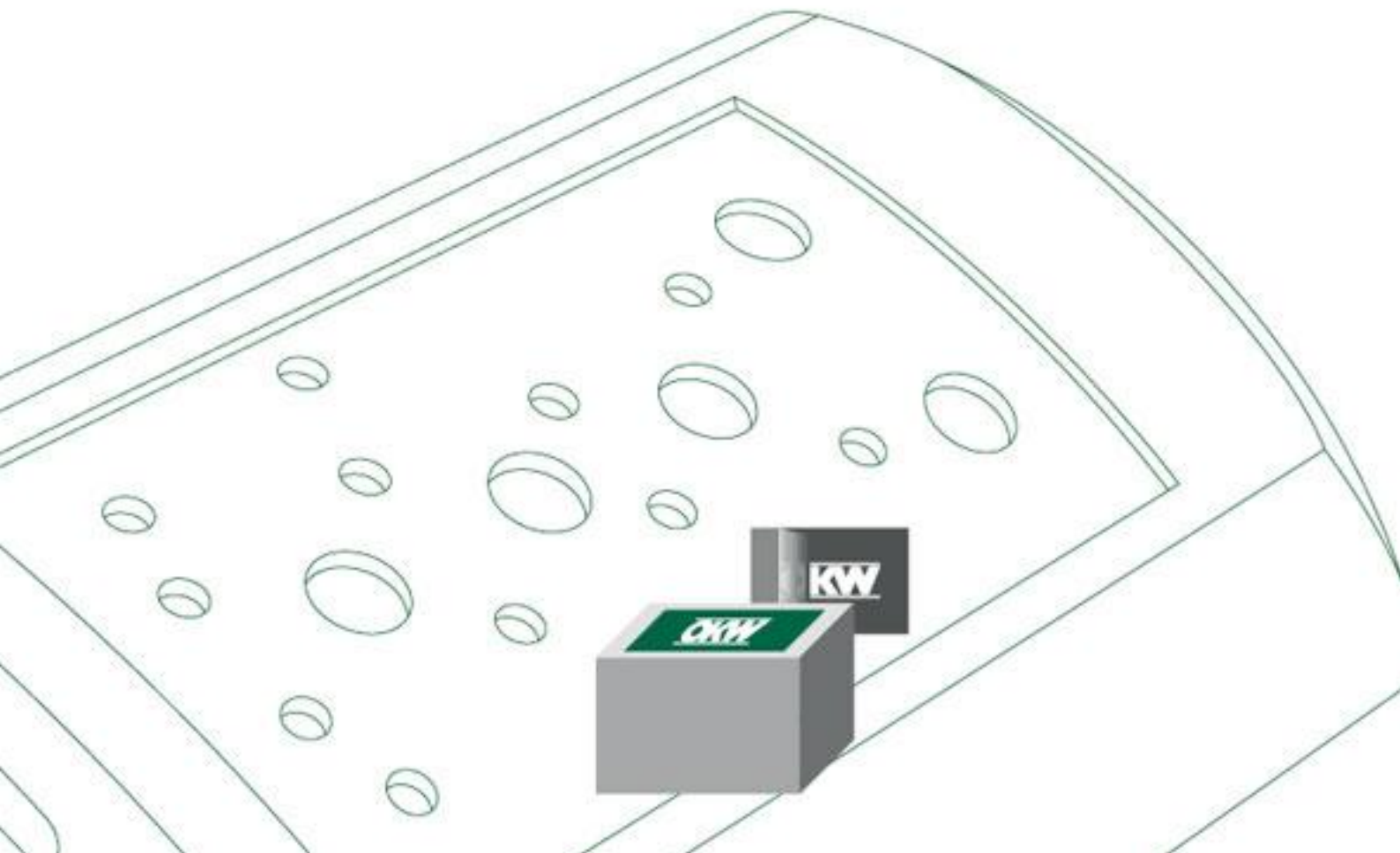


## MEMBRANE KEYBOARDS



## SERVICES

We offer membrane keypads for most applications, e.g. remote controls, machine control systems, medical devices (disinfected applications), electrical units in household and peripheral applications the suitable solution.

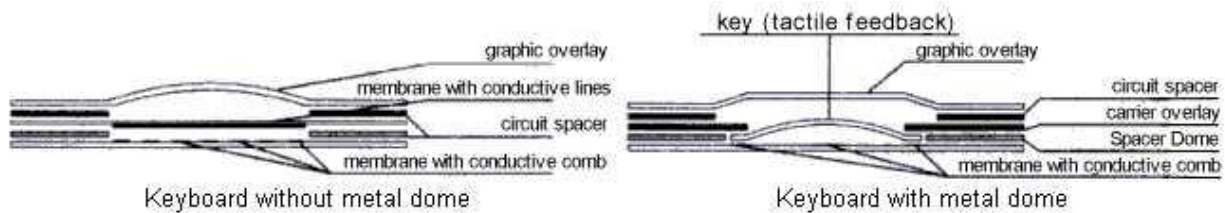
Use our potential and know-how for the supply of your membrane keyboards. We would like to inform you in the following of the quality directives and technical specifications.

