

# Separate units ø 22: Heads

IP 65  
With locking ring  
Conform to IEC 60947-5-1



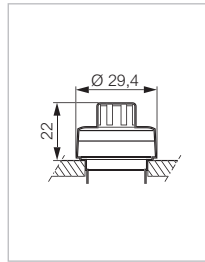
Characteristics (p. 94)  
Cross reference list (p. 311)

## ► BUTTON FOR POTENTIOMETER - NON ILLUMINATED

Cat. No.



L21RP03



Head + mounting base for potentiometer  
Plastic chrome bezel

Shaft ø 6 or 6.35 mm  
Potentiometer length 46 to 51 mm

**L21RP03**

## ► JOYSTICKS - NON ILLUMINATED

Cat. No.



LM2F

Heads supplied with a 3 position clip  
Specific electrical blocks (p. 63)

**Head does not lock in position 0**

**2 directions - 3 positions**

2 maintained (stay-put) A - 0 - B  
2 spring-return A → 0 ← B

**LM2F**  
**LM2A**

**4 directions - 5 positions**

4 maintained (stay-put) A  
C - 0 - D  
B

**LM4F**

4 spring-return A  
C → 0 ← D  
B

**LM4A**

**Head locks in position 0**

**2 directions - 3 positions**

2 maintained (stay-put) A - 0 - B  
2 spring-return A → 0 ← B

**LMV2F**  
**LMV2A**

**4 directions - 5 positions**

4 maintained (stay-put) A  
C - 0 - D  
B

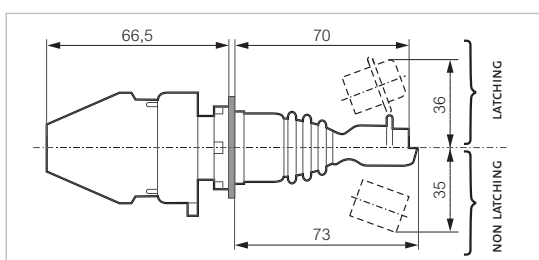
**LMV4F**

4 spring-return A  
C → 0 ← D  
B

**LMV4A**



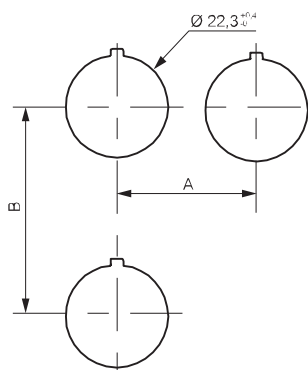
LMV4F



Catalogue No. in bold: normally in stock at distribution outlets

# Panel cut-out

## DRILLING

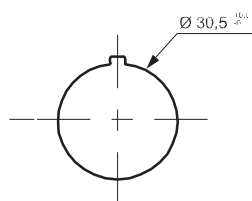


For heads equipped with electrical blocks with screw or plug-in terminals

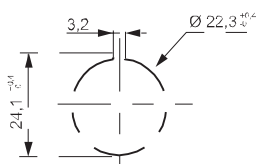
### Minimum interval (mm)

|          |      |                                           |
|----------|------|-------------------------------------------|
|          | = 30 | With or without legend (usual case)       |
|          | = 33 | IP 67 (silicon shroud)                    |
|          | = 40 | With large legend plate                   |
| <b>A</b> | > 40 | For mushroom head Ø 40                    |
|          | > 45 | For selector switch with long handle      |
|          | = 38 | For super-flush button                    |
|          | = 50 | With 5 position clip                      |
|          | = 45 | With or without legend plate (usual case) |
| <b>B</b> | = 54 | With double touch                         |
|          | = 77 | With double touch + legend plate          |
|          | = 50 | Joystick                                  |

## DRILLING FOR SUPER-FLUSH BUTTON

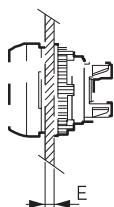


## DRILLING WHEN USING THE ANTI-ROTATION RING (OPTIONAL)



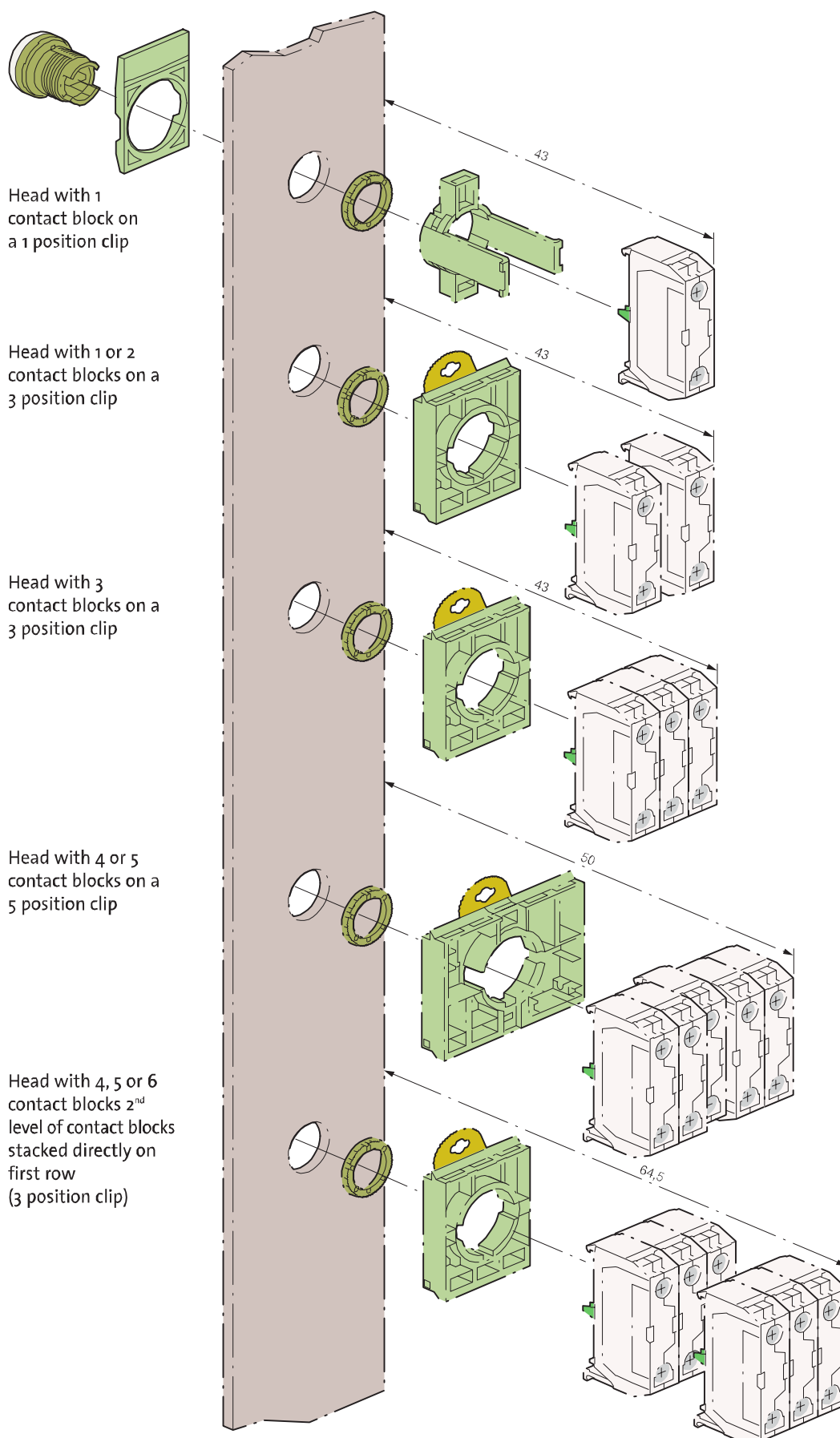
## THICKNESS OF PANEL (E)

