

Construction

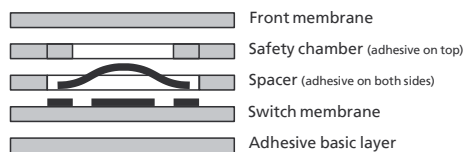
Normally the external side of the transparent front membrane is matt. The membrane is printed on the back, so the printing is protected against environmental influences such as dirt, moisture and scratches. The front membrane, switch membrane, spacers and the basic layer are glued together using high-quality bonding sheets and can subsequently be pressed if required. Pressing of the membrane keypad is not a standard process! It is only carried out for special applications, e.g.:

- increased impermeability
- impermeability against alcohol

Conductive silver

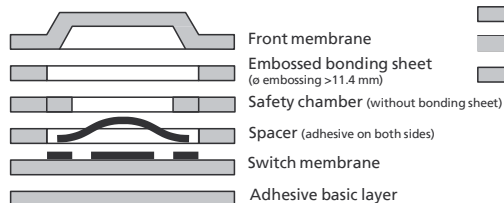
Version 1 (Standard)

Keypad with pressure point



Version 2

Keypad with pressure point and embossing



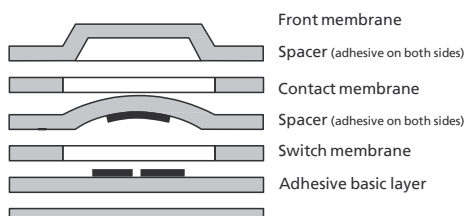
Version 3

Keypad without pressure point



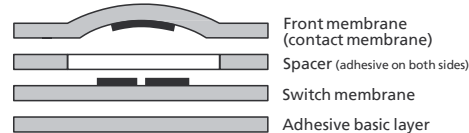
Version 4

Keypad with pressure point with embossing (Mylardom indirect)



Version 5

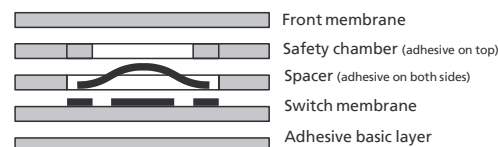
Keypad with pressure point with embossing (Mylardom direct)



Copper laminated

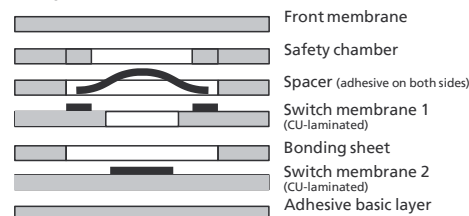
Version 1 (Standard)

Keypad with pressure point



Version 2

Keypad with pressure point, 2-layer



LEDs

If LEDs also need to be integrated into the keypad, the front panel must be provided with a dimpled embossing in the area where the LEDs are to be fitted.

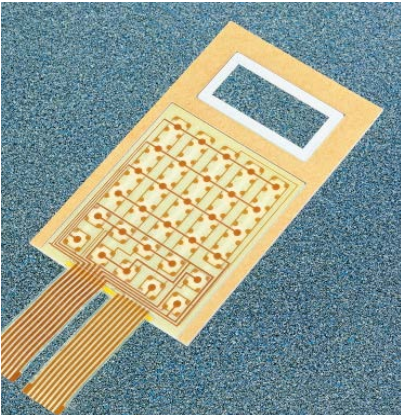
If embossing is not wanted, the keypad can also be fitted using an additional LED layer and a pad. Note that this method increases the total thickness of the keypad.

Screening membrane (option)

In order to carry off discharges of static electricity and to prevent the influence of spurious frequencies, screening can be built into the keypad. This screening membrane is fitted underneath the covering membrane; display screen with screening available on request.

Snap discs

Snap discs or metal domes are manufactured of stainless steel. The contact side is gold-plated. The switch operation pressure of our standard snap discs is approx. 2.5 to 3 N. Depending on the size of the domes, the minimum distance from the center of one key to the next is 16 (11) mm.



