a world of switching capabilities

APEM SWITCH PANELS



APEM

APEM, A WORLD OF SWITCHING CAPABILITIES

APEM is a worldwide manufacturer of switches and switch panels.

A switch specialist since its creation in 1952, APEM complemented its lines, in the 1980,s, with the production of switch panels and specific interfaces.

The company has 13 subsidiaries and a sales network of more than 130 distributors and agents on the five continents. Its production sites are located in Europe, North Africa, North America and Asia.

A MANUFACTURER OF PROFESSIONAL SWITCH PANELS

The switch panel is a decorative element, since it represents all or part of the equipment front panel. It is also a switching element: its design and manufacturing require faultless reliability, just like that of professional switches. Quality throughout the production process resulted in the ISO 9001 certification, 2000 version.



VERTICAL INTEGRATION FOR CUSTOMER SERVICE

One of APEM's major assets is, without doubt, 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.

SWITCH PANEL PROCESS

Design





Assembly
Wiring

CNC machining





Metrology
Tests

Silk-screen printing





Test
laboratory

Embossing



Die-cutting



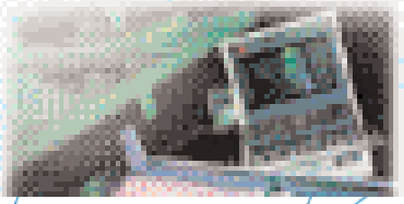
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TECHNOLOGIES ADAPTED TO MULTIPLE APPLICATIONS

Each switch panel is developed to customer's specifications for a specific application.

APEM offers several technologies covering 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.

Traditional applications

INSTRUMENTATION
Energy distribution, remote transmission, portable test set, radiation measurement, speed variation, dosage chain.....

MEDICAL
Syringe pump, remote control for beds, incubator control panel, re-education equipment...

TIME MANAGEMENT
Attendance clock, time-stamp, sport results display, taxis...

REMOTE CONTROLS
For gate opening, lighting control, projectors...

WEIGHING SYSTEMS
Industrial weighing machine, kitchen scales, bathroom scales, stamping machine...

HOUSEHOLD APPLIANCES
Cooking hob, extractor hood, coffee maker, microwave oven, television set, refrigerator...

Applications in harsh environments

ACCESS CONTROL
Residential controller, car park entry, toll...

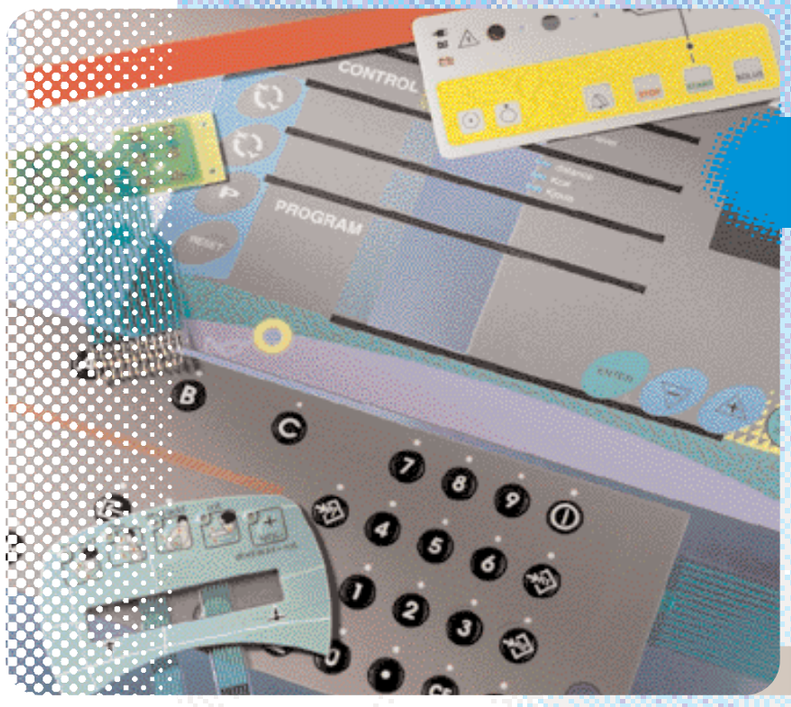
INTERACTIVE KIOSKS
For information, Internet...

VENDING MACHINES
ATM, ticket, fuel or drink dispenser, self-service night grocery...

MILITARY EQUIPMENT AND ENGINES
Dash board, control case, tyre pressure supervision, communication, GPS, guidance...

LIFTS
Control panel, call button...

CHEMICAL, OIL AND FOOD INDUSTRIES
Equipment exposed to stains, corrosive materials, extreme temperatures...



