

Microswitches MS Series

General purpose microswitches for heavier duty applications

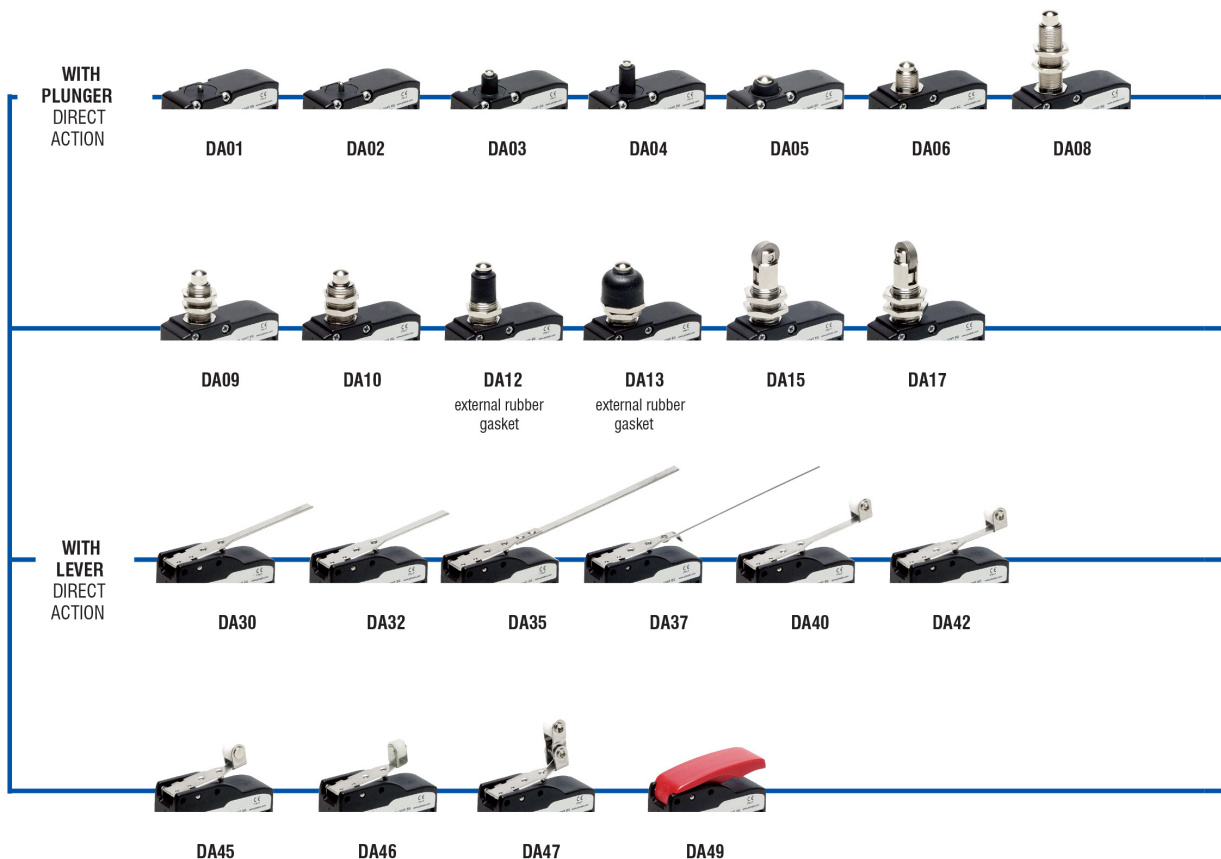
- High precision snap action mechanism
- 16A 250V AC resistive rating (I_{th})
- Wide range of actuator styles
- Screw terminals with self lifting plate
- 10 million mechanical operation cycles
- Protection degree IP20, IP40 or IP65
- Versions with positive opening
- Mechanically interchangeable with previous products (see cross reference section)
- UL and cUL Approvals



Options & Ordering Codes

MS	ST	C1	1	D	A01	G
Terminal Type						
Screw terminals with self-lifting plate		ST				
Contact Block						
1NO+NC, snap action		C1				
Max. Protection Degree						
IP40 (with protection)		1				
IP65 (with protection)		2				
Actuation Type						
Direct action				D		
Back direct action				B		
Inverted action				R		
Contacts Type						
		Silver contacts (standard)				
G		Silver contacts gold plated 1 μ m				
Actuator (see following pages)						
A01		With pin				
A02		With pin				
A03		With small push button				
..					

