Product Survey

Versions	Recommended Key grid	Illumination			Overall height	Contacts	Page
		Keyswitch		Signal indicator			
RACON 8 	≥ 12 mm	Non-illuminated			5.0 mm (variable plunger)	Gold	4 - 6
RACON 12 	≥ 15.24 mm	Non-illuminated			5.0 mm (variable plunger)	Gold	4 - 10
RACON 12 V 		Non-illuminated			5.0 mm (variabler plunger)	Gold	4 - 14
RACON 12 i 	≥ 15.24 mm	Fully illuminated			9.7 mm	Gold	4 - 16
RF 15 	≥ 19.05 mm	Non-illuminated	Fully/spot illuminated	Fully illuminated	9.7 mm or 12.5 mm (with keycap)	Gold or Silver	4 - 26
RF 15 N (nieder) 	≥ 19.05 mm	Non-illuminated	Illumination by separate/ integrated LED (depending on overall height)		6.2 mm 9.7 mm 12.5 mm 22.5 mm (var. plunger)	Gold or Silver	4 - 32
RF 15 R (rund) 	≥ 15.24 mm	Non-illuminated	Spot illuminated		9.7 mm or 12.5 mm	Gold or Silver	4 - 36
RF 15 H (hoch) 	≥ 20 mm	Non-illuminated	Fully illuminated		12.5 mm	Gold or Silver	4 - 42
RF 19 	≥ 23 mm	Non-illuminated	Fully/spot illuminated	Fully illuminated	9.7 mm	Gold or Silver	4 - 50
RF 19, 1 Ö + 1 S 	≥ 23 mm	Non-illuminated			9.7 mm	Gold or Silver	4 - 56

4

Versions	Recommended Key grid	Illumination			Overall height	Contacts	Page
		Keyswitch		Signal indicator			
RF 19 H (high profile) 	≥ 24 mm		Fully illuminated		12.5 mm	Gold or Silver	4 - 60
Main switch KN19 	≥ 19.05 x 38.1 mm	Non-illumi-nated	Spot illuminated with 1 LED		9.7 mm	Silver	4 - 75
RK 90 System	≥ 12.50 mm	Depending on the type of keyswitch used: – RACON (without plunger) – RF 15/RF 15 N – RF 19 – KN 19					4 - 79
RG 85 III System 	≥ 35/55 mm	Edge-illuminated and symbol illumination		Fully illuminated	14 mm	Silver	4 - 95
Full-Travael Keyswitch RS 76 	≥ 19.05 mm	Non-illumi-nated	Fully/spot illuminated		15.5/15.9 mm (with key caps)	RS 76 M: Gold RS 76 C: contactless	4 - 115
Keyswitches for Conductor Board 	≥ 19.05 mm	Non-illuminated			19.5 mm (without key)	Gold	4 - 143

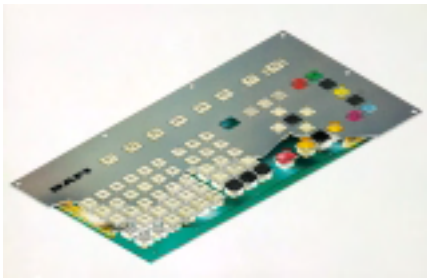
4

Examples for Applications Standards

RF 15

RG 85 III System

RF 15 with RK 90 System



CE-Conformity

The products of the Chapter "PCB Keyswitches" can – relating to the CE-conformity according to the Low-Voltage Directive 73/23/EWG – be divided into the following groups:

All products with an operating voltage U_B > 50 V
F. ex. Short-Travel Main Switch KN 19, for this product the Low-Voltage Directive 73/23/EWG applies.

All products with an operating volltage U_B < 50 V
F. ex. RACON, RF 15, RS 76, for these components no directive applies.

Single parts, accessories and illumination
No directive applies for these products.

EMC-Law
The components of this catalogue are within the meaning of the law concerning the electromagnetic conformity (= EMC-Law) "basic components as, for ex., switches, signal lamps or like" and, therefore, do not fall within the scope of the EMC-Law.

Declarations of Conformity
Declarations of conformity for all concerned products are available and can be delivered upon request. Please always state the exact order reference of the respective product.