MEMBRANE SWITCH PANELS

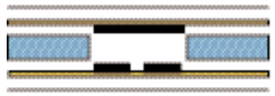
Membrane switch panels carry out switching functions and enhance the final product with a tailored decorative appearance. They can be directly connected to the electronic equipment by a flexible tail termination. They consist of several layers of polyester and adhesive.

Advantages

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



WITHOUT TACTILE FEEDBACK



mechanical specifications

Contact force:	2 N
Contact travel:	0.21 mm +/- 15 %
Type of contact:	silver ink
Operations:	10 000 000

climatic specifications

Operating temperature:	-25° to + 65°C
Storage temperature:	- 30° to + 85°C
Front face sealing:	IP 65

WITH TACTILE FEEDBACK by snap dome



mechanical specifications

Contact force:	2.5 N
Contact travel:	0.48 mm +/- 15 %
Type of contact:	stainless steel dome + silver ink
Operations:	1 000 000

climatic specifications

Operating temperature:	-25° to + 65°C
Storage temperature:	- 30° to + 85°C
Front face sealing:	IP 65

WITH TACTILE FEEDBACK by embossing



mechanical specifications

Contact force:	1 to 4 N +/- 30 %
Contact travel:	0.5 to 1 mm +/- 15%
Type of contact:	silver ink
Operations:	1 000 000

climatic specifications

Operating temperature:	-25° to + 40°C
Storage temperature:	- 30° to + 70°C
Front face sealing:	IP 65

electrical specifications for the 3 types

Nominal operating voltage:	24 V
Maximum operating voltage:	50 V
Minimum operating voltage:	1 V
Nominal intensity:	30 mA
Maximum switchable power:	500 mW
Contact circuit resistance:	1 ohm/cm (1 mm track)
Dielectric strength:	250 V rms
Insulation resistance at 100 V:	> 100 Mohms
Maximum contact bounce:	< 5 ms
Compatible with TTL and CMOS circuits	

Options

(See details page 18)


Texture varnish


Integrated components


Embossing


Changeable legends


EMC protection


Special cutting of tail connection


Reinforced sealing


Special snap dome


Support



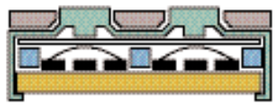
RUBBER KEYPADS

Rubber keypads consist of a silicone overlay and 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 is adapted to applications where the need for tactility is important and for large production runs.

Advantages

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

TECHNOLOGY



mechanical specifications

Contact force:	0.3 to 2.5 N
Contact travel:	0.8 to 3.5 mm
Type of contact:	carbon / carbon, silver / silver, stainless steel / silver, carbon / gold, silver / gold, stainless steel / gold
Operations:	1 000 000 to 10 000 000 depending on contact

climatic specifications

Operating temperature:	-25° to + 65°C
Storage temperature:	- 30° to + 85°C
Front face sealing:	IP 65

electrical specifications

Maximum operating voltage:	24 V
Maximum operating current:	30 mA
Contact resistance:	between 0.1 ohm and 200 ohms, depending on contact
Insulation resistance:	> 100 Mohms
Contact bounce:	depending on key shape



Options

(See details page 18)

EMC protection

Backlighting

Support

STAINLESS STEEL KEYPADS AND KEYBOARDS

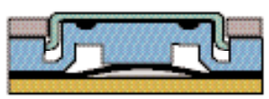


Stainless steel keypads and keyboards are particularly resistant to harsh environments: extreme climatic conditions, vandalism, stains... They consist of customised stainless steel single keys mounted in a front face.
APEM develops and sells five series meeting EMC international standards and featuring good tactile feedback and IP65 front face sealing. Technology and key shape make the difference between the series.

Advantages

7 AND 70 SERIES
for semi-protected environment

7 series



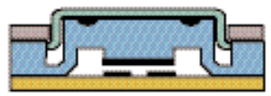
- Stainless steel keys and front face
- Rubber keypad
- Printed circuit
- Stainless steel dome

7
- Oblong keys
- Laser marking
- PS2-USB interface

mechanical specifications	
Contact force:	0.4 N +/- 0.5 N
Contact travel:	0.5 mm
Operations:	1 000 000
Sealing:	IP 65
Track ball:	IP 65 static

electrical specifications	
Maximum voltage:	24 VDC
Maximum current:	50 mA
Contact resistance:	< 10 ohms
Dielectric strength:	250 V
Insulation resistance:	> 100 M ohms

70 series



- Stainless steel keys and front face
- Rubber keypad
- Printed circuit
- Carbon contact

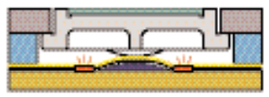
70
- Long-travel keys (rapid data entry)
- Laser marking
- PS2-USB interface