## DESIGN EXAMPLES

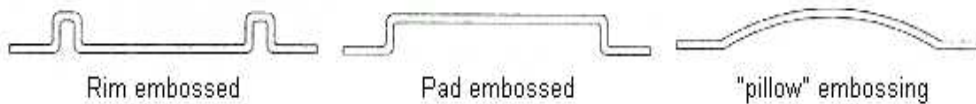


## TECHNICAL POSSIBILITIES

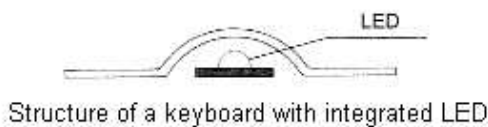
**Keyboard design without metal dome and with tactile feedback using metal domes** (standard with membrane keyboards)



### Embossing types

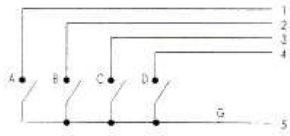


### Integrated LED (only with membrane keyboard)



## Types of connection (only with membrane keyboards)

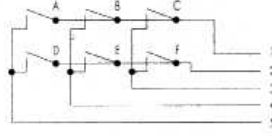
### **Common line**



Interconnection with 4 keys, A – D with common line G (Number of pin = number of keys + 1)

	1	2	3	4	5
A	x				x
B		x			x
C			x		x
D				x	x

### **Matrix**

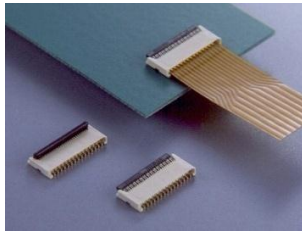
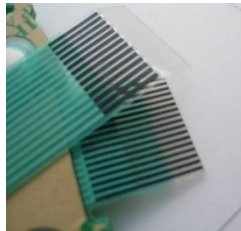


Interconnection with 4 keys as matrix

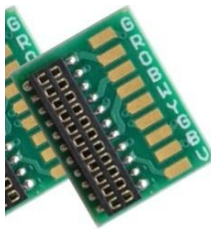
	1	2	3	4	5
A	x				x
B	x			x	
C	x		x		x
D		x			x
E		x		x	
F		x	x		

## Connectors (only with membrane keyboards)

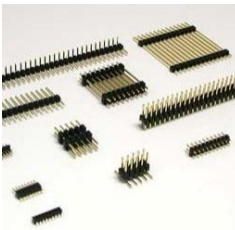
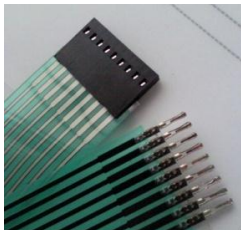
ZIF (**Z**ero**I**nset**F**orce)  
2.54 / 1.25 / 1.0 / 0.5 mm  
Always printed with carbon;  
The tail will be bent over.



Solder contacts  
2.54 mm (male)



Crimp flex standard  
2.54 mm (female)  
For plug-in socket/pin header.

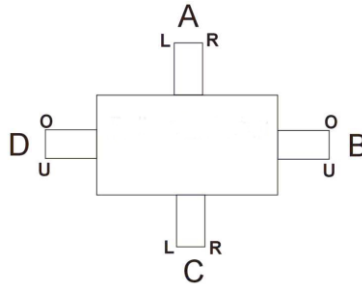


**Connection tail** (only with membrane keyboards)

**Length standard 50 mm**

**Connection position:**     Side A             Side B             Side C             Side D

**Position of PIN 1:**         Left (L)         Right (R)         Top (O)         Bottom (U)



## **EMC shielding**

Shielding of the front side towards the device can be achieved by metallic front plates.

To avoid reactive current, a reliable contact between the front plate and the device is necessary in one (!) place, using a suitable screw or press connection.

The shielding within the keyboard layers is effected by a printed silver lattice or on the entire surface with silver resp. IndiumTinOxide applied on an intermediate layer. The shielding layer is located directly between the overlay foil and the key-switches.

This kind of shielding cannot be used over display windows.

## **Suitable types of layout**

Sketch/drawing, pdf file, Corel-Draw file, dwg/dxf file

## **Unsuitable types of layout**

Image files, for example jpg, bmp, tiff, pcx ...

