# **Short Travel Keyboards**

### The technology at a glance

This technology uses high-quality short travel keys which are located behind a front panel made of metal. The front panel screens the device from electromagnetic interferences and gives the component assembly an increased inherent rigidity. The front panel is covered with a protective and design-oriented printed polyester foil. This foil protects the keyboard against dirt and humidity. The short travel keys provide the user with a clear tactile feedback.

11:11:11:11

TELEVENTE TE TE TE TE TE TE TE TE TE

Short travel keys have a very long service life. They are available in multiple sizes and with various actuating forces. The actuation travel amounts to approx. 0.3 mm. Short travel keyboards are manufacturable in all possible mounting and housing variants.

#### Laver construction of a short travel keyboard

1 PCB rear side (here with integrated key controller) 2 PCB (component side for keys) 3 Front panel (carrier plate) 4 Desian foil

#### Important technological advantages

- Protective and stabilizing front panel
- Dirt and water resistant •
- Excellent tactile feedback
- Different key sizes and operation forces
- Point lighting or complete lighting of the keys .
- Integration of display windows is possible
- Shapely front foils with a pleasant design .
- Good key separation realizable by rim/ key embossing • or relief foil
- Manufacture according to your specifications ٠
- Layout and colour design according to your wishes ٠
- The use of an antimicrobial keyboard foil is possible .

ANGENT 

#### Preferred application areas

- Special machine engineering
- Medical high-end devices with redundancy functions

404040

- Indoor and outdoor information terminals
- Tool building for measuring and control technology
- Safety control systems of all kinds
- Industrial applications



# Flat Input Keyboards



#### The technology at a glance

These components have a flat design. The lower, switch actuating element in this case is a solid printed circuit board (PCB). This ensures a high inzerent rigidity. The key positions are equipped with gold-plated contact points. These "gold on gold contacts" offer very high switch reliability. The metal domes are placed in the openings of the spacer foil and fixed with a retaining foil. The top layer of the keyboard is a printed design foil available in many colours. On the back of the PCB, complete component assemblies, such as keyboard controllers, can be integrated using SMD technology.

Flat input keyboards are manufacturable in all possible mounting and housing variants.

#### Layer construction of a flat input keyboard

1 Gold-plated PCB with integrated switching elements 2 Spacer foil 3 Retaining/ protective foil 4 Adhesive foil 5 Design foil

#### Important technological advantages

- Individual layouts and colours
- Minimum space required due to compact design
- Key legends can be changed (exchangeable text)
- Ideal pressure point due to metal domes
- Good tactile feel of the key positions due to embossing
- Rear side integration of electronic components
   (e.g. keyboard controller) possible
- Polyester front foil featuring a high chemical resistance
- Dirt and splash water proof
- No risk of silver migration
- The use of an antimicrobial keyboard foil is possible on request



- Machine engineering and system controls with small mounting depth
- Ideal for medical devices
- Measuring and control technology
- Space-saving keyboards for industrial PCs
- System control elements, e.g. for heating systems or industrial panels



# Flexible Membrane Keyboards



#### Layer construction of a flexible membrane keyboard

- 1 PCB track foil with integrated switching elements (switching foil) 2 Spacer foil
- 3 Retaining/ protective foil (optional)
- 4 Adhesive foil for design foil
- 5 Design foil

#### The technology at a glance

Membrane keyboards consist of several foil layers which are bonded with each other. Polyester foils printed with conductive silver paste are used as switch membranes. The top and bottom switch membranes are spaced from each other by means of a spacer foil. The contact closes when the upper design foil is pressed in the area where the key is located. The design foil is placed on the upper switch membrane. This design foil is highly transparent and has a fine-textured or smooth surface. This foil can be printed with various colours and informatory contents. As the keys are separated by means of rim, dome or key embossing, they provide a good tactile feedback and finger guiding.