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

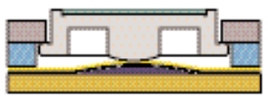
electrical specifications	
Maximum voltage:	12 VDC
Maximum current:	10 mA
Contact resistance:	8 to 20 ohms
Dielectric strength:	250 V
Insulation resistance:	> 100 M ohms

8P AND 8Z SERIES
for semi-protected environment

8P series



8Z series



- Stainless steel front face
- Stainless keys on support
- Silicone film
- Printed circuit
- Stainless steel dome

8P
- Backlighting
- Modularity
- Compact construction: 16.5 mm min. key spacing
- Laser marking or chemical etching

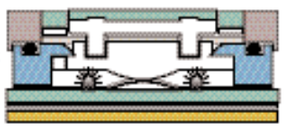
8Z
- Prominent keys
- Modularity
- Encryption option
- Laser marking or chemical etching

mechanical specifications	
Contact force:	0.4 N +/- 0.5 N
Contact travel:	0.5 mm
Operations:	1 000 000
Sealing:	IP 65
Track ball:	IP 65 static

electrical specifications	
Maximum voltage:	24 VDC
Maximum current:	50 mA
Contact resistance:	< 10 ohms
Dielectric strength:	250 V
Insulation resistance:	> 100 M ohms

9 SERIES
for external environments

9 series



- Stainless steel keys and front face
- Silicone film
- Printed circuit
- Stainless steel dome

9
- For harsh environments
- Backlighting
- Modularity
- Chemical etching
- Encryption option

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

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°/ + 70°C
With standard interface:	0°/+ 70°C
With specific interface:	- 20°/ + 70°C
Storage temperature:	- 40°/+ 85°C



STAINLESS STEEL KEYPADS AND KEYBOARDS

Numerous configurations

The five series offered by APEM not only meet the needs for standard keypads and keyboards, but also the needs for customised products with specific number of keys and key layout. Depending on the series, standard keys differ in shape and dimension; in all cases, custom marking is available. The APEM range also includes stainless steel keypads and keyboards with backlighting by LED's.

KEY SHAPES

7 series - 70 series

Oblong



8 series - 9 series

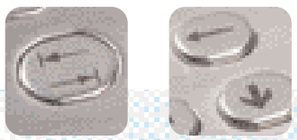
Round, square, rectangular



KEY MARKING

7 series - 70 series

Laser marking



8 series - 9 series

Chemical etching (colours available)



BACKLIGHTING



8 series - 9 series

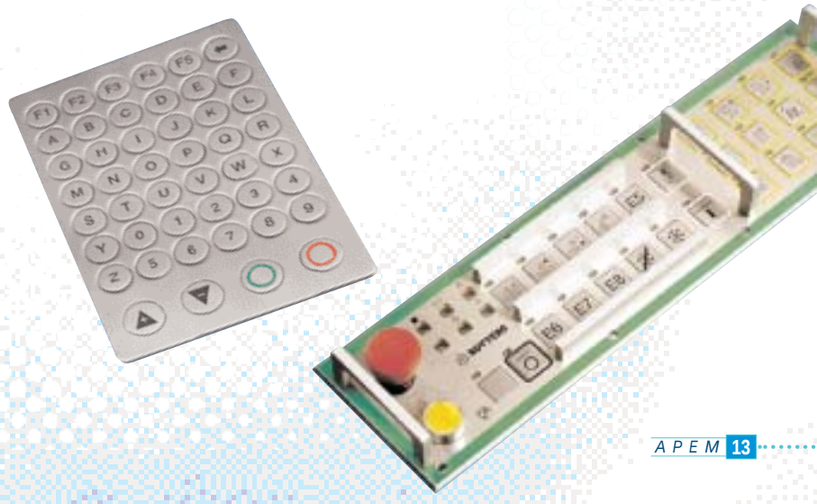
By LED (white, red, green, yellow, blue)

