Compact plastic limit switches with positive opening mechanism

Positive opening mechanism

LJK-N Series

Positive opening mechanism meets standards worldwide. A wide variety of actuators is available.

- **The LJK-N conforms to IEC standards, and is certified by UL and CSA. For equipment and facilities to be exported anywhere in the world, use the LJK-N with confidence.**
- **Positive opening mechanism⊖forces contacts open.***
  - **Can prevent problems caused by contact fusing.**
  - **Can be used also as a safety limit switch.**
- **Wide variety, with 33 catalog listings in the lineup**
  - **Actuators: 11 types**
  - **Contact configuration**
    Snap action: N.C. x 1 + N.O. x 1
    Slow action: N.C. x + N.O. x 1 (BBM: break before make), N.C. x 2

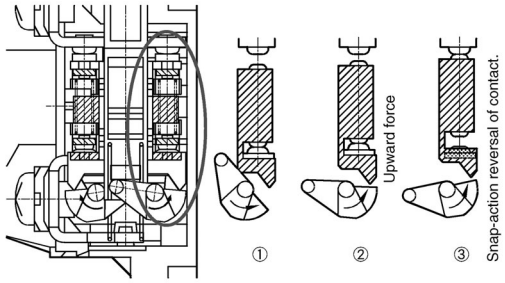
*Except for the steel wire and spring rod types.

CATALOG LISTING

Type of actuator	Internal switch mechanism	Contact configuration	Catalog listing
Resin roller lever	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2118F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2518F12**
	Slow action	N.C. x 2	**LJK-N2718F12**
Resin adjustable roller lever	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2145F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2545F12**
	Slow action	N.C. x 2	**LJK-N2745F12**
50mm dia. resin roller lever	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2139F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2539F12**
	Slow action	N.C. x 2	**LJK-N2739F12**
50mm dia. resin adjustable roller lever	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2149F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2549F12**
	Slow action	N.C. x 2	**LJK-N2749F12**
Plunger	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2110F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2510F12**
	Slow action	N.C. x 2	**LJK-N2710F12**
Resin roller plunger	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2102F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2502F12**
	Slow action	N.C. x 2	**LJK-N2702F12**
Resin cross roller plunger	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2103F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2503F12**
	Slow action	N.C. x 2	**LJK-N2703F12**
Resin one-way roller (horizontal)	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2121F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2521F12**
	Slow action	N.C. x 2	**LJK-N2721F12**
Resin one-way roller (vertical)	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2127F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2527F12**
	Slow action	N.C. x 2	**LJK-N2727F12**
Steel wire	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2106F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2506F12**
	Slow action	N.C. x 2	**LJK-N2706F12**
Spring rod	Snap action	N.C. x 1 + N.O. x 1	**LJK-N2108F12**
	Slow action BBM	N.C. x 1 + N.O. x 1	**LJK-N2508F12**
	Slow action	N.C. x 2	**LJK-N2708F12**

INTERNAL SWITCH

●Snap-action type

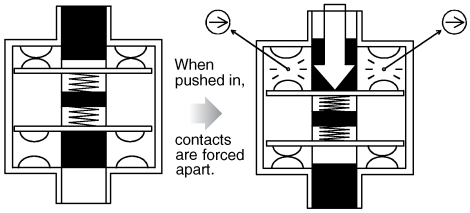


As seen above, the cam forces the N.C. contact up from the bottom, even if there is fusing of the contacts.

Note: Steel wire and spring rod types do not have positive opening mechanism.

●Slow-action BBM type

The slow action internal switch has N.C./N.O. electrically independent contacts (form Zb). The positive opening mechanism forces the contacts open (N.C. contacts only) even if they are fused.



