful not to exceed the prescribed torque when tightening as this may adversely affect the sealing properties and switch functioning, and also cause damage. If using a torque driver, verify that it is set to the prescribed torque. Also, we recommend that you use both flat metal washer and spring washer and adhesive to prevent loosening and to lessen the tightening load on the switch.

	Screws	Tightening torque
ABJ	M1.2	Not more than 0.098N·m
	M2.3	Not more than 0.29N·m
	M3.0	Not more than 0.29N·m
ABS	M2.3	Not more than 0.29N·m
ABV	M3.0	Not more than 0.49N·m

### 2) Fixed pin type

To secure the switch unit, thermally crimp or press-fit the mounting pins. If the pins are to be press-fitted, install a guide on the opposite surface to the mounting pins to prevent them from slipping out of position and developing play.

3) Be sure to maintain adequate insulating clearance between each terminal and ground.

4) The positioning of the switch should be such that direct force is not applied to the push-button or actuator in its free position. The operating force to the push-button should only be applied in a perpendicular direction.

5) The standard value of overtravel used should be within the range of 70% to 100% of the rated O.T. value.

6) When soldering the V-type turquoise switch or the immersion protected type of the J and S type switches, the sealing material sometimes forms a lump or bulge at the base of the terminal or lead. Be sure to allow enough space for this when attaching the switch.

### 2. Soldering operations

1) Manual soldering: use soldering irons (max. 350°C 662°F) capable of temperature adjustment. This is to prevent deterioration due to soldering heat. Care should be taken not to apply force to the terminals during soldering.

#### Specifications

	Wattage	Soldering time
ABJ	18 W	Within 3 seconds
ABS	60 W	Within 3 seconds
ABV	60 W	Within 5 seconds

2) Terminal portions should not be moved within 1 minute after soldering.

### 3. Variance of operating characteristics

Allow for up to  $\pm 20\%$  variation of the specified characteristics values to compensate for long term operational wear of the switch in your design.

#### 4. Cautions regarding use

1) When switching inductive loads (relays, solenoids, buzzers, etc.), an arc absorbing circuit is recommended to protect the contacts.

2) If switching of the contact is synchronized with the phase of the AC power, reduced electrical life or welded contact may occur. Therefore, test the switch while it is operating under actual loads for this condition. If found, you may wish to take corrective action in your design.

3) In the following operating condition, the electrical life might be greatly reduced depending upon the switching load. Please consult us before use.

- Switching operation at a high or low speed (near limits specified).

4) If the build up of dust or dirt becomes so severe that it requires the use of the attached lever, there is the concern that the flexible part may be impeded and return movement may not be possible. In this situation take the following precautions:

- Select a product number for a switch with a higher operation load or use a leaf type lever.
- Attach a protective cover to the lever.

5) If the leaf lever type switch is excessively pushed (pushed further than the operational limit position) or switching is done at high speed or is accompanied by the impact, the lever will break. Please be careful. Also, be careful with the BV short roller lever type switch as improper return may result from pressing too much.

### 5. Protection from dust, water and corrosive gas

1) The pin button and the space around the body cap Turquoise switches are sealed with elastic material, the terminal portion is integrally molded. This prevents dust entry and protects the switch against corrosive gases. Wireleaded types are recommended for applications subject to water or oil splash. However, avoid soaking these immersion protected types in oil or water, because they types are not of completely oil tight construction.

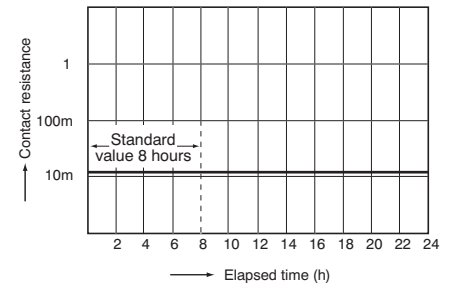
2) Take care that breathing actions don't allow water vapor to get inside during opening and closing or cause rapid temperature changes.

3) Keep away from environments where silicon based adhesives, oil or grease are present as faulty contacts may result from silicon oxide. Do not use in areas where flammable or explosive gases from gasoline and thinner, etc., may be present.

- Dust protection test

Test conditions:

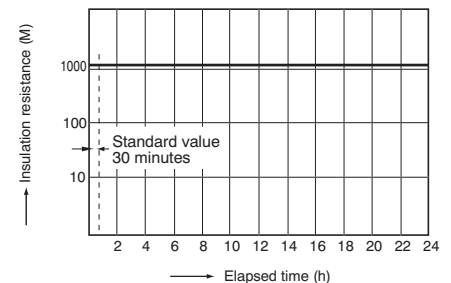
Dust-protected IP50 switches ...  
Repeatedly pass pure talc powder through a standard wire sieve with a 75 $\mu$ m nominal diameter so that the talc is suspended in the air around the switch area. Two kilograms of talc powder should be suspended for each cubic meter of laboratory space. The talc suspension should then be left for eight hours.



