

# APEM

TECLADOS PIEZOELECTRICOS



ERMEC, S.L. BARCELONA  
C/ Francesc Teixidó, 22  
E-08918 Badalona  
(Spain)

Tel.: (+34) 902 450 160  
Fax: (+34) 902 433 088  
[info@ermec.com](mailto:info@ermec.com)  
[www.ermec.com](http://www.ermec.com)

ERMEC, S.L. MADRID  
C/ Sagasta, 8, 1ª planta  
E-28004 Madrid  
(Spain)

PORTUGAL  
[portugal@ermec.com](mailto:portugal@ermec.com)  
BILBAO  
[bilbao@ermec.com](mailto:bilbao@ermec.com)

## Apem Italia Piezoelectric keypads

The APEM Piezoelectric keypads are based on the Piezoelectric effect of the “Piezo sensor”, and it just needs few  $\mu\text{m}$  of movement on the front surface to produce a usable switching voltage or charge. In fact, rather than being it a physical movement, it is simply a light force applied that generates an output from the switch element.

The single switches are connected in a Matrix pattern to achieve a reduced number of output connection on the PCB boards. The output voltage of each piezo sensor generates a “short circuit” between one line and one column of the matrix by an integrated electronic circuit.

In the un-actuated condition the piezoceramic switch is in a high-impedance state and it has an output resistance greater than 5 M Ohms; when it is actuated the output resistance is reduced to a value smaller than 7,5 Ohms, then the switching action is comparable to a conventional mechanical switch.



ERMEC, S.L. BARCELONA  
C/ Francesc Teixidó, 22  
E-08918 Badalona  
(Spain)



Tel.: (+34) 902 450 160  
Fax: (+34) 902 433 088  
[info@ermec.com](mailto:info@ermec.com)  
[www.ermec.com](http://www.ermec.com)

ERMEC, S.L. MADRID  
C/ Sagasta, 8, 1ª planta  
E-28004 Madrid  
(Spain)

PORTUGAL  
[portugal@ermec.com](mailto:portugal@ermec.com)  
BILBAO  
[bilbao@ermec.com](mailto:bilbao@ermec.com)



The negligible physical movement also removes any wear-out mechanism: piezoelectric switches have been tested for 10 million operations but in practice they have unlimited life. Neither is there any possibility of wear-out through sparks being generated and subsequent oxidation of contacts or other conductive elements within the switch.

The choice of overlay materials can also take account of the need for moisture, chemical or even radiation resistance. The switches and assemblies are hermetically sealed to a high standard up to IP68.

The construction of the Keypad may vary from a milled solid anodized Aluminum plate to a compound plate for the Stainless Steel versions, and the front face of the panels is seamlessly, flat and totally sealed. In both cases the back panel box of the keypad is made of a high impact injection molded plastic.

ERMEC, S.L. BARCELONA  
C/ Francesc Teixidó, 22  
E-08918 Badalona  
(Spain)



Tel.: (+34) 902 450 160  
Fax: (+34) 902 433 088  
[info@ermec.com](mailto:info@ermec.com)  
[www.ermec.com](http://www.ermec.com)

ERMEC, S.L. MADRID  
C/ Sagasta, 8, 1ª planta  
E-28004 Madrid  
(Spain)

PORTUGAL  
[portugal@ermec.com](mailto:portugal@ermec.com)  
BILBAO  
[bilbao@ermec.com](mailto:bilbao@ermec.com)

The legend of the keys on the front face in the Aluminum version is made of a chemically structured Silkscreen, otherwise in the St. St. version the key's legends are obtained by chemical etching 0,1 mm deep and bi-components ink infilling, then both versions have a very high resistance to wear-out.