SPECIFICATIONS

Standards	**Compliance**	Product-related: IEC 60947-5-1⊖, and EN 60947-5-1⊖ Machine-related: IEC 60204-1 and EN 60204-1
	Certification	UL 508, CSA C22.2 No. 14
Structure	**Protective structure**	IP65 (IEC 60529, JIS C 0920)
	Electrical shock protection	Class II (IEC 61140)
	Pollution degree	3
	Internal switch	**LJK-N21□□F12**: snap action, **LJK-N25□□F12** and **LJK-N27□□F12**: slow action
Electrical performance	**Electrical rating**	(See Table 1.)
	Insulation resistance	100MΩ or more between terminals with the same polarity and between each terminal and non-live metal part (by DC500 megger)
	Initial contact resistance	25mΩ or less (6 to 8Vdc, thermal current 1A, measured by voltage drop method)
	Rated thermal current (Ith)	10A
	Short-circuit protection	10A breaking fuse, gG (gl) type
	Rated insulation voltage (Ui)	500V (IEC 60947-5-1), 300V (UL 508, CSA C22.2 No. 14)
	Rated conditional short-circuit current	1,000A
	Rated impulse withstand voltage (Uimp)	6,000V
Mechanical performance	**Impact resistance**	Durability: 500m/s² Note: 50mm dia. resin adjustable roller lever types 150m/s² spring rod types 200m/s² IEC 60068-2-27
	Vibration resistance	250m/s² (10 to 500Hz), IEC 60068-2-6
	Max. operating speed and min. operating speed	(See Table 2.)
Life	**Mechanical life**	10 million operations
	Electrical life	Snap action: 300000 operations, Slow action: 400000 operations
Environment	**Operating temperature**	– 25 to +70°C (without freezing)
	Operating humidity	Max. 98% RH
	Storage temperature	– 40 to +70°C
Conduit		G 1/2
Recommended tightening torque		Body: 0.5 to 0.7N·m (M4) Head: 0.8 to 1.2N·m (M3 round head screw) Cover: 0.8 to 1.2N·m (M3 round head screw) Terminal: 0.8 to 1.2N·m (M3.5 round head screw) Lever: 1.3 to 1.7N·m (M4 round head screw)

●Table 1. Electrical rating

AC-15: A300 (Ue=240V, Ie=3A)
DC-13: R300 (Ue=250V, Ie=0.1A)

Utilization categories AC-15: solenoid load
DC-13: solenoid load
Ue: rated operating voltage
Ie: rated operating current

●Table 2. Max. operating speed and min. operating speed

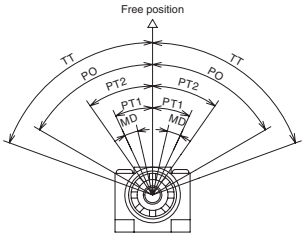
LJK-N2□□□F12
Actuator
Contact configuration

Actuator / Contact configuration	Roller lever type		Plunger type		One-way roller / non-directional operation types	
	LJK-N2□**18**F12 LJK-N2□**39**F12 LJK-N2□**45**F12 LJK-N2□**49**F12		LJK-N2□**10**F12 LJK-N2□**02**F12 LJK-N2□**03**F12		LJK-N2□**21**F12 LJK-N2□**27**F12 LJK-N2□**06**F12 LJK-N2□**08**F12	
	Min. speed	Max. speed	Min. speed	Max. speed	Min. speed	Max. speed
LJK-N2**1**□□F12	0.03m/min	1.5m/s	0.01m/min	0.5m/s	0.02m/min	1m/s
LJK-N2**5**□□F12	18m/min	1.5m/s	6m/min	0.5m/s	12m/min	1m/s
LJK-N2**7**□□F12	18m/min	1.5m/s	6m/min	0.5m/s	12m/min	1m/s

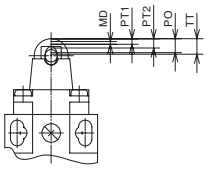
OPERATING CHARACTERISTICS BY ROTARY OR IN-LINE ACTUATIONS OF ACTUATORS

O.F.: max. operating force needed for N.C. operation P.O.F: min. force for positive opening