E = 1 to 6 mm



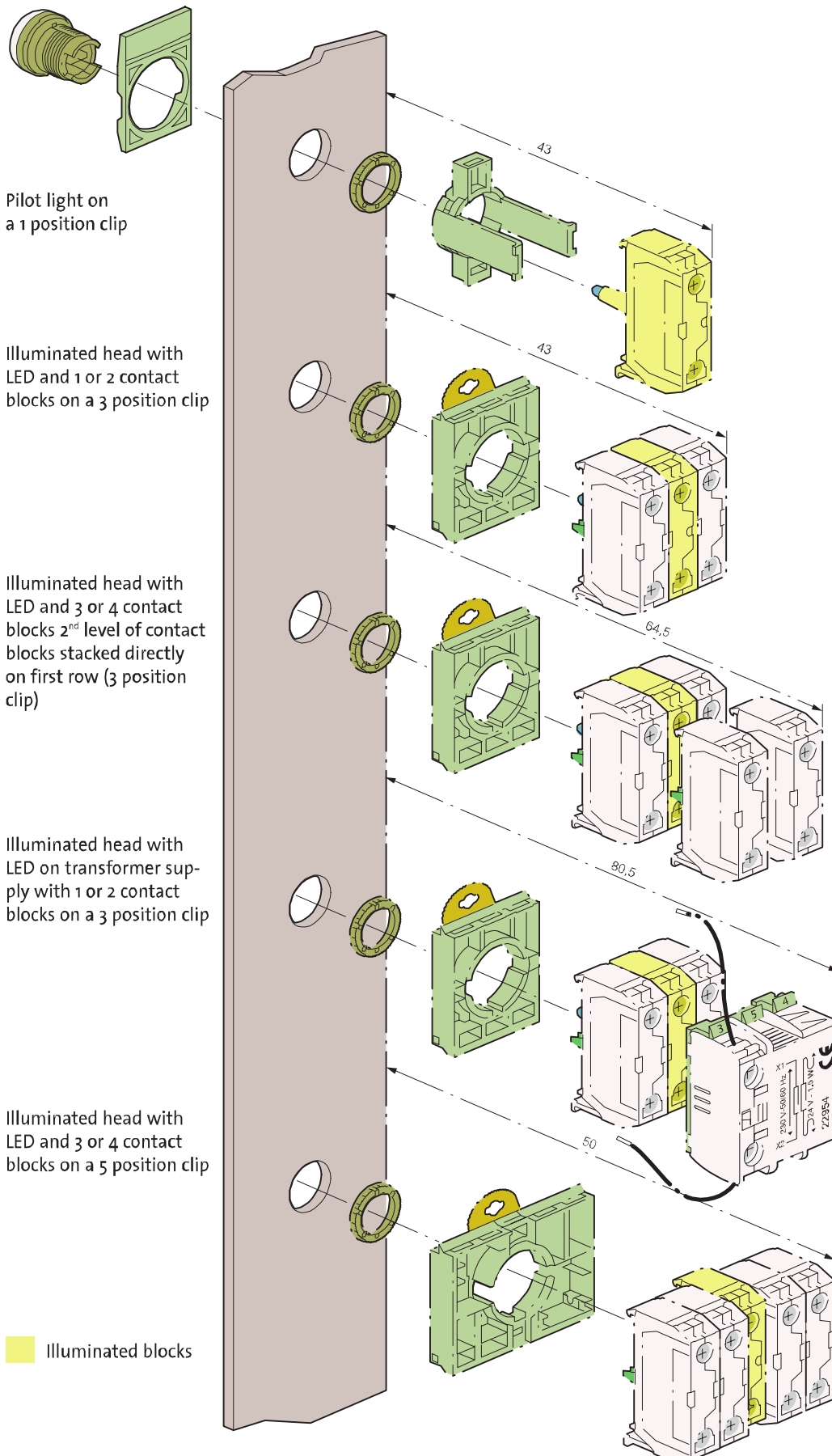
# Mounting blocks $\varnothing 22$

NON ILLUMINATED



# Mounting blocks ø 22

## ILLUMINATED



# Technical characteristics

## ► GENERAL

| Characteristics                         | Data                                                                                                                                                                                                                                                     | Standards                                                                           |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| ► Storage temperature                   | - 40 °C to + 70 °C                                                                                                                                                                                                                                       |                                                                                     |
| ► Operating temperature                 | - 25 °C to + 70 °C                                                                                                                                                                                                                                       |                                                                                     |
| ► Climatic resistance                   | Constant humid heat<br>Cyclic damp heat<br>Resistance to sea air                                                                                                                                                                                         | IEC 60068-2-3<br>IEC 60068-2-30<br>IEC 60068-2-52                                   |
| ► Degree of protection                  | IP 66 for standard heads<br>IP 67 for shrouded heads<br>IP 66 for equipped control stations<br>IP 20 at the rear of the panel for contact blocks<br>and one piece pilot lights<br>Type 1, 2, 3, 3R, 3S, 4, 4X, 12, and 13 for heads and control stations | IEC 60529<br><br><br><br><br>NEMA standard                                          |
| ► Protection against mechanical impacts | IK 05 illuminated and non illuminated heads<br>IK 07 empty control station                                                                                                                                                                               | IEC 62262                                                                           |
| ► Electrical insulation                 | Class II - heads and control station                                                                                                                                                                                                                     | IEC 60947-5-1                                                                       |
| ► Terminal marking                      |                                                                                                                                                                                                                                                          | IEC 60947-1                                                                         |
| ► Tightening torques                    | Locking ring: recommended 3 N.m<br>terminals: max. 1.2 N.m                                                                                                                                                                                               |                                                                                     |
| ► Approvals                             | UL United states and Canada<br>BV Bureau Véritas<br>Certification OC/CB                                                                                                                                                                                  | UL 508, CSA 22.2<br>Marine rules<br>IEC 60947-5-1<br>IEC 60947-5-5<br>IEC 60947-5-4 |
| ► Vibrations                            | withstand vibration<br>Fc test: 2 to 25 Hz, 1.6 mm; 25-100 Hz, 4 g                                                                                                                                                                                       | IEC 60068-2-6                                                                       |

