D5F

CSM_D5F_DS_E_2_2

Optical System Achieves 1-μm 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*.

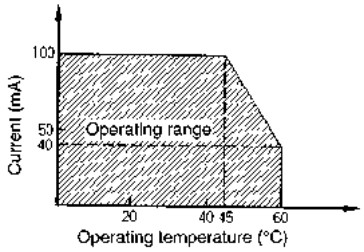
Ordering Information

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

Specifications

Ratings

Power supply voltage	12 to 24 VDC±10%, ripple (p-p): 10% max.
Output current	100 mA max.
Power consumption	30 mA max.
Leakage current	0.15 mA max.
Residual voltage	2 V max.



Characteristics

Degree of protection		IP67
Durability *1	**Mechanical**	5,000,000 operations min.
	Electrical	
Operating speed		1 μm/s to 0.5 m/s
Max. operating frequency		60 operations/minute max.
Insulation resistance		100 MΩ min. (at 500 VDC) between each terminal and non-current-carrying metal part
Dielectric strength (50/60Hz 1min)		1,100 VAC between each terminal and non-current-carrying metal part
Vibration resistance	**Malfunction**	10 to 500 Hz, 1.3-mm double amplitude
Shock resistance	**Malfunction**	300 m/s² max.
Repeat accuracy		1 μm max. *2
Ambient temperature *3		Operating: –10°C to +60°C (with no icing)
Ambient humidity		Operating: 35% to 95%RH
Weight		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 μm 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.

Deviation in electrical durability after 1,000,000 operations	10 μm max.
Temperature coefficient *	±50 × 10⁻⁶/°C max.

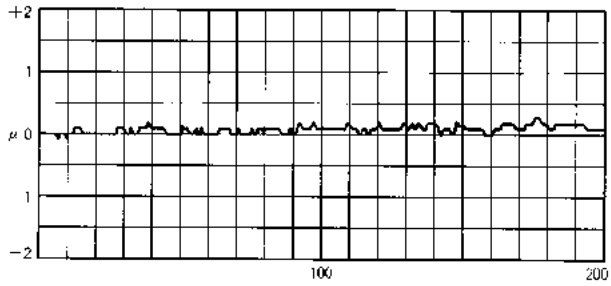
* Operating position fluctuation rate for a change of 1°C in the ambient temperature.

Repeat Accuracy (Reference Data)

