


## Optical System Achieves 1- $\mu\text{m}$ Operating Position Repeatability in this 4-way Switch

- No-contact structure for high reliability.
- Ceramic materials in measuring part for superior resistance to abrasion.
- Two different output types (PNP and NPN) available.
- Less abrasion and damage of mechanical contacts compared to switches with contacts, reducing fluctuation in the output.
- More compact than previous OMRON models: 40% less mass, 15% lighter across the operating width.



 Be sure to read *Safety Precautions* on page 4 and *Safety Precautions for All Limit Switches*.

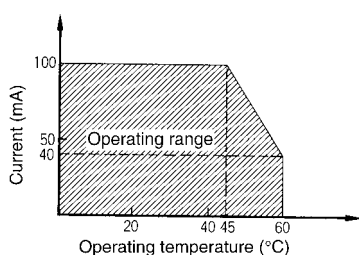
## Ordering Information

Output configuration	Contact form	Operation indicator	Cable length	Model
PNP open collector (+ common)	SPST-NC	ON when not operated	1 m	<b>D5F-2B10</b>
			3 m	<b>D5F-2B30</b>
NPN open collector (- common)	SPST-NO	ON when operated	1 m	<b>D5F-3C10</b>
			3 m	<b>D5F-3C30</b>

## Specifications

### Ratings

<b>Power supply voltage</b>	12 to 24 VDC $\pm$ 10%, ripple (p-p): 10% max.
<b>Output current</b>	100 mA max.
<b>Power consumption</b>	30 mA max.
<b>Leakage current</b>	0.15 mA max.
<b>Residual voltage</b>	2 V max.



### Characteristics

<b>Degree of protection</b>	IP67	
<b>Durability *1</b>	<b>Mechanical</b>	5,000,000 operations min.
	<b>Electrical</b>	
<b>Operating speed</b>	1 $\mu\text{m/s}$ to 0.5 m/s	
<b>Max. operating frequency</b>	60 operations/minute max.	
<b>Insulation resistance</b>	100 M $\Omega$ min. (at 500 VDC) between each terminal and non-current-carrying metal part	
<b>Dielectric strength (50/60Hz 1min)</b>	1,100 VAC between each terminal and non-current-carrying metal part	
<b>Vibration resistance</b>	<b>Malfunction</b>	10 to 500 Hz, 1.3-mm double amplitude
<b>Shock resistance</b>	<b>Malfunction</b>	300 m/s <sup>2</sup> min.
<b>Repeat accuracy</b>	1 $\mu\text{m}$ max. *2	
<b>Ambient temperature *3</b>	Operating: -10°C to +60°C (with no icing)	
<b>Ambient humidity</b>	Operating: 35% to 95%RH	
<b>Weight</b>	Switch body: Approx. 50 g; Cord: Approx. 23 g/m	

Note: The above figures are initial values.

\*1. Durability values are calculated at an operating temperature of +5°C to +35°C, and an operating humidity of 30% to 70%RH. Contact your OMRON sales representative for more detailed information on other operating environments.

\*2. Measurements were conducted repeatedly at the same point. The value is 1  $\mu\text{m}$  max. for 200 measurements. For other conditions in detail, contact your OMRON sales representative.

\*3. The ambient operating temperature varies depending on the current. Refer to the following Engineering Data.

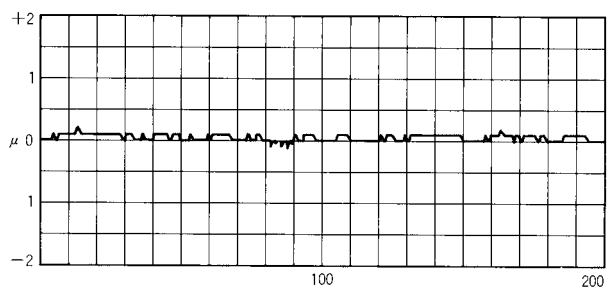
<b>Deviation in electrical durability after 1,000,000 operations</b>	10 $\mu\text{m}$ max.
<b>Temperature coefficient *</b>	$\pm 50 \times 10^{-6}/^\circ\text{C}$ max.

\* Operating position fluctuation rate for a change of 1°C in the ambient temperature.