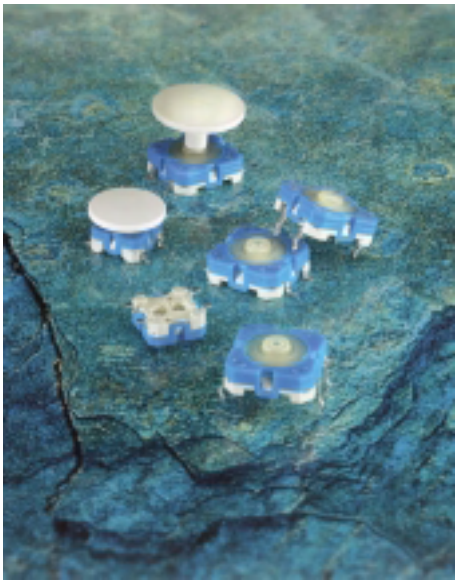
Marking
The marking will be corresponding to the Low-Voltage Directive 73/23/EWG resp. the Directive "CE-Marking 93/68/EWG" either on the packing or on the product itself or on the shipping documents.

UL-approval

for RACON 8/12, KN 19 and Short-Travel Keyswitches RF 15/19

The Short-Travel Main Switch KN 19 and data entry systems wich are built with Rafi short-travel switches according to our design proposals meet the requirements of the UL approbals for the American market.

UL file no. for KN 19: E 116362
UL file no. for data entry systems: E 202520



General data

RACON short-travel keyswitches with sealed contact system and distinct key click, excellent switching reliability. For use under an overlay or with RK 90 keycaps. Print and SMD versions available (suitable for automatic assembly).

Content

Stock items are marked by **bold printed** order numbers.

RACON 8

General data

RACON short-travel keyswitches offer an extremely high switching reliability while needing very little space. They can be arranged as single keys, in rows or key blocks.
When arranged under an overlay, RACON keyswitches should be combined with plungers.

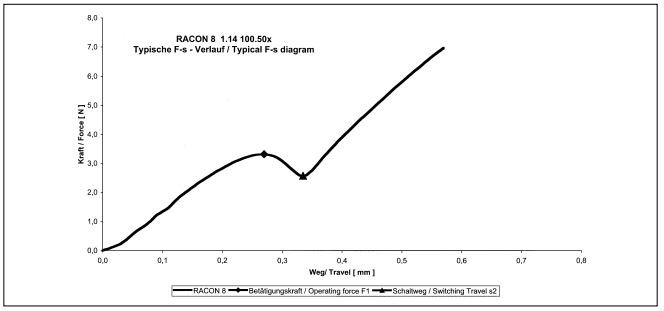
The features at a glance:
- Suitable for the most common soldering methods
  - Wave soldering bath for print versions
  - Reflow soldering (SMD)
  - Manual soldering
- SMD version suitable for processing with an automatic SMD assembly machine

Technical data

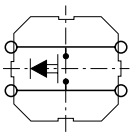
Dimensions	
Recommended key grid	see order block
Key grid max.	see order block
Length of housing	8.4 mm
Width of housing	8.4 mm
Overall height	5.00 mm
Mechanical design	
Mounting	soldering
Terminals	see order block
Contact system	snap-action contact
Contact arrangement	1 NO
Contact materials	Au
Illumination	no
Mechanical characteristics	
Operating force	$3.3^{+/-0.6}$ N
Switching travel	$0.34^{+/-0.1}$ mm
Robustness min.	100 N
Electrical characteristics	
Rated voltage min.	0.02 V
Rated voltage max.	42 V
Rated current min.	0.01 mA
Rated current max.	100 mA
Rated power max. (ohmic load)	1 W
Contact resistance when new max.	100 mΩ
Insulation resistance	10^9 Ω
Bouncing time max.	5 ms
Other specifications	
Ambient temp. operating min.	-40 °C
Ambient temp. operating max.	+80 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Operating life at R_T = 23° C and test force = 1,5 x rated force	1000000
Solderability / solder heat resistance PCB version	DIN IEC 600 68-2-20
Solderability / solder heat resistance SMD version	EN 61760-1 and DIN IEC 600-68-2-58
Flammability of materials	UL 94 HB
Packing	see order block
Produkt code	see order block

Stock items are marked by **bold printed** order numbers.

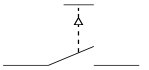
Typical force/travel diagram RACON 8



Circuit diagram RACON 8

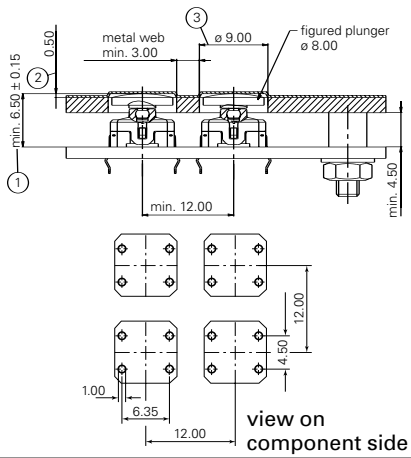


Switching symbols acc. to IEC 617 form X
(twice interrupting)