ATTENTION! The feasibility of a code number does not mean the effective availability of a product. There are other options possible, if you can not see the option you require please contact IMO.



Microswitches MS Series

Introduction



The MS series of microswitches has been developed with added features to replace the existing MV range. The main features of the new range have been kept the same as the existing MV range to allow for interchangeability.

However, extra features have increased the application field where these switches can be used. The innovative feature of this series is the tripping device which has evolved with the use of modern technology, allowing added features that offer a higher number of solutions when compared with similar devices currently present in the market.

The contacts of the new MS range have a higher reliability factor which has been achieved with the use of double contacts which are also used where positive opening of the contact is required.

The housing has been designed so a gasket can be added as an option in order to seal the device against fine dust or liquids up to IP65.

The terminals are more practical and allow for connection of a wider range of cable diameters. There are also options available with Fast-On terminals, with the choice of three different terminal exit angles.

Contact Block Reliability

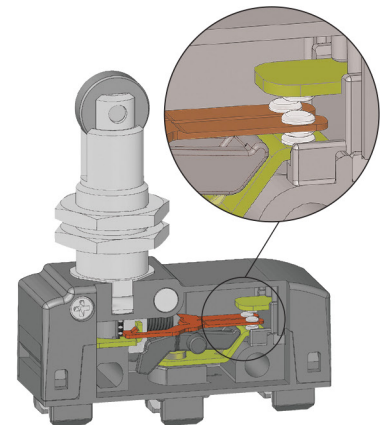
In the following table we refer to the typical microswitch contact structure (type A) normally used in the industry, compared with the innovative solution that IMO Precision Controls uses in new MS series microswitches: movable contact with single interruption and double contacts (type B).

As you can see from the table below, this last structure (type B) offers half of the contact resistance (R) than the simple mobile contact (type A) and a lower probability of failure (f_e).

In fact, defined x the probability of a commutation failure of a single interruption, it results that in the type A the failure probability $f_e = x$, in the type B the probability $f_e = x^2$. This means that if in a certain situation the failure probability x is equal, for instance, to 1×10^{-4} (1 failed interruption every 10.000), we will have:

- in type A one failed commutation every 10.000
- in type B one failed commutation every 100.000.000

Type	Figure	Description	Contact resistance R	Probability of failure f_e
A Common microswitch		Contacts with single interruption	$R = R_c$	$f_e = x$
B IMO microswitch MK series		Contacts with single interruption and double contacts	$R = R_c/2$	$f_e \cong x^2$

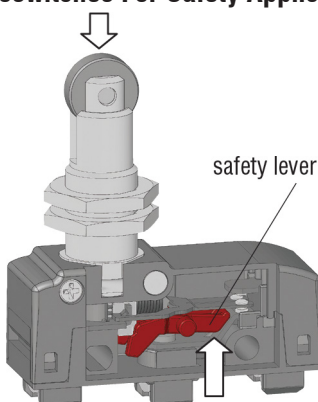


Extended Temperature Range

-40°C

On request the new MS series are also available with an extended temperature range. Where the IMO standard MS microswitches have a temperature range of -25°C $+85^{\circ}\text{C}$ to , these special versions can be used in places where the ambient temperature changes from -40°C to $+85^{\circ}\text{C}$ leading to possible installation inside cold stores, sterilizers or other equipment using very low ambient temperatures. Special materials have been used to realize these versions and these allow the specifications and features to remain unchanged under these conditions, thereby widening the installation possibilities. To have this option, add suffix H6 to the part number.

Microswitches For Safety Applications



All microswitches that have \odot beside the part number have a positive opening mechanism therefore suitable for safety applications.

These microswitches are provided with a rigid connection between the actuating plunger and the NC contacts, which means these are opened by force through a strong/sturdy internal safety lever.

The positive opening is in conformity with the IEC 60947-5-1 standard and as such these microswitches are suitable for installation in protection application.

