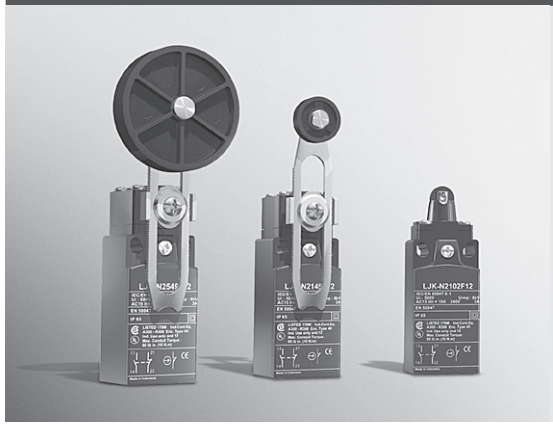
Compact plastic limit switches with positive opening mechanism

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. (excluding some models) 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

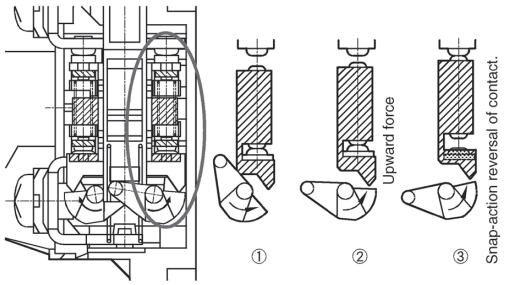
*Except for the steel wire and spring rod types.

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**
50 mm 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**
50 mm 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

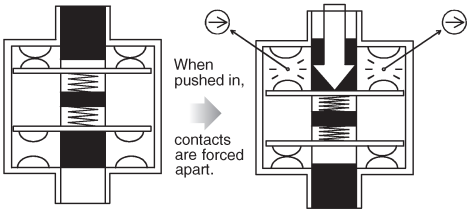


As seen above, the cam forces the N.C. contact up from the bottom, even if there is fusing of the contacts.

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	100 MΩ or more between terminals with the same polarity and between each terminal and non-live metal part (by DC500 megger)
	Initial contact resistance	25 mΩ or less (6 to 8 Vdc, thermal current 1A, measured by voltage drop method)
	Rated thermal current (Ith)	10A
	Short-circuit protection	10A breaking fuse, gG (gI) 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: 500 m/s² Note: 50 mm dia. resin adjustable roller lever types 150 m/s² spring rod types 200 m/s² IEC 60068-2-27
	Vibration resistance	250 m/s² (10 to 500 Hz), 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 0.7 N·m (M4) Head: 0.8 to 1.2 N·m (M3 round head screw) Cover: 0.8 to 1.2 N·m (M3 round head screw) Terminal: 0.8 to 1.2 N·m (M3.5 round head screw) Lever: 1.3 to 1.7 N·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

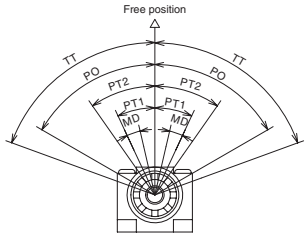
Actuator
LJK-N2□□□F12
Contact configuration

Actuator / Contact configuration	Roller lever type LJK-N2□**18**F12 LJK-N2□**39**F12 LJK-N2□**45**F12 LJK-N2□**49**F12		Plunger type LJK-N2□**10**F12 LJK-N2□**02**F12 LJK-N2□**03**F12		One-way roller / non-directional operation types 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-N21□□F12	0.03 m/min	1.5 m/s	0.01 m/min	0.5 m/s	0.02 m/min	1 m/s
LJK-N25□□F12	18 m/min	1.5 m/s	6 m/min	0.5 m/s	12 m/min	1 m/s
LJK-N27□□F12	18 m/min	1.5 m/s	6 m/min	0.5 m/s	12 m/min	1 m/s