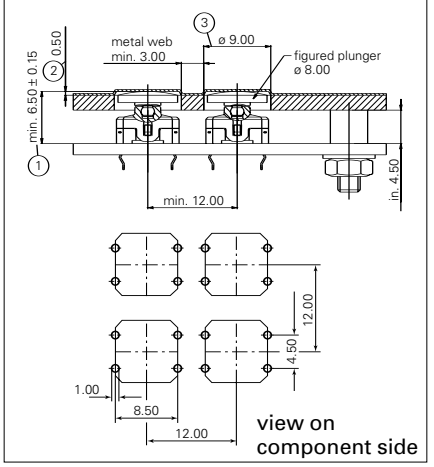


RACON 8, Typical system assembly with plunger under overlay

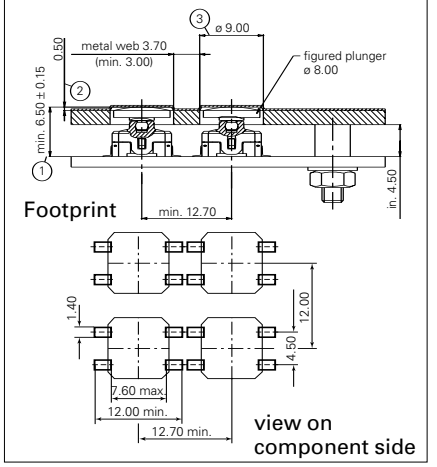
Solder terminal for PCB, outward



Solder terminal for PCB, inward

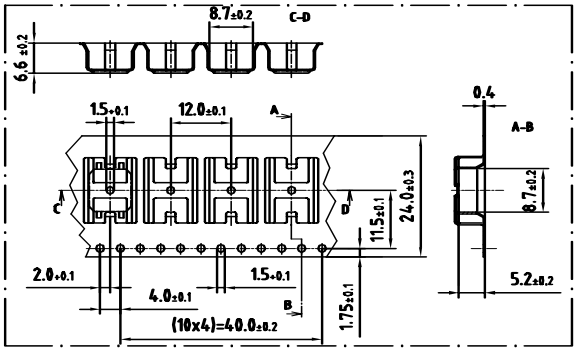


SMD gullwing (Z) terminal



Explanation
① Overall height = RACON + plunger
② Recommended area embossing 0.35 mm at glue spacer thickness of 0.15 mm
③ Front panel cut out = plunger diameter + 1 mm

RACON 8, SDM-terminal, tape and reel drawing

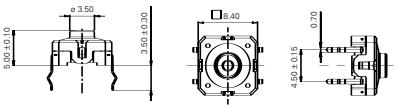


Accessories RACON 8

Description	Photo	Order no.	Page
Plunger for membrane data entry system		**5.46.167.042/0209**	4 - 20
Plunger for membrane data entry system		**5.46.167.090/0209**	4 - 20
Plunger for membrane data entry system		**5.46.168.042/0209**	4 - 20
Plunger for membrane data entry system		**5.46.169.042/0209**	4 - 20

For other plungers, refer to the chapter „RACON special accessories“; for keycaps, refer to the chapter „RK 90“.

RACON 8, solder terminals for PCB, outward

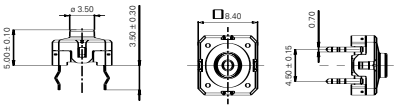


Terminals	Contact arrangement	Product code	Packing	Recommended key grid	Order no.
solder terminal for PCB, outward	1 NO	A1	60 pieces per tube	12 x 12 mm	**1.14.100.501/0000**

Technical data see page 4 - 6

Stock items are marked by **bold printed** order numbers.

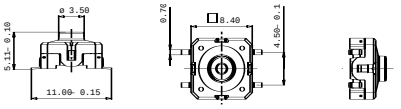
RACON 8, solder terminals for PCB, inward



Terminals	Contact arrangement	Product code	Packing	Recommended key grid	Order no.
solder terminal for PCB, inward	1 NO	B1	60 pieces per tube	12 x 12 mm	**1.14.100.502/0000**

Technical data see page 4 - 6

RACON 8, SMD gullwing (Z) terminals



Terminals	Contact arrangement	Product code	Packing	Recommended key grid	Order no.
SMD Gullwing (Z) terminals	1 NO	C1	1000 pieces tape and reel	12 x 12.7 mm	**1.14.100.503/0000**

Technical data see page 4 - 6

Stock items are marked by **bold printed** order numbers.