Colours

Special silk screen paints for plastics – so-called key switch colours – are used for the printing of the front membranes. Printing is on the back, which protects the layers of paint against environmental influences. Standard paints are selected and used according to RAL.

Shades of colours according to the HKS and Pantone scale can be printed. Additional costs for special colours will be charged for according to the work involved.

Front membrane design

A minimum line thickness of 0.3 mm must be kept to when the front panel is being designed. High-quality printing cannot be guaranteed if the line thickness is less than 0.3 mm.

For the front membrane design, Corel DRAW can be provided as a *.cdr file and used if necessary, as can vectored Windows data.

Surfaces

The following roughness grades are available for the surface of the front membranes:

1. gloss
2. silk-matt
3. matt

Matt surfaces are used in most cases.

Protective membranes

If required, a protective membrane can be drawn over the front membrane or only over the screen. This protective membrane can be removed without leaving any adhesive residues after the keypad has been fitted.

Releases

Before series manufacturing starts, a file will be emailed, or if preferred, a paper print-out will be sent by post for the purpose of release.

On request, release samples will be silk-screen printed and charged for according to the work involved.

Assembly

BOPLA offers a complete range of processing and assembly services. The advantages for the customer are: faster delivery times, fewer order requirements, and a reduced risk of rejects.

In this way, the customer can be certain that the keypad bonding sheet fits the various enclosure surfaces and that there is a high level of fitting accuracy.

External contour Front membrane / membrane keypad

The amount of play must be taken into consideration when planning a membrane keypad / front membrane on a supporting plate or in an enclosure.

The contour can be designed according to specific requirements.

Display glass

Glass is frequently used for screens instead of closed, clear membranes (front membranes).

The following materials can be offered:

1. acrylic glass (e.g. plexiglass)
2. polycarbonate (e.g. Macrolon)
3. crystal glass (e.g. window glass).

Technical data on copper-laminated membrane keypads

| | Copper technology with snap domes | CU/LS technology with snap domes | Keypad on PCB |
|--|--|--|--|
| IP protection on membrane keypad side (depending on design) | up to IP 67 | up to IP 67 | up to IP 67 |
| Snap domes, gold-plated contact side | 5 to 10 mm | 5 to 10 mm | 5 to 10 mm |
| Key area | from 5 x 5 mm | from 5 x 5 mm | from 5 x 5 mm |
| Min. average distance between keys | between 8 and 13 mm | between 8 and 13 mm | between 8 and 13 mm |
| Installation height | from approx. 0.6 to approx. 0.9 mm | from approx. 0.6 to approx. 0.9 mm | from approx. 0.7 to approx. 3.8 mm |
| Switch travel (depending on embossing) | approx. 0.3 to 0.65 mm | approx. 0.3 to 0.65 mm | approx. 0.3 to 0.65 mm |
| Switch force depending on membrane | between 3 and 5 N | between 3 and 5 N | between 3 and 5 N |
| Operating life (depending on snap dome used) | 300,000 to >1 mio. Test procedure acc. to DIN 42115 | 300,000 to >1 mio. Test procedure acc. to DIN 42115 | 300,000 to >1 mio. Test procedure acc. to DIN 42115 |
| Electrical data: | | | |
| Current | max. 100 mA | max. 100 mA | max. 100 mA |
| Voltage | max. 42 VDC | max. 42 VDC | max. 42 VDC |
| Maximum output | 0.6 W | 0.6 W | 0.6 W |
| Conductive strip resistance (at 100mm length and 1mm width)* | <0.1 ohm | <0.1 ohm | <0.1 ohm |
| Insulation resistance | >100 Mohm | >100 Mohm | >100 Mohm |
| Bouncing time (depending on actuation) | <10 msec | <10 msec | <10 msec |
| Operating temperature | | | |
| Keypads with embossing | -20°C to 70°C | -20°C to 70°C | -20°C to 70°C |
| Keypads without embossing | -20°C to 70°C | -20°C to 70°C | -20°C to 70°C |
| Storage temperature | | | |
| Keypads with embossing | -30°C to 80°C | -30°C to 80°C | -30°C to 80°C |
| Keypads without embossing | -40°C to 80°C | -40°C to 80°C | -40°C to 80°C |

*The conductive strip resistance is dependent on the layout arrangement. Conductive silver bridges may increase conductor resistance.