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Protection Degree IP20

By installing microswitches type MSSTC11xxx with terminal cover AC-C01 it is possible to obtain a microswitch that is IP20.

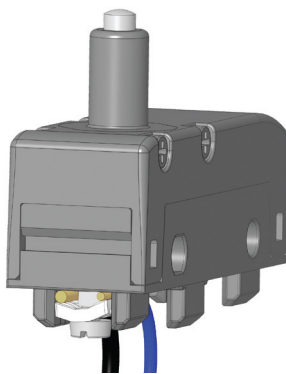
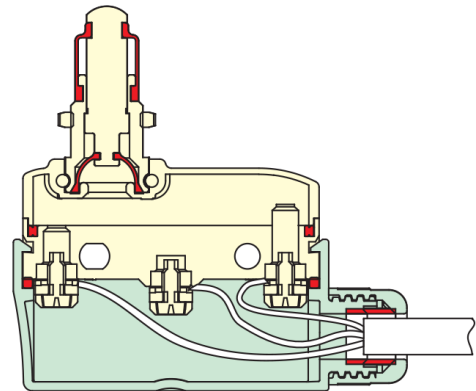
Protection Degree IP40

By installing microswitch types MSSTC11xxx with terminal cover AC-C02 it is possible to obtain a microswitch that is IP40.

Protection Degree IP65

By installing microswitch types MSSTC12xxx (not stocked) with terminal covers AC-MSCV22 or AC-MSCV23 it is possible to obtain a microswitch that is dustproof and waterproof and hence achieve IP65.

- Gaskets
- Microswitch: MKV12D12
- Terminal cover: VF MKCV22



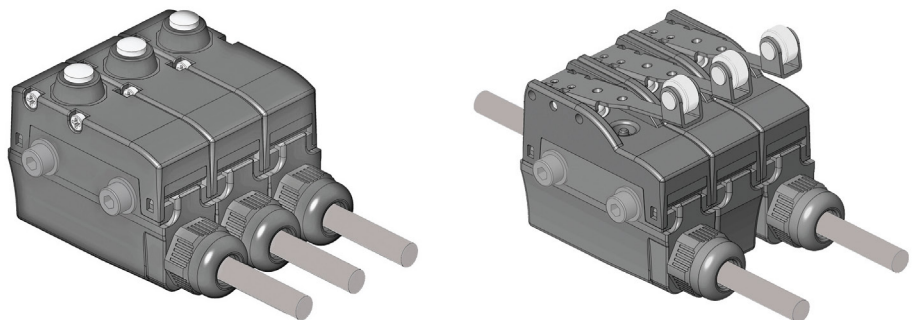
Clamping Screw Terminal For Different Size Cable

The clamping mechanism of the MS microswitches has been designed to allow for connection of different diameter cables. The clamping plate is designed in such a way to force the cable towards the screw hence achieving the most robust termination possible for all cable sizes within its specification.

Terminal Covers With Cable Gland Entry

Terminal covers can be supplied that incorporate a trap cable gland to achieve a protection level up to IP65.

These terminal covers are snap-in assembled and when used increase the size of the microswitch. The use of these covers can also be extended to installations where a number of microswitches are clamped together.



Rotating Actuators

The microswitches have been designed to allow the user to rotate the actuator head (roller plunger types only) by 90° steps and this is possible by removing the holding screws, rotating the head and then retting the screws back.



Microswitches MS Series



Technical Data

Housing:

Made of glass-reinforced polymer, self-extinguishing, shock-proof thermoplastic resin.
 Protection degree: IP20 (with protection AC-C01 - AC-C03)
 IP40 (with protection AC-MSCV • 1 • - AC-C02)
 IP65 (with protection AC-MSCV • 22 - AC-MSCV • 23)
 according to EN 60529

General Data:

Ambient temperature: from -25°C to +85°C (-40°C option)
 Max operating frequency: 3600 operations cycles 1/hour
 Mechanical endurance: 10 million operations cycles¹

(1) One operation cycle means two movements, one to close and one to open contacts, as foreseen by EN 60947-5-1 standard.