RACON 12

General data

RACON short-travel keyswitches offer an extremely high switching reliability while needing very little space. They can be arranged as single keys, in rows or key blocks.
When arranged under an overlay, RACON keyswitches should be combined with plungers.

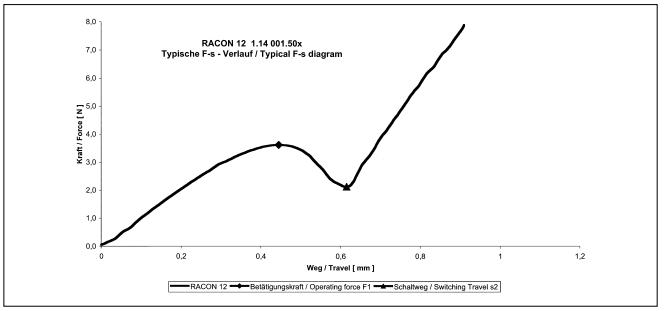
The features at a glance:
- Suitable for the most common soldering methods
  - Wave soldering bath for print versions
  - Reflow soldering (SMD)
  - Manual soldering
- SMD version suitable for processing with an automatic SMD assembly machine

Technical data

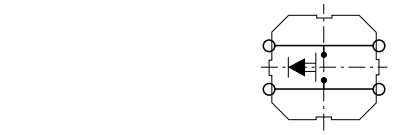
Dimensions	
Recommended key grid	see order block
Key grid max.	see order block
Length of housing	12 mm
Width of housing	12 mm
Overall height	see order block
Mechanical design	
Mounting	soldering
Terminals	see order block
Contact system	snap-action contact
Contact arrangement	1 NO
Contact materials	Au
Illumination	no
Mechanical characteristics	
Operating force	$3.6^{+/-0.7}$ N
Switching travel	$0.61^{+/-0.1}$ mm
Robustness min.	100 N
Electrical characteristics	
Rated voltage min.	0.02 V
Rated voltage max.	42 V
Rated current min.	0.01 mA
Rated current max.	100 mA
Rated power max. (ohmic load)	1 W
Contact resistance when new max.	100 mΩ
Insulation resistance	10^9 Ω
Bouncing time max.	5 ms
Other specifications	
Ambient temp. operating min.	-40 °C
Ambient temp. operating max.	+80 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Operating life at R_T = 23° C and test force = 1,5 x rated force	1000000
Solderability / solder heat resistance PCB version	DIN IEC 600 68-2-20
Solderability / solder heat resistance SMD version	EN 61760-1 and DIN IEC 600-68-2-58
Flammability of materials	UL 94 HB
Packing	see order block
Produkt code	see order block

Stock items are marked by **bold printed** order numbers.

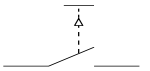
Typical force/travel diagram RACON 12



Circuit Diagram RACON 12

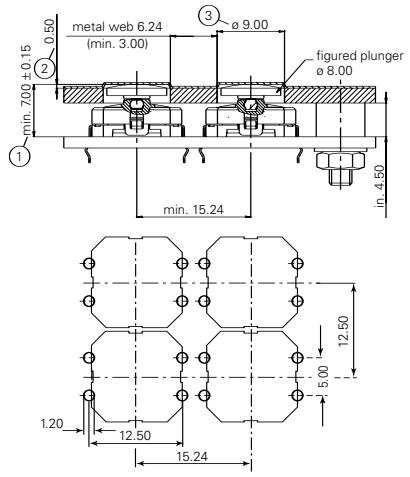


Switching symbols acc. to IEC 617 form X
(twice interrupting)



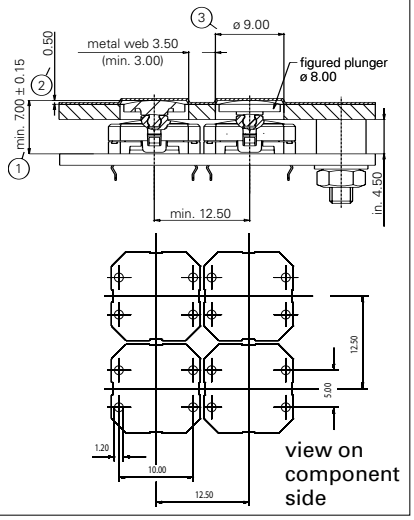
RACON 12, Typical system assembly with plunger under overlay