## **Additional information**

Wiring diagram, key assignment, LED assignment, pin sequence

## **WORKING WITH KEYBOARDS / ASSEMBLY INSTRUCTIONS**

Before lamination, the surface must be free of grease and release agents. Solvents must be used for cleaning, e.g. plastic cleaner. The transfer adhesive used requires a surface roughness of 25 micrometers. A contact pressure of 20 N/cm<sup>2</sup> is sufficient for lamination. Only then may the protective paper be partially removed.

The adhesive edge must be at least 5 mm.

In order to guarantee fitting accuracy of membrane keyboard / enclosure, machining and foil production should be done at OKW. Otherwise, a machined enclosure is to be put at OKW's disposal.

## GENERAL REQUIREMENTS

Lettering	Lettering must be easily legible (minimum line width 0.3 mm).
Characters	Characters must be clearly legible.
Lines and icons	No interruptions are permitted.
Flatness	No kinks or pressure marks are permissible. Detectable bumps in the front foils near the cable exits cannot be ruled out. Inclusions between the various layers must not be visible on the front.
Covering power	The covering power is sufficient if layers and structures underneath are not visible.
General procedure in the event of faults not described here	The permissible deviations must be agreed on between the customer and the manufacturer. The overall impression must correspond with the permissible faults.
Scope	All specifications apply for uninstalled keyboards. Deviations from this quality directive are permissible by arrangement with the customer.

## PRINT QUALITY

### Of opaque printing, transparent colours and window printing.

#### Dirt and dust inclusions / strains / fluff / scoring / scratches

	Normal visual requirements	Enhanced visual requirements
	(class 1)	(class 2)
▶ max. size (mm <sup>2</sup> )	0.25	0.16
▶ max. size (mm <sup>2</sup> ) with weak colour contrast	0.4	0.25
▶ max. number/dm <sup>2</sup>	2	1
▶ minimum interspace (mm)	50	80

For windows smaller than 1dm<sup>2</sup> the max. number of faults applies for the entire window surface, and as minimum interspace: diagonal length (mm) / 2

▶ lower fault limit (mm <sup>2</sup> )	0.063
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#### Scratches

Assessment like surface faults with weak colour contrast

#### Other quality deviations

▶ Colour deviation	Reference sample/tolerance limit sample to be defined by customer and supplier
▶ Gloss level deviation	By arrangement
▶ Clouding (colour shading)	Not visually perceptible in working position



Special requirements to be met by opaque printing

Reference sample/tolerance limit sample to be defined by customer and supplier. Reproducibility of colour tones:  $\Delta E$  2.  
Reproducibility of colour tones adjusted to enclosures  $\Delta E$  3.

## DIMENSIONAL TOLERANCES

### Printing tolerances

Definition / edge blur (mm)	$\pm 0.15$
Print overlapping	Print overlapping is necessary for technical reasons. Possible colour deviations in the vicinity of the overlapping area are permissible.
Permissible deviations in the line width	$\pm 10\%$

### Tolerances within the print

▶ within a shaping print (mm)	according to general tolerances DIN ISO 2768-1 fine: < 120 mm: $\pm 0.15$ $\geq 120$ mm < 400 mm: $\pm 0.2$ $\geq 400$ mm: $\pm 0.3$	
▶ between a shaping print (mm) (offset to 2nd, 3rd, etc. colour)	< 400 mm $\pm 0.3$	$\geq 400$ mm $\pm 0.5$

### Embossing tolerances

Embossing tolerances with respect to the print	< 400 mm	$\geq 400$ mm
▶ Embossing tolerances without margin (mm)	$\pm 0.3$	$\pm 0.5$
▶ Embossing tolerances with margin (mm)	$\pm 0.3$	$\pm 0.5$
▶ Edge embossing (mm)	$\pm 0.3$	$\pm 0.5$
▶ Dot embossing (mm)	$\pm 0.3$	$\pm 0.5$
▶ Special embossing (mm)	$\pm 0.3$	$\pm 0.5$

### Embossing height tolerance

▶ Standard embossing (mm)	$\pm 0.2$
▶ Special embossing (mm)	by arrangement with customer

### Blanking tolerances

Outer contour and cutouts (mm)	$\pm 0.3$ (closer tolerances possible by arrangement with customer)
Blanking for print (mm)	$\pm 0.3$



## CLIMATIC PARAMETERS

For relative humidity of 50 % (normal climate, non-condensing):

Operating temperature	<u>Min.</u>	<u>Max.</u>
▶ Keyboards with embossing	0°C	+ 45°C
▶ Keyboards without embossing	- 20°C	+ 70°C
Transport / storage temperature	<u>Min.</u>	<u>Max.</u>
▶ Keyboards with embossing	- 30°C	+ 45°C
▶ Keyboards without embossing	- 40°C	+ 80°C

Test conditions in accordance with manufacturer's specifications. Further climatic parameters possible by arrangement with customer.