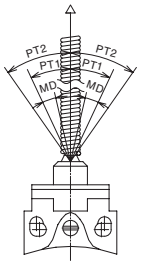
●Roller lever type



●Plunger type and one-way roller type



●Non-directional operation type

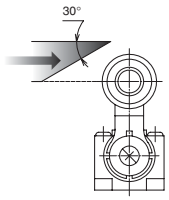


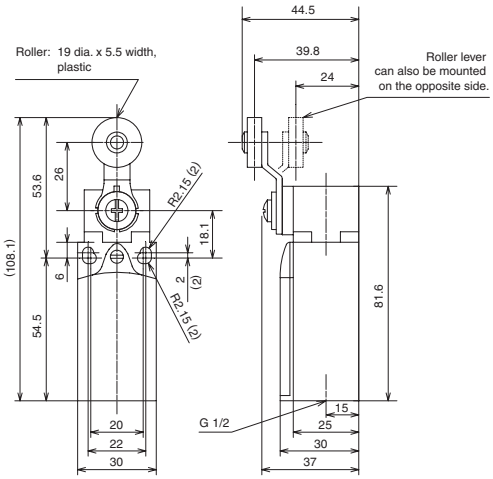
T.T.: total travel. P.T.1: pretravel for N.C. operation. P.T.2: pretravel for N.O. operation.
M.D.: minimum movement differential. P.O.: minimum travel to positive opening position.

SHAPE / DIMENSIONS / OPERATING CHARACTERISTICS / CIRCUIT DIAGRAMS

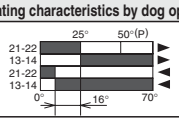
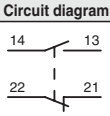
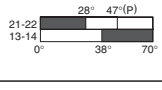
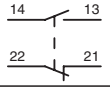
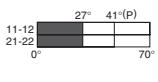
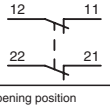
Resin roller lever: LJK-N2118F12, LJK-N2518F12, LJK-N2718F12

(unit: mm)





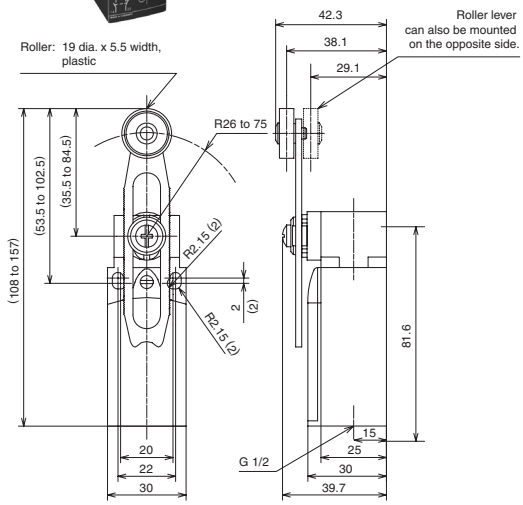
Operating characteristics by lever rotational angle	LJK-N2118F12	LJK-N2518F12	LJK-N2718F12
O.F. (max. operating force needed for N.C. operation)	0.1N·m	0.1N·m	0.1N·m
P.O. (min. travel to positive opening position)	50°	47°	41°
P.O.F. (minimum force for positive opening)	0.15N·m	0.15N·m	0.15N·m
PT1 (pretravel for N.C. operation)	(25°)	(28°)	(27°)
PT2 (pretravel for N.O. operation)	–	(38°)	–
MD	(16°)	–	–
TT (total travel)	(70°)	(70°)	(70°)

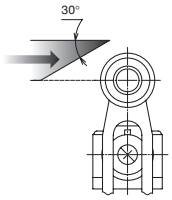
Catalog listing	Operating characteristics by dog operation	Circuit diagram
LJK-N2118F12		
LJK-N2518F12		
LJK-N2718F12		

■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

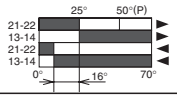
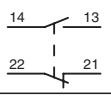
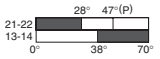
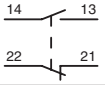
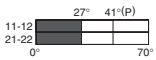
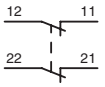
Resin adjustable roller lever: LJK-N2145F12, LJK-N2545F12, LJK-N2745F12

(unit: mm)