Solder terminal for PCB, outward



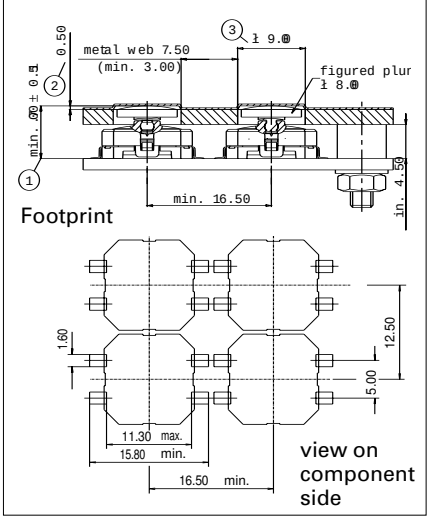
view on component side

Solder terminal for PCB, inward



view on component side

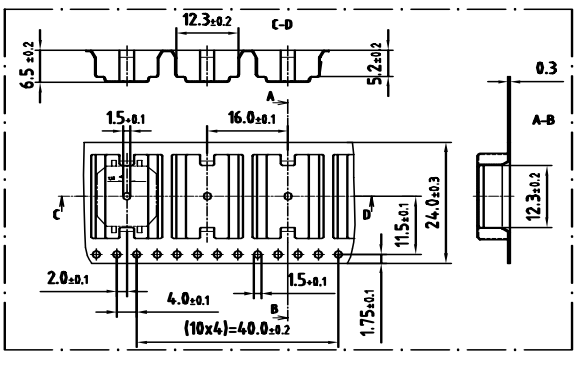
SMD gullwing (Z) terminal



view on component side

Explanation
① Overall height = RACON + plunger
② Recommended area embossing 0.35 mm at glue spacer thickness of 0.15 mm
③ Front panel cut out = plunger diameter + 1 mm

RACON 12, SMD-terminal, tape and reel drawing

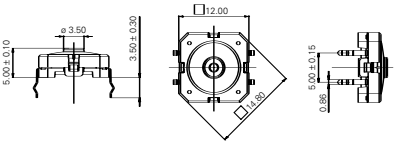


Accessories RACON 12

Description	Photo	Order no.	Page
Square plunger for membrane data entry system		**5.46.001.057/0209**	4 - 21
Plunger for membrane data entry system		**5.46.167.042/0209**	4 - 20
Plunger for membrane data entry system		**5.46.167.090/0209**	4 - 20
Plunger for membrane data entry system		**5.46.169.042/0209**	4 - 20

For other plungers, refer to the chapter „RACON special accessories“; for keycaps, refer to the chapter „RK 90“.

RACON 12, solder terminals for PCB, outward

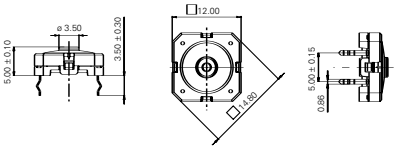


Terminals	Contact arrangement	Product code	Packing	Recommended key grid	Key grid max.	Order no.
solder terminal for PCB, outward	1 NO	A1	45 pieces per tube	15.24 x 15.24 mm	12.5 x 15.24 mm	**1.14.001.501/0000**

Technical data see page 4 - 10

Stock items are marked by **bold printed** order numbers.

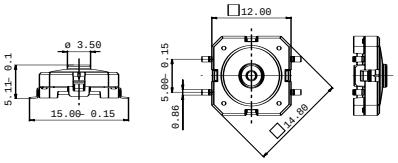
RACON 12, solder terminals for PCB, inward



Terminals	Contact arrangement	Product code	Packing	Recommended key grid	Key grid max.	Order no.
solder terminal for PCB, inward	1 NO	B1	45 pieces per tube	15.24 x 15.24 mm	12.5 x 12.5 mm	**1.14.001.502/0000**

Technical data see page 4 - 10

RACON 12, SMD gullwing (Z) terminals



Terminals	Contact arrangement	Product code	Packing	Recommended key grid	Key grid max.	Order no.
SMD Gullwing (Z) terminals	1 NO	C1	750 pieces tape and reel	15.24 x 16.5 mm	12.5 x 16.5 mm	**1.14.001.503/0000**

Technical data see page 4 - 10

Stock items are marked by **bold printed** order numbers.

RACON 12 V with vertical adapter

General data

The RACON 12 V version can be used, for example, for PC plug-in boards and for measurement and control engineering applications. The vertical mounting adapter (support element) absorbs the operating force so that the pressure on the soldered terminals is reduced. For this mounting arrangement, the keyswitch is provided with two horizontal terminals on one side.

