Thumbwheel Switch

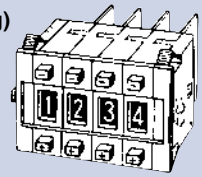
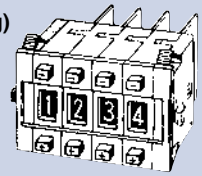
A7PS/A7PH

Dust-tight, Easy-to-Use, Push-operated Switches with Large Display Characters

- Simple push mechanism and large, easy-to-view numeric display make setting easy.
- Dust penetration prevented with seal for the display windows.

Ordering Information

Switches (Single Switch Units)

Model	A7PS		A7PH	
Classification (See note 1.)	Snap-in (front mounting) 		Snap-in (front mounting)  Long-life type	
Terminals	Solder terminals *1			
Color	Light gray	Black	Light gray	Black
Output code number	Model			
03 (decimal code)	A7PS-203	A7PS-203-1	A7PH-203	A7PH-203-1
06 (binary coded decimal)	A7PS-206	A7PS-206-1	A7PH-206	A7PH-206-1
07 (binary coded decimal, with component-adding provision) *2	A7PS-207	A7PS-207-1	A7PH-207	A7PH-207-1
19 (decimal code, with component-adding provision)	A7PS-219	A7PS-219-1	A7PH-219	A7PH-219-1
54 (binary coded hexadecimal)	A7PS-254	A7PS-254-1	A7PH-254	A7PH-254-1
55 (binary coded hexadecimal, with component adding provision) *2	A7PS-255	A7PS-255-1	---	---

Note: 1. The classification diagrams show 4 Switch Units combined with End Caps to create 4-digit displays.
2. The model numbers given above are for 1 Switch Unit.
3. Models with stoppers are also available. Add "-S□□" after the "203," "206," "207," "219," "254," or "255" in the model number and specify the display range in the □□. For example, to specify the range 0 to 6, add "-S06" to the model number (e.g., A7PS-206-S06-1).
4. Models with +, - displays can also be produced. Add "-PM" after the "206" in the model number (e.g., A7PS-206-PM or A7PS-206-PM-1)

*1. Models with PCB terminals are available.
*2. Models with diodes are available. Add "-D" to the model number (e.g., A7PS-207-D or A7PS-207-D-1).

Accessories (Order Separately)

Use accessories, such as End Caps and Spacers, with the Switch Units.

Accessory		Color	Light gray	Black
End Caps			A7P-M *	A7P-M-1 *
Spacer			A7P-P□ (See note.) *	A7P-P□-1 (See note.) *
Connectors	Solder terminals		NRT-C	
			NRT-CN	
	PCB terminals		NRT-CP	

Note: The □ in the Spacer model number stands for a letter in the range A to U. (Refer to the table in the following explanation about Spacers.)
* The minimum ordering unit is 10.

End Caps

End Caps are used on the Switch Units at each end and allow all the Switch Units to be securely mounted to a panel. They come in pairs, one for the left and one for the right.

Spacers

- Spacers are used for creating extra space or gaps between the Switch Units and have the same dimensions as the Switch Units themselves.
- There are also Spacers with engraved characters or symbols that can be used for indicating units, such as time and length. (Refer to the following table.) Consult your OMRON representative for details.

Symbol	A	B	C	D	E	F	G
Stamp	No designation	SEC	MIN	H	g	kg	mm

Symbol	H	J	K	L	Q	T	U
Stamp	cm	m	°C	PCS	x 10SEC	0	•

Specifications

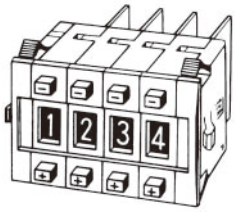
Item	Model	A7PS	A7PH
Switching capacity (resistive load)		50 VAC or 5 to 28 VDC 1 mA to 0.1 A	125 VAC or 5 to 28 VDC 10 μA to 0.15 A
Continuous carry current		1 A max.	3 A max.
Contact resistance		300 mΩ max.	
Insulation resistance	Between non-connected terminals	10 MΩ min. (at 500 VDC)	100 MΩ min. (at 500 VDC)
	Between terminal and non-current carrying part	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	Between non-connected terminals	600 VAC, 50/60 Hz for 1 min	
	Between terminal and non-current carrying part	1,000 VAC, 50/60 Hz for 1 min	
Vibration resistance		10 to 55 Hz, 1.5-mm double amplitude for 2 hours min.	
Shock resistance		490 m/s² min.	
Durability	Mechanical	100,000 operations min.	2,000,000 operations min.
	Electrical	50,000 operations min.	1,000,000 operations min.
Ambient temperature		Operating: -10°C to 65°C	
Ambient humidity		Operating: 45% to 85%	
Max. operating force		6.37 N max.	

