

Contact No. 270

**NKK**  
SWITCHES  
*Innovation Driving Quality*

# Dual Seal Waterproof Toggle

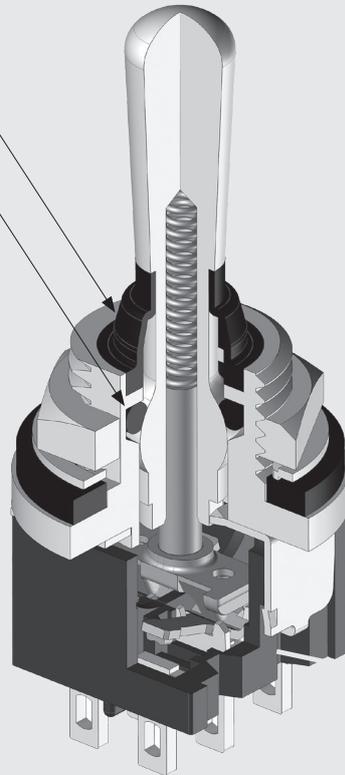


M Series  
**Large Bushing Toggle Switch**

NKK SWITCHES CO., LTD.

# Dual seal waterproof construction provides improved waterproofing reliability

(Design registered)



### Highly Reliable Dual Seal Waterproof Construction

Uses a dual seal waterproof construction consisting of waterproof rubber on the outside of the lever and an O-ring on the inside for increased waterproofing reliability.

### Stylish Design

Integrating the waterproof rubber with the bottom part of the metal lever creates a stylish design that also delivers the waterproof function.

### Sure Operation Feel

Integrated design eliminates the sensation of the waterproof rubber, achieving the same sure operation feel and operability of a standard metal lever.

### Panel Seal Mechanism

This panel seal mechanism complies with IP68 under IEC 60529.

### Dust-resistant Construction

Foreign matter does not collect in the moveable parts on the surface of the panel, resulting in unobstructed operation of the levers.

### Simple Installation

Integrated waterproof construction with the switch unit enables simple installation to the panel.

## Common Specification

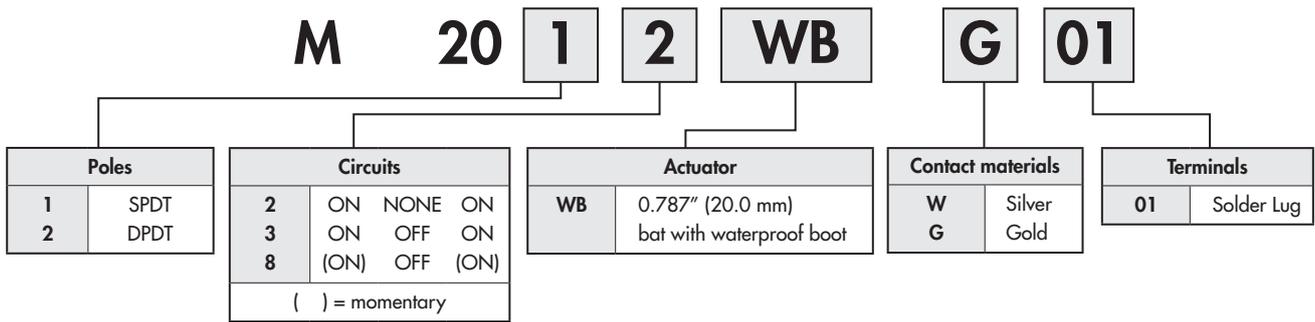
Common Specifications (Silver plated terminal/Contact point)	
Current capacity	6A 125V AC and 3A 250V AC 4A 30V DC (for On-None-On) 3A 30V DC (for all other circuits) Recommended lower limit voltage/ current 2V 0.1A AC/DC Minimum Input Out-off Voltage 1V 10mA AC/DC (initial value)
Contact resistance	10mΩ maximum (at DC2 - 4V 100mA)
Insulation resistance	1,000 MΩ minimum@DC500V
Voltage capacity	1,000V AC minimum between contacts for 1 minute minimum; 1,500V AC minimum between contacts and case for 1 minute minimum
Mechanical open/close durability	50,000 operations minimum
Electrical open/close durability	50,000 operations minimum (3A 125V AC) 25,000 operations minimum (6A 125V AC)
Operation temperature range	-30 through +85°C
Lever inclination angle	25±4°
Solder heat resistance	▶When soldering iron is used M2013XXX, M2018XXX Not exceeding 390°C, within 4s M2012XXX Not exceeding 350°C, within 3s

▶Solder the center position of the lever using M2013XXX, M2018XXX solder.