ERMEC, S.L. BARCELONA  
C/ Francesc Teixidó, 22  
E-08918 Badalona  
(Spain)

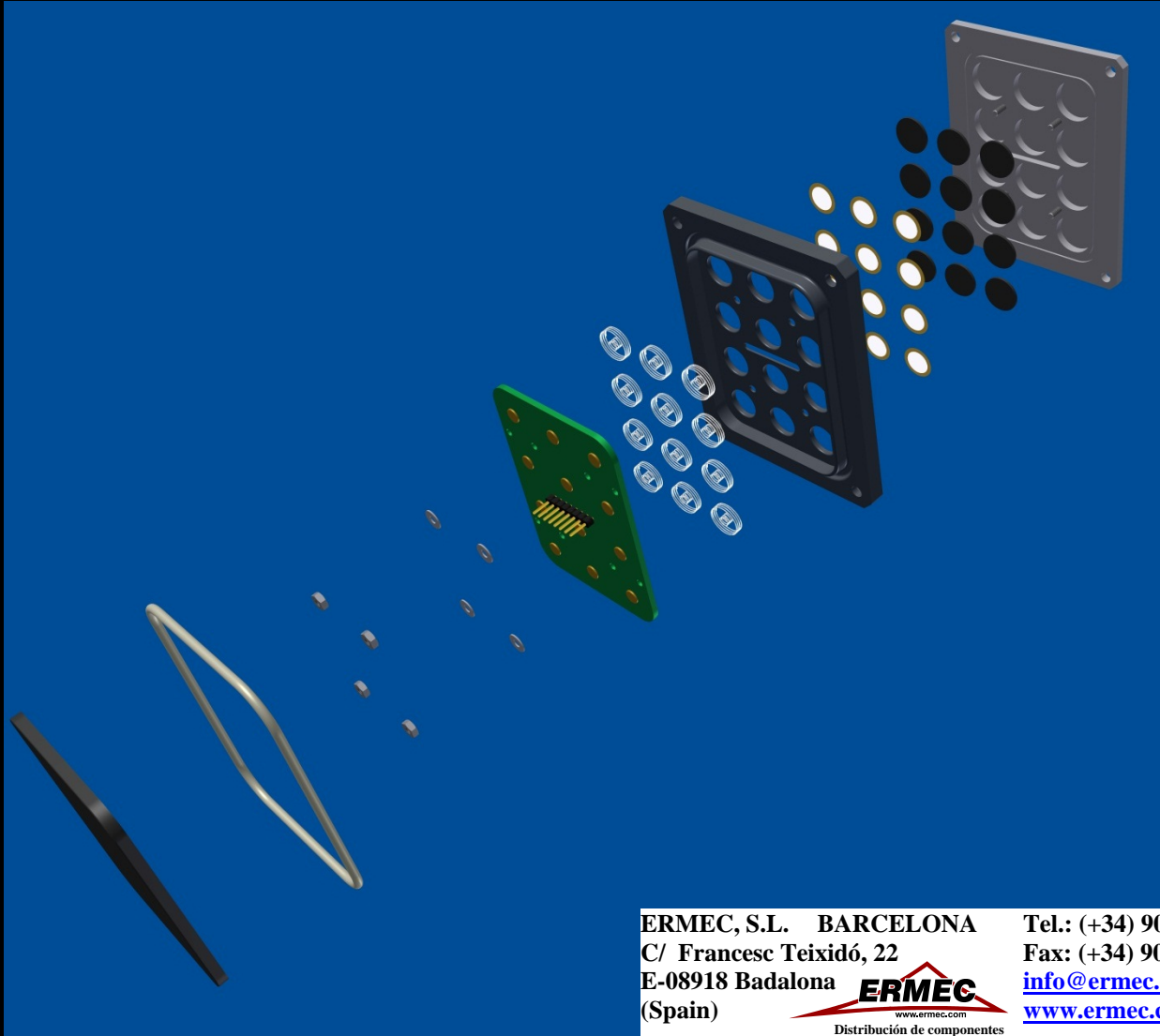


Tel.: (+34) 902 450 160  
Fax: (+34) 902 433 088  
[info@ermec.com](mailto:info@ermec.com)  
[www.ermec.com](http://www.ermec.com)

ERMEC, S.L. MADRID  
C/ Sagasta, 8, 1ª planta  
E-28004 Madrid  
(Spain)

PORTUGAL  
[portugal@ermec.com](mailto:portugal@ermec.com)  
BILBAO  
[bilbao@ermec.com](mailto:bilbao@ermec.com)

The Piezo sensors are firmly bonded to the back side of the front panel through a NBR rubber interface pad which prevents from unwanted actuations derived by vibrations or shock. The electrical interconnection between the Piezo sensors and the PCB is made by two concentric St. St. springs located on each switch and compressed in order to have a good electrical contacts between the parts.



