

General data

RF 15 (15 \times 15 mm) and RF 19 (19 \times 19 mm) with distinct key click, for use under an overlay or with RK 90 keycaps. Can be fully illuminated.

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RF short-travel keyswitches



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1

RF

4 - 24 PCB Keyswitches

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Specifications LED

3 mm LED

(valid for 25 °C)	Red LED	Green LED	Yellow LED
Max. forward current I_F :	30 mA	30 mA	20 mA
Current reduction from: $T_0 = 50$ °C:	approx 0.5 mA/°C	approx 0.5 mA/°C	approx 0.2 mA/°C
Wavelength typ:	635 nm	565 nm	586 nm
Forward voltage U_F/I_F typ:	2 V/10 mA	2 V/10 mA	2 V/10 mA
Reverse voltage U_R/I_F typ:	5 V/100 μA min.	5 V/100 μA min.	5 V/100 μA min.
Ambient temperature, operating:	- 20 °C + 80 °C	- 20 °C + 80 °C	- 20 °C + 80 °C
	Blue LED	White LED	Green LED superbright
Max. forward current I_F :	20 mA	25 mA	30 mA
Current reduction from: $T_0 = 50$ °C:	approx 0.6 mA/°C	-	-
Wavelength typ:	470 nm	-	510-545 nm
Forward voltage U_F/I_F typ:	2.7 V/10 mA	3.6 V/20 mA	3.5 V/20 mA
Reverse voltage U_R/I_F typ:	5V/100 μA min.	-	-
Ambient temperature, operating:	- 20 °C + 80 °C	- 20 °C + 80 °C	-30 °C + 100 °C

2 mm LED

(valid for 25 °C)	Red LED	Green LED	Yellow LED
Max. forward current I_F : Current reduction from: $T_0 = 50$ °C: Light current f_V/I_F typ: Wavelength typ: Forward voltage U_F/I_F typ: Reverse voltage U_F/I_F typ: Ambient temperature, operating:	30 mA 0.5 mA/°C - 637 nm 1.8 V/20 mA 5 V/100 μA min. - 55 °C + 100 °C	30 mA 0.5 mA/°C - 569 nm 2.1 V/10 mA 5 V/100 μA min. - 40 °C + 100 °C	50 mA 0.8 mA/°C 250 mIm/20 mA 590 nm 1.9 V/20 mA 5 V/100 μA min. -40 °C + 100 °C
	Blue LED	Multi-colour LED	
Max. forward current I_F : Current reduction from: $T_0 = 50$ °C: Light current f_V/I_F typ: Wavelength typ: Forward voltage U_F/I_F typ: Reverse voltage U_B/I_F typ: Ambient temperature, operating:	30 mA - - 464-485 nm 3.6 V/20 mA - 20 °C + 80 °C	30 mA approx 0.6 mA/°C - 635/565 nm 2 V/10 mA - - 20 °C + 80 °C	

Calculating the series resistor:	Rated power of series:	Example for 5 Volt:
$R_V = \frac{U_B - U_F}{I_F}$	$P_V = I_F^2 \times R_V$	$R_V = \frac{5V - 2.0 \text{ V}}{0.02 \text{ A}} = 150 \Omega \text{ (= standard value)}$

PCB Keyswitches 4 - 25



RF 15 short-travel keyswitch



General data

Low-profile keyboards with RF 15 components should be designed with a 19.05 mm grid. 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.

Rated power max. (ohmic

Technical data

General information

Colour of lens	see order block	load)	Au: 2 W, Ag: 12.5 W
Recommended key grid	19.05 mm	Contact resistance when	
		new max.	100 m Ω
Dimensions		Contact resistance acc.	
Length	15 mm	to life max.	3 Ω
Width	15 mm	Insulation resistance	10 ⁹ Ω
Overall height	9.7 mm	ESD strength (underneath	45.137
		overlay)	15 kV
Mechanical design	and devices into DCD	Bouncing time max.	5 ms
Mounting	soldering into PCB	0.1	
Terminals	contacts tin-plated, fix	Other specifications	
0	contact Ag plated	Ambient temp. operating	05.00
Contact system	snap-action contact	min.	-25 °C
Contact arrangement	1 NO	Ambient temp. operating	70.00
Contact materials	Au/Ag	max.	+70 °C
Illumination	spot-/fully illuminated	Storage temperature min.	-40 °C
LED colour	see order block	Storage temperature max.	00.00
LED type	see order block	(product)	+80 °C
		Storage temperature max.	50.00
Mechanical characteristics	0.00	(in tube)	+50 °C
Operating force max.	2 3 N	Resistance to constant	
Operating travel	0.5 mm	environment	according to
Switching travel	0.5 mm	5	IEC 600 68-2-3 and 2-30
Robustness min.	with through-plated PCB	Resistance at variable	
	100 N	environment	according to
		0 4: 1:6	IEC 600 68-2-14 and 2-33
Electrical characteristics	A 0 00 \/ A 0 \/	Operating life min.	1,000,000
Rated voltage min.	Au: 0.02 V, Ag: 3 V	Soldering time max.	2,5 sec.
Rated voltage max.	Au: 42 V, Ag: 50 V	Soldering temperature	250.90
Rated current min.	Au: 0,01 mA, Ag: 0,1 mA	max.	250 °C
Rated current max.	Au: 100 mA, Ag: 250 mA	Flammability of materials	UL 94 HB