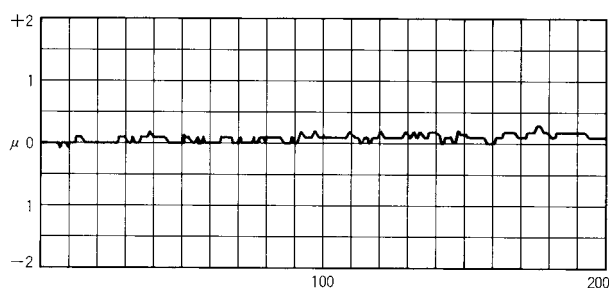
Repeat Accuracy (Reference Data)

D5F-2B10

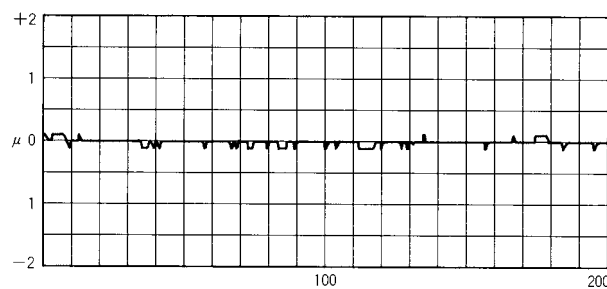
No.1 ON



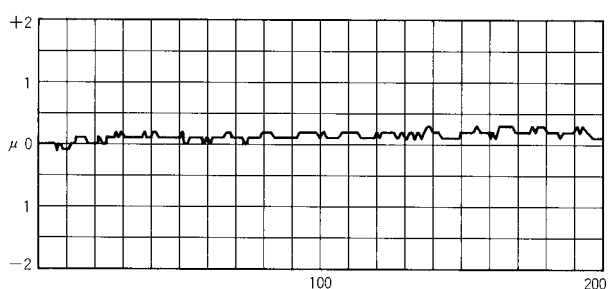
No.2 ON



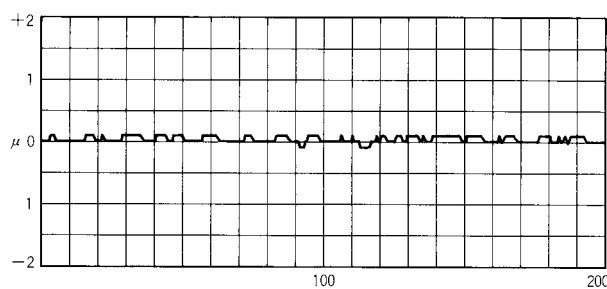
No.1 OFF



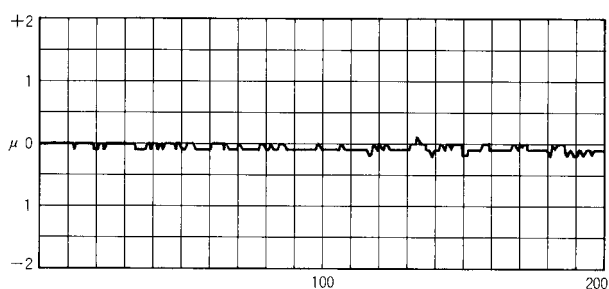
No.2 OFF



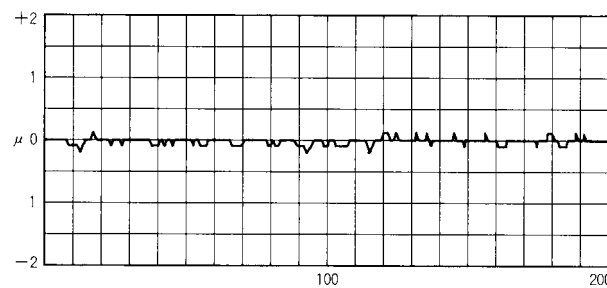