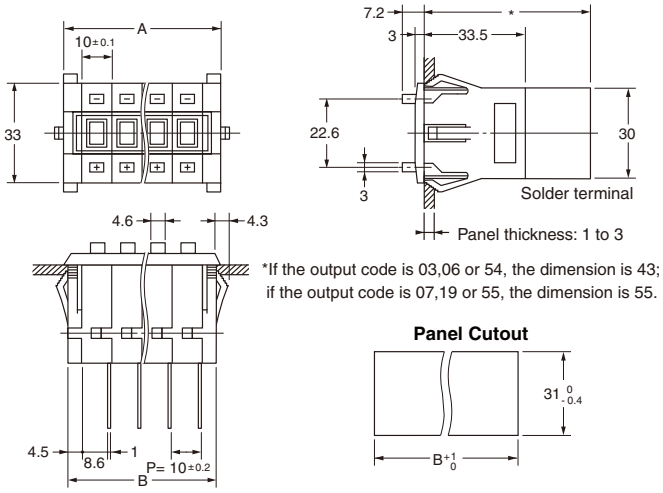
Dimensions

(Unit: mm)

Switches

A7PS-2□□(-1)
A7PH-2□□(-1)
Solder Terminal





*If the output code is 03,06 or 54, the dimension is 43; if the output code is 07,19 or 55, the dimension is 55.

Panel Cutout

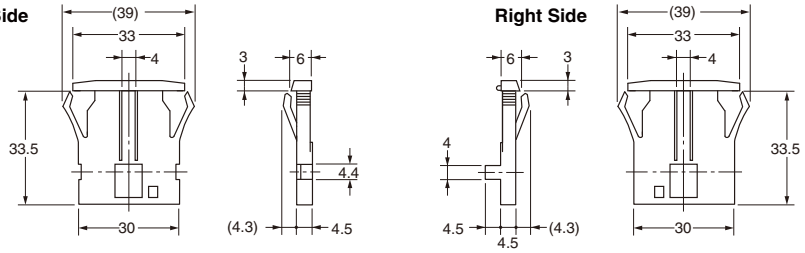
(Unit: mm)

Number of Switches (n)	Size A (n x 10 + 12)	Size B (n x 10 + 9)
1	22	19
2	32	29
3	42	39
4	52	49
5	62	59
6	72	69
7	82	79
8	92	89
9	102	99
10	112	109

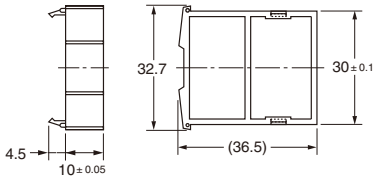
Note: 1. The dimensions above include both End Caps, and will increase 10 mm for each Spacer inserted.
2. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions. The tolerance for multiple connection is ±(number of units x 0.4) mm.

Accessories (Order Separately)

End Caps for Push-operated Switches
A7P-M(-1) Snap-in Panel Mounting



Spacers for Push-operated Switches
A7P-P□(-1) Snap-in Panel Mounting



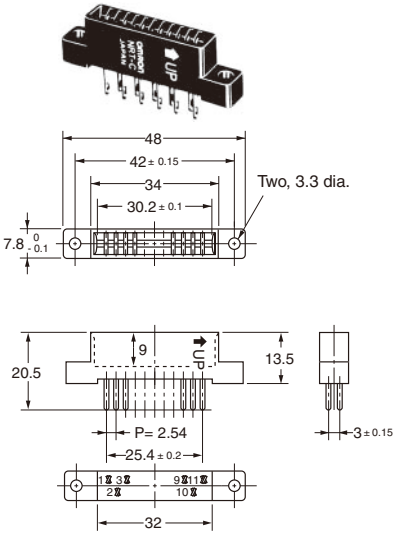
The □ in the Spacer model number stands for a letter in the range A to U. (Refer to the table under the explanation about Spacers on page 1.)