4 - 26 PCB Keyswitches

SOLUTIONS WITH PASSION

Force/Travel Diagram – Keyswitch RF 15

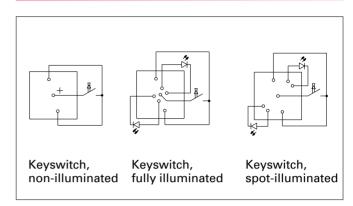
Operation characteristic limits RF F1 F2 1 0 0 0,2 0,4 s (mm) F3 0,6 0,8 1

 $F_1 = Max.$ operating force

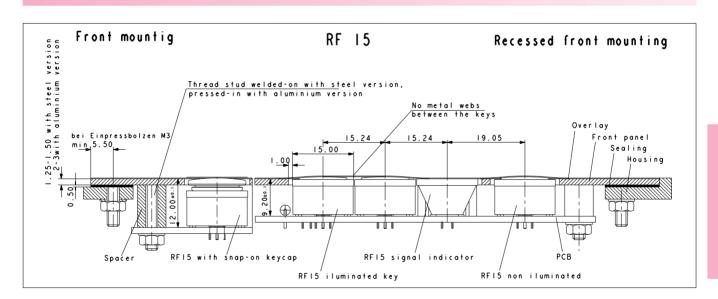
F 2 = Force at contact

F 2 is max. 55% of F 1

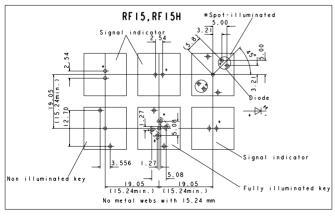
Circuit Diagram - Keyswitch RF 15



Dimensional Drawing RF 15

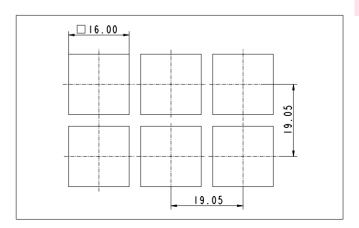


Hole Pattern RF 15



View on component side, all hole diameters 1,1 +/- 0,1 mm

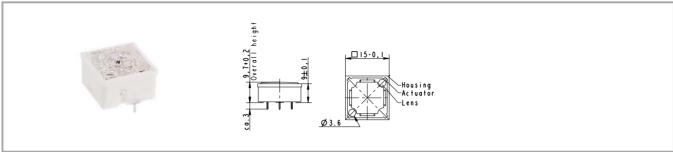
Hole Pattern – Front Panel



RF

PCB Keyswitches 4 - 27

RF 15 short-travel keyswitch, non-illuminated



Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Ag	not illuminated	transparent			3.14.100.006/0000
Au	not illuminated	transparent			3.14.100.001/0000

Technical data see page 4 - 26

Accessories:

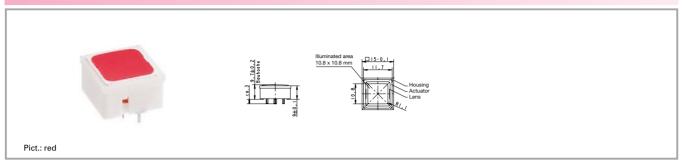
Keycap for RF 15, snap-on, for overall height 12.5 mm: 5.46.654.059/0227

For keycaps, refer to chapter accessories and system RK 90.

If exchangeable legends are required, or if an overall height of 12.5 mm is required, a keycap can be mounted on the non-illuminated keys. The keycap legend is visible through a window in the overlay. You can change the legend by replacing the keycap.



RF 15 short-travel keyswitch, fully illuminated with 2 LEDs



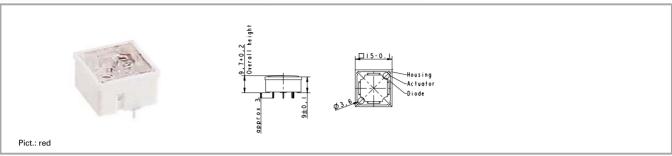
Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Ag	fully illuminated 2 LEDs	red	red	2 mm	3.14.200.021/0000
Ag	fully illuminated 2 LEDs	green	green	2 mm	3.14.200.022/0000
Ag	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.200.023/0000
Ag	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.200.024/0000
Ag	fully illuminated 2 LEDs	blue	blue	2 mm	3.14.200.025/0000
Au	fully illuminated 2 LEDs	green	green	2 mm	3.14.200.012/0000
Au	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.200.013/0000
Au	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.200.014/0000
Au	fully illuminated 2 LEDs	blue	blue	2 mm	3.14.200.015/0000

Technical data see page 4 - 26

For keycaps, refer to RK 90 system design. Technical data of LED see seperate page at the beginning of this chapter.