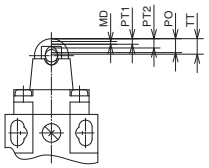
OPERATING CHARACTERISTICS BY ROTARY OR IN-LINE ACTUATIONS OF ACTUATORS

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

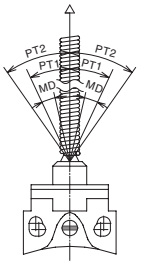
●Roller lever type



●Plunger type and one-way roller type



●Non-directional operation type

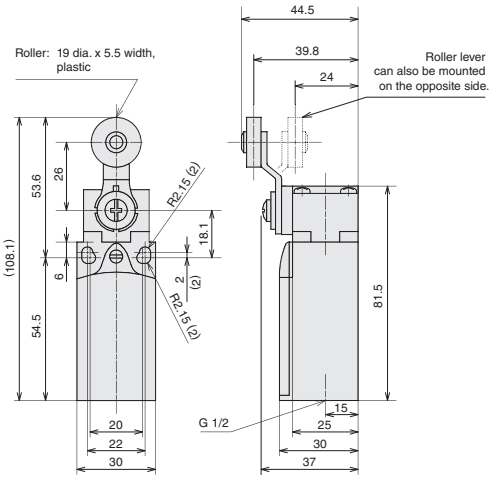


T.T.: total travel. P.T.1: pretravel for N.C. operation. P.T.2: pretravel for N.O. operation.
M.D.: minimum movement differential. P.O.: minimum travel to positive opening position.

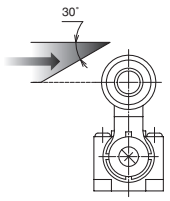
SHAPE / DIMENSIONS / OPERATING CHARACTERISTICS / CIRCUIT DIAGRAMS

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

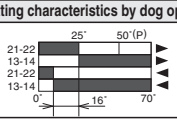
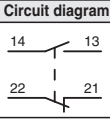
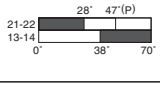
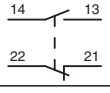
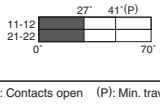
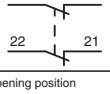
(unit: mm)



* Dimensional tolerance is ±0.4 unless otherwise specified.



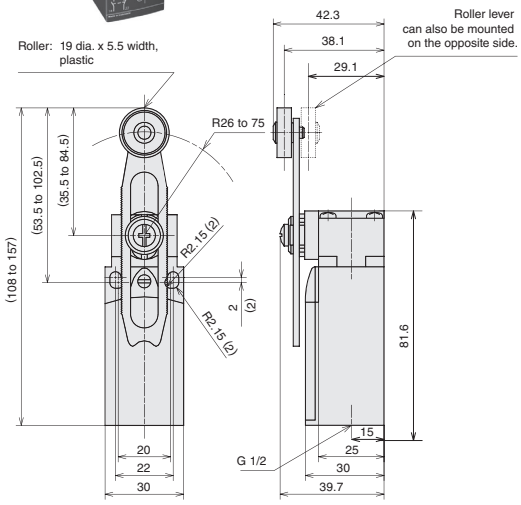
Operating characteristics by lever rotational angle	LJK-N2118F12	LJK-N2518F12	LJK-N2718F12
O.F. (max. operating force needed for N.C. operation)	0.1 N·m	0.1 N·m	0.1 N·m
P.O. (min. travel to positive opening position)	50˚	47˚	41˚
P.O.F. (minimum force for positive opening)	0.15 N·m	0.15 N·m	0.15 N·m
PT1 (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)



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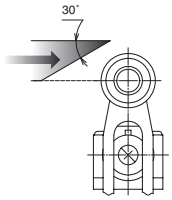
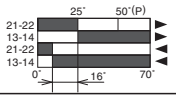
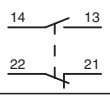
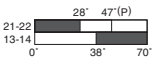
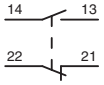
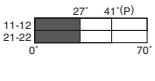
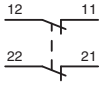
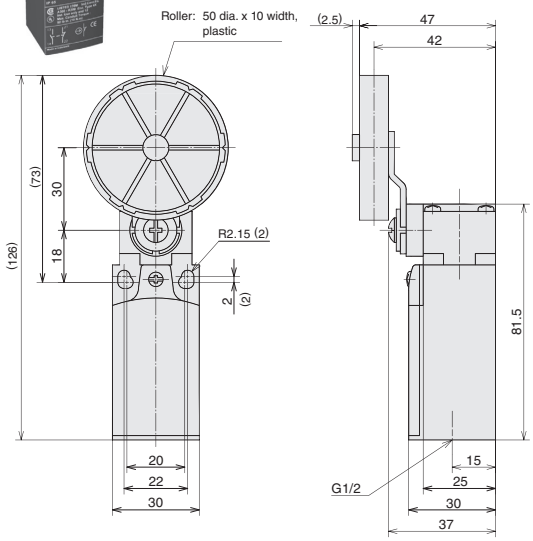