At the end of the assembling all the parts are totally sealed and potted with a specific bi-component elastic resin from the back side to protect the circuitry from the environmental conditions and contaminations.

ERMEC, S.L. BARCELONA  
C/ Francesc Teixidó, 22  
E-08918 Badalona  
(Spain)



Tel.: (+34) 902 450 160  
Fax: (+34) 902 433 088  
[info@ermec.com](mailto:info@ermec.com)  
[www.ermec.com](http://www.ermec.com)

ERMEC, S.L. MADRID  
C/ Sagasta, 8, 1ª planta  
E-28004 Madrid  
(Spain)

PORTUGAL  
[portugal@ermec.com](mailto:portugal@ermec.com)  
BILBAO  
[bilbao@ermec.com](mailto:bilbao@ermec.com)

## Electrical Data

Switching Voltage max. [VDC] 24

Switching Current max. [mA] 200

Lifetime electrical: [mill.] 10

Contact bounce time: [ms] <1

Insulation Resistance: (OFF = not actuated)[MΩ] > 5

Initial Contact Resistance: (ON = actuated)[Ω] < 7,5

## Mechanical Data

Actuating Force: [N] 2-4 depending on temperature.

Operating Temperature: [°C] -40 to +85

Storage Temperature: [°C] -40 to +85

IP Protection Class Front and Rear Side: [IP] IP 68

## Other Data

Materials: Front Panel Stainless Steel, Anodized Aluminum.

Lettering: Chemical engraving and Epoxy resin infilling /  
chemically structured and anodized printing.



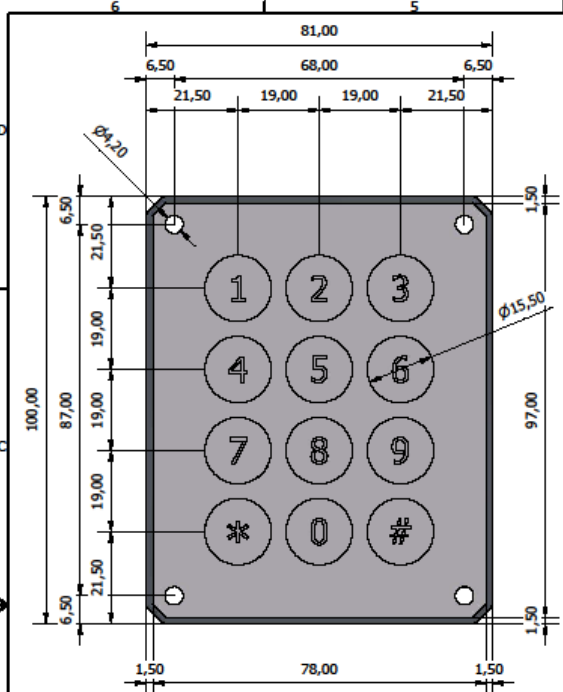
ERMEC, S.L. BARCELONA  
C/ Francisc Teixidó, 22  
E-08918 Badalona  
(Spain)



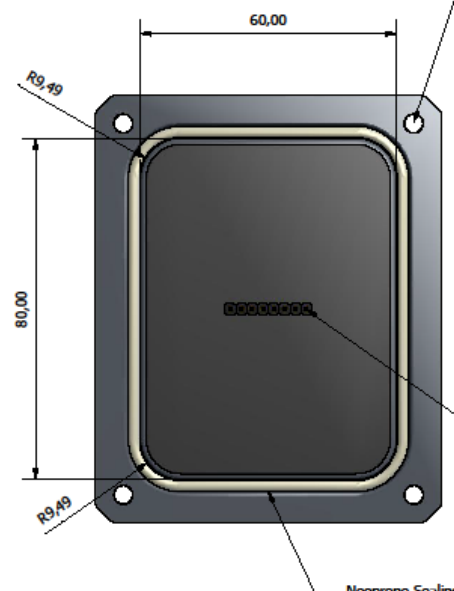
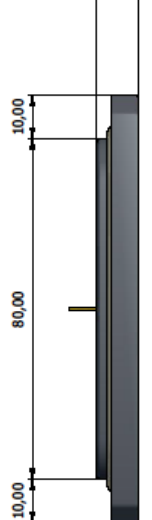
Tel.: (+34) 902 450 160  
Fax: (+34) 902 433 088  
[info@ermec.com](mailto:info@ermec.com)  
[www.ermec.com](http://www.ermec.com)