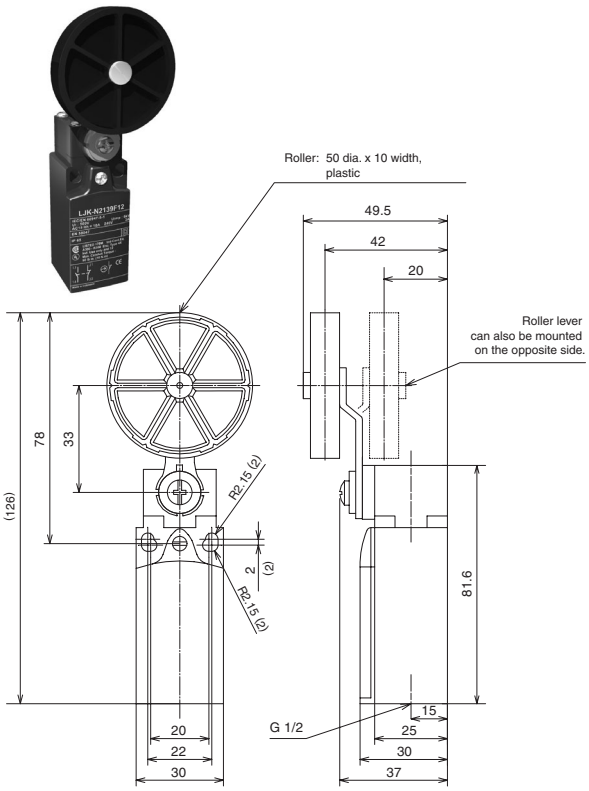


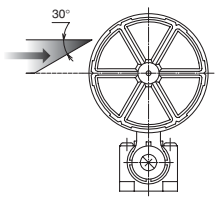
Operating characteristics by lever rotational angle	LJK-N2145F12	LJK-N2545F12	LJK-N2745F12
O.F. (max. operating force needed for N.C. operation)	0.1N·m	0.1N·m	0.1N·m
P.O. (min. travel to positive opening position)	50°	47°	41°
P.O.F. (minimum force for positive opening)	0.15N·m	0.15N·m	0.15N·m
PT1 (pretravel for N.C. operation)	(25°)	(28°)	(27°)
PT2 (pretravel for N.O. operation)	–	(38°)	–
MD	(16°)	–	–
TT (total travel)	(70°)	(70°)	(70°)

Catalog listing	Operating characteristics by dog operation	Circuit diagram
LJK-N2145F12		
LJK-N2545F12		
LJK-N2745F12		

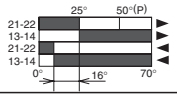
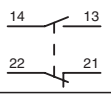
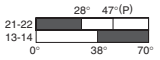
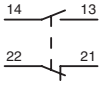
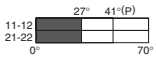
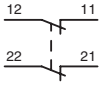
■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

50mm dia. resin roller lever: LJK-N2139F12, LJK-N2539F12, LJK-N2739F12





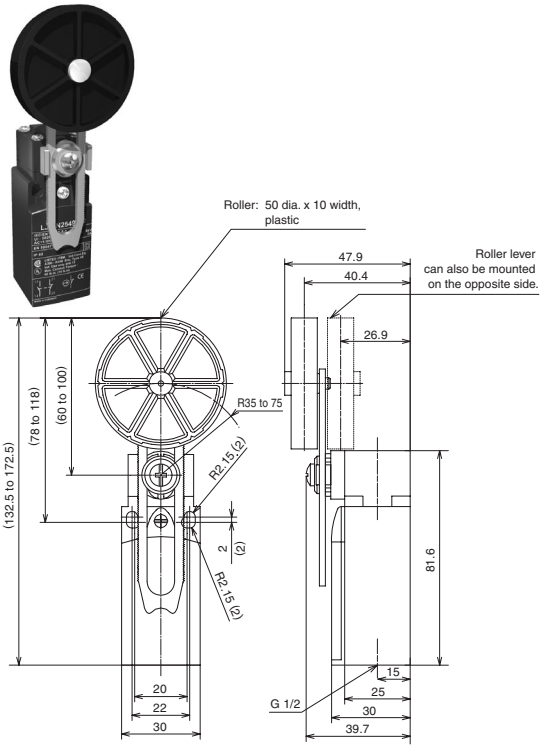
Operating characteristics by lever rotational angle	LJK-N2139F12	LJK-N2539F12	LJK-N2739F12
O.F. (max. operating force needed for N.C. operation)	0.1N·m	0.1N·m	0.1N·m
P.O. (min. travel to positive opening position)	50°	47°	41°
P.O.F. (minimum force for positive opening)	0.15N·m	0.15N·m	0.15N·m
PT1 (pretravel for N.C. operation)	(25°)	(28°)	(27°)
PT2 (pretravel for N.O. operation)	–	(38°)	–
MD	(16°)	–	–
TT (total travel)	(70°)	(70°)	(70°)