Switch for fine current Common specifications (Gold-plated terminal/Gold-plated contact)	
Current capacity Common for AC/DC	0.4VA MAX. 28V MAX. (Applicable voltage range: 20mV to 28V) (Applicable ampere range: 0.1mA to 0.1A)
Contact resistance	20mΩ maximum (at 20mV 10mA)
Insulation resistance	1,000 MΩ minimum@DC500V
Voltage capacity	1,000V AC minimum between contacts for 1 minute minimum; 1,000V AC minimum between contacts and case for 1 minute minimum
Mechanical open/close durability	50,000 operations minimum
Electrical open/close durability	50,000 operations minimum
Operation temperature range	-30 through +85°C
Solder heat resistance	▶When soldering iron is used Not exceeding 390°C, within 4s

⚠ Each rated value/performance value is obtained through independent testing. Therefore, the same results are not guaranteed under complex conditions. Please refer to General Specifications page in General Catalog "Switch Guide" on specific models, ratings and ordering instructions.

## ► Typical Switch Ordering Example

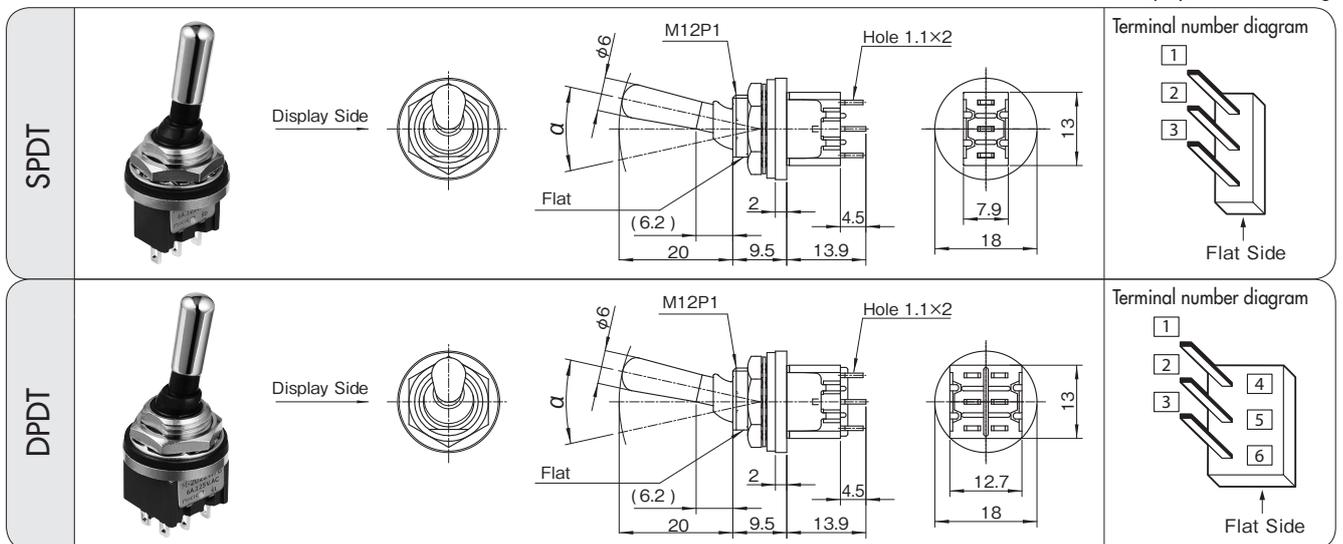


## ► Poles & Circuits

Toggle position ( ) = momentary			Model name				Contact terminal number				
			Silver plated terminal/Silver contact point		Gold plated terminal/Gold plated contact point		Circuit	Left	Center	Right	
Left	Center	Right	SPDT	DPDT	SPDT	DPDT					
ON	NONE	ON	M2012WBW01	M2022WBW01	M2012WBG01	M2022WBG01	SPDT	2-3	-	1-2	
ON	OFF	ON	M2013WBW01	M2023WBW01	M2013WBG01	M2023WBG01					
(ON)	OFF	(ON)	M2018WBW01	M2028WBW01	M2018WBG01	M2028WBG01	DPDT	2-3	5-6	-	1-2    4-5