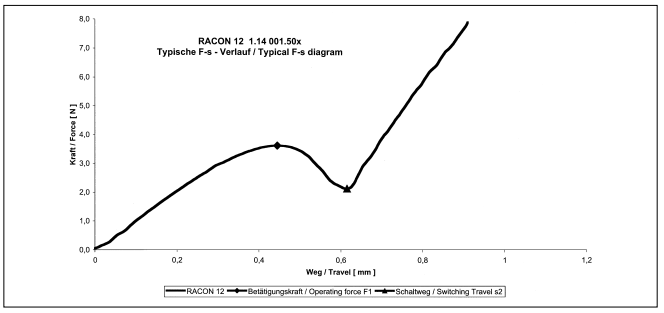
Technical data

Dimensions	
Length	14.5 mm
Width	13.6 mm
Overall height	5 mm
Mechanical design	
Mounting	soldering
Terminals	solder terminal tin-plated
Contact system	snap-action contact
Contact arrangement	1 NO
Contact materials	Au
Illumination	no
Mechanical characteristics	
Operating force	$3.6^{+/-0.7}$ N
Switching travel	$0.61^{+/-0.1}$ mm
Robustness min.	100 N
Electrical characteristics	
Rated voltage min.	0.02 V
Rated voltage max.	42 V
Rated current min.	0.01 mA
Rated current max.	100 mA
Rated power max. (ohmic load)	1 W
Contact resistance when new max.	100 mΩ
Insulation resistance	10^9 Ω
Bouncing time max.	5 ms

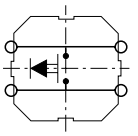
Other specifications	
Ambient temp. operating min.	-40 °C
Ambient temp. operating max.	+80 °C
Storage temperature min.	-50 °C
Storage temperature max. (product)	+85 °C
Storage temperature max. (rail)	+85 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Operating life at R_T = 23° C and test force = 1,5 x rated force	1000000
Solderability / solder heat resistance	according to DIN IEC 600 68-2-20
Flammability of materials	UL 94 HB
Packing	in boxes à 100 piece
Produkt code	F 1

Stock items are marked by **bold printed** order numbers.

Typical force/travel diagram RACON 12V

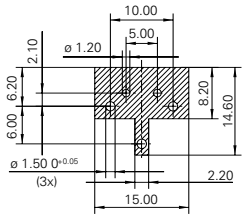


Circuit Diagram RACON 12V



Switching symbols acc. to IEC 617 form X
(twice interrupting)

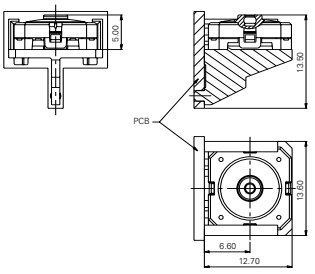
PCB footprint RACON 12V



Drilling hole diagramm
view on component side

Hatched areas:
In this area no
components and
no conductor tracks

RACON 12 V with vertical adapter

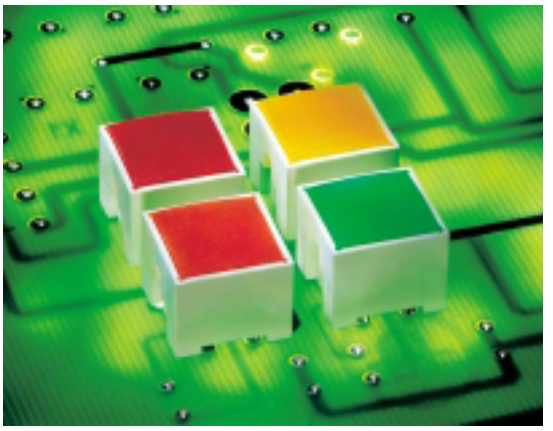


Terminals	Contact arrangement	Product code	Packing	Order no.
solder terminal tin-plated	1 NO	F 1	100 pieces per box	1.14.001.505/0000

Technical data see page 4 - 14

Stock items are marked
by **bold printed** order numbers.

RACON 12 i



General data

Application note
Low-profile keyboards with RACON 12 i components should be designed with a grid spacing of 15.24 mm. With this grid, frame webs remain free between the individual keys. The overlay can be glued onto these frame webs; we recommend area embossing over the keys for the overlays. If our RK 90 system design is used, we recommend the 9 x 9 mm keycaps.