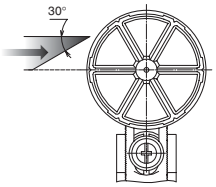
Catalog listing	Operating characteristics by dog operation	Circuit diagram
LJK-N2139F12		
LJK-N2539F12		
LJK-N2739F12		

■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

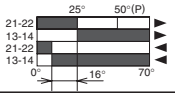
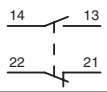
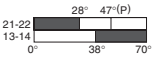
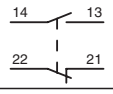
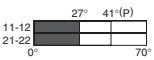
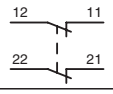
50mm dia. resin adjustable roller lever: LJK-N2149F12, LJK-N2549F12, LJK-N2749F12

(unit: mm)



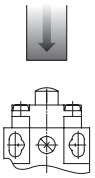


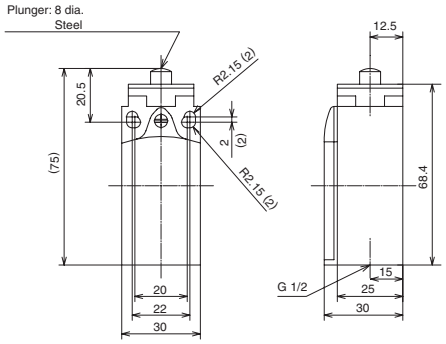
Operating characteristics by lever rotational angle	LJK-N2149F12	LJK-N2549F12	LJK-N2749F12
O.F. (max. operating force needed for N.C. operation)	0.1N·m	0.1N·m	0.1N·m
P.O. (min. travel to positive opening position)	50°	47°	41°
P.O.F. (minimum force for positive opening)	0.15N·m	0.15N·m	0.15N·m
PT1 (pretravel for N.C. operation)	(25°)	(28°)	(27°)
PT2 (pretravel for N.O. operation)	–	(38°)	–
MD	(16°)	–	–
TT (total travel)	(70°)	(70°)	(70°)

Catalog listing	Operating characteristics by dog operation	Circuit diagram
LJK-N2149F12		
LJK-N2549F12		
LJK-N2749F12		

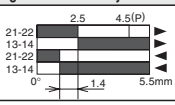
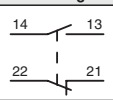
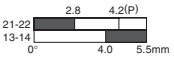
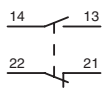
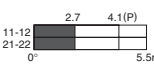
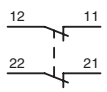
■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

Plunger: LJK-N2110F12, LJK-N2510F12, LJK-N2710F12





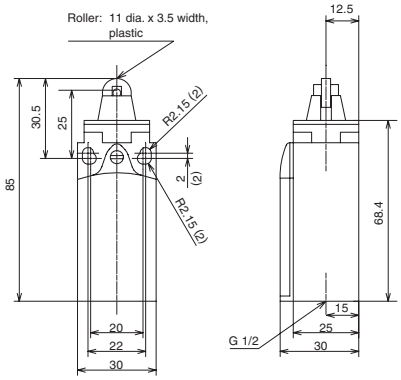
Operating characteristics by vertical operation	LJK-N2110F12	LJK-N2510F12	LJK-N2710F12
O.F. (max. operating force needed for N.C. operation)	15N	15N	15N
P.O. (min. travel to positive opening position)	4.5mm	4.2mm	4.1mm
P.O.F. (minimum force for positive opening)	30N	30N	30N
PT1 (pretravel for N.C. operation)	(2.5mm)	(2.8mm)	(2.7mm)
PT2 (pretravel for N.O. operation)	–	(4.0mm)	–
MD	(1.4mm)	–	–
TT (total travel)	(5.5mm)	(5.5mm)	(5.5mm)

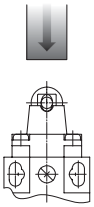
Catalog listing	Operating characteristics by vertical operation	Circuit diagram
LJK-N2110F12		
LJK-N2510F12		
LJK-N2710F12		