Operating characteristics by lever rotational angle	LJK-N2145F12	LJK-N2545F12	LJK-N2745F12
O.F. (max. operating force needed for N.C. operation)	0.1 N·m	0.1 N·m	0.1 N·m
P.O. (min. travel to positive opening position)	50°	47°	41°
P.O.F. (minimum force for positive opening)	0.15 N·m	0.15 N·m	0.15 N·m
PT1 (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

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



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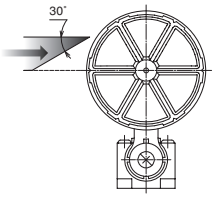
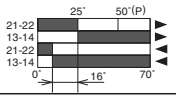
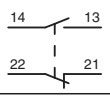
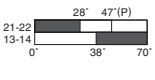
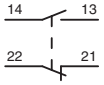
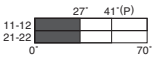
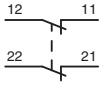


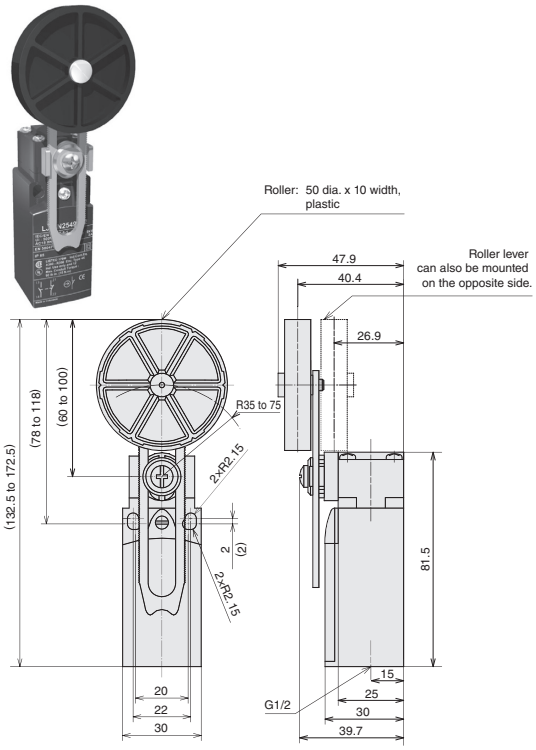
Operating characteristics by lever rotational angle	LJK-N2139F12	LJK-N2539F12	LJK-N2739F12
O.F. (max. operating force needed for N.C. operation)	0.1 N·m	0.1 N·m	0.1 N·m
P.O. (min. travel to positive opening position)	50°	47°	41°
P.O.F. (minimum force for positive opening)	0.15 N·m	0.15 N·m	0.15 N·m
PT1 (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

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

(unit: mm)



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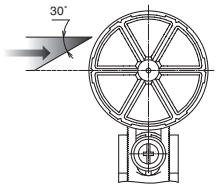
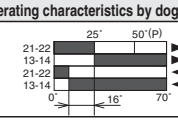
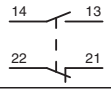
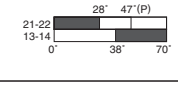
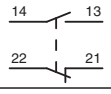
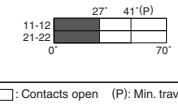
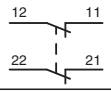
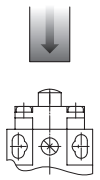