Technical data

General information

Colour of lens	see order block
Recommended key grid	15.24 x 15.24 mm
Key grid max.	12.5 x 12.5 mm

Dimensions

Length	11.35 mm
Width	11.35 mm
Overall height	9.7 mm

Mechanical design

Mounting	soldering
Terminals	PCB terminals
Contact system	snap-action contact
Contact arrangement	1 NO
Contact materials	Au
Illumination	fully illuminated 2 LEDs
LED colour	see order block
LED type	standard 2 mm

Mechanical characteristics

Operating force	$3.3^{+/-0.6}$ N
Switching travel	$0.34^{+/-0.1}$ mm
Robustness min.	100 N

Electrical characteristics

Rated voltage min.	0.02 V
Rated voltage max.	42 V
Rated current min.	0.01 mA
Rated current max.	100 mA
Rated power max. (ohmic load)	1 W
Contact resistance when new max.	100 mΩ
Dielectric strength AC min.	750 V
Insulation resistance	10^9 Ω
Bouncing time max.	5 ms

Other specifications

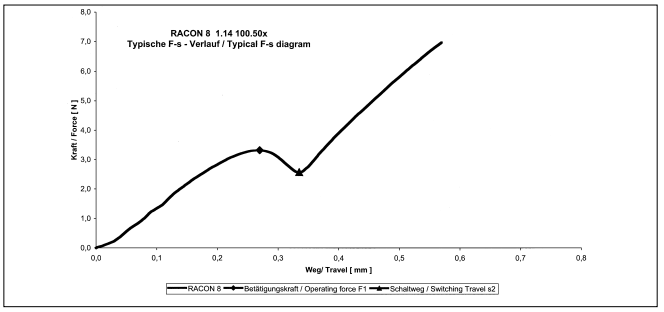
Ambient temp. operating min.	-40 °C
Ambient temp. operating max.	+80 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Operating life at R_T = 23° C and test force = 1,5 x rated force	1000000
Solderability / solder heat resistance	according to IEC 600 68-2-20
Flammability of materials	UL 94 HB
Packing	in tubes à 45 piece

Electrical characteristics of LED

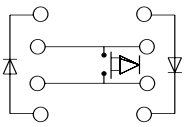
LED rated current max. I_F at 25°C	red/green: 30, yellow: 50 mA
LED current reduction beginning with 50 degree C	red: 0.5 mA/Grad C, yellow0.8 mA/Grad C
LED wavelength typ.	red 639, green 510-535, yellow 590
LED forward voltage U_F at 20 mA	red: 1.8 V/20 mA, yellow: 1.9 V/20 mA
LED breakdown voltage U_R at 25°C	min. 5 V/0.1 mA

Stock items are marked by **bold printed** order numbers.

Typical force/travel diagramm RACON 12i

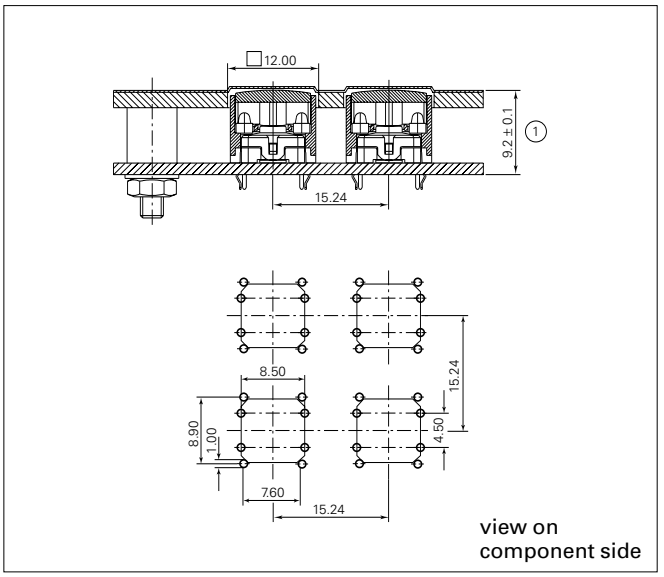


Circuit Diagram RACON 12i

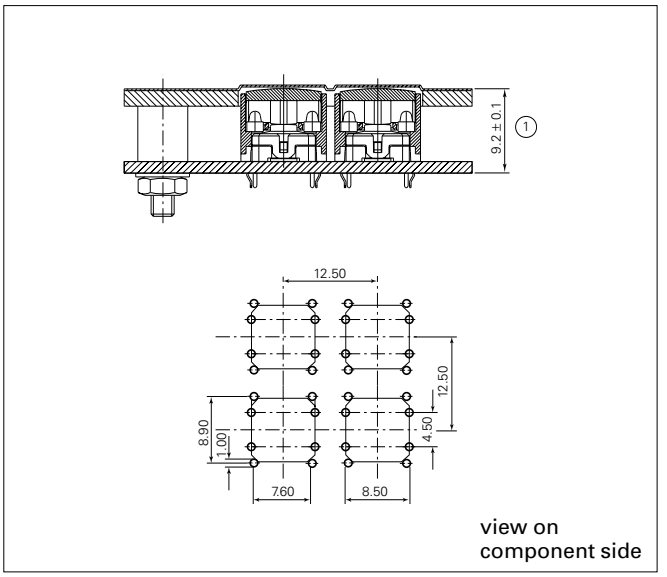


Switching symbols acc. to IEC 60 617 form X
(twice interrupting)