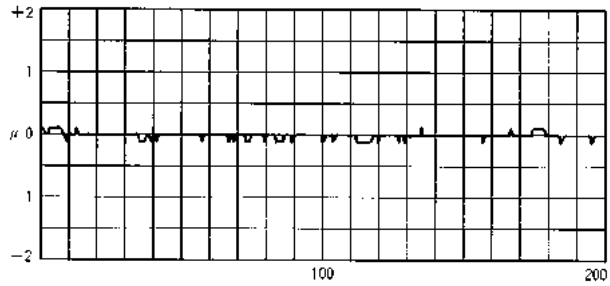
D5F-2B10

No.1 ON

No.2 ON



No.1 OFF



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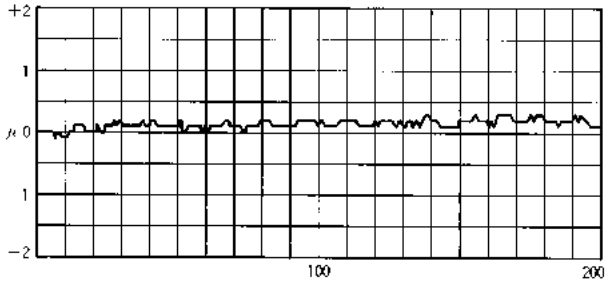
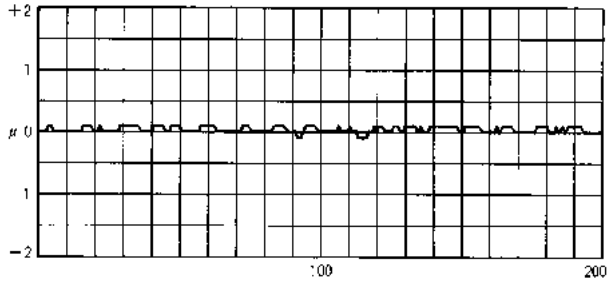
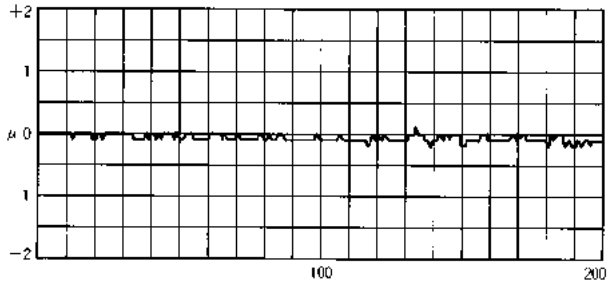


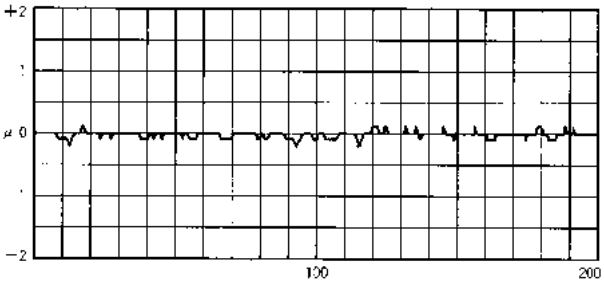
No.3 ON



No.4 ON



No.3 OFF



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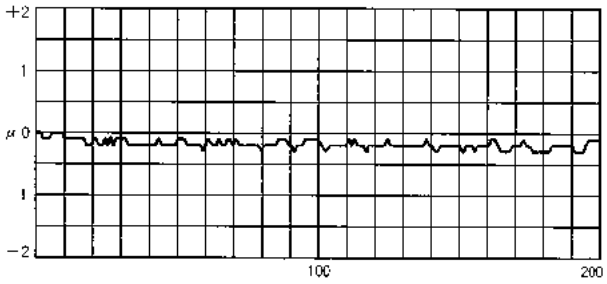
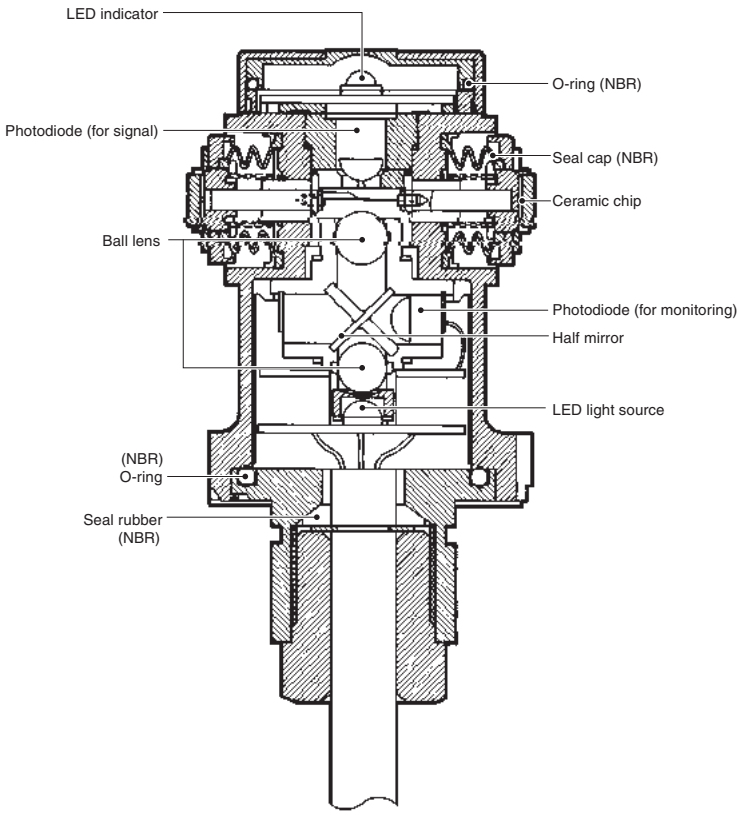


