a world of switching capabilities

Switch panels

APEM
www.apem.com
Since its creation in 1952, APEM has become over the years a leading manufacturer of switches, switch panels and joysticks. The group is established worldwide with its 7 subsidiaries and a sales network of more than 130 distributors and agents on five continents. Its production sites are located in Europe, North Africa, North America and Asia.

One of APEM’s major assets is a production mode integrating all design and manufacturing stages, along with the fabrication of specific tooling. This strategic choice allows the company to rapidly meet its customers’ needs for quality products.

A MANUFACTURER OF PROFESSIONAL SWITCH PANELS

Thanks to a 30 years’ experience in the design and manufacturing of switch panels, APEM has developed a specific expertise recognised by its numerous customers. Its quality standards have resulted in the ISO 9001 certification, 2000 version. Unless otherwise requested, all APEM switch panels are RoHS compliant.
Each switch panel is developed to customer’s specifications for a dedicated application. APEM offers several technologies suitable for multiple applications fields, from professional industrial equipment to vending machines through military equipment and engines.

The advantages of each technology are featured on the following pages. The choice of a technology depends on the final destination of the equipment, the specifications level, the usage of the switch panel...

For some very specific applications, APEM can integrate several technologies in the same interface.
MEMBRANE SWITCH PANELS

Membrane switch panels carry out switching functions and enhance the final product with a tailored decorative appearance. They can be directly connected to the electronic equipment by a flexible tail termination. They consist of several layers of polyester and adhesive.

- Ease of customization
- Security / reliability
- Simple construction
- Ease of cleaning
- Ease of mounting by adhesive
- Sealing
- Good quality / price ratio

Options
(See details page 18)
**Advantages**

Rubber keypads consist of a silicone overlay mounted over a flexible or rigid circuit. Overlay customization is obtained by silk-screen printing, laser etching or material coloration. Different types of coating (matt, glossy, epoxy) are available to protect the graphics. This technology provides a specific tactile feel and is suitable for large production runs.

- Soft feel
- High tactile feedback (0.8 to 1.5 mm travel)
- Long life
- Dust and water sealing
- Excellent quality / price ratio

### Mechanical Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact force</td>
<td>0.3 to 2.5 N</td>
</tr>
<tr>
<td>Contact travel</td>
<td>0.5 to 2.5 mm</td>
</tr>
<tr>
<td>Operation</td>
<td>depending on contact</td>
</tr>
</tbody>
</table>

### Climatic Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>20°C to +60°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-30°C to +85°C</td>
</tr>
<tr>
<td>Front face sealing</td>
<td>IP 65</td>
</tr>
</tbody>
</table>

### Electrical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum operating voltage</td>
<td>24 V</td>
</tr>
<tr>
<td>Maximum operating current</td>
<td>30 mA</td>
</tr>
<tr>
<td>Contact resistance</td>
<td>&gt; 100 Mohms</td>
</tr>
<tr>
<td>Contact bounce</td>
<td>depending on key shape</td>
</tr>
<tr>
<td>Contact force</td>
<td>0.1 to 200 ohms</td>
</tr>
<tr>
<td>Contact travels</td>
<td>0.8 to 3.5 mm</td>
</tr>
<tr>
<td>Type of contact</td>
<td>carbon / carbon, stainless steel / carbon, stainless steel / gold, carbon / gold, silver / gold, stainless steel / silver, stainless steel / silver, stainless steel / gold, carbon / carbon, stainless steel / stainless steel</td>
</tr>
<tr>
<td>Operations</td>
<td>depending on contact</td>
</tr>
</tbody>
</table>

### Options

- Integrated components
- EMC protection
- Chemical resistance
- Backlighting
- Support

**Options** (See details page 16)
Stainless steel keypads and keyboards are particularly resistant to harsh environments: extreme climatic conditions, vandalism, stains... They consist of customised stainless steel single keys mounted in a front panel.

APEM designs and manufactures three series meeting EMC international standards and featuring good tactile feedback and IP65 front face sealing.

