

Technical Data

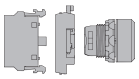
Standards and Approvals	
IEC / EN 60947-1	Low-Voltage Switchgear and Controlgear - Part 1: General rules
IEC / EN 60947-5-1	Low-Voltage Switchgear and Controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
IEC / EN 60947-5-5	Low-Voltage Switchgear and Controlgear - Part 5-5: Control circuit devices and switching elements - Electrical Emergency Stop device with mechanical latching function
IEC / EN 60073	Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators
IEC / EN 60529	Degrees of Protection provided by enclosures (IP Code)
EN 50013	Low-Voltage Switchgear and Controlgear for industrial use - Terminal marking and distinctive number for particular control switches
DIN 40050-9	Road vehicles; Degrees of Protection (IP-code); protection against foreign objects; water and contact; electrical equipment
UL 508	Industrial Control Equipment
CSA C22.2 No 14	Industrial Control Equipment

Environmental Data		
Degrees of Protection		
Operators	**IEC/EN DIN**	**UL/CSA**
Pushbutton: MP *	IP66	Type 1, 3R, 4, 4X, 12, 13
Double Pushbutton: MPD *	IP66	Type 1, 3R, 4, 4X, 12, 13
Mushroom Pushbutton: MPM *	IP66	Type 1, 3R, 4, 4X, 12, 13
Emergency Stop: MPMT/P *	IP66	Type 1, 3R, 4, 4X, 12, 13
Selector Switch: M2SS/M3SS *	IP66	Type 1, 3R, 4, 4X, 12, 13
Key-operated Selector Switch: M2SSK/M3SSK *	IP66	Type 1, 3R, 4, 4X, 12
Toggle Switch: MTS2/MTS3 *	IP66	Type 1, 3R, 4, 4X, 12, 13
Extreme Duty Pushbutton: KP6	-	Type 1, 3R, 4, 4X
Reset Pushbutton: KPR *	IP 66	Type 1, 3R, 4, 4X, 12, 13
Joystick: MJS	IP66, 67, 69K	Type 1, 4X (indoor), 12, 13
Pilot Lights: ML	IP66	Type 1, 3R, 4, 4X, 12, 13
Buzzer: KB	IP65	Type 4X
Potentiometer: KT *	IP66	Type 1, 3R, 4, 4X, 12, 13
Contact Block and Transformer Block	IP20	-
Plastic Enclosures	IP66	Type 1, 3R, 4, 4X, 12, 13
Metallic Enclosures	IP66, 67, 69K	-
Temperature		
Ambient temperature during operation		-25 to +70 °C
Storage temperature		-40 to +85 °C
*) With Chrome Plastic Bezel	IP66	Type 1, 12, 13

Please note that specified degree of protection is for operator mounted on panel. If other items are mounted in between, please make sure that they are correctly sealed.

Technical Data	
Cable connections	
Operator	**Cable terminal**
Potentiometer	0.5-2.5 mm^2 / 24 - 12 AWG
Terminals	
Plus-minus Pozidriv No.2 screw with DIN-washer.	
Connectable Area	min. 1 x 0.5 mm^2 /AWG 20 max. 2 x 2.5 mm^2/2 x AWG14
Tightening Torque	
Potentiometer	0.4 Nm (Cable terminals)
Operators Locking Nut	Min. 2 Nm / Max. 2.3 Nm
Cable Terminals	0.9 Nm

Material	
No ozone depleting substances in the products. All front of panel plastic components are made of polycarbonate	
PC Polycarbonate	High impact strength, good outdoor resistance. Chemical resistance (see table below)
PSU Polysulphone	Can withstand high temperatures, acids, basic solutions, alkaline compounds, oils, alcohols.
PA Polyamide	Can withstand high temperatures, aliphatic, aromatic and chlorinated hydrocarbons, esters, ketone-aldehydes, alcohols and basic solutions.
PBT	Can withstand high temperature, aliphatic and aromatic hydrocarbons, acids, basic solutions, alcohols, grease and oils
Zinc	Good corrosion resistance in inland-, sea and industrial atmosphere.
Light-alloy	Good corrosion resistance in inland-, sea and industrial atmosphere.
Chemical Resistance for Polycarbonate	
Chemical Class	**Effects**
Acids	No significant effect under most typical conditions of concentration and temperature
Alcohols and Alkalis	Generally compatible at low concentration and room temperature. Higher concentrations and elevated temperatures can result in etching and attack evidenced by decomposition.
Aliphatic Hydrocarbons	Generally compatible
Amines	Surface crystallization and chemical attack. Avoid.
Aromatic Hydrocarbons	Partial solvents and severe stress cracking agents (i.e., xylene, toulene). Avoid.
Detergents and Cleaners	Mild soap solutions are generally compatible. Strong alkaline materials should be avoided.
Esters	Cause severe crystallization. Partial solvents. Avoid.
Greases and Oils	Pure petroleum types generally compatible. Many additives used with them are not.
Halogenated Hydrocarbons	Solvents. Avoid.
Ketones	Cause severe crystallization and stress cracking. Partial solvents. Avoid.
Silicone Oil and Greases	Generally compatible up to 85 °C.