Operating characteristics by lever rotational angle	LJK-N2149F12	LJK-N2549F12	LJK-N2749F12
O.F. (max. operating force needed for N.C. operation)	0.1 N·m	0.1 N·m	0.1 N·m
P.O. (min. travel to positive opening position)	50˚	47˚	41˚
P.O.F. (minimum force for positive opening)	0.15 N·m	0.15 N·m	0.15 N·m
PT1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

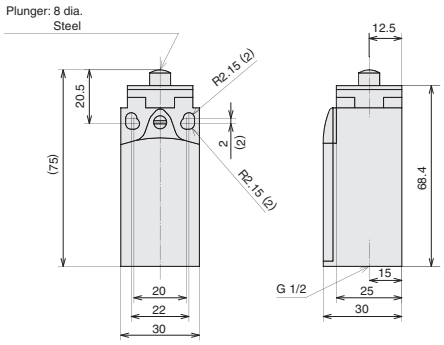
Catalog listing	Operating characteristics by dog operation	Circuit diagram
LJK-N2149F12		
LJK-N2549F12		
LJK-N2749F12		

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

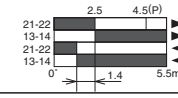
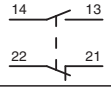
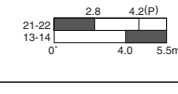
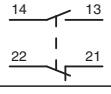
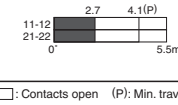
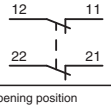
Plunger: LJK-N2110F12, LJK-N2510F12, LJK-N2710F12



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



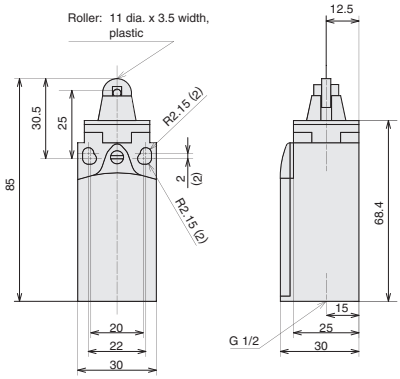
* Dimensional tolerance is ±0.4 unless otherwise specified.

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

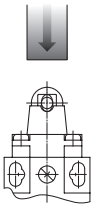
■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

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

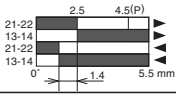
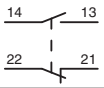
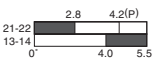
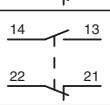
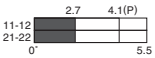
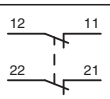
(unit: mm)



* Dimensional tolerance is ±0.4 unless otherwise specified.

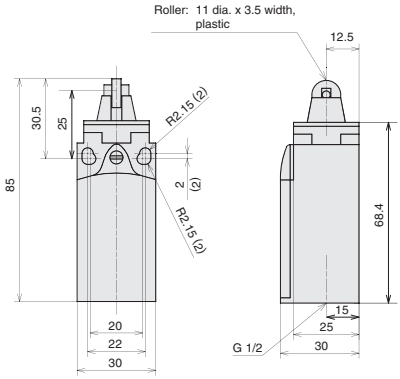


Operating characteristics by vertical operation	LJK-N2102F12	LJK-N2502F12	LJK-N2702F12
O.F. (max. operating force needed for N.C. operation)	15 N	15 N	15 N
P.O. (min. travel to positive opening position)	4.5 mm	4.2 mm	4.1 mm
P.O.F. (minimum force for positive opening)	30 N	30 N	30 N
PT1 (pretravel for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

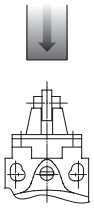
Catalog listing	Operating characteristics by vertical operation	Circuit diagram
LJK-N2102F12		
LJK-N2502F12		
LJK-N2702F12		

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

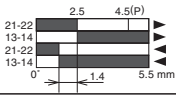
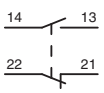
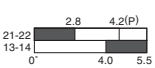
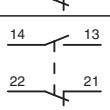
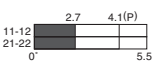
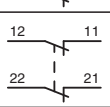
Resin cross roller plunger: LJK-N2103F12, LJK-N2503F12, LJK-N2703F12



* Dimensional tolerance is ±0.4 unless otherwise specified.



