



Information

Construction

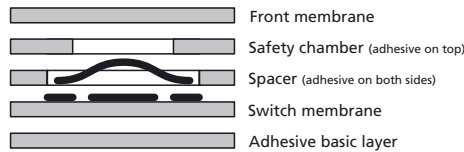
Normally the external side of the transparent front membrane is matt. The membrane is printed on the back, so the printing is protected against environmental influences such as dirt, moisture and scratches. The front membrane, switch membrane, spacers and the basic layer are glued together using high-quality 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

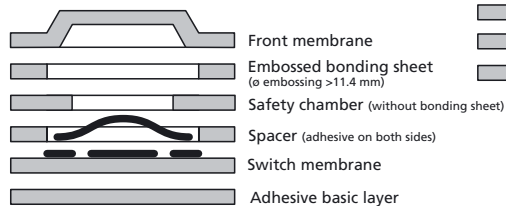
Version 1 (Standard)

Keypad with pressure point



Version 2

Keypad with pressure point and embossing



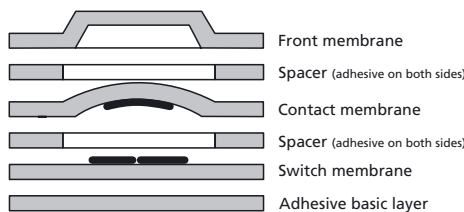
Version 3

Keypad without pressure point



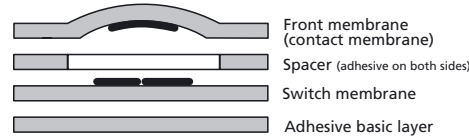
Version 4

Keypad with pressure point with embossing (Mylardom indirect)



Version 5

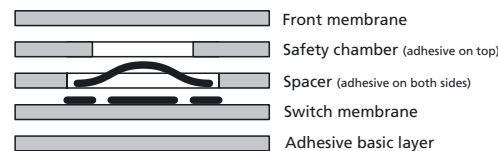
Keypad with pressure point with embossing (Mylardom direct)



Copper laminated

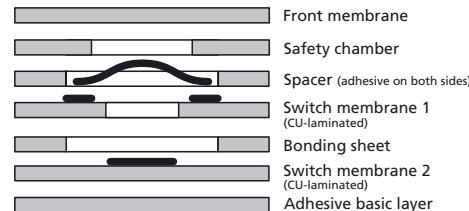
Version 1 (Standard)

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)

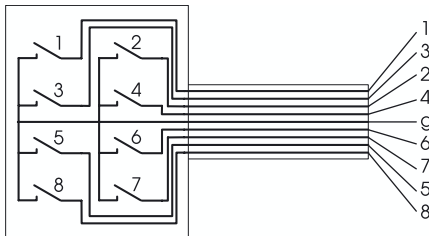
In order to carry off discharges of static electricity and to prevent the influence of spurious frequencies, screening can be built into the keypad. This screening membrane is fitted underneath the covering membrane; display screen with screening available on request.

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 centre of one key to the next is 16 (11) mm.

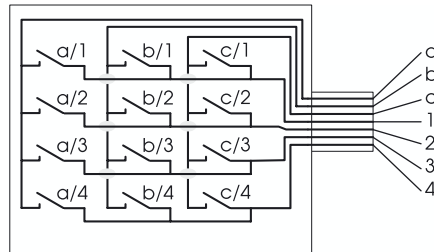
Circuits

a) Common conductor cable



Each key is connected to the common cable and a strip conductor output. No additional decoding is required. All conductors are led to a highly flexible membrane cable in order to connect the entire keypad area to the electronics.

