

## 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          | Catalog number 1, 3R, 4, 4X, 12, 13   |
| Double pushbutton: MPD *                    | IP66          | Catalog number 1, 3R, 4, 4X, 12, 13   |
| Mushroom pushbutton: MPM *                  | IP66          | Catalog number 1, 3R, 4, 4X, 12, 13   |
| Emergency Stop: MPMT/P *                    | IP66          | Catalog number 1, 3R, 4, 4X, 12, 13   |
| Selector Switch: M2SS/M3SS *                | IP66          | Catalog number 1, 3R, 4, 4X, 12, 13   |
| Key-operated Selector Switch: M2SSK/M3SSK * | IP66          | Catalog number 1, 3R, 4, 4X, 12       |
| Toggle Switch: MTS2/MTS3 *                  | IP66          | Catalog number 1, 3R, 4, 4X, 12, 13   |
| Extreme Duty pushbutton: KP6                | -             | Catalog number 1, 3R, 4, 4X           |
| Reset pushbutton: KPR *                     | IP 66         | Catalog number 1, 3R, 4, 4X, 12, 13   |
| Joystick: MJS                               | IP66, 67, 69K | Catalog number 1, 4X (indoor), 12, 13 |
| Pilot lights: ML                            | IP66          | Catalog number 1, 3R, 4, 4X, 12, 13   |
| Buzzer: KB                                  | IP65          | Catalog number 4X                     |
| Potentiometer: KT *                         | IP66          | Catalog number 1, 3R, 4, 4X, 12, 13   |
| Contact block and Transformer block         | IP20          | -                                     |
| Plastic Enclosures                          | IP66          | Catalog number 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 Catalog number 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

#### Terminals

Plus-minus Pozidriv No.2 screw with DIN-washer.

|                       |   |
|-----------------------|---|
| Connectable Area      | min. 1 x 0.5 mm <sup>2</sup> /AWG 20<br>max. 2 x 2.5 mm <sup>2</sup> /2 x AWG14 |
| Tightening Torque     |   |
| 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, toluene). 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 Catalog numbers 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.  |



### Approvals

The pushbuttons, selector switches and pilot lights are approved by:  
- National approval agencies: UL, CSA and China Compulsory Product Certification

For detail information please contact ABB

## Technical data

### 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, $I_e$<br>Utilization category AC 15, | at: 120 V<br>at: 230 V<br>at: 400 V<br>at: 690 V | 8 A<br>6 A<br>4 A<br>2 A |  |
| Rated Operational Current, $I_e$<br>utilisation category DC 13, | at: 24 V<br>at: 125 V<br>at: 250 V               | 5 A<br>1.1 A<br>0.55 A   |  |

#### Ratings as per UL, CSA, NEMA

|                           |  |                              |  |                                      |
|---------------------------|--|------------------------------|--|--------------------------------------|
|                           |  | A600<br>AC                   |  | Q600<br>DC                           |
| Rated Insulation Voltage  |  | 600 V                        |  | 600 V                                |
| Rated Thermal Current     |  | 10 A                         |  | 2.5 A                                |
| Rated Operational Current | at: 120 V<br>at: 240 V<br>at: 480 V<br>at: 600 V | 6 A<br>3 A<br>1.5 A<br>1.2 A | at: 125 V<br>at: 250 V<br>at: 480 V<br>at: 600 V | 0.55 A<br>0.27 A<br>0.10 A<br>0.10 A |

**Contact resistance** < 25 mΩ

**Compulsory function test** at: 5V, 16 mA

#### Max. number of contact blocks per operator

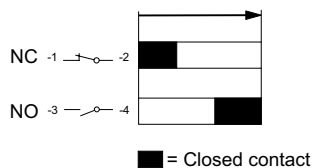
The Contact blocks can be stacked in max two levels on the 3- block holder. Only one level is accepted on the 5-block holder.

|  |   |
|--|---|
| pushbutton, Toggle Switch, Mushroom pushbutton,<br>Double pushbutton, Selector Switch, Key-operated<br>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



#### 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, $I_e$<br>utilisation category AC 14, | at: 125 V | 0.5 A |
| Rated Operational Current, $I_e$<br>utilization category DC 13, | at: 24 V  | 0.3 A |
| Rated Operational Current, $I_e$<br>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 Mushroom pushbutton   |  | 2 million operations  |
| Selector Switches<br>Present standard<br>(no operation of center contact)          |  | 500 000 operations    |
| 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    |

## Technical data

### 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. |

## Catalog number and list price explanation

Assembled pilot device catalog numbers are created by selecting the appropriate characters from the grid. Begin at the top of the grid and work down, adding the desired characters to the catalog number to create a specific product. The list price is found by adding the prices of all the individually selected options.