■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

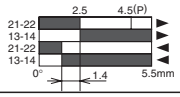
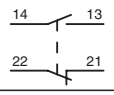
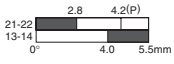
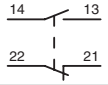
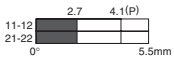
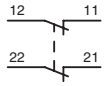
Resin roller plunger: LJK-N2102F12, LJK-N2502F12, LJK-N2702F12

(unit: mm)



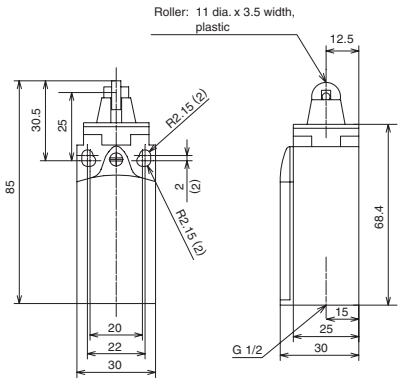


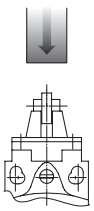
Operating characteristics by vertical operation	LJK-N2102F12	LJK-N2502F12	LJK-N2702F12
O.F. (max. operating force needed for N.C. operation)	15N	15N	15N
P.O. (min. travel to positive opening position)	4.5mm	4.2mm	4.1mm
P.O.F. (minimum force for positive opening)	30N	30N	30N
PT1 (pretravel for N.C. operation)	(2.5mm)	(2.8mm)	(2.7mm)
PT2 (pretravel for N.O. operation)	–	(4.0mm)	–
MD	(1.4mm)	–	–
TT (total travel)	(5.5mm)	(5.5mm)	(5.5mm)

Catalog listing	Operating characteristics by vertical operation	Circuit diagram
LJK-N2102F12		
LJK-N2502F12		
LJK-N2702F12		

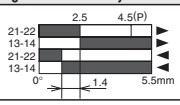
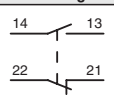
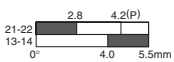
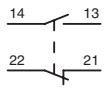
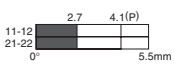
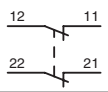
■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

Resin cross roller plunger: LJK-N2103F12, LJK-N2503F12, LJK-N2703F12





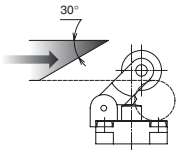
Operating characteristics by vertical operation	LJK-N2103F12	LJK-N2503F12	LJK-N2703F12
O.F. (max. operating force needed for N.C. operation)	15N	15N	15N
P.O. (min. travel to positive opening position)	4.5mm	4.2mm	4.1mm
P.O.F. (minimum force for positive opening)	30N	30N	30N
PT1 (pretravel for N.C. operation)	(2.5mm)	(2.8mm)	(2.7mm)
PT2 (pretravel for N.O. operation)	–	(4.0mm)	–
MD	(1.4mm)	–	–
TT (total travel)	(5.5mm)	(5.5mm)	(5.5mm)

Catalog listing	Operating characteristics by vertical operation	Circuit diagram
LJK-N2103F12		
LJK-N2503F12		
LJK-N2703F12		

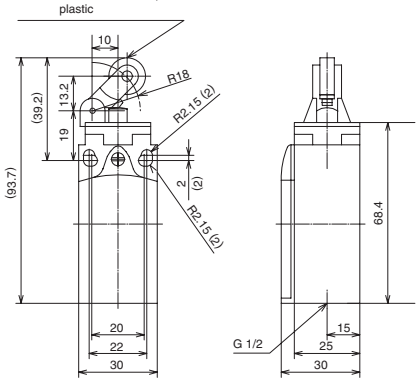
■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

Resin one-way roller (horizontal): LJK-N2121F12, LJK-N2521F12, LJK-N2721F12

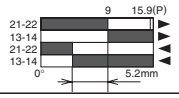
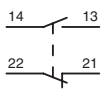
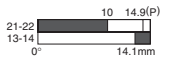
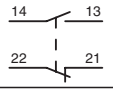
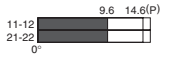
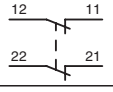
(unit: mm)