Main data

- Polymer housing
- High reliability contacts
- Protection degree IP20, IP40 or IP65
- 4 terminal types available
- 47 actuators available
- Versions with positive opening
- Silver contacts gold plated versions
- Terminal covers with wire trap cable gland
- Mechanically interchangeable with previous
- products (see cross reference section)

Cross Section Of The Conductors (flexible copper wire):

MS Series:	min.	1 x 0,34 mm ²	(1 x AWG 22)
	max.	2 x 1,5 mm ²	(2 x AWG 16)

In Conformity With Standards:

IEC 60947-5-1, EN 60947-5-1, IEC 60529, EN 60529.

Approvals:

UL508

In Conformity With Requirements Requested By:

Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and Electromagnetic Compatibility 2004/108/EC.

Positive Contact Opening In Conformity With Standards:

IEC 60947-5-1, EN 60947-5-1, EN 60947-5-1, VDE 0660-206.

Markings & Quality Marks



Installation for safety applications:

Use only switches marked with the symbol . The safety circuit must always be connected with the NC contacts (normally closed contacts) as stated in the standard EN 60947-5-1, encl. K, par. 2. The switch must be actuated by a travel length that is at least up to the positive opening travel (POT) value of which is listed near the code article. The switch must be actuated at least with the positive opening force (POT), value of which is listed near the code article.

Electrical Data:

Thermal current (I _{th}):	16 A
Rated insulation voltage (U _i):	250 Vac 300 Vdc
Conditional short circuit current:	1000 A according to EN 60947-5-1
Protection against short circuits:	fuse 10 A 500 V type gG
Pollution degree:	3
Dielectric strength:	2000 Vac/min.

Utilisation Categories:

Alternate current:	AC15 (50 ... 60 Hz)
U _e (V)	250 120
I _e (A)	6 6
Direct current:	DC13
U _e (V)	24 125 250
I _e (A)	5 0,6 0,3

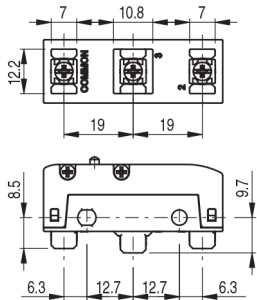
Data Type Approved By UL:

Utilisation categories: Q300 (69 VA, 125-250 Vdc)
 A300 (720 VA, 120-300 Vac)

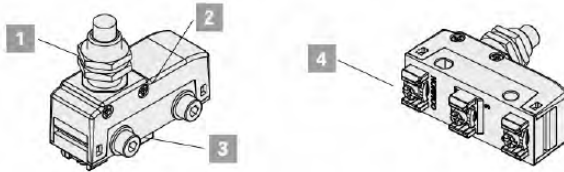
In conformity with standard: UL 508

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Terminal Outline Dimension



Fixing



Tighten the nut **1** with torque 2...3 Nm.

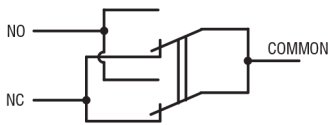
Tighten the screws **4** with torque 0.6...0.8 Nm.

Tighten the screws **2** with torque 0.4...0.5 Nm.

Tighten the nut **3** M4 with torque 0.8...1.2 Nm.

NOTE: a torque higher than 1.2 Nm may cause the microswitch to break.

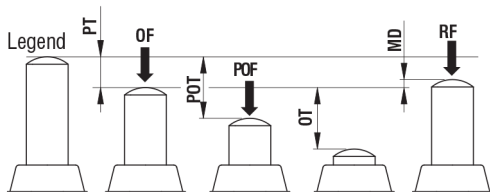
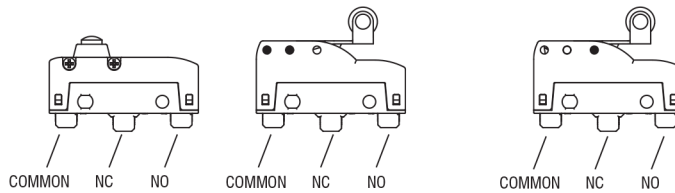
Wiring Dimension



Contacts with single interruption and double contacts

With direct and back direct action [B, D]

With inverted action [R]