# Technical characteristics

## ► CONTACT BLOCKS

| Screw and plug-in connection characteristics          | Data                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                            | Standards                |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| ► Rated insulation voltage                            | 690 V AC<br>600 V AC                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                            | IEC/EN 60947-1<br>UL 508 |
| ► NC contacts                                         | Positive opening                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                            | IEC/EN 60947-5-1         |
| ► Rated impulse voltage $U_{imp}$<br>Pollution degree | 6 kV<br>3                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                            |                          |
| ► Conventional thermal current in free air conditions | AC15: 10 A<br>DC13: 2,5 A                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                            | IEC 60947-5-1            |
| ► Electrical ratings                                  | <b>Alternating current</b><br>AC15 - A 600<br>$U_e = 120\text{ V}$ , $I_e = 6\text{ A}$<br>$U_e = 240\text{ V}$ , $I_e = 3\text{ A}$<br>$U_e = 380\text{ V}$ , $I_e = 1,9\text{ A}$<br>$U_e = 480\text{ V}$ , $I_e = 1,5\text{ A}$<br>$U_e = 500\text{ V}$ , $I_e = 1,4\text{ A}$<br>$U_e = 600\text{ V}$ , $I_e = 1,2\text{ A}$<br><br><b>Minimum operating current</b><br>- standard blocks<br>$U_e = 24\text{ V DC}$ and $I_e = 5\text{ mA}$<br>Failure rate $< 10^{-8}$ | <b>Direct current</b><br>DC13 - Q 600<br>$U_e = 125\text{ V}$ , $I_e = 0,55\text{ A}$<br>$U_e = 250\text{ V}$ , $I_e = 0,27\text{ A}$<br>$U_e = 400\text{ V}$ , $I_e = 0,15\text{ A}$<br>$U_e = 500\text{ V}$ , $I_e = 0,13\text{ A}$<br>$U_e = 600\text{ V}$ , $I_e = 0,1\text{ A}$<br><br>- golden contacts<br>$U_e = 5\text{ V DC}$ and $I_e = 1\text{ mA}$<br>Failure rate $< 10^{-8}$ | IEC 60947-5-1            |
| ► Electrical operating life                           | <b>1 million cycles for:</b><br>- AC15 - B 300<br>$U_e = 120\text{ V}$ , $I_e = 3\text{ A}$<br>$U_e = 240\text{ V}$ , $I_e = 1,5\text{ A}$                                                                                                                                                                                                                                                                                                                                  | - DC13 - R 300<br>$U_e = 125\text{ V}$ , $I_e = 0,22\text{ A}$<br>$U_e = 250\text{ V}$ , $I_e = 0,1\text{ A}$                                                                                                                                                                                                                                                                              |                          |
| ► Applicable wire sizes                               | Rigid or flexible wire without ferrule: $0,5\text{ mm}^2$ to $2 \times 2,5\text{ mm}^2$<br>Rigid or flexible wire with ferrule: $0,5\text{ mm}^2$ to $2 \times 1,5\text{ mm}^2$                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                            |                          |

| Faston connection                                                  | Data                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                            | Standards               |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| ► Rated insulation voltage                                         | 320 V AC<br>300 V AC                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                            | IEC/EN60947-1<br>UL 508 |
| ► NC contacts                                                      | Positive opening                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                            | IEC/EN 60947-5-1        |
| ► Rated impulse withstanding voltage $U_{imp}$<br>Pollution degree | 6 kV<br>3                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                            |                         |
| ► Conventional thermal current in free air conditions              | AC 15: 10 A<br>DC 13: 2,5 A                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                            | IEC 60947-5-1           |
| ► Electrical ratings                                               | <b>Alternating current</b><br>AC15 - A 300<br>$U_e = 120\text{ V}$ , $I_e = 6\text{ A}$<br>$U_e = 240\text{ V}$ , $I_e = 3\text{ A}$<br><br><b>Minimum current of use</b><br>$U_e = 24\text{ V DC}$ and $I_e = 5\text{ mA}$<br>Failure rate $< 10^{-8}$ | <b>Direct current</b><br>DC13 - Q 300<br>$U_e = 125\text{ V}$ , $I_e = 0,55\text{ A}$<br>$U_e = 250\text{ V}$ , $I_e = 0,27\text{ A}$<br><br>- DC13 - R 300<br>$U_e = 125\text{ V}$ , $I_e = 0,22\text{ A}$<br>$U_e = 250\text{ V}$ , $I_e = 0,1\text{ A}$ | IEC 60947-5-1           |
| ► Electrical operating life                                        | <b>1 million cycles for:</b><br>- AC15 - B 300<br>$U_e = 120\text{ V}$ , $I_e = 3\text{ A}$<br>$U_e = 240\text{ V}$ , $I_e = 1,5\text{ A}$                                                                                                              | - DC13 - R 300<br>$U_e = 125\text{ V}$ , $I_e = 0,22\text{ A}$<br>$U_e = 250\text{ V}$ , $I_e = 0,1\text{ A}$                                                                                                                                              |                         |
| ► Faston size                                                      | 6,35 mm or $2 \times 2,8\text{ mm}$                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                            |                         |

# Technical characteristics

## ▶ CONTACT BLOCKS

| Pin-style connection (for PCB)                                | Data                                                                                                                |                                                                                            | Standards                      |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------|
| ▶ Rated insulation voltage                                    | 250 V AC<br>250 V AC                                                                                                |                                                                                            | IEC/EN60947-1<br>UL 508        |
| ▶ NC contacts                                                 | Positive opening                                                                                                    |                                                                                            | IEC/EN 60947-5-1               |
| ▶ Rated impulse withstanding voltage Uimp<br>Pollution degree | 4 kV<br>3                                                                                                           |                                                                                            |                                |
| ▶ Conventional thermal current in free air conditions         | AC 15: 5 A<br>DC 13: 1 A                                                                                            |                                                                                            | IEC 60947-5-1                  |
| ▶ Electrical ratings                                          | <b>Alternating current</b><br>AC 15 - B 300<br>Ue = 120 V, Ie = 3 A<br>Ue = 240 V, Ie = 1,5 A                       | <b>Direct current</b><br>DC13 - R 300<br>Ue = 125 V, Ie = 0,22 A<br>Ue = 250 V, Ie = 0,1 A | IEC 60947-5-1<br>IEC 60947-5-4 |
|                                                               | <b>Minimum current of use</b><br>- standard blocks<br>Ue = 24 V DC and Ie = 5 mA<br>Failure rate < 10 <sup>-8</sup> | - golden contacts<br>Ue = 5 V DC and Ie = 1 mA<br>Failure rate < 10 <sup>-8</sup>          |                                |
| ▶ Electrical operating life                                   | <b>1 million cycles for:</b><br>- AC15 - B 300<br>Ue = 120 V, Ie = 3 A<br>Ue = 240 V, Ie = 1,5 A                    | - DC13 - R 300<br>Ue = 125 V, Ie = 0,22 A<br>Ue = 250 V, Ie = 0,1 A                        |                                |
| ▶ Pin diameter                                                | Ø 1 mm                                                                                                              |                                                                                            |                                |

## ▶ LED BLOCKS FOR ILLUMINATED HEADS AND ONE PIECE LED PILOT LIGHTS

| Characteristics                                  | Data                                                                                                  | Standards        |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------|
| ▶ Rated insulation voltage                       | 300 V                                                                                                 | IEC/EN 60947-5-1 |
| ▶ Rated impulse voltage Uimp<br>Pollution degree | 4 kV (with filter block see p. 64)<br>3                                                               | IEC/EN 60947-5-1 |
| ▶ Operating voltage                              | 12 to 24 V AC/DC<br>48 V AC/DC (for LED block)<br>130 V AC<br>230 V AC                                |                  |
| ▶ Frequency                                      | 50 or 60 Hz                                                                                           |                  |
| ▶ Lifetime at rated supply voltage               | Red and yellow: 100 000 hours at 25 °C<br>Other colours: 50 000 hours at 25 °C                        |                  |
| ▶ Consumption of LED blocks                      | Voltage:<br>- 24 V: 25 mA ± 20%<br>- 48 V: 15 mA ± 5%<br>- 130 V: 20 mA ± 10%<br>- 230 V: 16 mA ± 30% |                  |