#### Important technological advantages

- Easy to clean with customary cleaning agents
- Flat design suitable for industrial applications
- Resistant against dust and humidity
- Customized controllers available
- Individual layouts and colour schemes
- Terminal lugs for zero insertion force connectors or crimped connectors
- Polyester foil is resistant against many chemicals
- Excellent tactile feel due to embossing
- Metal domes can be integrated
- Good key separation due to rim, dome or surface
   embossing



#### Application fields

- Consumer products of any kind
- Mass products in all industries
- Computer games and electronic toys
- Electronic balances and home devices
- Mobile data collection terminals
- Medical and analysis equipment



# Design Foils & Front Panels

#### Design foils

Mostly, the foils are based on special transparent polyester. They feature a very high transparency and a fine-textured surface. In order to protect the colours against environmental influences, it is the rear side of the foils which is printed. By special adhesives and spacers, the connection to the lower foil layers and carrier plates is ensured. As a spacer is mounted between the foil and the carrier plate, exchangeable label strips can be inserted. Design foils provided with rim or key embossing ensure an optimum user friendliness.

#### Important technological advantages

- Individual layout and colour designs as well as text prints on the foils
- Clearly arranged and multi-coloured prints
- Different embossings improve the tactile feel
- Comprehensive design counselling
- Available either as design foil with adhesive foil on the back side or as foil laminated onto the front panel or the housing
- Front panels separately available, without design foil



#### **Application fields**

- All kinds of foil covered keyboards and keyboard covers
- Control panels and console covers
- Appliance rating plates and flow charts
- Separate front panels for your devices
- Vendor parts as semi-finished products
- Control panels laminated with foil

#### Front panels

The aluminium, carbon and plexiglas front panels are equipped with all necessary recesses and contour gradients by means of our modern CNC-3D drilling, milling and engraving systems. Large series are blanked at a favourable price. Completed by threaded bolts or other mechanical elements, precise mechanical component assemblies are the result.



# Silicone Keypads



#### The technology at a glance

Compared to other keyboard technologies silicone keypads offer price advantages particularly in mass production. They are durable and reliable, and almost unlimited design options are possible. The colour and shape of the key caps can be defined freely. Silicone keypads are made of highly elastic and toxin free silicone rubber. The keypads are produced by shaping kneadable base materials at a defined temperature and pressure. Each pad type requires a special tool. In most cases, there is one conductive carbon pill per key on the bottom side. Usually, the lower contact part is based on meander-shaped conductor tracks on foil or PCB.

#### Construction

1 Carbon contacts
 2 Stiffening clip
 3 Silicone mat

#### Tools for silicone keypads

The tools for producing silicone keypads are made of a special alloy. They are manufactured with highly precise CNC milling and eroding machines. During one production cycle several silicone keypads can be manufactured simultaneously by using one mould. Thus, already during the manufacture of the tools, the focus is placed on the optimization of the production.

#### Important technological advantages

- Good tactile feel of the single keys
- An intelligent contact design ensures safe contact making on the PCB
- Silicone can be provided with a coating
- Optionally available with plastic caps
- Suitable, customized housing available
- Unlimited design options
- Several colour combinations in one keyboard
- Designs with light function available
- Good chemical resistance
- Dirt and water proof
- · Very well-priced keyboard in series production



#### Application fields

- Medical applications (antimicrobial design / fluorine-silicone)
- Remote controls for TV sets and control systems
- Measuring instruments (e.g. oscilloscopes)
- Phone pads in mobile and standard phones
- Communication systems of all kinds
- Information terminals



# Long Travel Keyboards



Ju

#### The technology at a glance

For data input devices in office environments or for mass data input, customized long travel keyboards with long travel technology are suitable. The individual electromechanical keys are equipped with separate key caps. Typically, the key travel is 2.5 to 4 mm. Those long travel keyboards are available as modular assemblies without housing or as models integrated in special customized housing. The key layout, the colours and key cap printings are made according to customer specifications and after consultation. Due to the use of high-quality key modules, the highest possible reliability of 50 million operation cycles is guaranteed.

### Important technological advantages

- Anti-glare surfaces
- Different key printing technologies
- High abrasion resistance of the key legends (protective lacquer)
- Customized housing
- Keys based on Gold Cross point technology

#### Lettering of long travel keys

Depending on the required quantity and the desired combination of the key cap base colour and the colour of the lettering five different lettering technologies are available:

- Engraving
- Pad printing
- Sublimation print
- Two-colour injection moulding
- Laser marking

### Application examples

- Special keyboards for POS systems
- Medical devices
- Machine control systems in safe
   environments
- Manufacture of measuring instruments
- Data processing devices for mass data collection
- Operating data collection



## Stainless Steel/ Carbon Keyboards



1 Front panel (stainless steel or carbon) 2 Silicone keypad with stainless steel key caps 3 Switch membrane with contact meanders Industrial operating systems -Flexibly configurable component carriers

Control panels can be divided into four basic elements: base carrier or carrier plate/ casing, central data input unit, additional data input unit and data output unit. With these four elements, various versions can be developed which are always oriented towards the demands made by the operational environment.