No.3 ON



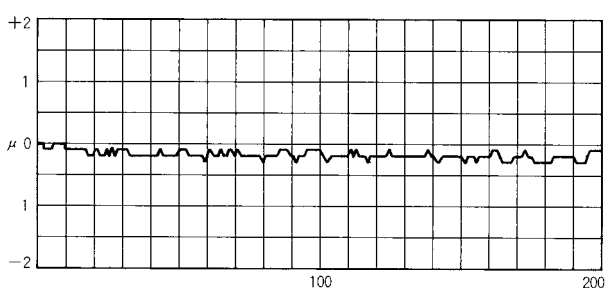
No.4 ON



No.3 OFF

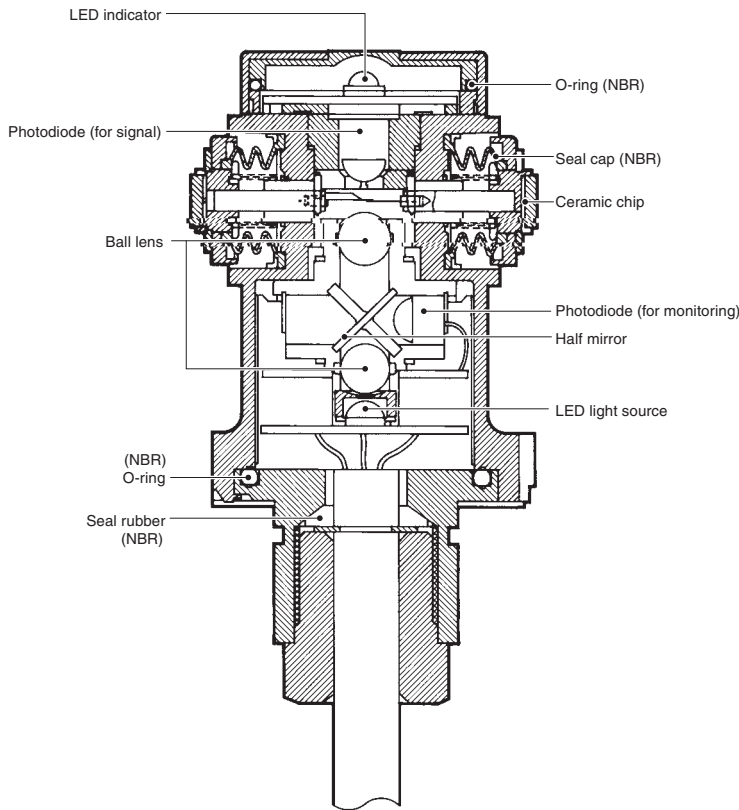


No.4 OFF



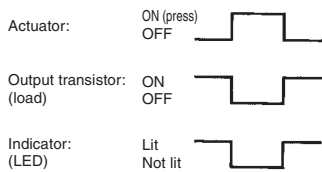
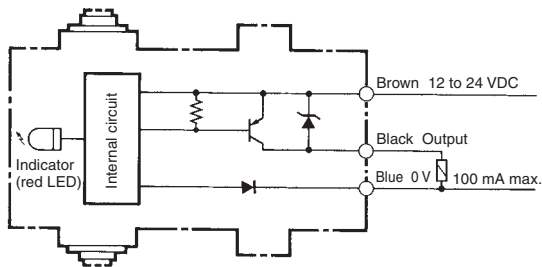
# Structure and Nomenclature

## Structure

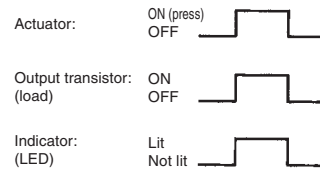
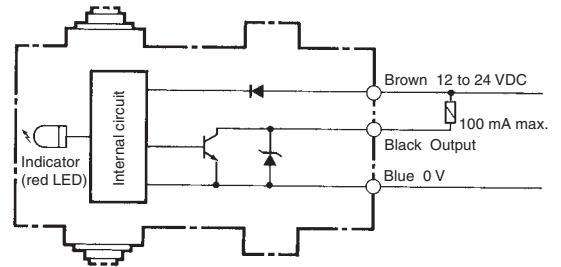