# Technical characteristics

## ► ONE PIECE PILOT LIGHT BA9S

| Characteristics                        | Data                                               | Standards               |
|----------------------------------------|----------------------------------------------------|-------------------------|
| ► Rated insulation voltage             | 400 V                                              | IEC 60947-5-1           |
| ► Rated impulse withstand voltage Uimp | 4 kV                                               | IEC/EN 60947-1          |
| ► Bulb rating                          | 400 V max. - 2,6 W max.<br>240 V max. - 2,6 W max. | IEC 60947-5-1<br>UL 508 |

## ► HEADS

| Characteristics                            | Data                                                                                                                                                                                                                                                                                             | Standards |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| ► Mechanical endurance (in million cycles) | Spring return: 5<br>Push-push: 0,5<br>Selector switches: 0,3<br>Mushroom head maintained function EN 418: 0,10<br>Mushroom head maintained function: 0,15                                                                                                                                        |           |
| ► Activation force in N                    | Spring return + NO: 6,5<br>Spring return + NC: 4,5<br>Additional NO contact: 4,5<br>Additional NC contact: 3,0<br>Push-pull mushroom head + NO + NC: 27<br>Push-turn mushroom head + NO + NC: 22<br>Push-pull mushroom head EN 418 + NO + NC: 37<br>Push-turn mushroom head EN 418 + NO + NC: 60 |           |
| ► Activation force in Nm                   | Selector switch + NO: 0,04<br>Additional NO contact: 0,03                                                                                                                                                                                                                                        |           |

## ► EMERGENCY STOP ACTUATORS - EN 418:

For equipment subject to Machine Security Directive CE 98/37 and EN60204 standard.

BACO emergency stop switches EN418 and contact blocks meet the requirements of the European Machine Directive EN 418 and EN60947-5-5 specification.

Our E-stops provide the "fool-proof" or "tease-proof" emergency stop switch feature - described below, that latches in the emergency stop command and then switches the contact state to open the circuit and shut down the equipment.

"After the emergency stop command has been generated during actuation of the emergency stop device, the command shall be maintained by engagement (latching-in) of the actuating means. The emergency stop command shall be maintained until the emergency stop device is reset (disengaged). It shall not be possible for the emergency stop device to engage without generating the stop command."

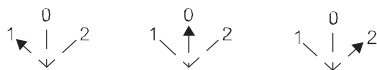
Simply stated, this directive indicates that the latching mechanism of the switch is activated when the actuator is pushed to a certain point. The switch will continue to remain in this latched position until manually reset by twisting to release.

# Diagrams

## MECHANICAL OPERATION

For 3 position selector switches

Handle position  
(front side view)



Contacts block actuation  
(back view)



Back side view

Non operated block



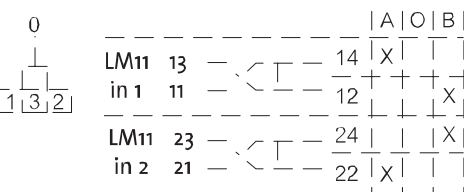
Operated block



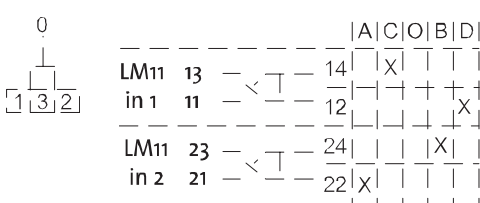
## MECHANICAL OPERATION

For Joysticks

2 positions

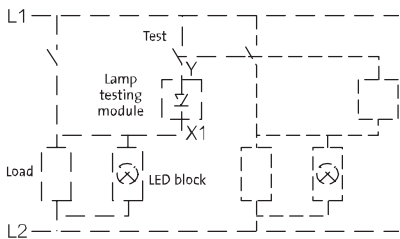


4 positions

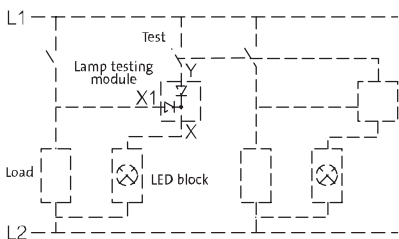


## PUSH-TO-TEST LED PILOT LIGHT DIAGRAMS

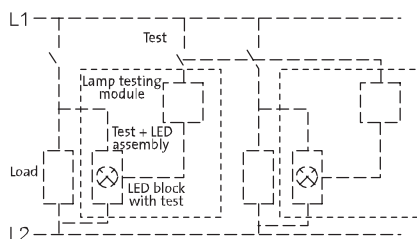
Lamp-testing module with  
1 diode (33ET) for direct  
supply 24 V and 48 V



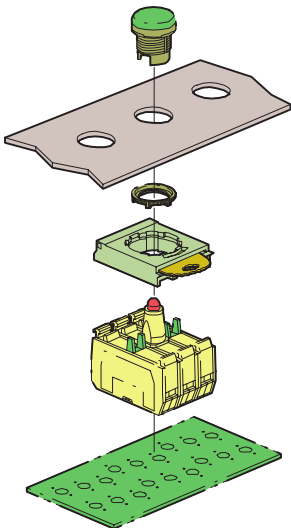
Lamp-testing module with  
2 diodes (33ETT) for direct  
supply 24 V and 48 V



Lamp-testing assembly  
for direct supply 130 V and 240 V  
(Consult us - see page 79)



## PRINTED CIRCUIT BOARD MOUNTING



# Frontelemente ø 22

IP 65  
Mit Befestigungsmutter  
Nach Norm EN-IEC 60947-5-1



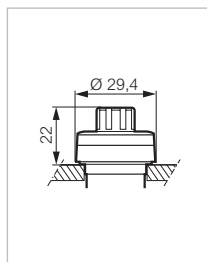
Technische Daten (Seite 94)  
Vergleichstabelle (Seite 311)

## POTENTIOMETER ANTRIEB MIT TRÄGER - NICHT BELEUCHTBAR

Bestell-Nr.



L21RP03



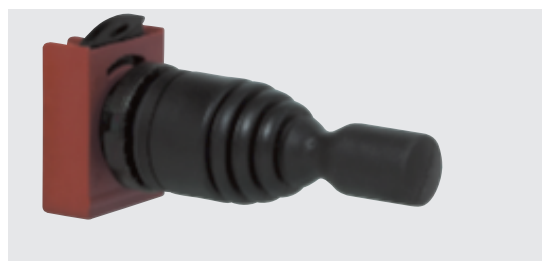
Potentiometer nicht im Lieferumfang enthalten  
Frontring Kunststoff verchromt

Achse ø 6 bis 6,35 mm  
Achse Länge 46 bis 51 mm

L21RP03

## JOYSTICKS - NICHT BELEUCHTBAR

Bestell-Nr.