Specifications for deviating data on request.

Technical data on conductive silver membrane keypads

| | Conductive silver technology with snap domes | Mylar dome – direct contact on conductive silver basis | Mylar dome – indirect contact on conductive silver basis |
|--|---|---|---|
| IP protection on membrane keypad side (depending on design) | up to IP 67 | up to IP 67 | up to IP 67 |
| Snap domes, gold-plated contact side | 7 to 10 mm from | | |
| Key area | 7x 7 mm | ø7 / ø8 / ø9 / ø10 mm | ø7 / ø8 / ø9 / ø10 mm |
| Min. average distance between keys | between 10 and 13 mm | between 10 and 13 mm | between 10 and 13 mm |
| Installation height | from approx. 0.6 to approx. 0.9 mm | approx. 0.6 mm | approx. 1 mm |
| Switch travel (depending on embossing) | approx. 0.3 to 0.65 mm | approx. 0.3 to 0.6 mm | approx. 0.3 to 0.65 mm |
| Switch force depending on membrane | between 3 and 4 N | between 2 and 4 N | between 2 and 4 N |
| Operating life (depending on snap dome used) | >1 mio. Test procedure acc. to DIN 42115 | > 300,000 Test procedure acc. to DIN 42115 | > 500,000 Test procedure acc. to DIN 42115 |
| Electrical data: | | | |
| Current | max. 100 mA | max. 100 mA | max. 100 mA |
| Voltage | max. 42 VDC | max. 30 VDC | max. 42 VDC |
| Maximum output | 0.6 W | 0.6 W | 0.6 W |
| Conductive strip resistance (at 100mm length and 1mm width)* | <6 ohm | <6 ohm | <6 ohm |
| Insulation resistance | >100 Mohm | >100 Mohm | >100 Mohm |
| Bouncing time (depending on actuation) | <10 msec | <10 msec | <10 msec |
| Operating temperature | | | |
| Keypads with embossing | -20°C to 70°C | 0°C to 45°C | 0°C to 45°C |
| Keypads without embossing | -20°C to 70°C | | |
| Storage temperature | | | |
| Keypads with embossing | -30°C to 80°C | -30°C to 45°C | -30°C to 45°C |
| Keypads without embossing | -40°C to 80°C | | |

Specifications for deviating data on request.

Technical data on copper-laminated Profiline membrane keypads

| | Profiline B | Profiline XE |
|---|------------------------------------|------------------------------------|
| IP protection on membrane keypad side (depending on design) | up to IP 67 | up to IP 67 |
| Material used for front membrane | Bayfol CR 6-2 | Autotex XE |
| Snap domes, gold-plated contact side | 8 and 10 mm | 8 and 10 mm |
| Key area | from 5x5 to approx. 30x30 mm | from 7x7 to approx. 30x30 mm |
| Min. average distance between keys | between 16 and 40 mm | between 16 and 40 mm |
| Minimum clearance of key edge to keypad edge* | between 11 and 24 mm | between 11 and 24 mm |
| Installation height | from approx. 1.4 to approx. 1.6 mm | from approx. 1.4 to approx. 1.6 mm |
| Embossing height | selectable: 1 / 1.5 / 2 mm | up to 1.0 mm |
| Switch travel (depending on embossing) | approx. 0.3 to 0.65 mm | 0.65 mm |
| Switch force | between 3 and 5 N | >5 N |
| Operating life | from 300,000 to 500,000 | >1 mio. |
| (depending on snap dome used) | Test procedure acc. to DIN 42115 | Test procedure acc. to DIN 42115 |
| Electrical data: | | |
| Current | max. 100 mA | max. 100 mA |
| Voltage | max. 42 VDC | max. 42 VDC |
| Maximum output | 0.6 W | 0.6 W |
| Conductive strip resistance | <0.1 ohm | <0.1 ohm |
| (at 100mm length and 1mm width)** | | |
| Insulation resistance | >100 Mohm | >100 Mohm |
| Bouncing time (depending on actuation) | <10 msec | <10 msec |
| Operating temperature | -20°C to 45°C | -20°C to 70°C |
| Storage temperature | -40°C to 80°C | -40°C to 80°C |