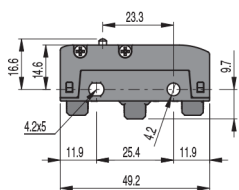


MD Differential Travel
PT Pre-Travel
OF Operating Force

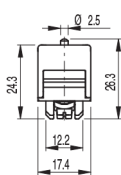
OT Over-Travel
POT Positive Opening Travel
MD Movement Differential

RF Releasing Force
POF Positive Opening Force

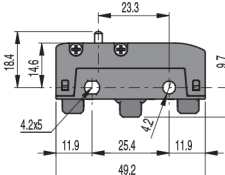
Microswitches With Direct Action 10pcs per pack



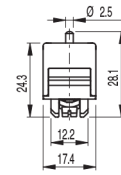
MSSTC11DA01 PT 0.5mm
1NO+1NC OT 1.5mm
MD 0.5mm



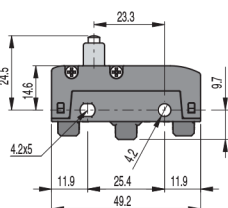
OF 4 N
RF 3 N



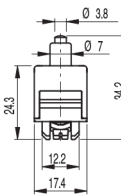
MSSTC11DA02 PT 0.5mm
1NO+1NC OT 2mm
MD 0.05mm



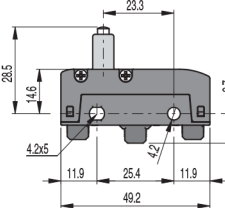
OF 4 N
RF 3 N



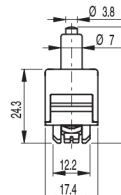
MSSTC11DA03 PT 0.5mm
1NO+1NC OT 2mm RF 3 N
MD 0.5mm



OF 4 N

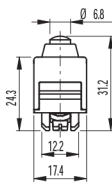
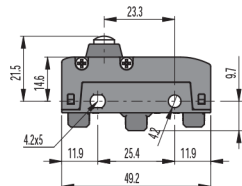


MSSTC11DA04 PT 0.5mm
1NO+1NC OT 2mm
MD 0.05mm



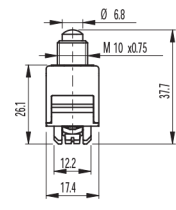
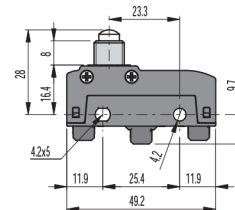
OF 4 N
RF 3 N

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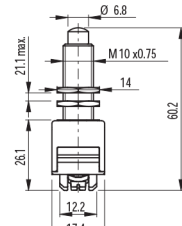
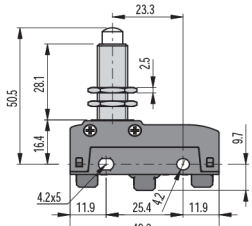
MSSTC11DA05 \rightarrow 1NO+1NC PT 0,5 mm
OT 2 mm
MD 0,05 mm
POT 2,2 mm

OF 4 N
RF 3 N
POF 20 N



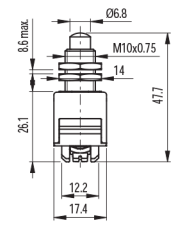
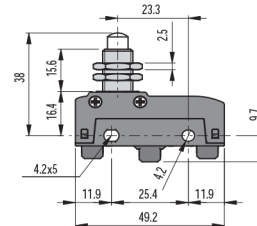
MSSTC11DA06 \rightarrow 1NO+1NC PT 0,5 mm
OT 3 mm
MD 0,05 mm
POT 2,2 mm

OF 4 N
RF 3 N
POF 20 N



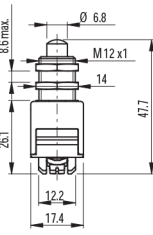
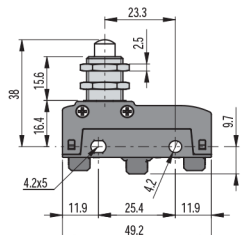
MSSTC11DA08 \rightarrow 1NO+1NC PT 0,5 mm
OT 5,5 mm
MD 0,05 mm
POT 2,2 mm