b) X-Y matrix

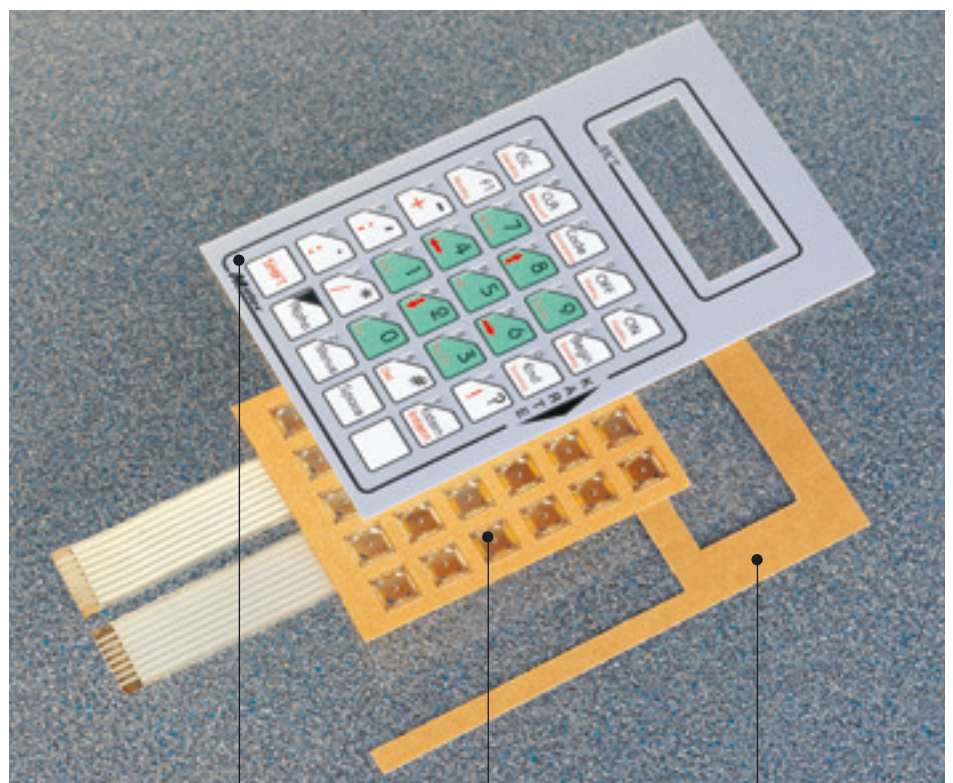


The horizontal X output conductors and the vertical Y output conductors are connected to the contact points of the keys. This reduces the number of connections to just a few conductors.

Padding keypads

Low-cost customer-specific membrane keypads can be manufactured on the basis of our standard keypad range.

After selection of a basic keypad body, the rest of the surface is filled with a spacer. A front membrane, back-printed according to the customer's instructions, is then fitted over the whole construction.



Front membrane

Body

Bonding sheet (pad)



Information

Membrane cable

The position of the exit point and the related length of the connection membrane should be determined during the planning phase. The leading out of the contact connections is via the membrane cable.

The ribbon is punched out of the keypad in the area of the exit so that the membrane cannot tear when it is bent. The standard grid dimension is 2.54 mm. Avoid excessive bending. The ideal bending radius for the cable is > 4 mm.

Plugs

The membrane cable can be led either into one membrane direct plug soldered to the PCB, or a plug is crimped at the end of the cable. If plugs have been crimped in position, a single-row post plug must be fitted as a counter-piece on the PCB.

Protection types

When laminating the keypad onto a support, we recommend sealing the cable exit with a suitable adhesive. If the keypad is pressed onto the supports by means of a pressing device, the keypad is absolutely waterproof (also alcohol-proof, depending on the design).

If an enclosure used with a keypad is expected to achieve ingress protection category IP 65, note the following:

1. The cable inlet in the enclosure must be sealed with a special adhesive.
2. It may be necessary to adapt the construction of the keypad.

Slot-in pockets

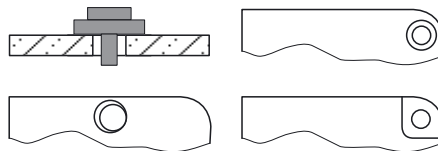
Slot-in pockets can be incorporated in the keypad for the subsequent individual marking of keys or surfaces.