ERMEC, S.L. MADRID  
C/ Sagasta, 8, 1ª planta  
E-28004 Madrid  
(Spain)

PORTUGAL  
[portugal@ermec.com](mailto:portugal@ermec.com)  
BILBAO  
[bilbao@ermec.com](mailto:bilbao@ermec.com)



### Customer Panel Cut-Out 61 x 81 x n. 4 R=10

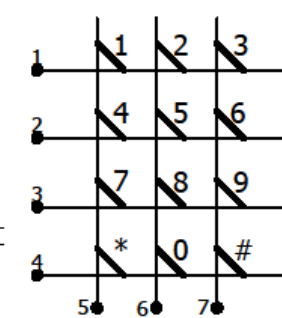
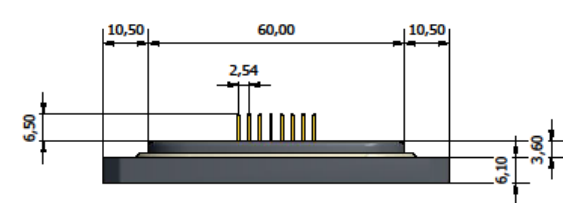
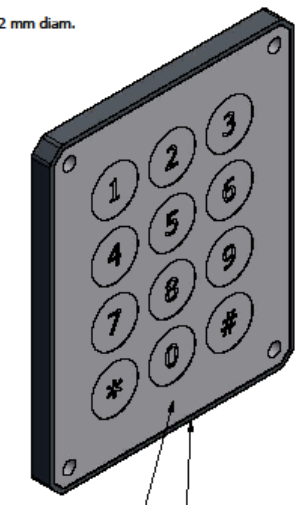