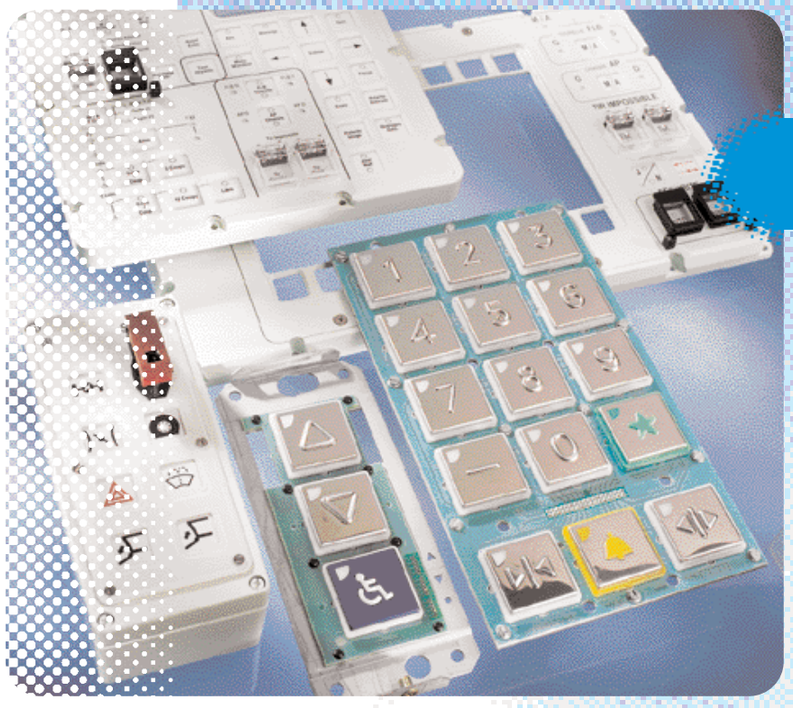
Supply voltage: + 5, + 12, + 24 VDC
Max. current for a backlit key:
8 series: 10 to 40 mA
9 series: 10 to 20 mA
depending on LED colour, number of LED's and supply voltage.

MODULARITY

8 series - 9 series

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





SPECIFIC SWITCH PANELS

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 propose multifunction solutions at optimal cost.
The following examples illustrate the most frequently requested functions.

LARGE KEYS with raised markings



Advantages

- 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



Advantages

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

BACKLIGHTING by LED's



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



Advantages

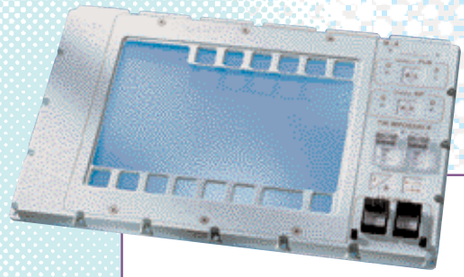
- Polyester overlay stuck on a plastic support
- Rubber keypad providing front face sealing
- Printed circuit including metal snap domes and backlighting LED's
- Electrical connection by cables and connectors
- Rear sealing by injection of resin
- Mechanical part serving as support and fixation
- Integrated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



SPECIFIC SWITCH PANELS

High performance versions for military and aeronautic applications

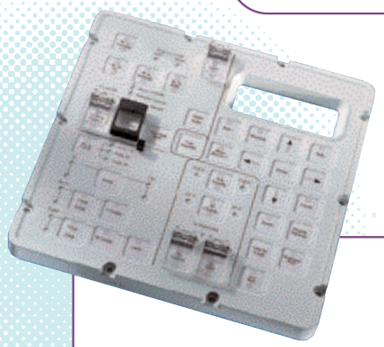
High performance switch panels carry out the same functions as the other specific switch panels, but feature higher electrical, mechanical and climatic resistance, according to the most stringent standards (GAM EG13...).
They are developed and manufactured to customer's specifications.



Transparent window with EMC protection by metal grid.

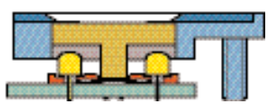


Addition of a toggle switch and an accessory preventing accidental toggle actuation.



Addition of a security cap intended to prevent unintentional actuation of some keys.

TECHNOLOGY



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.

A LARGE CHOICE OF OPTIONS FOR YOUR SWITCH PANELS

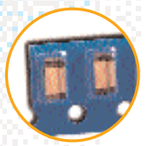
YOU HESITATE BETWEEN POLYESTER AND POLYCARBONATE?

POLYESTER is recognized for its excellent durability and chemical resistance. It is available in matt 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 94V2).



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 membrane 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
Membrane switch panels naturally feature front face sealing.
To obtain a sealed panel-to-support assembly, several options are available, such as sealing blocks.



CEM PROTECTION
The requirements of international standards in matter of electro-magnetic compatibility becoming more stringent, APEM offers a comprehensive range of shielding for all types of switch panels, including those with transparent windows.



SPECIAL SNAP DOMES
The most commonly used tactile feedback is obtained with a stainless steel snap dome featuring a 2.5 N contact force. APEM's snap dome offering includes different shapes and forces. The stainless steel snap domes can be gold plated for very low contact resistance.



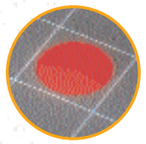
CHANGEABLE LEGENDS
For easy customization of your switch panels, APEM proposes to incorporate pockets accepting changeable legend strips with different languages, logos or pictograms.



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 a specific 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 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 or standard associated electronics (PC-AT-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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