Replaceable slot-in strips (e.g. for logos) can be inserted from the side, front or rear. The slot-in pocket is fitted directly behind the front membrane, so the slot-in strip is visible in the unprinted area.

Mounting holes

If components are fitted in the supporting plate and centered in the front membrane, take the amount of play into consideration. The punched-out hole in the front membrane must be larger.

If the mounting drill-holes are very close to the corner of a keyboard, the result is thin, unequal intermediate sections. In such cases, the corner should be completely cut out.



Supporting plates

The supporting plates are manufactured according to customers' specifications.

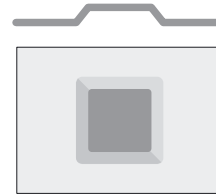
They can be supplied with press-in bolts with the following standard dimensions:

thread	hole ø in tin	length (mm)														min. distance from edge to middle at hole	
M2.5	3,0	6	8	10	12	15	18										5,5
M 3	3,0	6	8	10	12	15	18	20	22	25	30						5,5
M 4	4,0	6	8	10	12	15	18	20	22	25	28	30	35	38			7,5

aluminium/steel

Embossings

Dome embossing

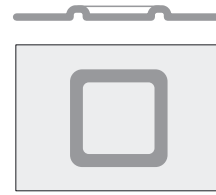


On the dome embossing the embossed area is about 0.3 mm higher than the front membrane.

Possible embossing forms:



Edge embossing

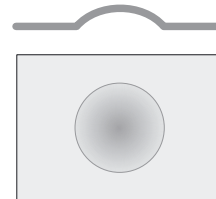


The edge embossing is used to guide the fingers. The niveau at front membrane and key area remains the same.

Possible embossing forms:

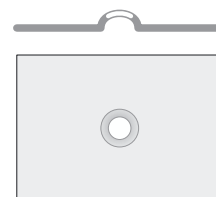


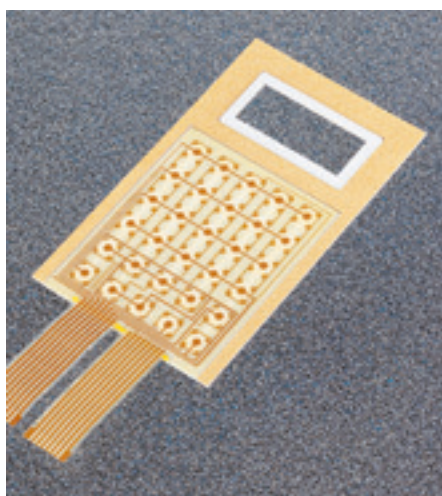
Bubble embossing



The bubble embossing is in various diameters from 8 to 17 mm available.

Wart embossing for LEDs





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	300,000 to >1 mio.	300,000 to >1 mio.	300,000 to >1 mio.
(depending on snap dome used)	Test procedure acc. to DIN 42115	Test procedure acc. to DIN 42115	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	<0.1 ohm	<0.1 ohm	<0.1 ohm
(at 100mm length and 1mm width)*			
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		
Key area	from 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	>1 mio.	> 300,000	> 500,000
(depending on snap dome used)	Test procedure acc. to DIN 42115	Test procedure acc. to DIN 42115	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	<6 ohm	<6 ohm	<6 ohm
(at 100mm length and 1mm width)*			
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
Full-surface laminated touch panel*	up to IP 67	up to IP 67
Actuation force	< 50 g	< 50 g
Light transmission, installation on front and rear	> 80%	> 80%
Light transmission, full-surface laminated	> 72%	> 72%
Operating life	> 1 mio.	> 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: \varnothing 60 kV/mm Insulation resistance: $10^9 - 10^{11} \Omega$	Dielectric strength: \varnothing 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.