OF 4 N
RF 3 N
POF 20 N



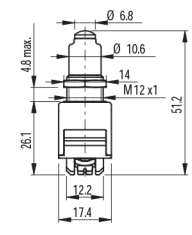
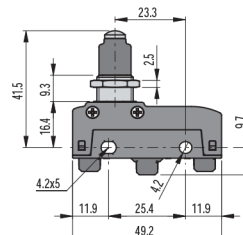
MSSTC11DA09 \rightarrow 1NO+1NC PT 0,5 mm
OT 5,5 mm
MD 0,05 mm
POT 2,2 mm

OF 4 N
RF 3 N
POF 20 N



MSSTC11DA10 \rightarrow 1NO+1NC PT 0,5 mm
OT 5,5 mm
MD 0,05 mm
POT 2,2 mm

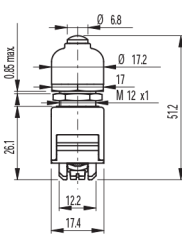
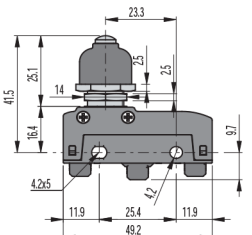
OF 4 N
RF 3 N
POF 20 N



MSSTC11DA12 \rightarrow 1NO+1NC PT 0,5 mm
OT 5,5 mm
MD 0,05 mm
POT 2,2 mm

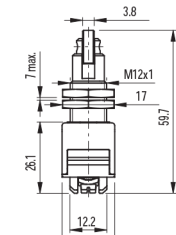
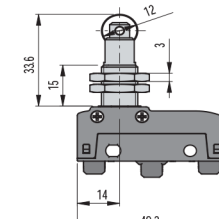
OF 4,5 N
RF 3 N
POF 20 N

Fixed only by threaded head



MSSTC11DA13 \rightarrow 1NO+1NC PT 0,6 mm
OT 5,4 mm
MD 0,05 mm
POT 2,2 mm

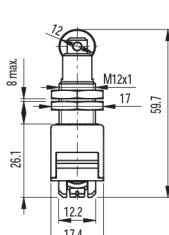
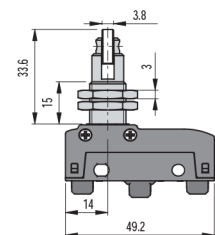
OF 6 N
RF 4 N
POF 20 N



MSSTC11DA15 \rightarrow 1NO+1NC PT 0,5 mm
OT 5,5 mm
MD 0,05 mm
POT 2,2 mm

OF 4 N
RF 3 N
POF 20 N

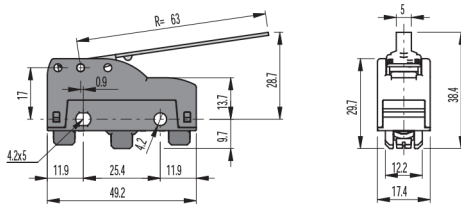
Fixed only by threaded head



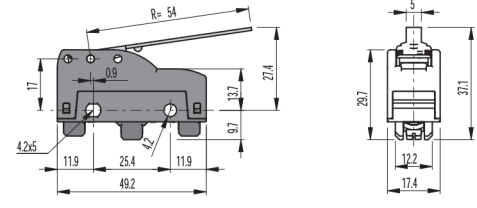
MSSTC11DA17 \rightarrow 1NO+1NC PT 0,5 mm
OC 5,5 mm
MD 0,05 mm
POT 2,2 mm

OF 4 N
RF 3 N
POF 20 N

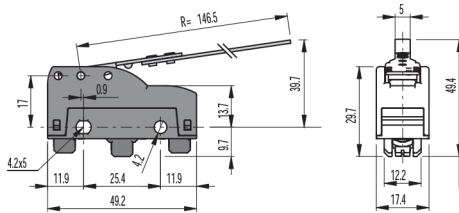
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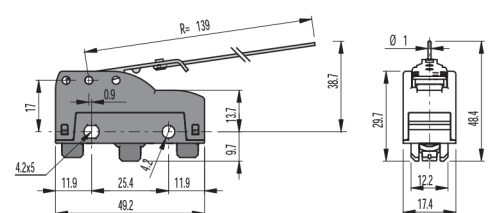
MSSTC11DA30 1NO+1NC PT 9 mm
OT 10 mm
MD 1,1 mm
OF 0,65 N
RF 0,5 N