Note: Unless otherwise indicated, dimensional tolerances for dimensions in the models above are ± 0.4 mm.

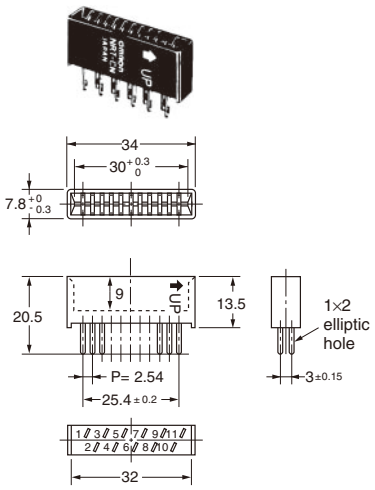
Connectors

(These devices allow Switches to be quickly removed for maintenance and inspection of connectivity, and quickly re-installed.)

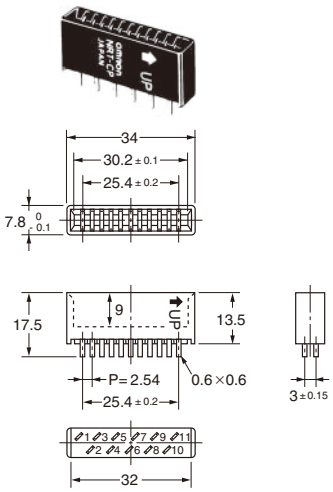
NRT-C Solder Terminals



NRT-CN Solder Terminals



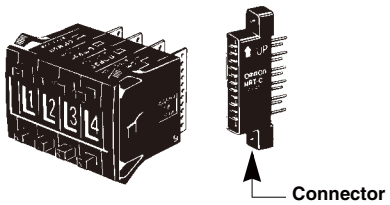
NRT-CP PCB Terminals



Note: Unless otherwise indicated, dimensional tolerances for dimensions in the models above are ± 0.4 mm.

Inserting Connectors

Insert Connectors with the "UP" arrow pointing up.

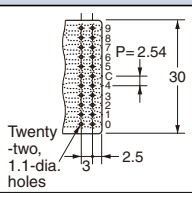


Output Codes/Terminals

- Switches with output codes 06 or 07 both use binary coded decimal but Switches with output code 07 have a component-adding provision. Similarly, Switches with output codes 54 or 55 both use binary coded hexadecimal but Switches with output code 55 have a component-adding provision.
- How to Read Output Codes
  For example, when the dial position is "3," the common terminal C on the Switch is connected to terminals 1 and 2. When the Switch is inserted into the Connector, the common terminal C becomes connector terminal 3, and terminals 1 and 2 become connector terminals 5 and 7 respectively.

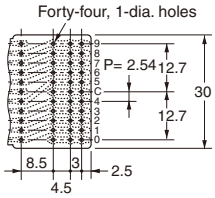
Output code number	Terminals	Output codes

03



Model	Switch Unit or Connector	Common terminal number	Terminals connected to common									
	Switch Unit	C	0	1	2	3	4	5	6	7	8	9
03,19	Connector	6	1	2	3	4	5	7	8	9	10	11
Dial	0		●									
	1			●								
	2				●							
	3					●						
	4						●					
	5							●				
	6								●			
	7									●		
	8										●	
	9											●

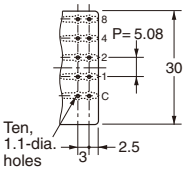
19



Component-adding provision

Note: The solid dot ● indicates that the internal switch is ON (i.e., connected to the common terminal).