### Advantages
- **Long-travel keys** (rapid data entry)
- Laser marking
- PS2-USB interface

### Mechanical Specifications
- **Contact force:** 1.5 N +/- 20 %
- **Contact travel:** 1.3 mm
- **Operations:** 1 000 000
- **Sealing:** IP 65
- **Track ball:** IP 65 static
- **Maximum voltage:** 12 VDC
- **Maximum current:** 10 mA
- **Contact resistance:** 8 to 20 ohms
- **Dielectric strength:** 250 V
- **Insulation resistance:** > 100 M ohms

### Electrical Specifications
- **Maximum voltage:** 24 VDC
- **Maximum current:** 50 mA
- **Contact resistance:** < 10 ohms
- **Dielectric strength:** 250 V
- **Insulation resistance:** > 100 M ohms

### Climatic Specifications
- **For all types**
  - **Operating temperature:** -20°C/+70°C
  - **With standard interface:** 0°C/+70°C
  - **With specific interface:** -20°C/+70°C
  - **Storage temperature:** -40°/+85°C

### Stainless Steel Keypads and Keyboards
- **8P Series**
  - **Mechanical specifications**
    - Contact force: 4 N +/- 0.5 N
    - Contact travel: 0.5 mm
    - Operations: 1 000 000
    - Sealing: IP 65
    - Track ball: IP 65 static
    - Maximum voltage: 24 VDC
    - Maximum current: 50 mA
    - Contact resistance: < 10 ohms
    - Dielectric strength: 250 V
    - Insulation resistance: > 100 M ohms
  - **Electrical specifications**
    - Maximum voltage: 24 VDC
    - Maximum current: 50 mA
    - Contact resistance: < 10 ohms
    - Dielectric strength: 250 V
    - Insulation resistance: > 100 M ohms

### Stainless Steel Keys and Front Face
- **Silicone film**
- **Printed circuit**
- **Stainless steel dome**
- **Stainless steel keys on support**
- **Silicone film**
- **Printed circuit**
- **Stainless steel dome**
- **1,2 or 4 led**

### For Harsh Environments
- **For harsh environments**
- **Backlighting**
- **Modularity**
- **Compact construction:** 16.5 mm min. key spacing
- **Laser marking or chemical etching**

### For Semi-Protected Environments
- **70 Series**
  - **Mechanical specifications**
    - Contact force: 1.5 N +/- 20 %
    - Contact travel: 1.3 mm
    - Operations: 1 000 000
    - Sealing: IP 65
    - Track ball: IP 65 static
    - Maximum voltage: 12 VDC
    - Maximum current: 10 mA
    - Contact resistance: 8 to 20 ohms
    - Dielectric strength: 250 V
    - Insulation resistance: > 100 M ohms

### For External Environments
- **9 Series**
  - **Mechanical specifications**
    - Contact force: 2.5 to 4 N +/- 0.5 N
    - Contact travel: 0.5 mm
    - Operations: 3 000 000
    - Sealing: IP 65
    - Track ball: IP 65 static
    - Maximum voltage: 12 VDC
    - Maximum current: 10 mA
    - Contact resistance: 8 to 20 ohms
    - Dielectric strength: 250 V
    - Insulation resistance: > 100 M ohms
The design modularity of this product line and its capability to meet stringent requirements have resulted in the recognition of APEM as a leading manufacturer of high quality fully customised stainless steel keypads and keyboards.

Numerous configurations

The design modularity of this product line and its capability to meet stringent requirements have resulted in the recognition of APEM as a leading manufacturer of high quality fully customised stainless steel keypads and keyboards.

MODULARITY

Round, square, rectangular

Laser marking

Chemical etching (colours available)

Supply voltage: +5, +12, +24 VDC
Max. current for a backlit key:
8 series: 10 to 40 mA
9 series: 10 to 20 mA
depending on LED colour, number of LED’s and supply voltage.

BACKLITTING

8 series - 9 series

By LED (white, red, green, yellow, blue)

From standard keys, APEM can develop specific keypads and keyboards without expensive tooling costs for the customer.

STAINLESS STEEL KEYPADS AND KEYBOARDS

Numerous configurations

The design modularity of this product line and its capability to meet stringent requirements have resulted in the recognition of APEM as a leading manufacturer of high quality fully customised stainless steel keypads and keyboards.

KEY MARKING

70 series

Laser marking

8 series - 9 series

Chemical etching (colours available)

KEY SHAPES

70 series

Oblong

8 series - 9 series

Round, square, rectangular
In addition to the switching function, specific switch panels incorporate several other functions such as: illumination by LED, backlighting with one or two intensity levels, EMC protection, sealing, connection, support, mounting...

APEM’s expertise in varied and complementary technologies allows the company to offer multifunction solutions at optimal cost.

The following examples illustrate the most frequently requested functions.