N. 4 fixing holes 4.2 mm diam. for screws M4.

Matrix connector Pin 1

Anodized Aluminum front face

High impact plastic case



Matrix schematic diagram

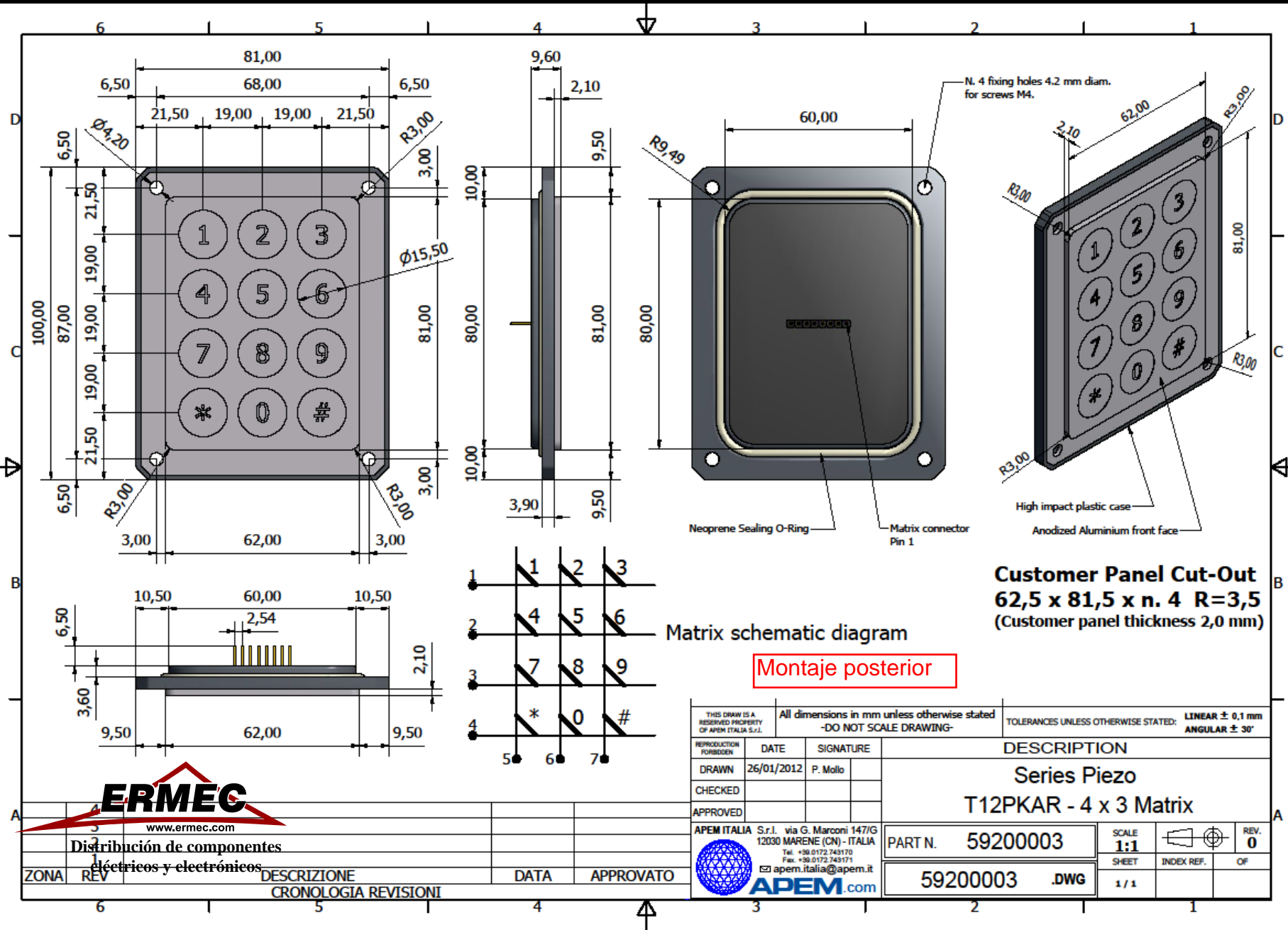
Montaje frontal



www.ermec.com  
Distribución de componentes

ZONA	REV	DESCRIZIONE	DATA	APPROVATO
		CRONOLOGIA REVISIONI		

THIS DRAWING IS A RESERVED PROPERTY OF APEM ITALIA S.r.l.		All dimensions in mm unless otherwise stated -DO NOT SCALE DRAWING-		TOLERANCES UNLESS OTHERWISE STATED: LINEAR ± 0.1 mm ANGULAR ± 30'	
REPRODUCTION FORBIDDEN	DATE	SIGNATURE	DESCRIPTION		
DRAWN	22/03/2011	P. Mollo	Series Piezo T12PKAF - 4x3 Matrix		
CHECKED			PART N. 59200001		
APPROVED			59200001 .DWG		
APEM ITALIA S.r.l. via G. Marconi 147/G 12030 MARENE (CN) - ITALIA Tel. +39 0172 743170 Fax. +39 0172 743171 apem.italia@apem.it			SCALE 1:1	REV. 0	
APEM.com			SHEET 1 / 1	INDEX REF.	OF



**Customer Panel Cut-Out**  
**62,5 x 81,5 x n. 4 R=3,5**  
 (Customer panel thickness 2,0 mm)

Matrix schematic diagram

Montaje posterior

THIS DRAW IS A RESERVED PROPERTY OF APEM ITALIA S.r.l.		All dimensions in mm unless otherwise stated -DO NOT SCALE DRAWING-		TOLERANCES UNLESS OTHERWISE STATED: LINEAR ± 0,1 mm ANGULAR ± 30'	
REPRODUCTION FOREIGNER	DATE	SIGNATURE	DESCRIPTION		
DRAWN	25/01/2012	P. Mollo	Series Piezo		
CHECKED			T12PKAR - 4 x 3 Matrix		
APPROVED			PART N. 59200003		
APEM ITALIA S.r.l. via G. Marconi 147/G 12030 MARENE (CN) - ITALIA Tel. +39 0172 745170 Fax. +39 0172 745171 apem.italia@apem.it			59200003 .DWG		SCALE 1:1
APEM.com			59200003		SHEET 1/1
DESCRIZIONE			DATA		INDEX REF. OF
CRONOLOGIA REVISIONI			APPROVATO		REV. 0



www.ermec.com  
 Distribución de componentes  
 eléctricos y electrónicos

ZONA	REV	DESCRIZIONE	DATA	APPROVATO
6				
5				
4				