



Operation Manual

Product name : Solid state auto switch

Model : D-F7NJ※

SOLID STATE AUTOSWITCH OPERATION MANUAL

Thank you for purchasing SMC product.
Please read through this manual to realize optimum performance.

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<Precaution> Please be sure to follow cautions for operation since important factors for safety are described in them.

Warning, attention, caution on handling.

Design and selection

1. Please confirm the spec.
Keep the specified range of the load current, voltage, temperature, and impact. Operation exceeding the spec. value may cause malfunction.
2. Keep actuators apart
To eliminate the influence (error operation) to the switch due to the interference of magnetic force, keep actuators 40mm or more apart when two or more of actuators are used in parallels. (When allowable interval is specified for each actuator, please follow it)
3. Mind ON time of the switch for detection at stroke center
In case of center position detection when piston does not stop at detected position, the switch operating time become short according to piston speed. Detectable max. piston speed is obtained by the formula below
$$V(\text{mm/s}) = \frac{\text{Autoswitch operating range}(\text{mm})}{\text{Load operating time}(\text{ms})} \times 1000$$

4. Keep wiring as short as possible
Although longer wiring does not affect the function, please keeps it 100m or shorter
5. Don't use load produce surge voltage
If load including a relay or solenoid valve which generate surge voltage is directly operated, use surge absorption element built-in type.
6. When use into interlock circuit
If an autoswitch is used for an interlock signal which require high reliability, prepare mechanical protection or employ double interlock style using other switch (sensor) together.
Please check up the operation periodically.
7. Prepare enough space for maintenance
When designing please take the space for maintenance into consideration.

Mount/adjustment

1. Don't drop nor hit
Don't drop, hit, nor apply excessive impact (300m/s² or more)
Even if the switch case is not hurt, switch may be damaged inside and may malfunction.
2. Don't choose actuator with the switch lead wire
Not only become the cause of disconnection of lead wire, it applies stress to the inside of the switch, and the switch internal element is damaged.
3. Keep tightening torque of the switch
If the torque exceed the proper value, set screw, set bracket, switch etc. may be damaged.
While the torque is lower than proper range result in displacement of switch mount position. (Refer "How to mount switch")
4. Set the switch within operating
Adjust the autoswitch so that the piston stops at the center of operating area (Where switch is ON). Mount position of the catalogue indicates the optimum position at stroke end. If set the switch at operating area end, i.e. border of ON and OFF, operation may become inconsistent.

Wiring

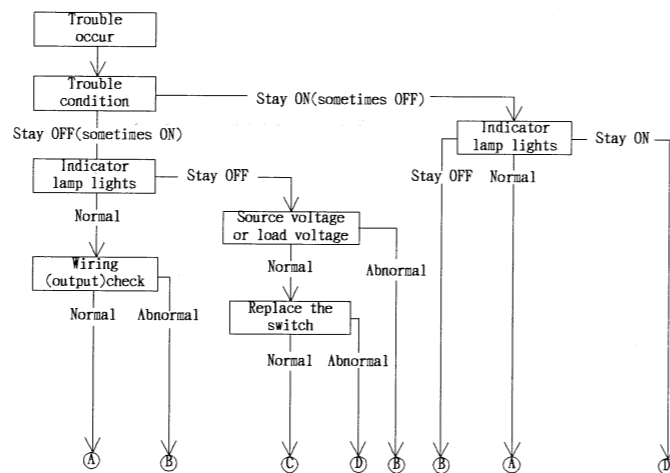
1. Don't apply repeated bending force nor tensile force
Switch sensor parts and heat resistant sheath cord are used under high temperature, please don't apply repeated bending force nor tensile force for lead wire.
2. Connect load before supplying power
Without load, excess current may damage the switch instantly.
3. Wire properly!
Not all the wiring mode is applied with protection. Switch may be damaged.
4. Don't let power lines and high voltage lines be together
Keep autoswitch wiring apart from power/high voltage lines to shut signal line noise and surge from them.
5. Ensure insulation of wiring
Insulation failures (contact with other circuit, grounding, insulation failure between terminal) may damage the switch due to excess voltage or current.

Operating environment

1. Don't use in explosive environment
Autoswitch is not intrinsically safe. NEVER use it in explosive atmosphere.
2. Don't use where magnetic force exist
Autoswitch may malfunction or the magnetic force inside magnet of the actuator may be decreased.
3. Don't use where exposed to water and steam constantly
Although satisfies IEC standard IP63 structure (JIS C 0920: watertight) in the sensor parts, don't use where exposed to water and steam constantly.
4. Don't use where exposed to oil and chemicals
Coolant, detergent, oils and chemicals may quickly be deteriorated including insulation failure, malfunction due to resin filling the switch inside, lead wire hardened.
5. Don't use where exposed to temperature cycle
Extreme thermo-cycling (When cooling rapidly from the high temperature) may do harm with the switch inside.
6. Don't use where surge generating source exist
Instruments produce large surge (solenoid lifter, high frequency guide path, motor, etc.) close to the autoswitch internal circuit element.
7. Mind the pile of iron chip and existence of magnetic object
If chip dust or iron dust of welded spatter is heavily piled around the autoswitch equipped actuator, or a magnetic object exists close to the actuator, the autoswitch may operate improperly as magnetic force inside of the actuator is lost.

Maintenance

1. To avoid unexpected wrong operation, perform periodic maintenance.
 - i) Extra tightening of set screw
When set screw is loose or displaced from proper tightening position, tighten it after adjusting set position.
 - ii) Ensure the existence of lead wire damage
Cause of insulation failure. When find damages, replace the switch or repair the lead wire.
 - iii) Confirm the green lights of two colors display
Red indicator lamp means the detection at unstable area. Readjust the mounting position so that the indicator lamp light green (Optimum area).
2. Check flow
When detection failure occur (stay ON/OFF), please check based on the next flow.