RF 15 short-travel keyswitch, 1 LED spot-illumination



Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Ag	spot illumination 1 LED	opaque white	blue	3 mm	3.14.100.040/0000
Ag	spot illumination 1 LED	transparent	red	3 mm	3.14.100.041/0000
Ag	spot illumination 1 LED	transparent	green	3 mm	3.14.100.042/0000
Ag	spot illumination 1 LED	transparent	yellow	3 mm	3.14.100.043/0000
Au	spot illumination 1 LED	opaque white	blue	3 mm	3.14.100.030/0000
Au	spot illumination 1 LED	transparent	red	3 mm	3.14.100.031/0000
Au	spot illumination 1 LED	transparent	green	3 mm	3.14.100.032/0000
Au	spot illumination 1 LED	transparent	yellow	3 mm	3.14.100.033/0000

Technical data see page 4 - 26

Double-spot LED illumination available on request Technical data of LED see seperate page at the beginning of this chapter.





RF 15 N short-travel keyswitch





General data

The RF 15N keyswitch provides a minimum overall height of 6.2 mm. The overall height can be varied by extension plungers which are inserted into the cross-like notches on the actuator tops.

LEDs can only be arranged separately next to the keyswitches up to an overall height of 10 mm (i.e. without plunger or with small plunger).

Keyswitches with overall heights of 12 mm or more can be provided with a maximum of 2 LEDs which are inserted into the recesses of the keyswitch housing. LEDs of keyswitches with overall heights of 12.5 mm or more should be placed onto LED spacers in order to obtain satisfactory illumination.

Technical data

General information

Recommend	
Dimensions Length	

see order block rid 19.05 mm

Length 15 mm
Width 15 mm
Overall height 6.2 mm

Mechanical design Mounting

Mounting soldering into PCB
Terminals contacts tin-plated, fix contact Ag plated
Contact system snap-action contact
Contact arrangement 1 NO
Contact materials Au/Ag

Illumination external 3 mm LED possible if height < 12 mm

Mechanical characteristics

Operating force max.
Operating travel
Switching travel
Robustness min.

2 ... 3 N
0.5 mm
0.5 mm
with through-plated PCB

100 N

Electrical characteristics
Rated voltage min.
Rated voltage max.
Rated current min.
Rated current max.
Rated power max.

Au: 0.02 V, Ag: 3 V
Au: 42 V, Ag: 50 V
Au: 0,01 mA, Ag: 0,1 mA
Au: 100 mA, Ag: 250 mA

(ohmic load) Au: 2 W, Ag: 12.5 W

Other specifications

Ambient temp. operating min.

-25 °C

Ambient temp. operating max.

+70 °C

Storage temperature min.

Storage temperature max.

(product)

+80 °C

storage temperature max.

(in tube) +50 °C Resistance to constant environment according to

Resistance at variable environment

nvironment according to IEC 600 68-2-14 and 2-33 perating life min. 1,000,000

2,5 sec.

IEC 600 68-2-3 and 2-30

Operating life min.
Soldering time max.
Soldering temperature

max. 250 °C Flammability of materials UL 94 HB

4 - 32 PCB Keyswitches

4

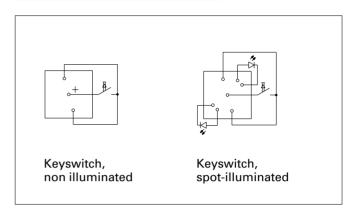
SOLUTIONS WITH PASSION

Force/Travel Diagram – Keyswitch RF 15 N

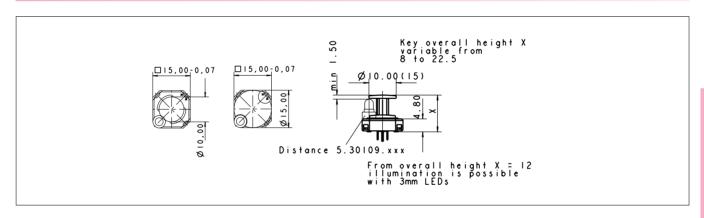
F 1 = Max. operating force

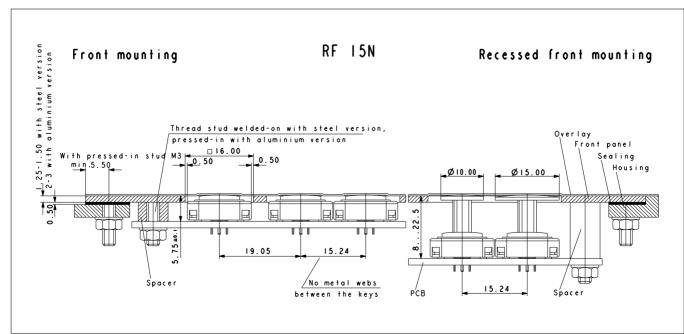
F 2 = Force at contact F 2 is max. 55% of F 1