Roller: 14 dia. x 5.5 width, plastic

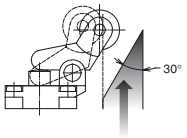


Operating characteristics by dog operation	LJK-N2121F12	LJK-N2521F12	LJK-N2721F12
O.F. (max. operating force needed for N.C. operation)	6N	6N	6N
P.O. (min. travel to positive opening position)	15.9mm	14.9mm	14.6mm
P.O.F. (minimum force for positive opening)	10N	10N	10N
PT1 (pretravel for N.C. operation)	(9mm)	(10mm)	(9.6mm)
PT2 (pretravel for N.O. operation)	–	(14.1mm)	–
MD	(5.2mm)	–	–
TT (total travel)	–	–	–

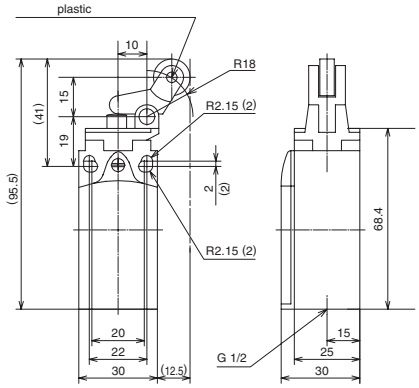
Catalog listing	Operating characteristics by dog operation	Circuit diagram
LJK-N2121F12		
LJK-N2521F12		
LJK-N2721F12		

■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

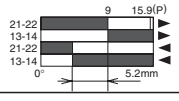
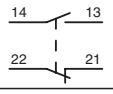
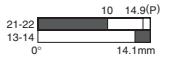
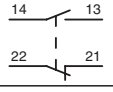
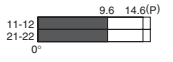
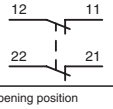
Resin one-way roller (vertical): LJK-N2127F12, LJK-N2527F12, LJK-N2727F12



Roller: 14 dia. x 5.5 width, plastic



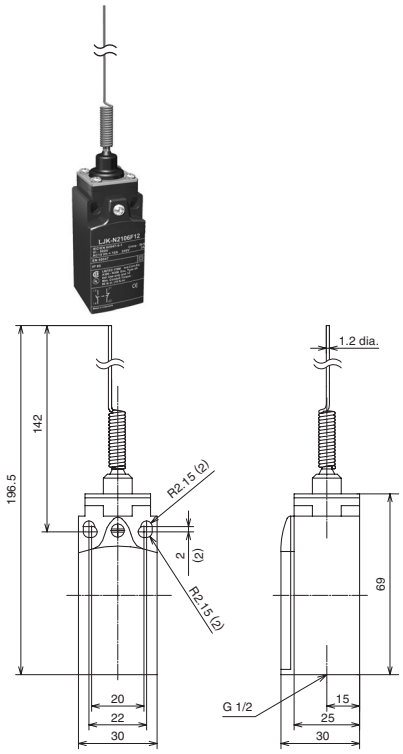
Operating characteristics by dog operation	LJK-N2127F12	LJK-N2527F12	LJK-N2727F12
O.F. (max. operating force needed for N.C. operation)	6N	6N	6N
P.O. (min. travel to positive opening position)	15.9mm	14.9mm	14.6mm
P.O.F. (minimum force for positive opening)	10N	10N	10N
PT1 (pretravel for N.C. operation)	(9mm)	(10mm)	(9.6mm)
PT2 (pretravel for N.O. operation)	–	(14.1mm)	–
MD	(5.2mm)	–	–
TT (total travel)	–	–	–

Catalog listing	Operating characteristics by dog operation	Circuit diagram
LJK-N2127F12		
LJK-N2527F12		
LJK-N2727F12		

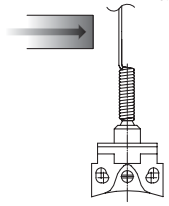
■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

Steel wire: LJK-N2106F12, LJK-N2506F12, LJK-N2706F12

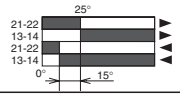
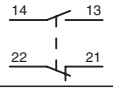
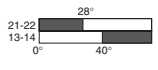
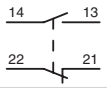
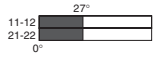
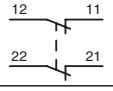
(unit: mm)



Note: Steel wire switches do not have positive opening mechanism.