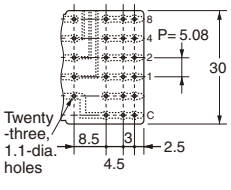
06



Model	Switch Unit or Connector	Common terminal number	Terminals connected to common			
	Switch Unit	C	1	2	4	8
06	Connector	3	5	7	9	11
07	Connector	1.3 *				
Dial	0					
	1		●			
	2			●		
	3		●	●		
	4				●	
	5		●		●	
	6			●	●	
	7		●	●	●	
	8					●
	9		●			●

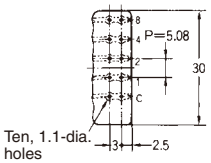
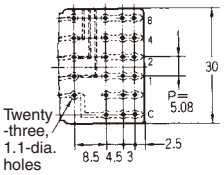
* Terminal 3 is the common terminal for the component-adding provision.

07



Component-adding provision

Note: The solid dot ● indicates that the internal switch is ON (i.e., connected to the common terminal).

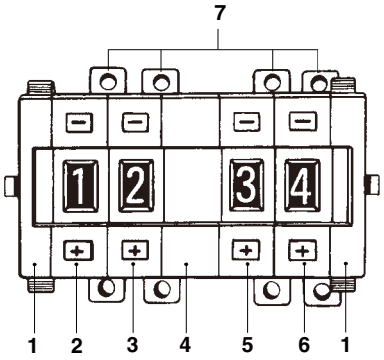
Output code number	Terminals	Output codes
54		
55	 Component-adding provision	

Model	Switch Unit or Connector	Common terminal number	Terminals connected to common			
	Switch Unit	C	1	2	4	8
54	Connector	3	5	7	9	11
55	Connector	1				
Dial	0					
	1		●			
	2			●		
	3		●	●		
	4				●	
	5		●		●	
	6			●	●	
	7		●	●	●	
	8					●
	9		●			●
	A			●		●
	B		●	●		●
	C				●	●
	D		●		●	●
	E			●	●	●
	F		●	●	●	●

Note: 1. The solid dot l indicates that the internal switch is ON (i.e., connected to the common terminal).

Ordering Procedure

Place orders as shown in the example below, specifying the model and number.



1. A7P-M (End Caps): 1 set
2. A7PS-203 (Switch Unit): 1 piece
3. A7PS-206 (Switch Unit): 1 piece
4. A7P-PA (Spacer): 1 piece
5. A7PS-207 (Switch Unit): 1 piece
6. A7PS-219 (Switch Unit): 1 piece

Note: Standard products are not factory-assembled for shipment. Contact your OMRON representative for details on ordering factory-assembled sets.

7. NRT-C (Connector): 4 pieces

Safety Precautions

Refer to *Precautions for Correct Use* on in the *Technical Guide for Thumbwheel Switches*.

Precautions for Correct Use

Handling

- The molded components of the Switch use polyacetal resin and ABS resin. It is recommended that alcohol is used to wipe off dirt and smudges from the molded components. Take care to prevent the alcohol from getting inside.
- A7P Thumbwheel Switches are dust-proof, but they are not drip-proof. Do not use them in areas subject to water or oil exposure.
- Do not allow solder flux or alcohol to enter the Switch.
- Do not push the (+) and (-) operating push-buttons at the same time.

Safety Precautions for All Thumbwheel Switches

For precautionary information on individual products, refer to *Safety Precautions* in the relevant section.

⚠ WARNING

Electric shock may possibly occur. Do not perform wiring work or touch the charged parts of terminals while power is supplied to the Switch.

Precautions for Correct Use

For details, refer to *Precautions for Correct Use of Thumbwheel Switches* in *Technical Guide for Switches and Level Control Equipment*.

Precautions for Correct Use

Environment

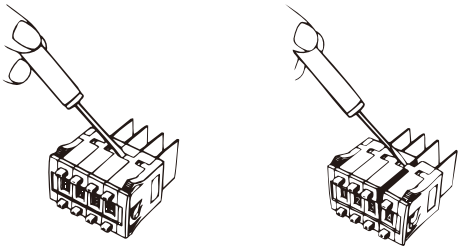
- Do not use where gases are generated (ammonia, chlorine, sulfur dioxide).
- Although Switches are of nearly dust-proof construction, they are not drip-proof, therefore do not use in areas subject to water or oil exposure and do not operate with wet or oily hands. (The A7MD has a dust-proof construction on contact parts, but consider your installation location carefully. The A7MA is not of dust-proof construction.)
- Provide additional dust-proofing measures, such as using a dust-proof cover, when using in sand-exposed areas.