Circuit Diagram - Keyswitch RF 15 N



Dimensional Drawings RF 15 N





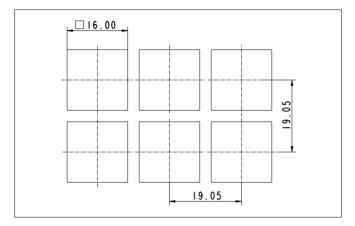
4

RF

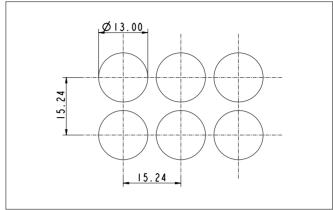
PCB Keyswitches 4 - 33

Hole Patterns – Front Panel RF 15 N

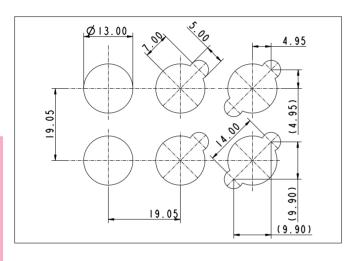
RF 15 N without plunger



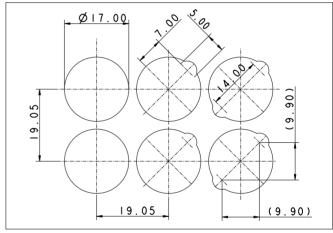
RF 15 N with plunger ø 10 mm, non-illuminated



RF 15 N with plunger ø 10 mm, illuminated

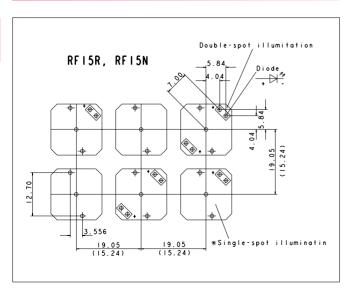


RF 15 N with plunger ø 15 mm, illuminated



Hole Pattern RF 15 N

RF



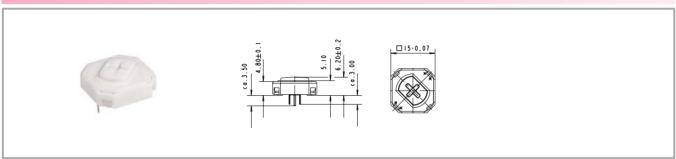
View on component side All hole diameters 1,1 */- 0,1 mm PCB layout Keyswitch 1/400" grid



Accessories RF 15 N short-travel keyswitch

Description	Photo	Order no.	Page
LED yellow, 3mm	1111	1.90.690.103/0000	5 - 20
LED spacer for RF 15 N, Ø 5 mm, spacing length 2.2 mm, light grey, for use with overall height of 12.5 mm		5.30.109.010/0756	
Extension plunger for RF 15 N, Ø 10 mm, overall height 22.5 mm	T	5.46.011.028/0710	
Extension plunger for RF 15 N, Ø 15 mm, overall height 22.5 mm	Ť	5.46.017.028/0710	

RF 15 N short-travel keyswitch, non-illuminated



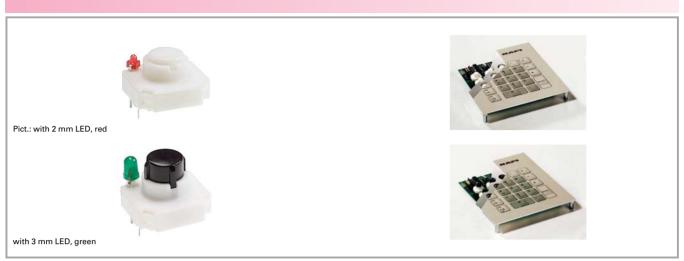
Contact materials	Illumination	Recommended key grid	Overall height	Order no.
Au	external 3 mm LED possible if height < 12 mm	19.05 mm	6.2 mm	3.14.100.601/0000
Ag	external 3 mm LED possible if height < 12 mm	19.05 mm	6.2 mm	3.14.100.606/0000

Technical data see page 4 - 32

For keycaps, refer to RK 90 system design. Double-spot LED illumination available on request.



RF 15 R short-travel keyswitch



General data

The round actuator of the RF 15 R keyswitch requires round front panel cut-outs. These make it possible to use a narrow keyboard grid of only 15.24 mm with sufficiently large frame webs between the individual keys. We recommend area embossing over the actuators for the overlay.

Contact resistance when

Technical data

General information

Rated current max. Rated power max.

(ohmic load)