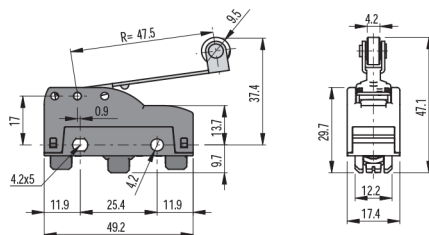
MSSTC11DA32 1NO+1NC PT 7,7 mm
OT 8,3 mm
MD 0,9 mm
OF 0,76 N
RF 0,58 N



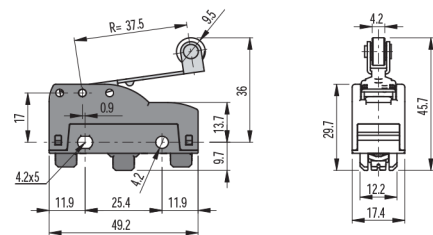
MSSTC11DA35 1NO+1NC PT 19 mm
OT 16,7 mm
MD 2,5 mm
OF 0,28 N
RF 0,22 N



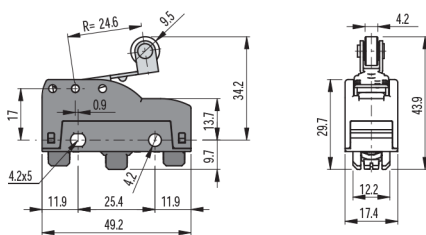
MSSTC11DA37 1NO+1NC PT 19 mm
OT 9,5 mm
MD 2,3 mm
OF 0,08 N
RF 0,04 N



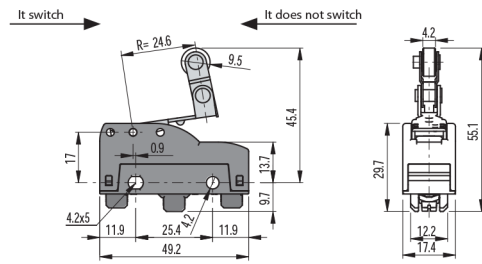
MSSTC11DA40 1NO+1NC PT 6,7 mm
OT 7,8 mm
MD 0,8 mm
OF 0,86 N
RF 0,66 N



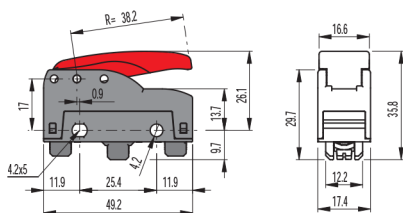
MSSTC11DA42 1NO+1NC PT 5,3 mm
OT 5,7 mm
MD 0,6 mm
OF 1,09 N
RF 0,84 N



MSSTC11DA45 1NO+1NC PT 3,5 mm
OT 4,5 mm
MD 0,4 mm
OF 1,66 N
RF 1,28 N



MSSTC11DA47 1NO+1NC PT 3,5 mm
OT 4 mm
MD 0,4 mm
OF 1,66 N
RF 1,28 N



MSSTC11DA49 1NO+1NC Hand operated

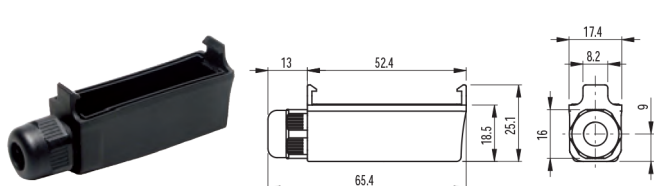
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Cross Reference