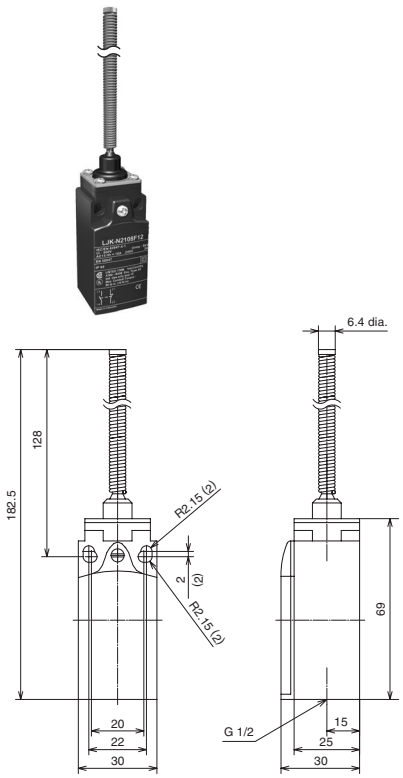


Operating characteristics by wire inclination angle	LJK-N2106F12	LJK-N2506F12	LJK-N2706F12
O.F. (max. operating force needed for N.C. operation)	0.13N·m	0.13N·m	0.13N·m
P.O. (min. travel to positive opening position)	–	–	–
P.O.F. (minimum force for positive opening)	–	–	–
PT1 (pretravel for N.C. operation)	(25°)	(28°)	(27°)
PT2 (pretravel for N.O. operation)	–	(40°)	–
MD	(15°)	–	–
TT (total travel)	–	–	–

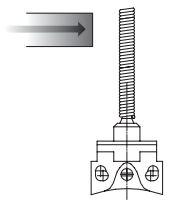
Catalog listing	Operating characteristics by dog operation	Circuit diagram
LJK-N2106F12		
LJK-N2506F12		
LJK-N2706F12		

■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

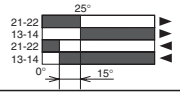
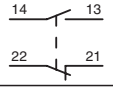
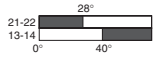
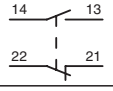
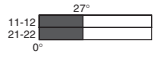
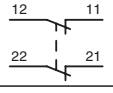
Spring rod: LJK-N2108F12, LJK-N2508F12, LJK-N2708F12



Note: Steel wire switches do not have positive opening mechanism.



Operating characteristics by rod inclination angle	LJK-N2108F12	LJK-N2508F12	LJK-N2708F12
O.F. (max. operating force needed for N.C. operation)	0.13N·m	0.13N·m	0.13N·m
P.O. (min. travel to positive opening position)	–	–	–
P.O.F. (minimum force for positive opening)	–	–	–
PT1 (pretravel for N.C. operation)	(25°)	(28°)	(27°)
PT2 (pretravel for N.O. operation)	–	(40°)	–
MD	(15°)	–	–
TT (total travel)	–	–	–

Catalog listing	Operating characteristics by dog operation	Circuit diagram
LJK-N2108F12		
LJK-N2508F12		
LJK-N2708F12		

■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

HANDLING PRECAUTIONS

1. Mounting the switch

- Always tighten each part of the safety switch to the tightening torque recommended in the product specifications. If any part is tightened excessively, the screw and/or other parts may be damaged.
- Mount the dog so that no force is directly applied to the actuator in the free state.
- Do not use any glue or lubricant containing silicone. Doing so might result in faulty electrical conductivity.

2. Wiring

- Do not perform wiring work with the power turned ON. Doing so might cause an electrical shock or cause the device to operate suddenly.

3. Adjustment

- Do not apply excessive force (force 5 times larger that the O.F.) to the actuator when it is beyond the operation limit position. Doing so might break the switch.
- Adjust the actuator motion so that it exceeds the specified P.O. (travel to positive opening position) but does not exceed the operation limit position.

4. Operating environment

- Do not use in a location subject to splashing with strong acid or alkali.