General Information		Contact resistance when	
Recommended key grid	15.24 mm	new max.	100 m Ω
		Contact resistance acc.	
Dimensions		to life max.	3 Ω
Length	15 mm	Insulation resistance	$10^9 \Omega$
Width	15 mm	ESD strength (underneath	
Overall height	9,7/12,5 mm	overlay)	15 kV
		Bouncing time max.	5 ms
Mechanical design			
Mounting	soldering into PCB	Other specifications	
Terminals	contacts tin-plated, fix	Ambient temp. operating	
	contact Ag plated	min.	-25 °C
Contact system	snap-action contact	Ambient temp. operating	
Contact arrangement	1 NO	max.	+70 °C
Contact materials	Au/Ag	Storage temperature min.	-40 °C
Illumination	spot illumination	Storage temperature max.	
LED colour	see order block	(product)	+80 °C
LED type	see order block	Storage temperature max.	
		(in tube)	+50 °C
Mechanical characteristics		Resistance to constant	
Operating force max.	2 3 N	environment	according to
Operating travel	0.5 mm		IEC 600 68-2-3 and 2-30
Switching travel	0.5 mm	Resistance at variable	
Robustness min.	with through-plated PCB	environment	according to
	100 N		IEC 600 68-2-14 and 2-33
		Operating life min.	1,000,000
Electrical characteristics		Soldering time max.	2,5 sec.
Rated voltage min.	Au: 0.02 V, Ag: 3 V	Soldering temperature	_
Rated voltage max.	Au: 42 V, Ag: 50 V	max.	250 °C
Rated current min.	Au: 0,01 mA, Ag: 0,1 mA	Flammability of materials	UL 94 HB
Rated current max.	Au: 100 mA, Ag: 250 mA		

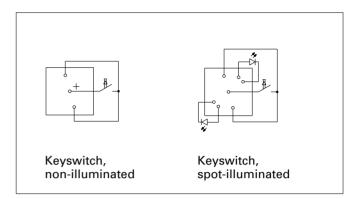
4 - 36 **PCB** Keyswitches

Au: 2 W, Ag: 12.5 W

SOLUTIONS WITH PASSION

Force/Travel Diagram – Keyswitch RF 15 R

Circuit Diagram - Keyswitch RF 15 R

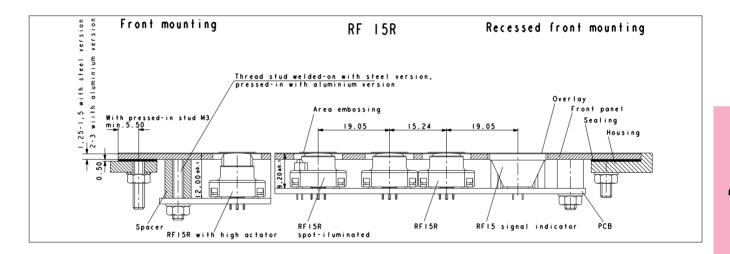


F 1 = Max. operating force

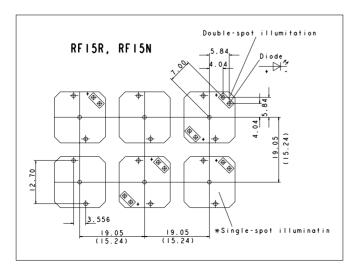
F 2 = Force at contact

F 2 is max. 55% of F 1

Dimensional Drawing RF 15 R



Hole Pattern RF 15 R

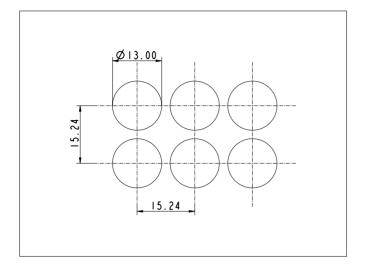


View on component side All hole diameters 1,1 +/-0,1 mm PCB layout Keyswitch 1/400" grid 4

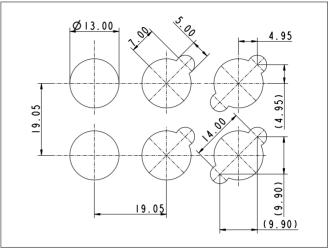


Hole Pattern – Front Panel RF 15 R

RF 15 R, non-illuminated

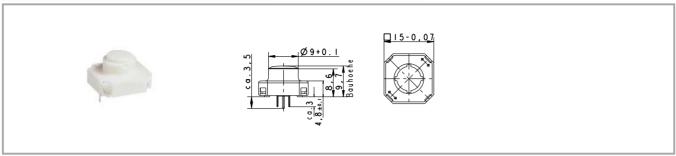


RF 15 R, illuminated



4

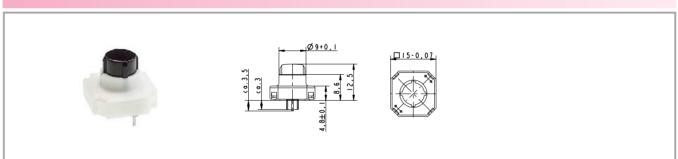
RF 15 R low short-travel keyswitch, non-illuminated



Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	9.7 mm	not illuminated			3.14.100.501/0000
Ag	9.7 mm	not illuminated			3.14.100.506/0000

Technical data see page 4 - 36

RF 15 R high short-travel keyswitch, non-illuminated

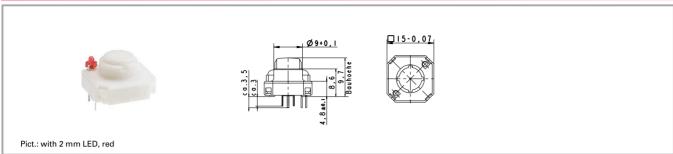


Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	12.5 mm	not illuminated			3.14.100.801/0000
Ag	12.5 mm	not illuminated			3.14.100.806/0000