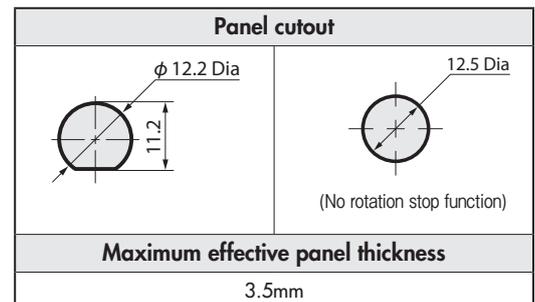
## ► Switch Exterior Diagram

► Terminal numbers are not displayed on the housing.



Standard hardware		
Hexagonal nut (AT 503)	Inner tooth washer (AT 508)	Rubber washer (AT 401 P)
Material: Tin alloy (chromium color) plating thickness: 2.4	Material: Chrome plating thickness: 0.5	Material: NBR Color: Black thickness: 1.5

For details, see "Precautions" on the next page.



## ► Precautions

### ● About Rubber

The waterproof rubber is made from silicone rubber, and the rubber washer and O-rings are made from NBR.

Silicone rubber has excellent heat resistance, cold resistance and weather resistance general properties, but has inferior durability and oil resistance properties.

NBR has excellent oil resistance, chemical resistance and durability general properties, but has inferior weather resistance and ozone resistance properties.

The same effects may not be achieved depending on the environment and methods of use. Therefore, please thoroughly evaluate the product in your usage environment.

For details, see "Handling Instructions/Considerations for Rubber Parts" (p.D-4) of the Comprehensive Switch Catalog.

◎: Excellent, ○: Good, △: Acceptable, X: Unacceptable

Abbreviation	NBR	Si	EPR (EPM, EPDM, EPT)	CR
Name	Nitrile rubber	Silicone rubber	Ethylene Polypropylene rubber	Chloroprene rubber
Heat resistance	△	◎	○	△
Cold resistance	△	◎	○	○
Fatigue resistance	○	X - △	○	○
Durability	○ - ◎	X	○	◎
Weather resistance	X - △	○ - ◎	◎	◎
Ozone resistance	X - △	○	◎	○
Oil resistance*	Fuel oil	○ - ◎	X	X
	Lubricating oil	○ - ◎	△ - ○	△ - ○

\*Oil resistance is dependent on the type of oil.

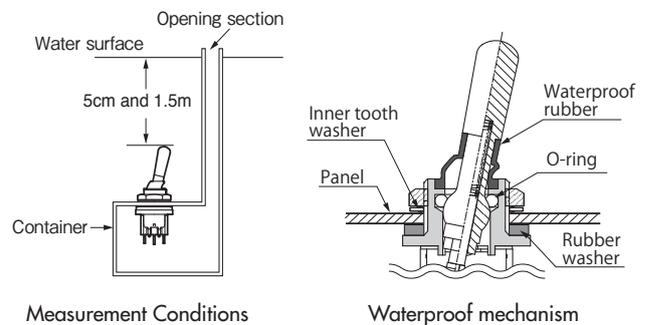
### ● Panel Installation

Install so that the inner tooth washer is at the upper side of the panel, and the rubber washer is at the lower side.  
Be sure to install the inner tooth washer and rubber washer.

### ● About Waterproofing Performance (IP68 Compatible)

This product is designed as a panel seal, and is not to be used in water.

Waterproofing is measured as shown in the diagram by submersing the product 5cm from the surface of the water, and opening and closing 50 times at a frequency of 50 to 60 times per minute. The product is then submersed 1.5m from the surface and left in this position for 30 minutes, after which it is opened and closed again under the same conditions as before. The insulation resistance and voltage capacity are each within the rated values, and water has not entered inside the switch and installation panel.



## ► Main Applications

Construction machinery, machine tools, transportation equipment, food processing equipment, kitchen equipment, medical equipment, etc.



Construction machinery



Transportation equipment

## ► Sale Start Date

March 2, 2016

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