## Output Circuit Diagram

D5F-2B□0



D5F-3C□0

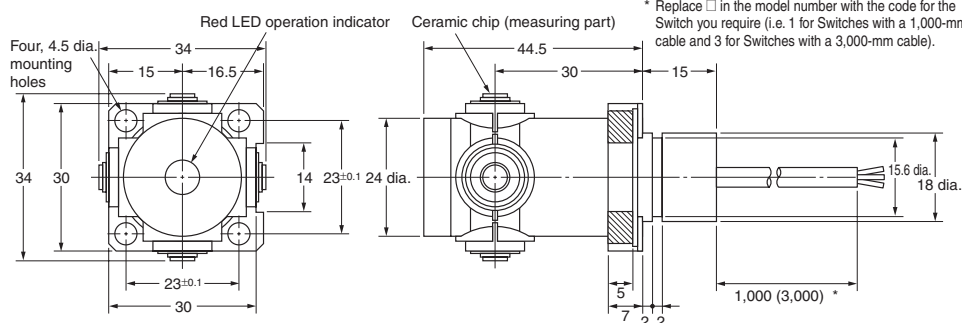
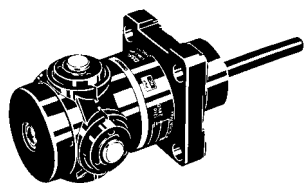


## Dimensions and Operating Characteristics

(Unit: mm)

D5F-2B□0

D5F-3C□0



Operating force	OF	max.	2.45 N
Release force	RF	min.	0.98 N
Pretravel	PT	max.	0.5 mm
Movement Differential	MD	max.	20 μm
Total travel	TT	min.	2.2 mm

Note: 1. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions

## Safety Precautions

Refer to *Safety Precautions for All Limit Switches*.

## Precautions for Safe Use

Do not impose any force exceeding 29.42 N max. on the cable, otherwise the cable may break. Make sure that the bending radius of the cable is at least R20 mm.

## Precautions for Correct Use

## Connections

- Take the residual voltage (2 V max.) into consideration when connecting a load or power supply.
- When the internal circuit of the D5F is open, there will be a leakage current of 0.15 mA maximum and a residual voltage on the load. Check the release voltage of the load before use.

## Handling

Do not drop or impose external force, such as shock, on the D5F. Otherwise, the D5F may malfunction or lose its accuracy.

## Operating Environment

The operating environment has a significant effect on the D5F. Consult your OMRON representative before using the D5F in environments with different cutting oil, solvent, or gas. Testing has been performed for the following 12 types of cutting oil. Consult with your OMRON representative for application under other conditions, such as other cutting oils, solvents, and gases.

Cutting oil	Manufacturer
Yushiron Oil No. 7 and No. 21	Yushiro Chemical Industry Co., Ltd.
Yushiron Cut UB-75 and G-55	Yushiro Chemical Industry Co., Ltd.
Yushiroken EC-50, CN-102, MIC-2, MIC-10, and S-52	Yushiro Chemical Industry Co., Ltd.
Emulcut No.10	Kyodo Yushi Co., Ltd.
CosmoCool X106	Cosmo Oil Co., Ltd.
Cool CH	Idemitsu Kosan Co., Ltd.

## Noise

If the power supply line is affected by excessive noise, the D5F may lose its accuracy.

Refer to the following and if the noise level is excessively high, take a proper countermeasure, such as the use of a noise filter.

Level	Influence on accuracy
1kV p-p	3 μm max.
1.5kV p-p	5 μm max.

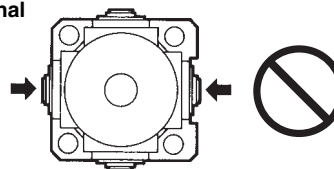
Make sure that the ripple rate of the power supply is 10% maximum.

## Operation

Do not press two or more plungers at the simultaneously, otherwise the D5F may break.

## (Example)

## Two-directional Operation



## Precautions

## &lt;Light Source Burnout&gt;

The D5F does not use any contacts. Therefore no contact failures will result. If the LED light source burns out due to noise or any other cause, the following will result.

D5F-2B□0: The output transistor is kept turned OFF.

D5F-3C□0: The output transistor is kept turned ON.

Take the above into consideration and install a stopper mechanism so that the machine will not be damaged or the Switch will not be pressed excessively if the output transistor does not operate properly.

## &lt;Adhesive Agent&gt;

The ceramic chips are glued with epoxy resin that may deteriorate due to cutting oil or warm solvent. In the worst case, the chips may fall off. The chips can withstand certain cutting oils or acetone. Check the operating environment before using the D5F.

## 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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2008.11

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