Technical data see page 4 - 36

4

RF 15 R low short-travel keyswitch, 1 LED spot-illumination



Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	9.7 mm	spot illumination 1 LED	2 mm	red	3.14.100.531/0000
Au	9.7 mm	spot illumination 1 LED	2 mm	green	3.14.100.532/0000
Au	9.7 mm	spot illumination 1 LED	2 mm	yellow	3.14.100.533/0000
Ag	9.7 mm	spot illumination 1 LED	2 mm	red	3.14.100.541/0000
Ag	9.7 mm	spot illumination 1 LED	2 mm	green	3.14.100.542/0000
Ag	9.7 mm	spot illumination 1 LED	2 mm	yellow	3.14.100.543/0000

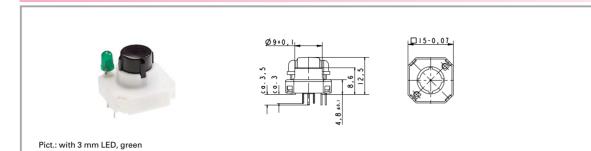
Technical data see page 4 - 36

Versions with 2 LEDs available on request.

Technical data of LED see seperate page at the beginning of this chapter.



RF 15 R high short-travel keyswitch, 1 LED spot-illumination



Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	12.5 mm	spot illumination 1 LED	3 mm	blue	3.14.100.830/0000
Au	12.5 mm	spot illumination 1 LED	3 mm	red	3.14.100.831/0000
Au	12.5 mm	spot illumination 1 LED	3 mm	green	3.14.100.832/0000
Au	12.5 mm	spot illumination 1 LED	3 mm	yellow	3.14.100.833/0000
Ag	12.5 mm	spot illumination 1 LED	3 mm	blue	3.14.100.840/0000
Ag	12.5 mm	spot illumination 1 LED	3 mm	red	3.14.100.841/0000
Ag	12.5 mm	spot illumination 1 LED	3 mm	green	3.14.100.842/0000
Ag	12.5 mm	spot illumination 1 LED	3 mm	yellow	3.14.100.843/0000

Technical data see page 4 - 36

Versions with 2 LEDs available on request.

Technical data of LED see seperate page at the beginning of the chapter.



RF 15 H short-travel keyswitch



General data

Application notes:

The RF 15 H key has an overall height of 12.5 mm and can be fully illuminated. When designing membrane keyboards, we recommend using a key grid of at least 19.05 mm and a 0.13 mm overlay with area embossing over the keys. You can use the O-ring (accessory) to block the key and use it as an indicator field or blank spaceholder.

Technical data

Rated current max.

General information		Rated power max.	
Colour of lens	see order block	(ohmic load)	Au: 2 W, Ag: 12.5 W
Recommended key grid	20 mm	Contact resistance when	-
, -		new max.	100 m Ω
Dimensions		Contact resistance acc.	
Length	15 mm	to life max.	3Ω
Width	15 mm	Insulation resistance	$10^9 \Omega$
Overall height	12.5 mm	ESD strength (underneath	
_		overlay)	15 kV
Mechanical design		Bouncing time max.	5 ms
Mounting	soldering into PCB		
Terminals	see order block	Other specifications	
Contact system	snap-action contact	Ambient temp. operating	
Contact arrangement	1 NO	min.	-25 °C
Contact materials	Au/Ag	Ambient temp. operating	
Illumination	not illuminated / fully illu-	max.	+70 °C
	minated	Storage temperature min.	-40 °C
LED colour	see order block	Storage temperature max.	
LED type	see order block	(product)	+80 °C
		Storage temperature max.	
Mechanical characteristics		(in tube)	+50 °C
Operating force max.	2 3 N	Resistance to constant	
Operating travel	0.5 mm	environment	according to
Switching travel	0.5 mm		IEC 600 68-2-3 and 2-30
Robustness min.	with through-plated PCB	Resistance at variable	
	100 N	environment	according to
			IEC 600 68-2-14 and 2-33
Electrical characteristics		Operating life min.	1,000,000
Rated voltage min.	Au: 0.02 V, Ag: 3 V	Soldering time max.	2,5 sec.
Rated voltage max.	Au: 42 V, Ag: 50 V	Soldering temperature	_
Rated current min.	Au: 0,01 mA, Ag: 0,1 mA	max.	250 °C

4 - 42 PCB Keyswitches

Flammability of materials

UL 94 HB

Au: 100 mA, Ag: 250 mA

RAFI SOLUTIONS WITH PASSION

Force/Travel Diagram - Keyswitch RF 15 H

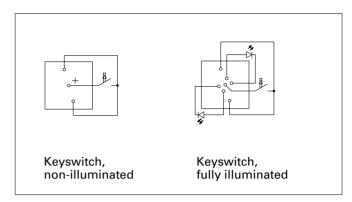
Operation characteristic limits RF F1 F2 1 0 0,2 0,4 8 (mm) 0,6 0,8 1