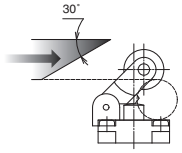
Operating characteristics by vertical operation	LJK-N2103F12	LJK-N2503F12	LJK-N2703F12
O.F. (max. operating force needed for N.C. operation)	15 N	15 N	15 N
P.O. (min. travel to positive opening position)	4.5 mm	4.2 mm	4.1 mm
P.O.F. (minimum force for positive opening)	30 N	30 N	30 N
PT1 (pretravel for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

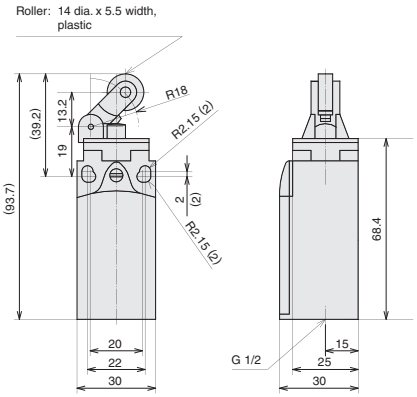
Catalog listing	Operating characteristics by vertical operation	Circuit diagram
LJK-N2103F12		
LJK-N2503F12		
LJK-N2703F12		

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

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

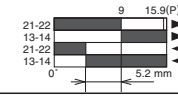
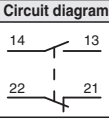
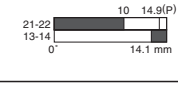
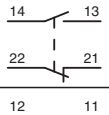
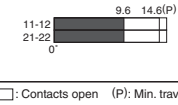
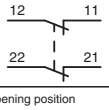
(unit: mm)





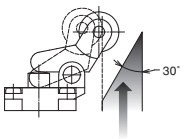
* Dimensional tolerance is ±0.4 unless otherwise specified.

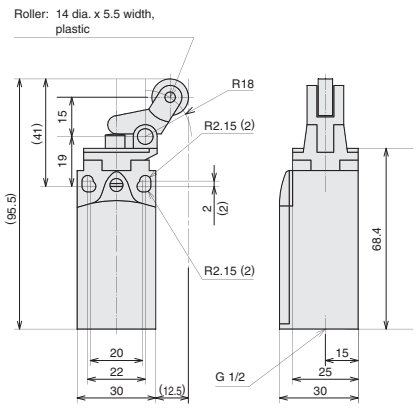
Operating characteristics by dog operation	LJK-N2121F12	LJK-N2521F12	LJK-N2721F12
O.F. (max. operating force needed for N.C. operation)	6 N	6 N	6 N
P.O. (min. travel to positive opening position)	15.9 mm	14.9 mm	14.6 mm
P.O.F. (minimum force for positive opening)	10 N	10 N	10 N
PT1 (pretravel for N.C.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

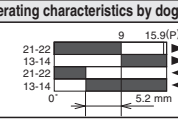
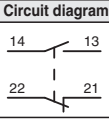
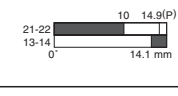
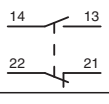
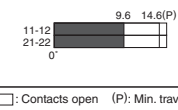
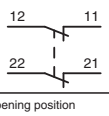
Resin one-way roller (vertical): LJK-N2127F12, LJK-N2527F12, LJK-N2727F12





* Dimensional tolerance is ±0.4 unless otherwise specified.