LM2F

Joystick geliefert mit 3 Fachadapter  
Spezielle Kontaktelemente erforderlich (siehe Seite 63)

Ohne Verriegelung in Stellung 0

2 Richtungen - 3 Stellungen

2 Rastend A - 0 - B  
2 Tastend A → 0 ← B

LM2F  
LM2A

4 Richtungen - 5 Stellungen

4 Rastend A  
C - 0 - D  
B

LM4F

4 Tastend A  
C → 0 ← D  
B

LM4A

Mit Verriegelung in Stellung 0

2 Richtungen - 3 Stellungen

2 Rastend A - 0 - B  
2 Tastend A → 0 ← B

LMV2F  
LMV2A

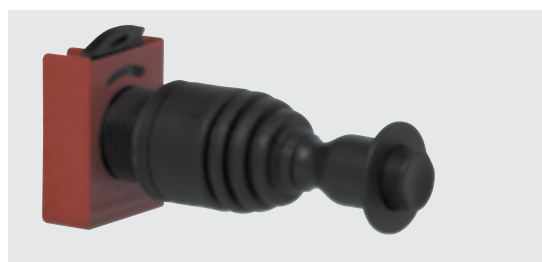
4 Richtungen - 5 Stellungen

4 Rastend A  
C - 0 - D  
B

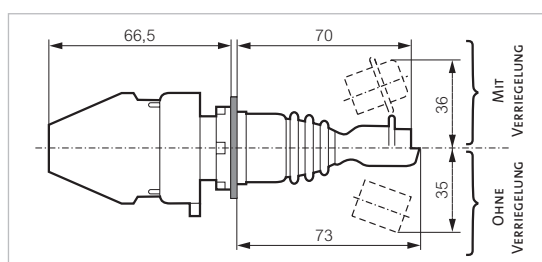
LMV4F

4 Tastend A  
C → 0 ← D  
B

LMV4A



LMV4F



Bestellnummern in Fettdruck: ab Lager erhältliche Produkte

# Separate units ø 22: Heads

IP 66  
To be combined with a clip and electrical blocks (p. 48)  
Equipped with a locking ring  
Plastic black bezel  
Conform to IEC 60947-5-1



Characteristics (p. 94)  
Cross reference list (p. 311)

## ► EN 418/ISO 13850 EMERGENCY STOP - NON ILLUMINATED (CONTINUED)

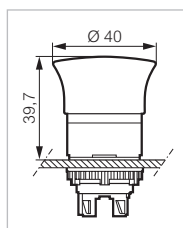
Ø 40 EN 418/ISO 13850 - STAY-PUT

Push-pull to reset

Cat. No.



L22DR01



Head position visible from the side with yellow collar  
Compliant with the requirements of emergency stop:  
IEC 60947-5-5 / EN 418/ISO 13850

● Red

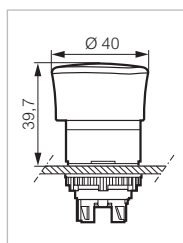
**L22DR01**

Ø 40 EN 418/ISO 13850 - STAY-PUT

Push-turn to reset



L22ER01



Head position visible from the side with yellow collar  
Compliant with the requirements of emergency stop:  
IEC 60947-5-5 / EN 418/ISO 13850

● Red

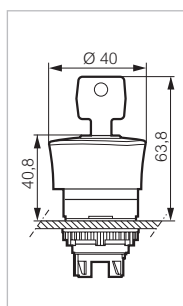
**L22ER01**

Ø 40 EN 418/ISO 13850 - STAY-PUT

Key to reset



L22GR01



Supplied with 2 keys profile n° 455  
Head position visible from the side with yellow collar  
Compliant with the requirements of emergency stop:  
IEC 60947-5-5 / EN 418/ISO 13850

● Red

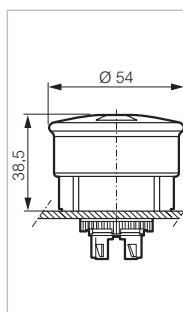
**L22GR01**

Ø 54 EN 418/ISO 13850 - STAY-PUT

Push-pull to reset with flag indicator



L22DU01



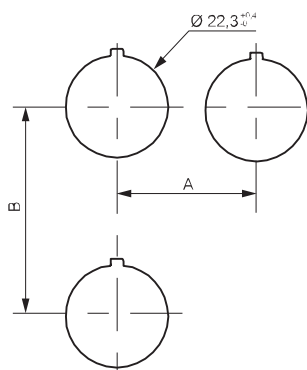
Double position indicator: head and collar  
Compliant with the requirements of emergency stop:  
IEC 60947-5-5 / EN 418/ISO 13850

● Red - engraving O - I  
● Red - engraving STOP - I

**L22DU01A**  
**L22DU01**

# Panel cut-out

## DRILLING

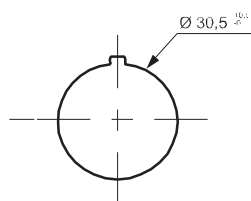


For heads equipped with electrical blocks with screw or plug-in terminals

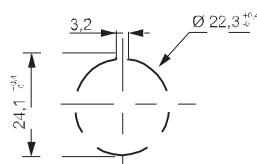
### Minimum interval (mm)

|   |      |                                           |
|---|------|-------------------------------------------|
|   | = 30 | With or without legend (usual case)       |
|   | = 33 | IP 67 (silicon shroud)                    |
|   | = 40 | With large legend plate                   |
| A | > 40 | For mushroom head Ø 40                    |
|   | > 45 | For selector switch with long handle      |
|   | = 38 | For super-flush button                    |
|   | = 50 | With 5 position clip                      |
|   | = 45 | With or without legend plate (usual case) |
| B | = 54 | With double touch                         |
|   | = 77 | With double touch + legend plate          |
|   | = 50 | Joystick                                  |