## MECHANICAL PARAMETERS

Actuating force	dependent on design
Mechanical load-bearing capacity	dependent on design
Service life	> 1 million operating cycles Test method in accordance with DIN 42115

UL 94 Classification

Autotype Product	Grad	UL Classification	Regist.-No.
Autostat (heat-stable Polyester)	CT5	UL 94 VTM2	E165805
Autoflex PC (hard-coated Polycarbonate)	G/A180 G/A250 G/A380 G/A480 G/A640 G/A750	UL 94 HB	E165805

Link to the UL Recognized Component Mark [www.ul.com/database/index.htm](http://www.ul.com/database/index.htm)  
 Search for Category Control No./List No.  
 Category No. QMFZ2 & QMFZ8  
 List No. E165805

The following Autotype Products have no UL 94 classification. But the basic materials are classified as follows:

Autotype Product	Grad	Polyester Basis Film	UL Classification	Regist.-No.
Autotex	V/F150 V/F200 V/F280 Inkjet	Melinex O	UL 94 HB	E93687
Autotex	V/F157 V/F207	Melinex 728	UL 94 VTM2	E93687
Autoflex EB	G/A130 G/A180 G/A250	Melinex 715	UL 94 VTM2	E93687
Autoflex EB	G137 G187	Melinex 728	UL 94 VTM2	E93687
Autostat	AHU3 AHU4 AHU5	Mylar A	UL 94 VTM2	E93687
Autostat	CTS5	Mylar J	UL 94 VTM2	E93687

Link to the UL Recognized Component Mark [www.ul.com/database/index.htm](http://www.ul.com/database/index.htm)  
 Search for Category Control No./List No.  
 Category No. QMFZ2  
 List No. E93687

## ELECTRICAL PARAMETERS

	<u>Min.</u>	<u>Max.</u>
Switching voltage (DC)	100 mV	42 V
Switched current	0.5 mA	100 mA
Make/break capacity	-	0.6 W
Circuit-board conductor resistance	depends conductor cross-section and length: typically 0.1Ω/mm length, width 1 mm	
Insulation resistance	10 <sup>8</sup> Ω (tested at 100 V)	
Dielectric strength	in accordance with DIN 42115 part 1	
Contact bounce time		
▶ Flat (with contact surface)	< 3 ms	
▶ Metal dome	< 10 ms	
▶ Dome embossing	< 20 ms	
Minimum cable bending radius	> R = 2 mm	



## TEST CRITERIA

Tester: trained, experienced person with normal vision

Viewing distance (mm): 500

Viewing angle (with respect to viewing direction): 90°, mirroring not permitted

Lighting

- ▶ Top lighting: 1000 lx standard illumination D65
- ▶ Transmitted light: Light table

Display window: test against black-and-white background or by arrangement with customer

Test scope

- ▶ Function test (restricted to random sample by arrangement with customer): 100%
- ▶ Optical test (restricted to random sample by arrangement with customer): 100% evaluation with Keyboard Forum test board for surface faults

Viewing time/dm<sup>2</sup>(s)  
(not longer than 15 seconds in all)

normal optical requirements	enhanced optical requirements
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(class 1)	(class 2)
5	10

depending on the design and size, viewing time is limited, to a typical duration of 4 sec

## CHEMICAL RESISTANCE

Simultaneous exposure to different media may alter the resistive properties of a material! To be safe, it is advisable to test the membrane keyboard with the case for sufficient resistance of the material under the conditions of the specific application.

Resistance of the membrane keyboards:

Gasoline	–
Diesel oil	o
Sea water	+
Hydrochloric acid 10%	+
Weak alkaline solutions	–
Strong alkaline solutions	–
Atmospheric influences	+
Lactic acid	+
Acetone	–

Values at room temperature: + = constant; o = conditionally constant; – = inconstant

The resistance of the case depends on the used plastic material.  
See material data sheet on our website.

## FIXED COSTS

According quotation.

## FORM OF DELIVERY

Packed in PE-bags resp. cartons; protected from scratches.  
Assembling on demand.  
Quantity differencies + 10 % possible.

For inquiries there is a checklist on our website available ([www.okw.com](http://www.okw.com))

Odenwälder Kunststoffwerke  
Gehäusesysteme GmbH  
Friedrich-List-Str. 3  
74722 Buchen/Germany  
[www.okw.com](http://www.okw.com)