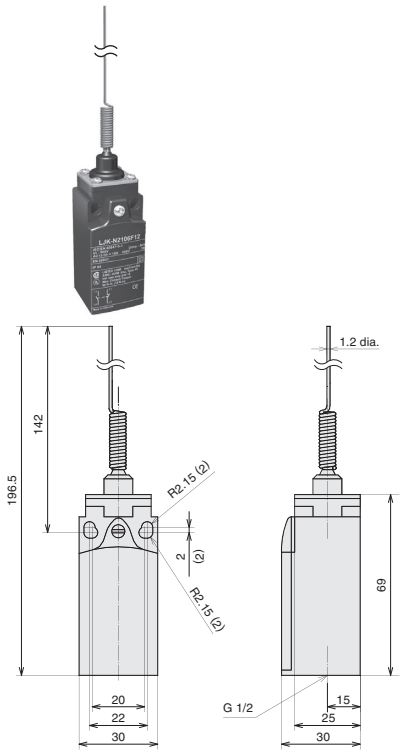
Operating characteristics by dog operation	LJK-N2127F12	LJK-N2527F12	LJK-N2727F12
O.F. (max. operating force needed for N.C. operation)	6 N	6 N	6 N
P.O. (min. travel to positive opening position)	15.9 mm	14.9 mm	14.6 mm
P.O.F. (minimum force for positive opening)	10 N	10 N	10 N
PT1 (pretravel for N.C.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

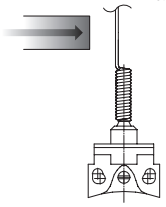
Steel wire: LJK-N2106F12, LJK-N2506F12, LJK-N2706F12

(unit: mm)

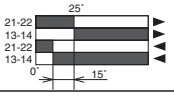
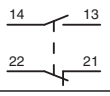
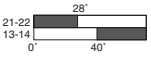
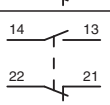
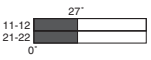
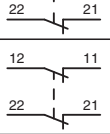


* Dimensional tolerance is ±0.4 unless otherwise specified.

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



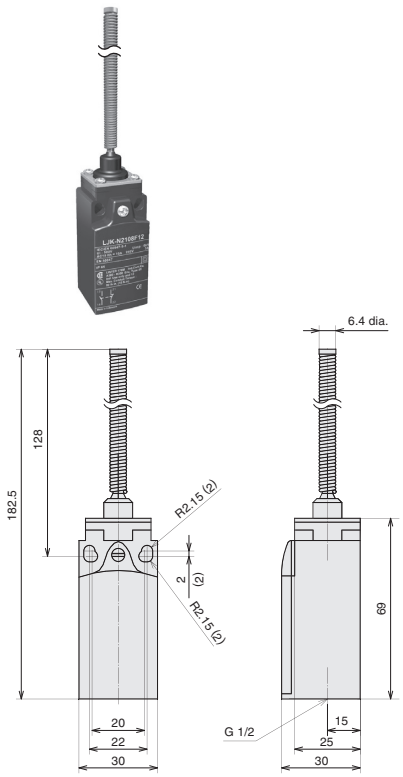
Operating characteristics by wire inclination angle	LJK-N2106F12	LJK-N2506F12	LJK-N2706F12
O.F. (max. operating force needed for N.C. operation)	0.13 N·m	0.13 N·m	0.13 N·m
P.O. (min. travel to positive opening position)	–	–	–
P.O.F. (minimum force for positive opening)	–	–	–
PT1 (pretravel for N.C. operation)	(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		

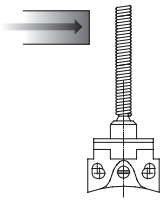
■: Contacts closed □: Contacts open (P): Min. travel to positive opening position

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

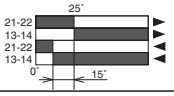
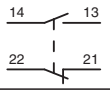
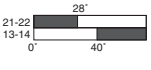
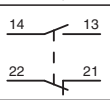
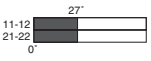
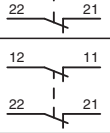
Note: Steel wire switches do not have positive opening mechanism.



* Dimensional tolerance is ±0.4 unless otherwise specified.



Operating characteristics by rod inclination angle	LJK-N2108F12	LJK-N2508F12	LJK-N2708F12
O.F. (max. operating force needed for N.C. operation)	0.13 N·m	0.13 N·m	0.13 N·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.

Before use, thoroughly read the “Precautions for use” and “Precautions for handling” in the Technical Guide on pages **D-111** to **D-122** as well as the instruction manual and product specification for this switch.