## DRILLING FOR SUPER-FLUSH BUTTON

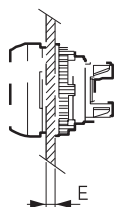


## DRILLING WHEN USING THE ANTI-ROTATION RING (OPTIONAL)



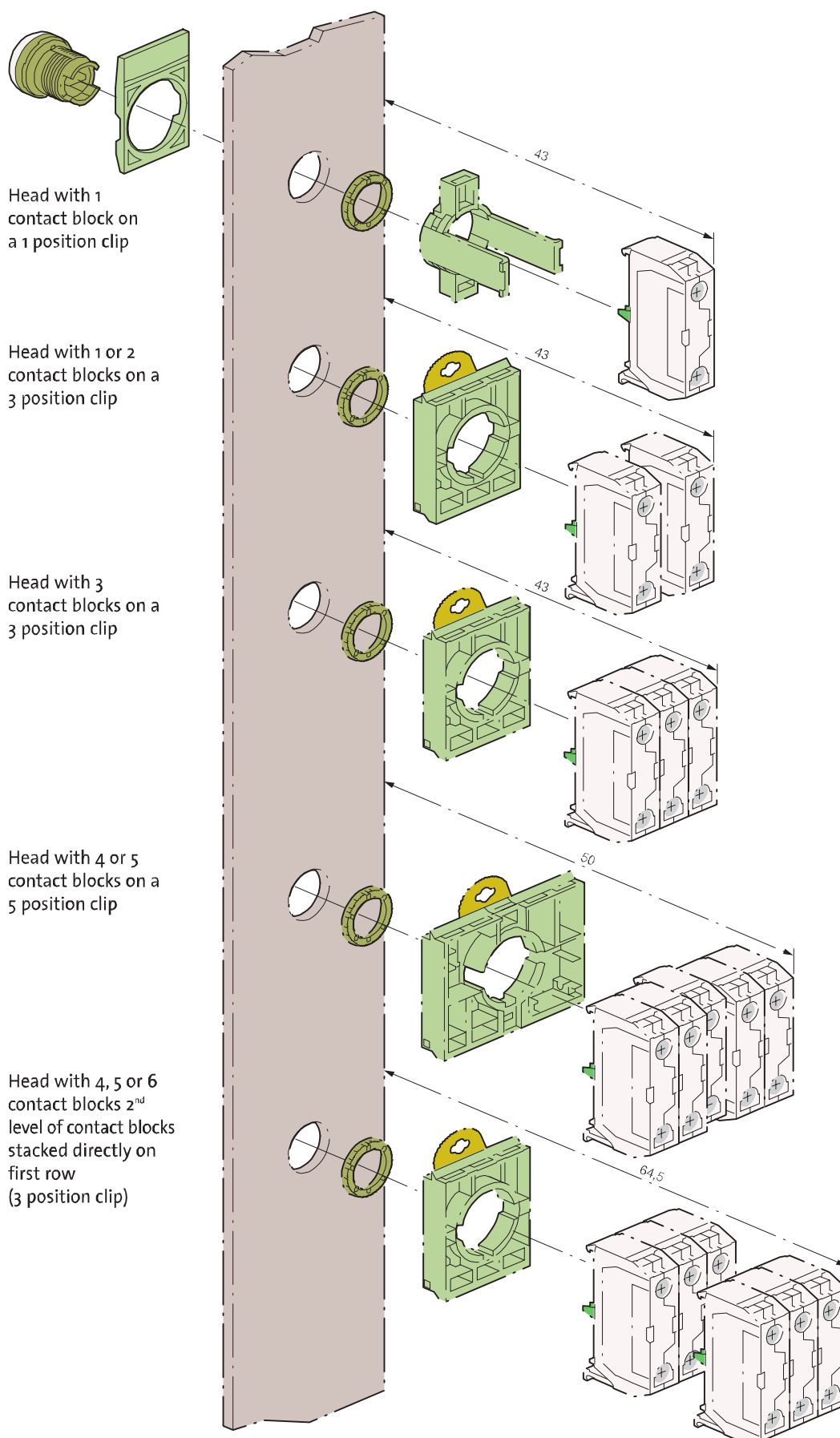
## THICKNESS OF PANEL (E)