F 1 = Max. operating force

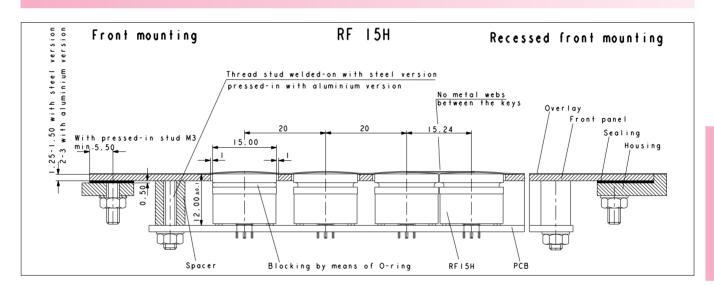
F 2 = Force at contact

F 2 is max. 55% of F 1

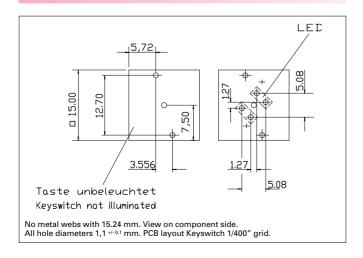
Circuit Diagram - Keyswitch RF 15 H



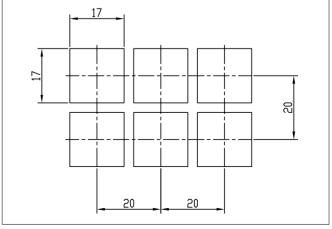
Dimensional Drawing



Hole Pattern



Hole Pattern – Front Panel



4

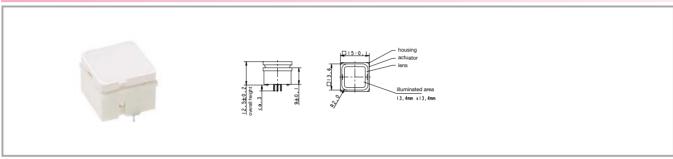
RF

PCB Keyswitches

Accessories RF 15 H short-travel keyswitch

Description	Photo	Order no.	Page
O-ring, black, for blocking the operating stroke		5.30.120.009/0100	5 - 27

RF 15 H short-travel keyswitch, non-illuminated

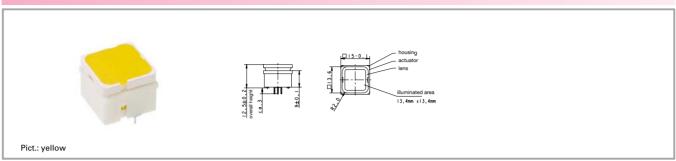


Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	not illuminated	white			3.14.100.702/0000
Ag	not illuminated	white			3.14.100.707/0000

Technical data see page 4 - 42

4

RF 15 H short-travel keyswitch, fully illuminated



Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	fully illuminated 2 LEDs	red	red	2 mm	3.14.200.731/0000
Au	fully illuminated 2 LEDs	green	green	2 mm	3.14.200.732/0000
Au	fully illuminated 1 LED	green	green super bright	3 mm	3.14.200.736/0000
Au	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.200.733/0000
Au	fully illuminated 1 LED	white	white	3 mm	3.14.200.735/0000
Au	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.200.738/0000
Au	fully illuminated 1 LED	blue	blue	3 mm	3.14.200.739/0000
Au	fully illuminated 2 LEDs	white	multi colour	3 mm	3.14.100.734/0000
Ag	fully illuminated 2 LEDs	red	red	2 mm	3.14.200.741/0000
Ag	fully illuminated 2 LEDs	green	green	2 mm	3.14.200.742/0000
Ag	fully illuminated 1 LED	green	green super bright	3 mm	3.14.200.746/0000
Ag	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.200.743/0000
Ag	fully illuminated 1 LED	white	white	3 mm	3.14.200.745/0000
Ag	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.200.748/0000
Ag	fully illuminated 1 LED	blue	blue	3 mm	3.14.200.749/0000
Ag	fully illuminated 2 LEDs	white	multi colour	3 mm	3.14.100.744/0000

Technical data see page 4 - 42

When using the keyswitches with multicolour LEDs the illumination colour can be varied from red to green by change of polarity. Due to the frequency of the polarity-changes the colours red, green, yellow as well as all secondary colours from these are possible. Technical data of LED see seperate page of the beginning of this chapter.

4



RF 15 signal indicator



Pict.: green

Technical data

General	infor	mation
General	intori	nation

Colour of lens Recommended key grid

Dimensions

Length Width

Overall height

Mechanical design

Mounting Illumination LED colour LED type

Other specifications

Ambient temp. operating

min.

see order block 19.05 mm

15 mm 15 mm 9.7 mm

soldering into PCB fully illuminated 1 LED see order block

2 mm

-25 °C

Ambient temp. operating max.

Storage temperature min. Storage temperature max. (product)

Storage temperature max. (in tube)

Resistance to constant environment

Resistance at variable environment

Soldering time max. Soldering temperature max.