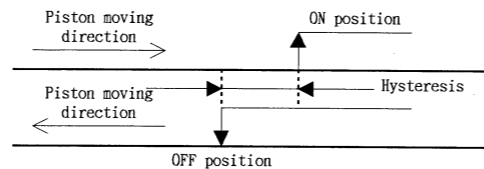


- Ⓐ...Switch output parts failure(replace)
- Ⓑ...Correct wiring
- Ⓒ...Switch failure
- Ⓓ...Reokace cylinder. Detectable magnet field inadequate(No magnet)

Others

1. For durability against water, elasticity, application at welding site, please consult us.
2. If ON and OFF position (hysteresis) cause problems, please consult us.

Hysteresis

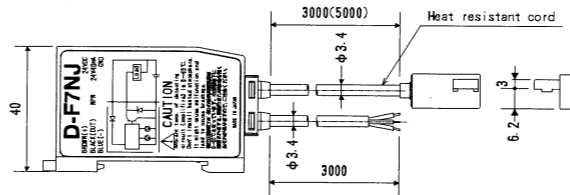
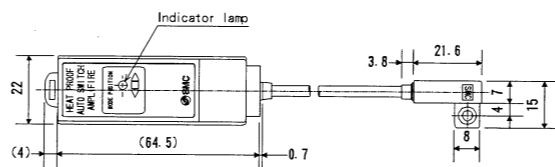


1. Product specification

Model number	D-F7NJL	D-F7NJZ
Wiring length	3m	5m
Wiring style	Three wire type	
Output style	NPN type	
Application	Relay, PLC	
Power source	24VDC (20~26VDC)	
Current consumption	25mA or less	
Load voltage	28VDC or less	
Load current	40mA or less	
Internal voltage drop	0.8V or less	
Leak current	100μA or less	
Response time	1ms or less	
Proof impact	Sensor : 1000m/s ² (102G) Amplifier : 300m/s ² (30G)	
Ambient temperature	Sensor : 0 to 150°C Amplifier : 0 to 60°C	
Indicator lamp (Amplifier)	Operating position : Red diode emitted Most sensitive operating position : Green diode emitted	
Lead wire	Between the Sensor and Amplifier : Heat resistant sheath cord φ3.4, 3m(Z type...5m) Amplifier grommet : Oil resistant sheath cord φ3.4, 0.2mm ² , 3wires(brown•black•blue), 3m	
Protection structure	Sensor : IEC529 standard IP63, JIS C0920(rainy-proof) Amplifier : IEC529 standard IP65, JIS C0920(spout-proof)	

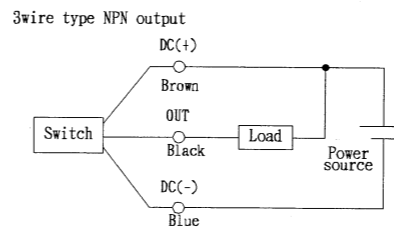
2. Exterior dimension

○D-F7NJ※



3. Wiring style

○ Basic wiring



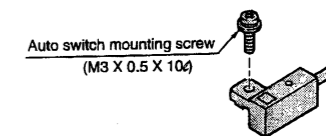
- Connection with PLC (sequence controller)
Connect to the PLC of Sink input specification.

4. How to mount/Mount bracket

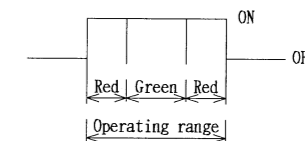
[Sensor]
Each actuator has specified mount bracket when mounted to the Solid state switch sensor parts.
Mount bracket depend on actuator type and tube I.D. Please refer the below.
When an autoswitch is mounted for the first time, please ensure the actuator is magnet built-in type, then prepare brackets correspond to the actuator.
The application actuator : CDQ2※※-XB14

Mount bracket model number	
Tube caliber[mm]	Mount bracket model number
16•20•25	BQ-1
32•40•50•61	BQJ1-032

- Appropriate tightening torque



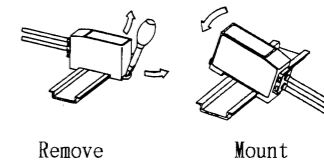
- M3 mount biss tightening torque shall be 0.5~0.7N•m (5.1~7.1kgf•cm)
- Setting the detecting position



Set the actuator at the stroke end. Set the switch in the area to where the autoswitch green lamp light.
(Detecting actuator end)
Based on A and B dimensions in the actuator catalogue, set the switch.

[Amplifier]

- It needs for DIN terminal when mount to the Solid state switch amplifier parts.
- How to mount DIN terminal
As described below, hand the hook on the bottom of the body on DIN rail, and then push and hold them along with arrow mark. For removal, pull them along with arrow mark by standard driver.



5. Cautions

1. Do not use under high temperature over 150°C
Use under ambient temperature over 150°C (on sensor part) makes defective function lower and life shorter. Keep ambient temperature of sensor part 150°C or less including margin for expected change.
2. Do not cut lead wire between sensor and amplifier part.
Circuit of sensor and amplifier are adjusted integrally, if sensor part is replaced, switch can't operate properly.

□ When you inquire about the product, please contact to followings.

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- | | |
|---------------------------------|------------------------------|
| ENGLAND / Phone 0908-563888 | GERMANY / Phone 6103-402-0 |
| ITALY / Phone 02-92711 | FRANCE / Phone 1-64-76-10-00 |
| HOLLAND / Phone 020-6255525 | SWEDEN / Phone 08-7088590 |
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