- Waterproof test

Test conditions:

Immersion protected IP67 switches ...  
Submerge at 1 m below the water surface for 30 minutes.

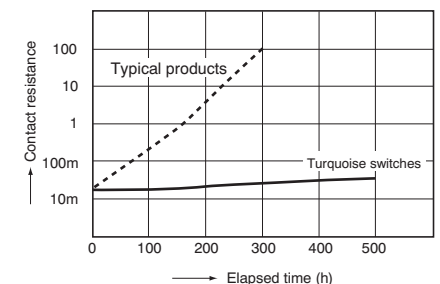


- Hydrogen sulfide exposure test

Test conditions:

Concentration: 3 ppm  
Temperature: 40°C 104°F

Humidity: 75% RH



# Notes for Turquoise Switches

## 6. Oil-proof and chemical-proof characteristics

The rubber elastomer swells when exposed to oil and chemicals. The extent of swelling will vary widely depending on the type and amount of oil and chemicals. Check with the actual oil or chemicals used.

In particular, be aware that solvents such as freon, chlorine, and toluene cannot be used.

## 7. Washability (ABJ and ABS)

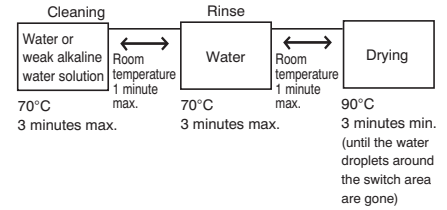
The Turquoise switch terminal with lead wires type and without lead wires typeshare the same main body. As a result, if the print board terminal type satisfies the set conditions, then it can undergo a complete cleaning after automatic soldering. After soldering is completed, perform cleaning within the prescribed temperature and time range, and pay careful attention to the following points.

1) Perform proper temperature, time, drying control in the cleaning process in order to prevent absorption of the liquid due to respiratory action. Be particularly careful that all the water droplets in the switch area are cleaned off in the final drying process.

2) Some cleaning liquids (solvents) may harm the rubber parts. Use water or a weak alkaline water solution.

3) Ultrasonic cleaning methods may damage the internal components or contacts. Use immersion or shower cleaning methods. In addition to the above points, the use of automatic cleaning equipment is particularly recommended for easy control of the process temperature and time. The recommended cleaning conditions for the Turquoise switches are shown below. However, please evaluate the actual cleaning process to verify its suitability for the switch.

## Recommended Cleaning Method



## REFERENCE

### 1. Dust-protected type

This type of construction prevents dust that is large enough to have an effect on operation from getting inside the unit. This construction is stipulated by protective classes against solid matter in the IEC standards (IEC60529). Test conditions: The switch is left for eight hours in a test chamber with a constant level of floating pure talc that has passed through a standard 75µm sieve, in a concentration of 2kg of talc per cubic meter of volume in the test chamber.

### 2. Immersion-protected type

This type of construction prevents any harmful effects even after the device is left underwater at a depth of 1 m for 30 minutes. This construction is stipulated by protective classes against water in the IEC standards (IEC60529).

### 3. IEC's IP Codes

The IEC (International Electrotechnical Commission) has defined the IP characteristic code that represents the levels of protection described in IEC standard (IEC60529). The two numbers that follow the IP code (the characteristics numbers) indicate the suitability of this protection for all environmental conditions.

### • Level of Protection Indicated by the 1st Characteristics Number

1st Characteristics Number	Protection level (IEC60529/Solid matter)
0	No protection
1	Protected against solid matter larger than 50mm
2	Protected against solid matter larger than 12mm
3	Protected against solid matter larger than 2.5mm
4	Protected against solid matter larger than 1.0mm
5	Dust-protected type Prevents dust that is large enough to have an effect on operation from getting inside the unit
6	Dust-resistant type Prevents dust from getting inside the unit

### • Level of Protection Indicated by the 2nd Characteristics Number

JIS C0920	2nd Characteristics Number	Protection level (IEC60529/Liquid matter)
	0	No protection
Droplet-protected type I	1	Protected against water droplets that fall perpendicular to the unit
Droplet-protected type II	2	Protected against water droplets that fall from within 15° of perpendicular to the unit
Rain-protected type	3	Protected against water droplets that fall from within 60° of perpendicular to the unit
Splash-protected type	4	Protected against water that splashes on the unit from any direction
Spray-protected type	5	Free from adverse effects even if sprayed directly with water from any direction
Water-resistant type	6	Protected against water sprayed directly on the unit from any direction
Immersion-protected type	7	Water does not get inside of the unit when submerged in water according to the specified conditions
Underwater type	8	Unit can be used underwater

Note: Details of test conditions are the same as JIS C 0920. Please refer to them.