### Pushbuttons, non-illuminated

| Options                           | Catalog number characters |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----------------------------------|---------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Momentary flush                   |                           |   | M | P | 1 | - |   |   |   |   |   |   |   |   |   |
| Maintained flush                  |                           |   | M | P | 2 | - |   |   |   |   |   |   |   |   |   |
| Momentary extended                |                           |   | M | P | 3 | - |   |   |   |   |   |   |   |   |   |
| Maintained extended               |                           |   | M | P | 4 | - |   |   |   |   |   |   |   |   |   |
| Bezel, black plastic, with holder |                           |   |   |   |   |   | 4 | 0 |   |   |   |   |   |   |   |
| Bezel, chrome metal, with holder  |                           |   |   |   |   |   | 6 | 0 |   |   |   |   |   |   |   |
| Button color - Red                |                           |   |   |   |   |   |   |   | R |   |   |   |   |   |   |
| Button color - Green              |                           |   |   |   |   |   |   |   | G |   |   |   |   |   |   |
| Button color - Yellow             |                           |   |   |   |   |   |   |   | Y |   |   |   |   |   |   |
| Button color - Blue               |                           |   |   |   |   |   |   |   | L |   |   |   |   |   |   |
| Button color - White              |                           |   |   |   |   |   |   |   | W |   |   |   |   |   |   |
| Button color - Black              |                           |   |   |   |   |   |   |   | B |   |   |   |   |   |   |
| Button color - Clear              |                           |   |   |   |   |   |   |   | C |   |   |   |   |   |   |
| Contact blocks, 1 NO              |                           |   |   |   |   |   |   |   |   | 1 | 0 |   |   |   |   |
| Contact blocks, 2 NO              |                           |   |   |   |   |   |   |   |   | 2 | 0 |   |   |   |   |
| Contact blocks, 3 NO              |                           |   |   |   |   |   |   |   |   | 3 | 0 |   |   |   |   |
| Contact blocks, 1 NC              |                           |   |   |   |   |   |   |   |   | 0 | 1 |   |   |   |   |
| Contact blocks, 2 NC              |                           |   |   |   |   |   |   |   |   | 0 | 2 |   |   |   |   |
| Contact blocks, 3 NC              |                           |   |   |   |   |   |   |   |   | 0 | 3 |   |   |   |   |
| Contact blocks, 1 NO + 1 NC       |                           |   |   |   |   |   |   |   |   | 1 | 1 |   |   |   |   |
| Contact blocks, 2 NO + 1 NC       |                           |   |   |   |   |   |   |   |   | 2 | 1 |   |   |   |   |
| Contact blocks, 1 NO + 2 NC       |                           |   |   |   |   |   |   |   |   | 1 | 2 |   |   |   |   |
| Contact blocks, 1 NO, Gold        |                           |   |   |   |   |   |   |   |   | 1 | 0 | G |   |   |   |
| Contact blocks, 2 NO, Gold        |                           |   |   |   |   |   |   |   |   | 2 | 0 | G |   |   |   |
| Contact blocks, 3 NO, Gold        |                           |   |   |   |   |   |   |   |   | 3 | 0 | G |   |   |   |
| Contact blocks, 1 NC, Gold        |                           |   |   |   |   |   |   |   |   | 0 | 1 | G |   |   |   |
| Contact blocks, 2 NC, Gold        |                           |   |   |   |   |   |   |   |   | 0 | 2 | G |   |   |   |
| Contact blocks, 3 NC, Gold        |                           |   |   |   |   |   |   |   |   | 0 | 3 | G |   |   |   |
| Contact blocks, 1 NO + 1 NC, Gold |                           |   |   |   |   |   |   |   |   | 1 | 1 | G |   |   |   |
| Contact blocks, 2 NO + 1 NC, Gold |                           |   |   |   |   |   |   |   |   | 2 | 1 | G |   |   |   |
| Contact blocks, 1 NO + 2 NC, Gold |                           |   |   |   |   |   |   |   |   | 1 | 2 | G |   |   |   |
| Text Caps with Clear Lens Only    |                           |   |   |   |   |   |   |   | C |   |   |   | C | X | X |
| 5 Block Holder                    |                           |   |   |   |   |   |   |   |   |   |   |   |   |   | 5 |
| 30mm Black Plastic Adaptor Ring   | G                         | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 30mm Chrome Metal Adaptor Ring    | G                         | 2 |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                                   |                           |   | M | P | 1 | - | 4 | 0 | R | 1 | 0 |   |   |   |   |

#### EXAMPLE:

What is the catalog number and price for a 22mm momentary flush pushbutton with a black bezel, red button & 1 NO contact block? Follow the arrows to see how the catalog number is determined.