*These clearances depend on the size of the inlay.

**The conductive strip resistance is dependent on the layout arrangement. Conductive silver bridges may increase conductor resistance. Specifications

for deviating data on request.

Technical data on touch panels

These data are based on the values of touch screens (resistive) used in the past. Other touch types and manufacturers on request. Critical values should always be compared with the relevant data sheet.

| Technology manufacturer | Analogue 4-wire | Analogue 5-wire |
|--|------------------------|-------------------------|
| Protection categories: | | |
| Installation front and rear without air vent | up to IP 65 | up to IP 65 |
| Installation front and rear with air vent | up to IP 64 | up to IP 64 up to IP 67 |
| Full-surface laminated touch panel* | up to IP 67 | < 50 g |
| Actuation force | < 50 g | > 80% |
| Light transmission, installation on front and rear | > 80% | > 72% |
| Light transmission, full-surface laminated | > 72% | > 1 mio. |
| Operating life | > 1 mio. | |
| Electrical data: | | |
| Voltage | DC 5 V | DC 5 V |
| Insulation resistance | > 10 Mohm at 25 V * | > 10 Mohm at 25 V* |
| Current | 35 mA | 35 mA |
| Operating temperature | -10°C to 60°C | -10°C to 60°C |
| Storage temperature | -20°C to 70°C | -20°C to 70°C |

* With full-surface lamination, the minimal touch thickness is dependent on the touch size. The larger the touch panel, the thicker the carrier glass should be (danger of breakage). Touch

panels for systems with deviating specifications on request.

Characteristics and resistance of the plastic parts

| Characteristics | Polycarbonate PC | Polyester PETP |
|----------------------------|---|--|
| Mechanical characteristics | Tensile strength: good Scratch resistance: very good Processing embossing/punching: very good Printing: very good | Tensile strength: good Scratch resistance: very good Processing embossing/punching: very good Printing: very good |
| Electrical characteristics | Dielectric strength: Ø 60 kV/mm Insulation resistance: $10^9 - 10^{11} \Omega$ | Dielectric strength: Ø 250 kV/mm Insulation resistance: $10^9 - 10^{11} \Omega$ |
| Thermal characteristics | Temperature range: -50°C to 120°C Melting point: 220°C Flammability: slow to self-extinguishing | Temperature range: - 70°C to 150°C Melting point: 250°C Flammability: slow to self-extinguishing |
| Visual characteristics | Good light permeability, very suitable for LED displays. Colour reproduction slightly reduced. | Excellent light permeability, giving good legibility of LED and LCD displays. Good colour reproduction. |
| Chemical characteristics | Polycarbonate is resistant to mineral acids, many organic acids, oxidation and reduction agents, neutral and acid saline solutions, many oils, saturated aliphatic and cycloaliphatic hydrocarbons and alcohol, excluding methyl alcohol. | To a great extent, polyester membrane is insensitive to moisture and most chemicals. Polyester is resistant to detergents, water, petrol, many oils, alcohol, vinegar, aliphatic hydrocarbons, bleaching agents, 2% ferric chloride solution, iodine, ethyl acetate, food colouring, engine oil; less resistant to chlorinated hydrocarbons, ketones, aromatic hydrocarbons. |

NOTE: If different media come into contact with each other, the stability factors may change. For this reason, we cannot accept any liability for the details.