As component carriers, various materials can be used. In the majority of cases, aluminium is used. Further possible options are carbon or plastic. The carriers can be integrated into the system in various ways. By default, stay bolts for the front mounting of the carrier plate which are mounted on the reverse are used.

#### The technology at a glance

In the age of the Internet, the demand for robust Internet terminals has caused a sudden upvaluation of metal keyboards. However, those input systems are frequently used for the classical applications as well, such as for cash or ticket machines. Those metal keyboards are available as modular component assemblies without housing or as models integrated into special customized housing. The key layout, the external dimensions and the lasing of the key caps are made according to the customer's specifications. Optionally available: a classical, flat key top design or higher key tops ensuring a longer key travel and a higher input speed.

#### Important technological advantages

- Robust design
- High quality and noble appearance
- Suitable for unsupervised use (outdoors as well)
- Optionally with integrated heating for the use at temperatures below 0°C
- Safe and pleasant tactile feel
- Single keys available
- Integration of electronics (e.g. keyboard controller)
- Lettering is selectable on request
- Backlight function available
- Key positions and external dimensions are freely selectable

### Application examples

- Keyboards for Points of Information in public areas
- Ideally suited for internet terminals
- Bancomats and cashpoints
- Ticket machines
- Applications in public area
- Elevator and lift control systems



## Touchscreens



Jun

#### Intuitive operation - Capacitive

In case of digital touchscreens, thin isolating channels are created in the ITO layers in order to produce conductive tapes. As the tapes of the upper and lower ITO films are positioned at an angle of 90° to each other, a key matrix is created. In case of the analogue principle, the ITO layers are not cut. Contact to the upper layer is applied vertically and laterally on both sides – to the lower layer horizontally. The short-circuit point of the two layers is determined by the voltage divider using a complex evaluation electronics.

#### The technology at a glance - Resistive

A customized touchscreen requires two layers of an ITO sputtered base material, which are separated from each other by means of spacers. ITO stands for indium tin oxide, which is an almost transparent, but conductive material. Sputtering refers to a special method for depositing thin films. Suitable base materials for ITO films are foil or glass.

When pressing the top layer, a conductive connection between the upper and lower ITO layers is established at the pressed point. The position of the contact point is identified by an analytical circuit.

#### Important technological advantages

- Flat design; no parallax errors
- Can be operated with any kind of soft object, e.g. finger, pencil tip
- No drift and thus no calibration required
- Surface soiling does not affect functioning
- Analogue or digital principle available
- Main dimensions can be freely selected
- Terminal lug is based on copper conductor tracks
- Through-connection on the terminal lug is possible all connections on one side
- High light transmission
- Scratch-proof surface coating

- Application examples
- Computer technology: note pads, information terminals
- Multimedia: information systems, POS consoles and internet terminals
- Medical engineering: patient monitoring systems
- Industry: process monitoring, control panels, process visualization systems
- Toys industry: interactive games



## **Enclosures and Devices**



#### **Enclosures and Devices**

Besides the keyboard unit, a suitable housing is an essential component of an operating system. Very often, the standard housing range does not satisfy customer needs. Therefore, InduKey develops and provides customized keyboard or device housing. For this, we use the different manufacturing technologies of our suppliers being selected in such a way that they are optimally suited for your application with regard to design and manufacturing costs. Whether plastic or metal, we will provide you with the adequate housing.

#### Metal housing

- Use of standard extruded profiles
- Design of bowl casings
- Highly robust and protective
- IP level up to 65 available
- Different surface coatings

#### Negative deep drawing

- Suited for series production of medium quantities (< 500 pieces)
- Cost-efficient manufacture of the deep-drawing die
- Design-oriented undercuts available
- Various joint designs available
- Different surface textures

#### Tool-free housing technology

- Suited for prototypes and medium series
- Plate material is scored and bent
- Front panels are specifically glued
- For simple geometric contours
- No tool making required

#### Injection moulding

- Suited for large-scale production
- Cost-efficient serial production of housing
- Dimensional stability
- Complicated spherical contours possible
- Cost-efficient tool making and manufacture



#### Housing made by:

- Sand and dead-mould casting or
  pressure die and waste wax casting
- Aluminium pressure die casting
- Magnesium pressure die casting
- Magnesium waste wax casting
- Plastic injection moulding

... we find the optimum technology for your robust housing.