Old						New							
N		mm				N			mm				
P/N	OF	RF	PT	OT	MD	P/N	OF	RF	POF	PT	OT	MD	PO
MV17	3.57	2.04	0.5	5.5	0.05	MSSTC11DA17	4	3	20	No change	No change	No change	2.2
MV15	3.57	2.04	0.5	5.5	0.05	MSSTC11DA15	4	3	20	No change	No change	No change	2.2
MV40	0.61	0.41	8	5	1	MSSTC11DA40	0.86	0.66	N/A	6.7	7.8	0.8	N/A
MV10	3.57	2.04	0.5	5.5	0.05	MSSTC11DA10	4	3	20	No change	No change	No change	2.2
MV35	0.33	0.27	20	15	4	MSSTC11DA35	0.28	0.22	N/A	19	16.7	2.5	N/A
MV06	3.57	2.04	0.5	2	0.05	MSSTC11DA06	4	3	20	No change	3	No change	2.2
MV45	1.12	0.71	3.5	2.5	0.6	MSSTC11DA45	1.66	1.28	N/A	No change	4.5	0.4	N/A
MV05	3.57	2.04	0.5	1.5	0.05	MSSTC11DA05	4	3	20	No change	2	No change	2.2
MV42	0.82	0.51	6	3	0.8	MSSTC11DA42	1.09	0.84	N/A	5.3	5.7	0.6	N/A
MV01	3.57	2.04	0.5	0.2	0.05	MSSTC11DA01	4	3	N/A	No change	1.5	No change	N/A
MV12	5.61	4.08	1	5	0.05	MSSTC11DA12	4.5	3	20	0.5	5.5	No change	2.2
MV30	0.51	0.31	10	6	1.5	MSSTC11DA30	0.65	0.5	N/A	9	1.1	No change	N/A
MV09	3.57	2.04	0.5	5.5	0.05	MSSTC11D09A	4	3	20	No change	No change	No change	2.2
MV37	0.1	0.05	20	10	4	MSSTC11DA37	0.08	0.04	N/A	19	9.5	2.3	N/A

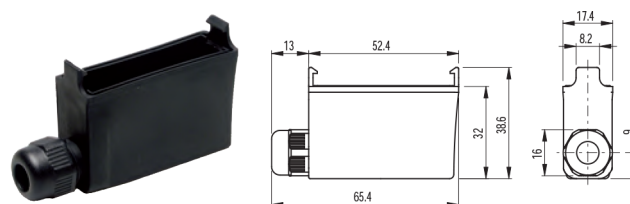
OF= Operating Force (maximum) OT= Over-travel POF= Positive Opening Force
 RF= Releasing Force (minimum) MD= Movement Differential N/A= Not Applicable
 PT= Pre-travel (maximum) PO= Positive Opening

Terminal Protection Covers 10 pcs per pack



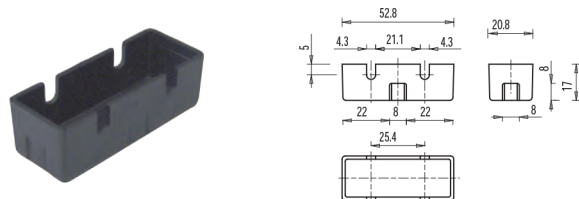
Terminal protection cover for screw terminals snap-in assembled and with wire trap cable gland. It allows the installation of more switches side by side.

Article	Description	Protection Degree
AC-MSCV12	Terminal protection cover without gasket for multipolar cables from Ø 4 to Ø 7,5 mm	IP40
AC-MSCV22	Terminal protection cover without gasket for multipolar cables from Ø 4 to Ø 7,5 mm	IP65
AC-MSCV23	Terminal protection cover without gasket for multipolar cables from Ø 4 to Ø 7,5 mm	IP65

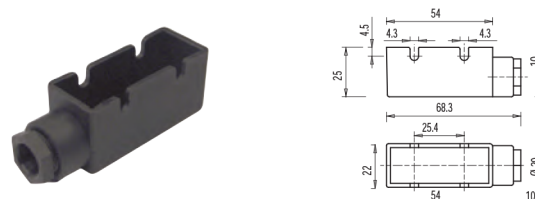


Terminal protection cover for vertical faston terminals snap-in assembled and with wire trap cable gland. It allows the installation of more switches side by side.

Article	Description	Protection Degree
AC-MSCH12	Terminal protection cover without gasket for multipolar cables from Ø 4 to Ø 7,5 mm	IP40



Article	Description	Protection Degree
AC-C01	Terminal protection cover for screw terminals	IP20



Article	Description	Protection Degree
AC-C02	Terminal protection cover for screw terminals with cable gland PG9 for multipolar cables from Ø 5 to Ø 7 mm	IP40

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