



## Membrane keypads

Membrane keypads are widely used in instrumentation. In most cases their use is much more convenient than installation of mechanical buttons or other types of keypads.

The main advantages of membrane keypads are:

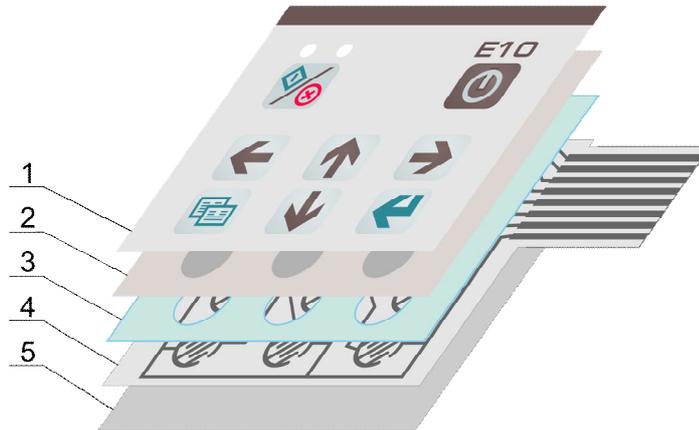
- Bright color pattern of your preference
- The pattern and the entire keypad are protected against abrasion, dust, water and aggressive environments
- Tactile effect (keys with embossing, metallic membranes)
- A keypad and keys can have virtually any shape and size
- Built-in backlight elements and LEDs
- Ability to work in harsh environmental conditions
- Ability to install a controller
- Windows (clear or colored) for LEDs and LCDs
- Compact size (the thickness of a keypad does not exceed 1.5 mm)
- Ease of installation (glue is applied on the back side of a keypad)
- Low price (compared to other types of keypads)

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## Membrane keypad functioning

A membrane keypad is a multi-layered device made of polymeric films with different layers (paint, adhesive, conductive, protective, etc). The scheme of a typical membrane keypad is demonstrated in Illustration 1.



**Illustration 1: Scheme of a membrane keypad**

1 – front film with graphic information, 2 – trailing elements, 3 – separation film, 4 – film with conductors and contact pads, 5 – glue layer

The front film contains graphic information. The pattern is applied to the inner side of the film, so that it is protected from abrasion. The front film is made of chemically and mechanically resistant polyester. Anti-glare coating is applied on the outer surface of the film. The front film has special embossing in the key area, which provides the tactile effect.

The trailing elements, separation film and film with conductors make up the electrical part of a membrane keypad which is responsible for electrical contact closure when a key is pressed. Contact pads of all the keys are connected to a flexible extra flat cable.

A glue layer is applied on the back side of a keypad and allows fixing it on the housing of a device. The use of modern permanently adhesive glues ensures reliability of fixation of the keypad without the need to use additional fasteners.

You can find more detailed information further in this document.



## Technical characteristics

All our membrane keypads comply with international standards. For more detailed information about technical characteristics of keypads see the document "**Membrane keypads — technical characteristics**", which can be found on our website or in the e-catalogue in the section «Membrane keypads». Basic characteristics of membrane keypads are shown in Table 1.

**Table 1: Basic technical characteristics of membrane keypads**

Parameter	Value
Switching voltage, V	Not more than 36
Switching current, mA	50
Insulation resistance not less than, MOhm	20
Key pressing force, N	2-8
Key stroke, mm	0,5-0,8 (0,2 without embossing)
Number of key activations	1,5 mln.
Keypad dimensions, mm	Up to 700x600
Operating temperature range, °C	-40 to +60°C
Maximum air humidity, %	98 at 35°C
Ingress protection	IP-65
Resistance to aggressive media	resistance

## Graphic and color design, production standards

We suggest that you check the standards of membrane keypad production prior to submitting an order — see the document "Membrane keypads — production standards", which can be found on our website or in the e-catalogue in the section "Membrane keypads".

## Tactile effect

A tactile effect allows the user to clearly feel the key activation. We produce keypads with three types of tactile effects:

- flat keys (no tactile effect) provide the easiest and quiet key activation.
- keys with embossing offer a good tactile effect at a low cost and smooth key pressing. A key can be embossed as a circle, rectangle, triangle, ellipse.
- metallic membranes provide a tactile effect that is felt even through thick gloves and produce a clear clicking sound when pressed. Another advantage of metallic membranes is their low contact resistance. We recommend this version for use in special machinery.

For more detailed information about tactile effects see the documents "**Tactile effect**" and "**Membrane keypads. Technical characteristics**", which can be found on our website or in the e-catalogue in the section "Membrane keypads".

## Versions of electric circuit and controller design

Several version of electric circuits of the control panel exist: it can be a fully membrane keypad (the entire electric circuit is made on film) or a keypad on a flexible or rigid printed circuit board. It can be connected to external power sources by a flat cable or by flexible wires. Optionally, EMI shielding of a membrane keypad is possible.

For more detailed information see the documents "**Versions of electric circuit and controller design**", which can be found on our website or in the e-catalogue in the section "Membrane keypads".

Also, in that document you can find description of controllers for membrane keypads and options of their implementation, including mounting into a keypad.

## Backlight and indicators

When using a keypad in low illumination conditions, built-in flat electroluminescent backlight elements (EBE) in a keypad are a good solution. (For more detailed information see the document "**Electroluminescent backlight**").

Our technology allows embedding LEDs into a keypad. Built-in LEDs are a convenient way of indication and local illumination. The use of compact LEDs for surface mount almost does not increase the thickness of a keypad. The parameters of LEDs (illumination color, brightness, etc) are selected by the customer. For more detailed information see the documents "**Built-in LEDs for membrane keypads**".

Passive illumination with the use of luminescent (phosphorescent) white paint is also possible. This type of illumination can be used in buttons, background highlighting, logotypes, etc.

## Windows

Transparent or colored windows of any shape and size can be made into a membrane keypad. Anti-reflective coating is applied on windows for LCDs.

## Housing

Membrane keypads are compatible with any type of plastic housing. Installation of a membrane keypad on a device's housing is done with an adhesive layer applied on the back side of a keypad. We can arrange installation of a keypad on any housing and cut all the necessary openings (for an extra flat cable, LEDs, LCD windows, fasteners) in the housing. You can select the type of housing from any company's catalogue, incl. BOPLA, ROSE, OKW.

## Standard keypads

We offer a wide range of standard membrane keypads so that you can learn about membrane keypads or create prototypes of devices. These keypads can be purchased directly at our office or from our partners.

We also offer customized versions of standard keypads (adjusting colors and inscriptions to your preferences without changes in the electric circuits or dimensions), thus providing a convenient solution for simple devices.

For more information about our range of standard keypads see the documents "**Standard keypads**", which can be found on our website or in the e-catalogue in the section "Membrane keypads".