# Lighting of Operating Surfaces

#### LED keys

With this method, the according lighting element is directly integrated into the key. In most cases, the lighting elements are LED's which have a service life of approx. 50,000 hours. Those LED's are available in various colours. Due to the transparency of the surface material of industrial keyboards, the keys can be illuminated effectively. As surface material, both foil and silicone can be backlighted due to their partial transparency. As illuminated keys, both short travel and long travel keys can be used.

The advantage of this method is that no setup costs are arising, since the keys can be assembled onto the board in the conventional way and without additional efforts.



#### Free LED

In case of this technology, the LED's are not constructionally linked to the key. They are either placed beneath or below the key, or they are position-independently placed as signal indicators (e.g. caps lock key). The latter function is the one which is more frequently used with regard to this technology. For the most part, here, On/Offmodes are visually realized. "Standalone-LED's" also can be used to indirectly illuminate keys without having to integrate them into the respective key. In case of silicone keyboards without mechanical switching elements, for example, the LED's are positioned directly below the key. By using this method, also plated domes can be illuminated without having to integrate the LED's constructionally. Here, the LED is fixed below the key.





#### EL foils

This interesting lighting method is based on the effect that energy is transformed into light when AC voltage is applied (electroluminescence). This way, the entire "EL foil", which is located below the actual operating/decor foil, can be illuminated. All cut-outs on the foil are not illuminated. This allows for the manufacture of almost layout-independent lightings for operating surfaces. Here, compared to the usage of LED's, non-recurring costs are arising due to the individual adjustment. However, the half life of the luminance is not as high as with the other technologies. After 10,000 hours, the luminance amounts to circa 50% of the original value.



#### Plastic light ducts

At first, in this case as well, an LED is used as light source. In contrast to other technologies, though, the light is emitted into light ducts made from plastic. Those light ducts have been abraded by means of chemical processes, so that the light is emitted there.

This so called fiberlight-method is very versatile; due to the light scattering and the individual length of the light ducts, operating surfaces of all sizes are backlightable. Due to the respective specific odification, setup-costs are arising when this method is applied.

## protection classes



The protection class with the two-digit IP codes (1st digit, 2nd digit) indicates the suitability of systems for different environmental conditions. According to DIN the abbreviation IP stands for International Protection.

| 1st digit | Protection against contact  | Protection against foreign objects                                      |
|-----------|---|---|
| 0         | - no protection   | - no protection   |
| 1         | - with large-area body parts<br>(back of the hand)                      | <ul> <li>large foreign objects,</li> <li>ø bigger than 50 mm</li> </ul> |
| 2         | - with the fingers  | - mid-size foreign objects, ø bigger than 12 mm                         |
| 3         | <ul> <li>with tools and wires,</li> <li>ø bigger than 2.5 mm</li> </ul> | - small foreign objects,<br>ø bigger than 2.5 mm                        |
| 4         | <ul> <li>with tools and wires,</li> <li>ø bigger than 1.0 mm</li> </ul> | - granular foreign objects,<br>ø bigger than 1 mm                       |
| 5         | - complete protection   | - dust deposit  |
| 6         | - complete protection   | - dust entry  |
|           |   |   |
| 2nd digit | Protection against water  |   |

- 0 - no protection
- vertically falling dripping water 1
- diagonally falling dripping water 2
- 3 - diagonally falling dripping water up to 15° relative to vertical line
- 4 - spray water up to 60° relative to vertical line
- 5 - splash water from all sides
- 6 - iet water
- 7 - strong jet water
- 8 - temporary immersion

### UW -1

"Underwaterproof" is an in-company test standard by InduKey. This standard exceeds the protection level IP68, which until now has been the highest standard for keyboards. Protection level IP68 means that the products are tested for water tightness by temporarily immersing them into water. The devices which are labelled "underwaterproof", however, have been tested under water for at least 24 hours. In the process, the water column amounts to at least one meter.