Storage

Do not store Switches in areas subject to high temperature or high humidity, or store them in room-temperature areas for extended periods of time. Doing so may cause oxidation of the terminals or problems with solder. It is also recommended that long periods of storage be avoided in general.

Handling

- Wiring
  After wiring has been completed, ensure an appropriate insulation distance.
- Set-up
  Do not use the Switch in the normally-pressed state. Doing so may occasionally result in premature deterioration of parts and changes in the characteristics.
- Do not touch charged parts, such as terminals, while the power is ON.
- Do not connect more than one power supply to a single Switch. Doing so may result in circuit malfunctions and short-circuits.
- When changing settings, do not touch the operating buttons if your fingers are wet or there is oil or any other foreign substance on your fingers.
- It is recommended that alcohol is used to wipe off dirt and smudges from the molded-plastic cases. Take care to prevent the alcohol from getting inside.
- Do not use thinner or other solutions which might damage the plastic.
- When connecting Switches, fit the mating parts together.
- When separating Switches, use a screwdriver as shown in the figure below; disconnect them by releasing the top and bottom hooks. Be careful not to bend the hooks.

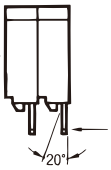


- Do not push the (+) and (-) operating push-buttons at the same time.
- Do not drop the Switch. Doing so may possibly result in deformation of the terminals, damage to the PCB, or damage to the resin catch (for connecting) on the side of the Switch.
- The output may be unstable while the pushbuttons are being pressed due to the structure of the Thumbwheel Switch. Read the output signal only after the display has stopped moving.

Models with PCB Terminals

- When using models with PCB terminals, make the terminal insertion holes in the back board (mother board) 1 mm or larger in diameter.
- Do not use excessive force in handling models with PCB terminals. In particular, take care to avoid dropping them as the terminals might bend or break.

Reference: Terminals can withstand a force of 7.84 N for 1 minute or more (A7D: 4.9 N for 10 seconds or more), and survive bending of 20° without breaking after returning to original position. Withstanding the repetitive application of external pressure, however, is beyond the scope of Switch specifications.



Connectors

- Insert Connectors while keeping the arrow pointing up (refer to A7BS/A7BL and A7PS/A7PH for details).
- Connector insertion load is about 14.7 N for each A7B-C and 34.3 N for each NRT-C.

Soldering

Note the following points when soldering printed circuit boards:

- Automatic Soldering
  Do not use dip cleaning. Doing so may result in flux penetration of the Switch interior, causing contact and rotational defects. Clean the flux as shown in Figure 1, tilting the Switch 80° or less and using a brush to apply the solvent only to the back of the board. It may also be cleaned by dipping only the back of the board into the solvent and then using a brush to clean.
- Dip Soldering
  When applying flux solvent, the dipping time is a maximum of 2 seconds. As shown in Figure 2, avoid flooding the top surface of the printed circuit board with flux. Using a brush to apply flux further reduces the danger of flux penetration. When cleaning flux with a brush, tilt the Switch 80° or less, as shown in Figure 1, in order to prevent flux from flowing onto the switch mounting surface. Clean flux as described above under *Automatic Soldering*.

Figure 1

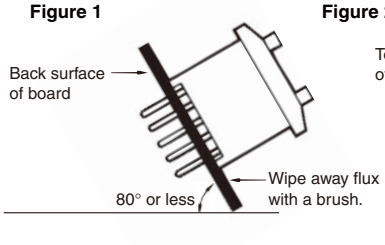
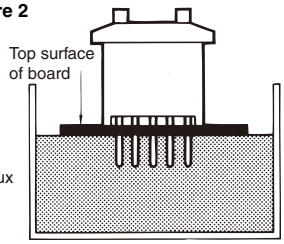


Figure 2



- Using a Soldering Iron
  Use a 30-W soldering iron at a temperature of 350°C for a maximum of 3 seconds, and flush as described above.
  Do not apply force to the terminals during soldering and for 3 minutes after soldering is completed. Doing so may result in conduction or operation failure.
- Ensure that soldering flux and alcohol do not penetrate into the Switch interior

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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