**Advantages**

- Large keys with raised markings
- Stainless steel or aluminium keys, overmolded in translucent polycarbonate
- Raised legends or symbols
- Backlighting by LED’s
- Printed circuit with metal snap domes
- Support plate with mounting accessories

**EMC Protection**

- Polyester graphics overlay
- EMC protection by metal grid
- Plunger / diffuser of translucent polycarbonate
- Backlighting by LED’s
- Printed circuit with metal snap domes

**Advantages**

- Polyester graphics overlay
- EMC protection by metal grid
- Plunger / diffuser of translucent polycarbonate
- Backlighting by LED’s
- Printed circuit with metal snap domes

**Sealed Construction**

- Polyester overlay stuck on a plastic support
- Rubber keypad providing front face sealing
- Printed circuit including metal snap domes and backlighting LED’s
- Electrical connection by cables and connectors
- Rear sealing by injection of resin
- Mechanical part serving as support and fixation
- Integrated microprocessor allowing multiplexing and RS 485 connection
**Specific Switch Panels**

High performance versions for military and aeronautic applications

High performance switch panels withstand even more stringent requirements in embedded applications. These switch panels feature extreme electrical, mechanical and climatic resistance, according to the most demanding standards.

A few examples are shown below.

- **Advantages**
  - Front face equipped with a finger location plate ensuring precise key operation
  - EMC protection by metal grid or metallized plastic parts
  - Translucent plunger / diffuser allowing dome actuation and backlighting diffusion
  - Printed circuit incorporating metal snap domes inserted in a casing, backlighting LED's and connection devices
  - Support plate allowing the assembly of the various parts

- **Available options:**
  - Mounting of switches or security caps, associated electronics, key encoding, etc.

- **Technology**
  - Addition of a security cap intended to prevent unintentional actuation of some keys.
  - Addition of a toggle switch and an accessory preventing accidental toggle actuation.
  - Transparent window with EMC protection by metal grid.
A LARGE CHOICE OF OPTIONS FOR YOUR SWITCH PANELS

HOW TO CHOOSE BETWEEN POLYESTER AND POLYCARBONATE?

POLYESTER is recognized for its excellent durability and chemical resistance. It is available in matte textured, anti-glare transparent or glossy transparent finish. It provides excellent transparency of window areas.

POLYCARBONATE allows higher key embossing. Moreover, it has good flammability properties (UL 94 V2).

BACKLIGHTING
Backlighting of either the keys or their background by integrated LED’s is available.

INTEGRATED COMPONENTS
The integration of SMT components and LED’s to switch panels spares an additional printed circuit board, while preserving a small thickness and front face sealing.

EMBOSSING
A specific tooling allows front face embossing to obtain prominent shapes: key surrounds, dots on keys, lines or curves enhancing the design.

REINFORCED SEALING/ CHEMICAL RESISTANCE
To obtain a sealed panel or a specific chemical resistance, several options are available, such as sealing blocks, specific materials, etc.

EMC PROTECTION
APEM offers a comprehensive range of shielding for all types of switch panels, including those with transparent windows.

SPECIAL SNAP DOMES
APEM’s snap dome offering includes different shapes and forces.

CHANGEABLE LEGENDS
For easy customization of your switch panels, APEM proposes pockets accepting changeable legend strips with different languages, logos or pictograms.

SPECIAL CUTTING OF TAIL CONNECTION
For tail connections with a 2.54 mm track pitch, standard cutting and positioning tolerances are +/- 0.2 mm. For a 1 or 1.25 mm track pitch, it may be necessary to have tolerances of +/- 0.1 mm. In this case, APEM utilizes an optical aim tool.

FINGER LOCATION PLATE
A machined polycarbonate or aluminium plate can be fixed to the graphics overlay to facilitate finger location and prevent accidental actuation.

TEXTURE VARNISH
A varnish providing a textured finish can be selectively applied to the graphics overlay, leaving some areas or windows free of texture to keep their glossy or transparent aspect. The matt/glossy contrast enhances panel cosmetics.

MECHANICAL FIXATION
All kinds of fixation accessories (crimped studs, screwed stand-offs, etc.) can be supplied on request.

ASSOCIATED ELECTRONICS
According to your specifications, specific associated electronics (PS2-RS232-USB) can also be supplied.

HEATER
For applications in external environments, a heater can be added to provide for a positive temperature. Mainly used on stainless steel keyboards.

SUPPORT
Our switch panels can be mounted on a plastic or metal support, designed to customer’s specifications.

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