Another difference arises during the active testing of the device. In contrast to IP68, where the devices are only passively immersed into water, the testing according to the "underwaterproof" standard involves an active operation of the keys in particular time intervals. In addition, upon completion of this test, a final and comprehensive testing of the keyboards is conducted.

Products which comply with the "underwaterproof" standard guarantee the user a high resistivity in wet to humid environments and demonstrate durable, robust quality and functionality.

#### **Test parameters**

| osition of the keyboard: | Common operating position                                      |
|--------------------------|--|
| later level:             | At least 100 cm above the highest point of the keyboard        |
| /ater quality:           | Tap water  |
| /ater temp.:             | Room temperature = 295 K +/- 5 K                               |
| est duration:            | At least 24 hours  |
| perating condition:      | No operation of the keyboard                                   |
| ctuation:                | During the test: 6-fold actuation of at least 10 keys in       |
|                          | intervals of 1 hour in each case                               |
| onnection cable:         | Non-insulated sockets of the connection cable which are facing |
|                          | away from the keyboard are not immersed into water             |
| unctionality test:       | Upon completion of the test, the keyboard has to be            |
|                          | fully functional   |
| isual inspection:        | Upon completion of the test, no changes on the keyboard        |
|                          | may be detectable  |
|                          |  |

# Key Technology & Mounting Types



#### Short travel keys

Mechanical switch elements used in industrial keyboards with a key travel of 0.3 mm and an actuation force of 3 N. These rugged keys are rated for up to 3 million operations per key. Short travel keys are used in all models of the TKS series as well as in special models of other series.



#### Gold plated domes

Mechanical switch elements that – as slightly curved metal domes – make contact with the PCB when being actuated. The advantage of the metal domes is their low height. This allows for a very flat keyboard design. The keyboards can be installed in extremely flat panels.



#### Flexible membrane keys

Flexible membrane keyboards are equipped with polyester foils printed with conductive silver paste. The upper and lower switch membranes are separated by means of spacer foil. A palpable key separation due to rim or key embossing ensures a good tactile feedback.



#### Metal keys

Metal keys which are primarily used for the TKV series are actually silicone keys. The difference is that silicone keys are provided with metal key caps which cannot be levered out. This is ensured by a brim on the bottom side of the cap, which anchors the cap firmly to the front panel.



#### Silicone keys

Silicone keys have carbon pills on the bottom side that make contact with the PCB after being actuated. The keys provide a pleasant tactile feedback and a very low noise level. Silicone keys are available in different shapes, colours and with different actuation forces and key travels. In large quantities they are very cost-efficient.



#### Long travel keys

They are used as mechanical switch elements in conventional PC keyboards. Long travel keys have a key travel of more than 3 mm. They require an actuation force of only 0.6 N. These keyboards are suited for the input of large amounts of data.

#### Housing version

Desktop versions can be used as so-called standalone versions. They are suited for places where a stable and even surface is available. Due to the plastic knobs on the bottom side of the device, they are skid-proof. One of the advantages of desktop versions is their application flexibility. They can be connected to systems with standard interfaces (PS/2, USB) without any problems.



#### Front mounted version

The most frequently used integration method for keyboards and cursor controls is the so-called MODUL variant. The studs on the rear side allow a comfortable installation into almost every system of any type. Due to the seals (included in delivery) lying underneath, a high IP protection level is guaranteed.



#### Rack mounted version (front panel)

Front panel versions are mainly used for integrating data input devices into 19-inch racks or 19-inch drawers. The mounting holes on the sides of the front panel allow a comfortable installation of the device. The keyboards are standardized according to the RU (Rack units; 1 RU = 44.45 mm) of the 19" system (1" = 25.4 mm).



THE

#### Drawer version

In the product line of foil covered industrial keyboards, so-called keyboard/drawer systems are available. Due to their compact size they are suited for the application in 19-inch mounting systems. The low mounting height of 1 RU (1 RU = 44.45 mm) requires only little space. The extracted drawer has an angle of about 15 degrees allowing for comfortable operation in standing position.

#### **VESA** version

The mounting of electronic devices to the wall, the ceiling or to panels is subject to the so-called VESA standard. The back side of the device is equipped with four insert nuts for installing the bolts. The distance between the mounting holes corresponds to a standardized matrix (usually 75 x 75 mm). This mounting method includes the assembly and system integration of desktop devices.