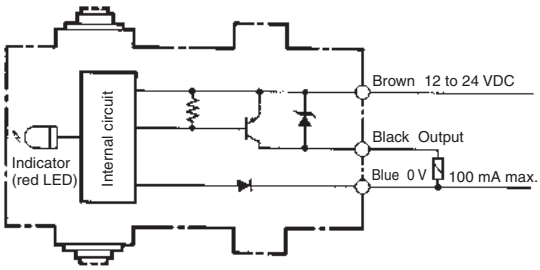
Structure and Nomenclature

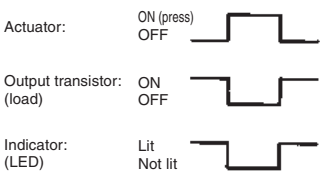
Structure



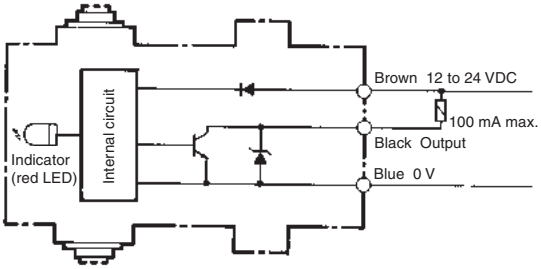
Output Circuit Diagram

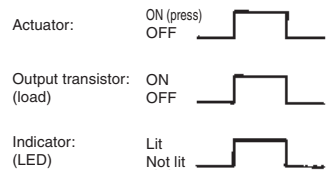
D5F-2B□0





D5F-3C□0

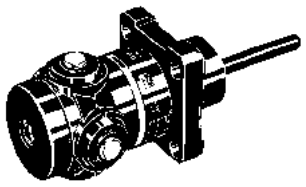


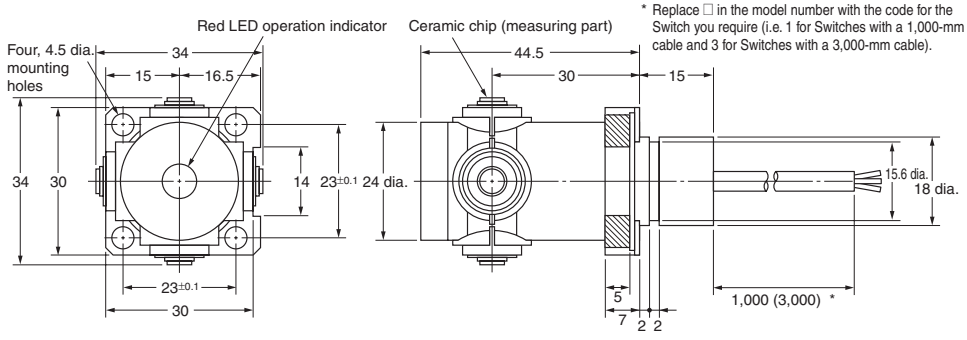


Dimensions and Operating Characteristics

(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 ±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.

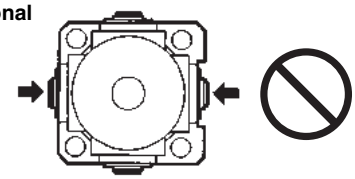
Level	Influence on accuracy
1kV p-p	3 μm max.
1.5kV p-p	5 μm max.

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

<Light Source Burnout>

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.

<Adhesive Agent>

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.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

2012.8

In the interest of product improvement, specifications are subject to change without notice.

OMRON Corporation
Industrial Automation Company

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