Electrical Data

Standard Contact Blocks

Self cleaning silver contacts, NC contact with positive opening. At voltages and currents below 24 V and 5.6 mA we recommend our Micro Switch Blocks.

Ratings as per IEC 60947-5-1

Rated Insulation Voltage, U_i		690 V		
Rated Thermal Current, I_{th}		10 A		
Rated Operational Current, I_e Utilization category AC 15,	at: 120 V at: 230 V at: 400 V at: 690 V	8 A 6 A 4 A 2 A		
Rated Operational Current, I_e utilisation category DC 13,	at: 24 V at:125 V at: 250 V	5 A 1.1 A 0.55 A		

Ratings as per UL, CSA, NEMA		A600 AC		Q600 DC
Rated Insulation Voltage		600 V		600 V
Rated Thermal Current		10 A		2.5 A
Rated Operational Current	at: 120 V at: 240 V at: 480 V at: 600 V	6 A 3 A 1.5 A 1.2 A	at: 125 V at: 250 V at: 480 V at: 600 V	0.55 A 0.27 A 0.10 A 0.10 A

Contact Resistance	< 25 mΩ
Compulsory Function Test	at: 5V, 16 mA

Max. number of Contact Blocks per Operator

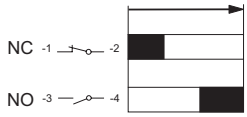
The Contact Blocks can be stacked in max two levels on the 3- block holder. Only one level is accepted on the 5-block holder.

Pushbutton, Toggle Switch, Mushroom Pushbutton, Double Pushbutton, Selector Switch, Key-operated Selector Switch and Emergency Stop Operator	6
Joystick	8

Short Circuit Protection

Max. fuse at 1 kA	gG 16A

Diagram for Make-and-Break Contact



■ = Closed contact

Micro Switch Block / Ratings as per IEC 60947-5-1

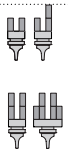
Rated Insulation Voltage, U_i		125 V
Rated Thermal Current, I_{th}		3 A
Rated Operational Current, I_e utilisation category AC 14,	at: 125 V	0.5 A
Rated Operational Current, I_e utilization category DC 13,	at: 24 V	0.3 A
Rated Operational Current, I_e utilization category DC 12,	at: 24 V	0.1 A

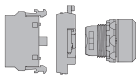
Minimum Switching Capacity

Standard Contact Blocks	24 V DC	5.6 mA
Gold plated Contact Blocks	5 V DC	12 mA
	12 V DC	1 mA
Micro Switch Blocks	3 V DC	1 mA
Ratings as per UL 508	125 V AC	3 A
	60 V DC	0.2 A
	48 V DC	0.1 A

Mechanical Data

Mechanical Life

Standard Contact Blocks		10 million operations
Pushbuttons, Momentary Mush-room Pushbutton		2 million operations
Selector Switches		500 000 operations
Present standard (no operation of center contact)		
With operation of center contact		250 000 operations
		150 000 operations
Maintained Mushroom Pushbutton, Key-operated Selector Switch and Double Pushbutton		500 000 operations
Emergency Stop		100 000 operations
Toggle Switch		1 million operations
Joystick		500 000 operations
		400 000 operations
		300 000 operations



Lamp Block ratings as per IEC 60 947-5-1	
Rated Insulation Voltage	230 V
Base	BA 9s
Permissible power, up to	2 W

Transformer Block	
Suitable for Filament Bulb 6 or 24 V AC, 1.2 W and LED 24 V.	
Rated Power	1.5 W
Rated Insulation Voltage acc. to IEC 70 °C (DT)	Class E

LED Bulbs	
Service Life for LED Bulbs means number of service hours until the brightness has been reduced down 50 %. Service Life 50 000 h	
Color of white LED	x=0.31 Y=0.32 means the position of color in the ICI Chromaticity Diagram
Voltage Tolerance on LED Bulbs	-30 to +10 % voltage is acceptable without affecting the Service Life
Voltage Peaks on LED Bulbs	Voltage Peaks up to 1000 V Current Peaks up to 500 mA during a few msec
Glowing Light	All integrated LED Bulbs have a function built in to cut leakage currents.