RACON 12i flat data entry system with metal webs

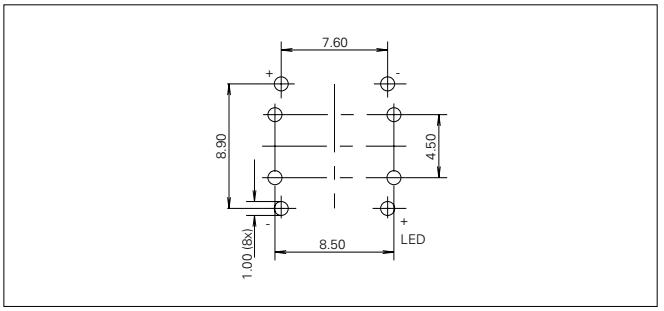


RACON 12i smallest grid

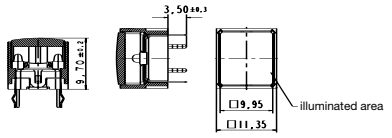


Explanation
① Recommended area embossing 0.35 mm at glue spacer thickness of 0.15 mm

LED hole patterns



RACON 12 i, solder terminals for PCB



lens red

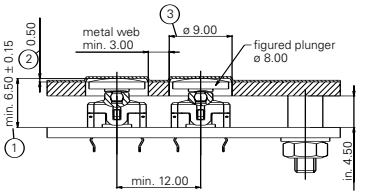
Terminals	Contact arrangement	Recommended key grid	Illumination	Colour of lens	LED colour	Order no.
PCB terminals	1 NO	15.24 x 15.24 mm	fully illuminated 2	red	red	**1.14.001.551/0000**
PCB terminals	1 NO	15.24 x 15.24 mm	fully illuminated 2	green	green	**1.14.001.552/0000**
PCB terminals	1 NO	15.24 x 15.24 mm	fully illuminated 2	yellow	yellow	**1.14.001.553/0000**
PCB terminals	1 NO	15.24 x 15.24 mm	fully illuminated 2	orange	yellow	**1.14.001.554/0000**

Technical data see page 4 - 16

Stock items are marked by **bold printed** order numbers.

RACON special accessories

Plunger for membrane data entry system



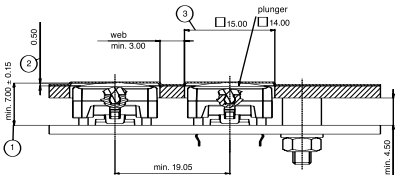
Length	Width	Overall height	Diameter	Order no. complete
		6.5 mm	8 mm	**5.46.167.301/0209**
		7 mm	8 mm	**5.46.167.090/0209**
		9.7 mm	8 mm	**5.46.167.091/0209**
		12.5 mm	8 mm	**5.46.167.092/0209**
		6.5 mm	11.5 mm	**5.46.167.227/0209**
		7 mm	11.5 mm	**5.46.167.042/0209**
		9.7 mm	11.5 mm	**5.46.167.043/0209**
		12.5 mm	11.5 mm	**5.46.167.044/0209**
		6.5 mm	14.5 mm	**5.46.168.227/0209**
		7 mm	14.5 mm	**5.46.168.042/0209**
		9.7 mm	14.5 mm	**5.46.168.043/0209**
		12.5 mm	14.5 mm	**5.46.168.044/0209**
		6.5 mm	19 mm	**5.46.169.227/0209**
		7 mm	19 mm	**5.46.169.042/0209**
		9.7 mm	19 mm	**5.46.169.043/0209**

Stock items are marked by **bold printed** order numbers.

Length	Width	Overall height	Diameter	Order no. complete
		12.5 mm	19 mm	**5.46.169.044/0209**

Front panel cut-out = Plunger diameter + 1 mm.

Square plunger for membrane data entry system



Length	Width	Overall height	Diameter	Order no. complete
14 mm	14 mm	7 mm		**5.46.001.057/0209**
14 mm	14 mm	9.7 mm		**5.46.001.058/0209**
14 mm	14 mm	12.5 mm		**5.46.001.059/0209**

Front panel cut-out = 15 mm.
Legend:
1. Overall height RACON + plunger
2. Recommended area embossing 0.35 mm at an adhesive layer thickness of 0.15 mm
3. Front panel cut-out = Plunger diameter + 1 mm circumferential clearance

Stock items are marked by **bold printed** order numbers.