E = 1 to 6 mm



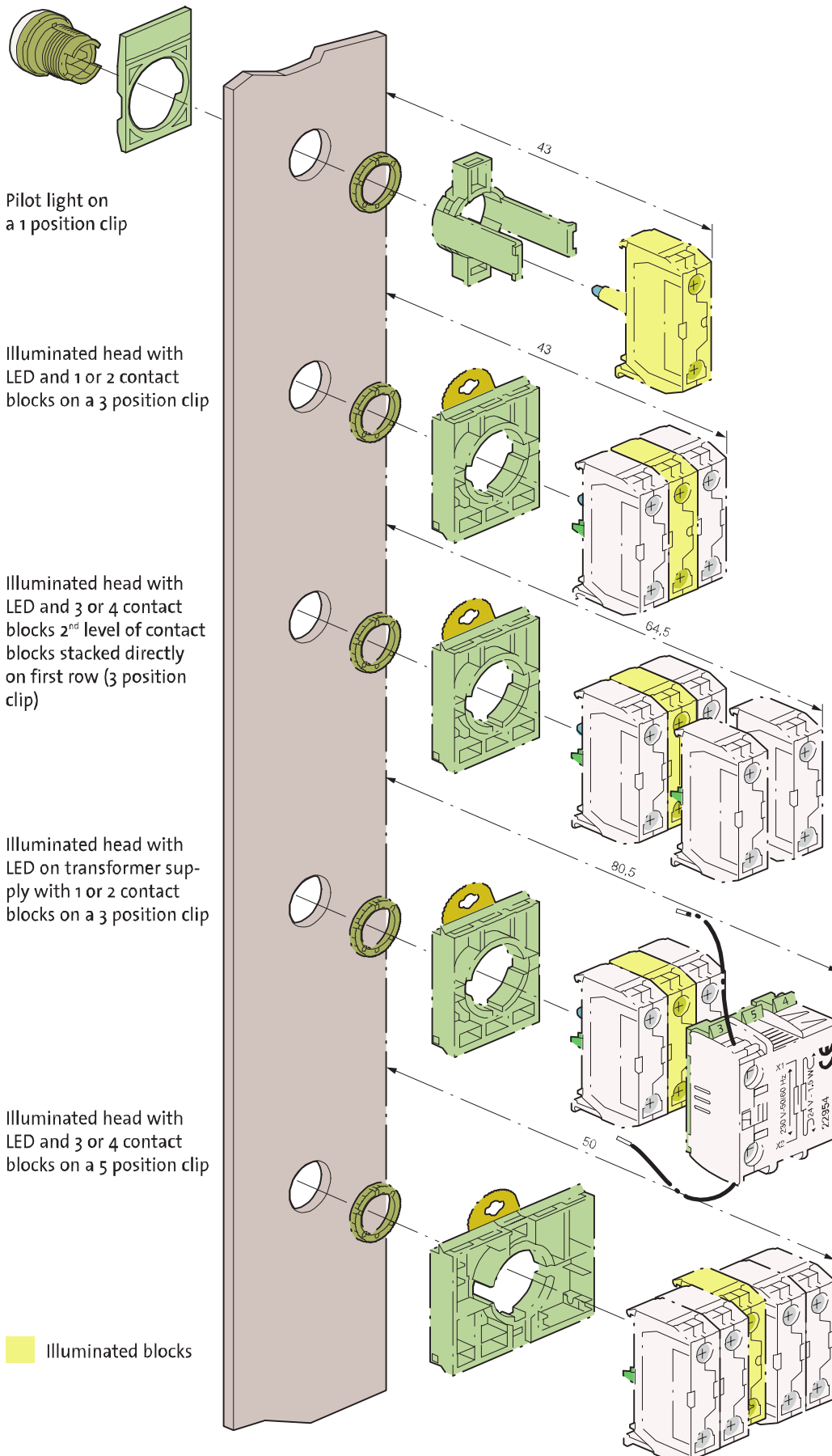
# Mounting blocks $\varnothing 22$

NON ILLUMINATED



# Mounting blocks $\varnothing 22$

## ILLUMINATED



# Technical characteristics

## ► GENERAL

| Characteristics                         | Data                                                                                                                                                                                                                                                     | Standards                                                                           |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| ► Storage temperature                   | - 40 °C to + 70 °C                                                                                                                                                                                                                                       |                                                                                     |
| ► Operating temperature                 | - 25 °C to + 70 °C                                                                                                                                                                                                                                       |                                                                                     |
| ► Climatic resistance                   | Constant humid heat<br>Cyclic damp heat<br>Resistance to sea air                                                                                                                                                                                         | IEC 60068-2-3<br>IEC 60068-2-30<br>IEC 60068-2-52                                   |
| ► Degree of protection                  | IP 66 for standard heads<br>IP 67 for shrouded heads<br>IP 66 for equipped control stations<br>IP 20 at the rear of the panel for contact blocks<br>and one piece pilot lights<br>Type 1, 2, 3, 3R, 3S, 4, 4X, 12, and 13 for heads and control stations | IEC 60529<br><br><br><br><br>NEMA standard                                          |
| ► Protection against mechanical impacts | IK 05 illuminated and non illuminated heads<br>IK 07 empty control station                                                                                                                                                                               | IEC 62262                                                                           |
| ► Electrical insulation                 | Class II - heads and control station                                                                                                                                                                                                                     | IEC 60947-5-1                                                                       |
| ► Terminal marking                      |                                                                                                                                                                                                                                                          | IEC 60947-1                                                                         |
| ► Tightening torques                    | Locking ring: recommended 3 N.m<br>terminals: max. 1.2 N.m                                                                                                                                                                                               |                                                                                     |
| ► Approvals                             | UL United states and Canada<br>BV Bureau Véritas<br>Certification OC/CB                                                                                                                                                                                  | UL 508, CSA 22.2<br>Marine rules<br>IEC 60947-5-1<br>IEC 60947-5-5<br>IEC 60947-5-4 |
| ► Vibrations                            | withstand vibration<br>Fc test: 2 to 25 Hz, 1.6 mm; 25-100 Hz, 4 g                                                                                                                                                                                       | IEC 60068-2-6                                                                       |

# Technical characteristics

## ► CONTACT BLOCKS

| Screw and plug-in connection characteristics                 | Data                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                      | Standards                |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| ► Rated insulation voltage                                   | 690 V AC<br>600 V AC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                      | IEC/EN 60947-1<br>UL 508 |
| ► NC contacts                                                | Positive opening                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                      | IEC/EN 60947-5-1         |
| ► Rated impulse voltage U <sub>imp</sub><br>Pollution degree | 6 kV<br>3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                      |                          |
| ► Conventional thermal current in free air conditions        | AC15: 10 A<br>DC13: 2,5 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                      | IEC 60947-5-1            |
| ► Electrical ratings                                         | <b>Alternating current</b><br>AC15 - A 600<br>U <sub>e</sub> = 120 V, I <sub>e</sub> = 6 A<br>U <sub>e</sub> = 240 V, I <sub>e</sub> = 3 A<br>U <sub>e</sub> = 380 V, I <sub>e</sub> = 1,9 A<br>U <sub>e</sub> = 480 V, I <sub>e</sub> = 1,5 A<br>U <sub>e</sub> = 500 V, I <sub>e</sub> = 1,4 A<br>U <sub>e</sub> = 600 V, I <sub>e</sub> = 1,2 A<br><br><b>Minimum operating current</b><br>- standard blocks<br>U <sub>e</sub> = 24 V DC and I <sub>e</sub> = 5 mA<br>Failure rate < 10 <sup>-8</sup> | <b>Direct current</b><br>DC13 - Q 600<br>U <sub>e</sub> = 125 V, I <sub>e</sub> = 0,55 A<br>U <sub>e</sub> = 250 V, I <sub>e</sub> = 0,27 A<br>U <sub>e</sub> = 400 V, I <sub>e</sub> = 0,15 A<br>U <sub>e</sub> = 500 V, I <sub>e</sub> = 0,13 A<br>U <sub>e</sub> = 600 V, I <sub>e</sub> = 0,1 A<br><br>- golden contacts<br>U <sub>e</sub> = 5 V DC and I <sub>e</sub> = 1 mA<br>Failure rate < 10 <sup>-8</sup> | IEC 60947-5-1            |
| ► Electrical operating life                                  | <b>1 million cycles for:</b><br>- AC15 - B 300<br>U <sub>e</sub> = 120 V, I <sub>e</sub> = 3 A<br>U <sub>e</sub> = 240 V, I <sub>e</sub> = 1,5 A                                                                                                                                                                                                                                                                                                                                                         | - DC13 - R 300<br>U <sub>e</sub> = 125 V, I <sub>e</sub> = 0,22 A<br>U <sub>e</sub> = 250 V, I <sub>e</sub> = 0,1 A                                                                                                                                                                                                                                                                                                  |                          |
| ► Applicable wire sizes                                      | Rigid or flexible wire without ferrule: 0,5 mm <sup>2</sup> to 2 x 2,5 mm <sup>2</sup><br>Rigid or flexible wire with ferrule: 0,5 mm <sup>2</sup> to 2 x 1,5 mm <sup>2</sup>                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                      |                          |

| Faston connection                                                         | Data                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                        | Standards               |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| ► Rated insulation voltage                                                | 320 V AC<br>300 V AC                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                        | IEC/EN60947-1<br>UL 508 |
| ► NC contacts                                                             | Positive opening                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                        | IEC/EN 60947-5-1        |
| ► Rated impulse withstanding voltage U <sub>imp</sub><br>Pollution degree | 6 kV<br>3                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                        |                         |
| ► Conventional thermal current in free air conditions                     | AC 15: 10 A<br>DC 13: 2,5 A                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                        | IEC 60947-5-1           |
| ► Electrical ratings                                                      | <b>Alternating current</b><br>AC15 - A 300<br>U <sub>e</sub> = 120 V, I <sub>e</sub> = 6 A<br>U <sub>e</sub> = 240 V, I <sub>e</sub> = 3 A<br><br><b>Minimum current of use</b><br>U <sub>e</sub> = 24 V DC and I <sub>e</sub> = 5 mA<br>Failure rate < 10 <sup>-8</sup> | <b>Direct current</b><br>DC13 - Q 300<br>U <sub>e</sub> = 125 V, I <sub>e</sub> = 0,55 A<br>U <sub>e</sub> = 250 V, I <sub>e</sub> = 0,27 A<br><br>- DC13 - R 300<br>U <sub>e</sub> = 125 V, I <sub>e</sub> = 0,22 A<br>U <sub>e</sub> = 250 V, I <sub>e</sub> = 0,1 A | IEC 60947-5-1           |
| ► Electrical operating life                                               | <b>1 million cycles for:</b><br>- AC15 - B 300<br>U <sub>e</sub> = 120 V, I <sub>e</sub> = 3 A<br>U <sub>e</sub> = 240 V, I <sub>e</sub> = 1,5 A                                                                                                                         | - DC13 - R 300<br>U <sub>e</sub> = 125 V, I <sub>e</sub> = 0,22 A<br>U <sub>e</sub> = 250 V, I <sub>e</sub> = 0,1 A                                                                                                                                                    |                         |
| ► Faston size                                                             | 6,35 mm or 2 x 2,8 mm                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                        |                         |

# Technical characteristics

## ▶ CONTACT BLOCKS

| Pin-style connection (for PCB)                                | Data                                                                                                                |                                                                                            | Standards                      |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------|
| ▶ Rated insulation voltage                                    | 250 V AC<br>250 V AC                                                                                                |                                                                                            | IEC/EN60947-1<br>UL 508        |
| ▶ NC contacts                                                 | Positive opening                                                                                                    |                                                                                            | IEC/EN 60947-5-1               |
| ▶ Rated impulse withstanding voltage Uimp<br>Pollution degree | 4 kV<br>3                                                                                                           |                                                                                            |                                |
| ▶ Conventional thermal current in free air conditions         | AC 15: 5 A<br>DC 13: 1 A                                                                                            |                                                                                            | IEC 60947-5-1                  |
| ▶ Electrical ratings                                          | <b>Alternating current</b><br>AC 15 - B 300<br>Ue = 120 V, Ie = 3 A<br>Ue = 240 V, Ie = 1,5 A                       | <b>Direct current</b><br>DC13 - R 300<br>Ue = 125 V, Ie = 0,22 A<br>Ue = 250 V, Ie = 0,1 A | IEC 60947-5-1<br>IEC 60947-5-4 |
|                                                               | <b>Minimum current of use</b><br>- standard blocks<br>Ue = 24 V DC and Ie = 5 mA<br>Failure rate < 10 <sup>-8</sup> | - golden contacts<br>Ue = 5 V DC and Ie = 1 mA<br>Failure rate < 10 <sup>-8</sup>          |                                |
| ▶ Electrical operating life                                   | <b>1 million cycles for:</b><br>- AC15 - B 300<br>Ue = 120 V, Ie = 3 A<br>Ue = 240 V, Ie = 1,5 A                    | - DC13 - R 300<br>Ue = 125 V, Ie = 0,22 A<br>Ue = 250 V, Ie = 0,1 A                        |                                |
| ▶ Pin diameter                                                | Ø 1 mm                                                                                                              |                                                                                            |                                |

## ▶ LED BLOCKS FOR ILLUMINATED HEADS AND ONE PIECE LED PILOT LIGHTS

| Characteristics                                  | Data                                                                                                  | Standards        |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------|
| ▶ Rated insulation voltage                       | 300 V                                                                                                 | IEC/EN 60947-5-1 |
| ▶ Rated impulse voltage Uimp<br>Pollution degree | 4 kV (with filter block see p. 64)<br>3                                                               | IEC/EN 60947-5-1 |
| ▶ Operating voltage                              | 12 to 24 V AC/DC<br>48 V AC/DC (for LED block)<br>130 V AC<br>230 V AC                                |                  |
| ▶ Frequency                                      | 50 or 60 Hz                                                                                           |                  |
| ▶ Lifetime at rated supply voltage               | Red and yellow: 100 000 hours at 25 °C<br>Other colours: 50 000 hours at 25 °C                        |                  |
| ▶ Consumption of LED blocks                      | Voltage:<br>- 24 V: 25 mA ± 20%<br>- 48 V: 15 mA ± 5%<br>- 130 V: 20 mA ± 10%<br>- 230 V: 16 mA ± 30% |                  |

# Technical characteristics

## ▶ ONE PIECE PILOT LIGHT BA9S

| Characteristics                        | Data                                               | Standards               |
|----------------------------------------|----------------------------------------------------|-------------------------|
| ▶ Rated insulation voltage             | 400 V                                              | IEC 60947-5-1           |
| ▶ Rated impulse withstand voltage Uimp | 4 kV                                               | IEC/EN 60947-1          |
| ▶ Bulb rating                          | 400 V max. - 2,6 W max.<br>240 V max. - 2,6 W max. | IEC 60947-5-1<br>UL 508 |

## ▶ HEADS

| Characteristics                            | Data                                                                                                                                                                                                                                                                                             | Standards |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| ▶ Mechanical endurance (in million cycles) | Spring return: 5<br>Push-push: 0,5<br>Selector switches: 0,3<br>Mushroom head maintained function EN 418: 0,10<br>Mushroom head maintained function: 0,15                                                                                                                                        |           |
| ▶ Activation force in N                    | Spring return + NO: 6,5<br>Spring return + NC: 4,5<br>Additional NO contact: 4,5<br>Additional NC contact: 3,0<br>Push-pull mushroom head + NO + NC: 27<br>Push-turn mushroom head + NO + NC: 22<br>Push-pull mushroom head EN 418 + NO + NC: 37<br>Push-turn mushroom head EN 418 + NO + NC: 60 |           |
| ▶ Activation force in Nm                   | Selector switch + NO: 0,04<br>Additional NO contact: 0,03                                                                                                                                                                                                                                        |           |

## ▶ EMERGENCY STOP ACTUATORS - EN 418:

For equipment subject to Machine Security Directive CE 98/37 and EN60204 standard.

BACO emergency stop switches EN418 and contact blocks meet the requirements of the European Machine Directive EN 418 and EN60947-5-5 specification.

Our E-stops provide the "fool-proof" or "tease-proof" emergency stop switch feature - described below, that latches in the emergency stop command and then switches the contact state to open the circuit and shut down the equipment.

"After the emergency stop command has been generated during actuation of the emergency stop device, the command shall be maintained by engagement (latching-in) of the actuating means. The emergency stop command shall be maintained until the emergency stop device is reset (disengaged). It shall not be possible for the emergency stop device to engage without generating the stop command."

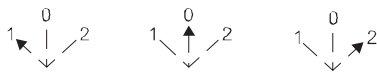
Simply stated, this directive indicates that the latching mechanism of the switch is activated when the actuator is pushed to a certain point. The switch will continue to remain in this latched position until manually reset by twisting to release.

# Diagrams

## MECHANICAL OPERATION

For 3 position selector switches

Handle position  
(front side view)



Contacts block actuation  
(back view)



Back side view

Non operated block



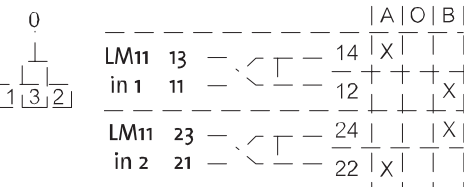
Operated block



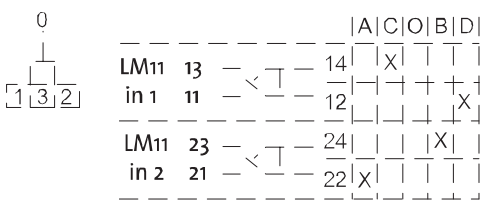
## MECHANICAL OPERATION

For Joysticks

2 positions

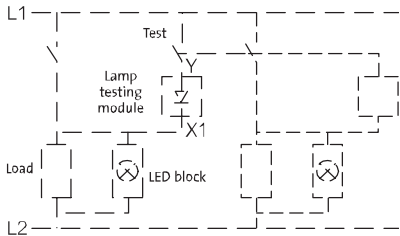


4 positions

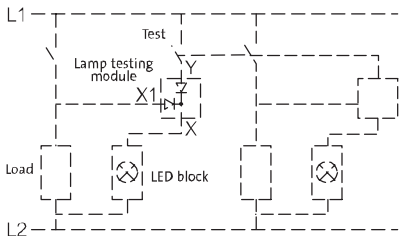


## PUSH-TO-TEST LED PILOT LIGHT DIAGRAMS

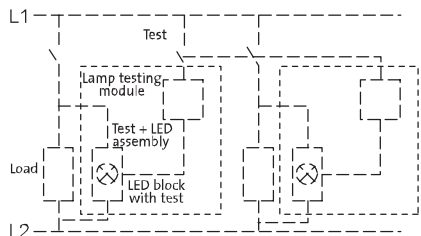
Lamp-testing module with  
1 diode (33ET) for direct  
supply 24 V and 48 V



Lamp-testing module with  
2 diodes (33ETT) for direct  
supply 24 V and 48 V



Lamp-testing assembly  
for direct supply 130 V and 240 V  
(Consult us - see page 79)



## PRINTED CIRCUIT BOARD MOUNTING