Flammability of materials

+70 °C -40 °C

+80 °C

+50 °C

according to

IEC 600 68-2-3 and 2-30

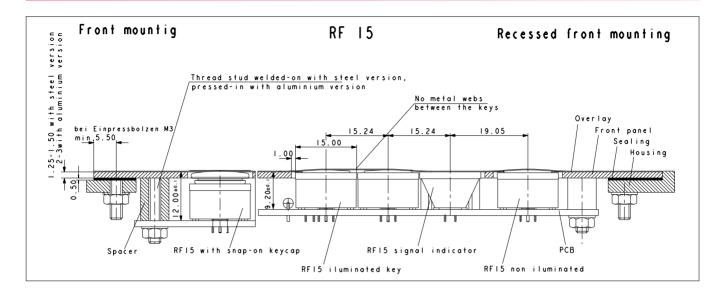
according to IEC 600 68-2-14 and 2-33

2,5 sec.

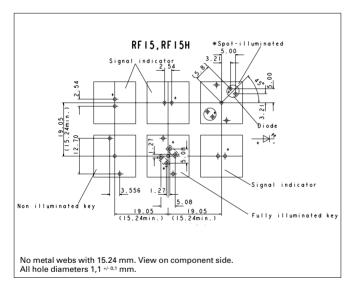
250 °C UL 94 HB

4 - 46 **PCB** Keyswitches

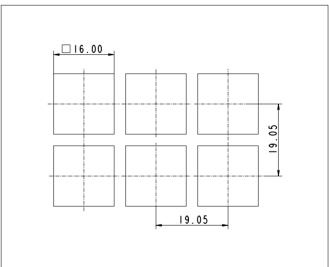
Dimensional Drawing Signal Indicator RF 15



Hole Pattern



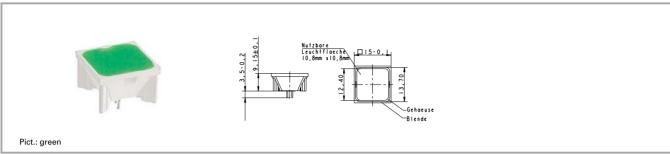
Hole Pattern – Front Panel



RF

PCB Keyswitches 4 - 47

RF 15 signal indicator, fully illuminated, 1 LED



Overall height	Illumination	Colour of lens	LED colour	LED type	Order no.
9.7 mm	fully illuminated 1 LED	red	red	2 mm	3.14.200.051/0000
9.7 mm	fully illuminated 1 LED	green	green	2 mm	3.14.200.052/0000
9.7 mm	fully illuminated 1 LED	yellow	yellow	2 mm	3.14.200.053/0000
9.7 mm	fully illuminated 1 LED	orange	yellow	2 mm	3.14.200.054/0000
9.7 mm	fully illuminated 1 LED	blue	blue	2 mm	3.14.200.055/0000

Technical data see page 4 - 46

For more information, see LEDs.

Technical data of LED see seperate page of the beginning of this chapter.

4

RF 19 short-travel keyswitch



General data

Application notes:

RF 19 keys offer a large actuation area. When designing low-profile keyboards with a grid of >= 23 mm, frame webs remain free between the individual keys.

Rated power max.

The overlay can be glued onto these frame webs; we recommend area embossing over the keys for the overlay.

Technical data

General information

Rated current max.

Conordi iniormation		natea perrei maxi	
Colour of lens	see order block	(ohmic load)	Au: 2 W, Ag: 12.5 W
Recommended key grid	23 mm	Contact resistance when	
, -		new max.	100 m Ω
Dimensions		Contact resistance acc.	
Length	19.05 mm	to life max.	3Ω
Width	19.05 mm	Insulation resistance	$10^9 \Omega$
Overall height	9.7 mm	ESD strength (underneath	
C		overlay)	15 kV
Mechanical design		Bouncing time max.	5 ms
Mounting	soldering into PCB	· ·	
Terminals	contacts tin-plated, fix	Other specifications	
	contact Ag plated	Ambient temp. operating	
Contact system	snap-action contact	min.	-25 °C
Contact arrangement	1 NO	Ambient temp. operating	
Contact materials	Au/Ag	max.	+70 °C
Illumination	spot-/fully illuminated	Storage temperature min.	-40 °C
LED colour	see order block	Storage temperature max.	
LED type	see order block	(product)	+80 °C
,,		Storage temperature max.	
Mechanical characteristics		(in tube)	+50 °C
Operating force max.	2 3 N	Resistance to constant	
Operating travel	0.5 mm	environment	according to
Switching travel	0.5 mm		IEC 600 68-2-3 and 2-30
Robustness min.	with through-plated PCB	Resistance at variable	
	100 N	environment	according to
			IEC 600 68-2-14 and 2-33
Electrical characteristics		Operating life min.	1,000,000
Rated voltage min.	Au: 0.02 V, Ag: 3 V	Soldering time max.	2,5 sec.
Rated voltage max.	Au: 42 V, Ag: 50 V	Soldering temperature	
Rated current min.	Au: 0,01 mÅ, Ag: 0,1 mA	max.	250 °C

4 - 50 PCB Keyswitches

Flammability of materials

UL 94 HB

Au: 100 mA, Ag: 250 mA

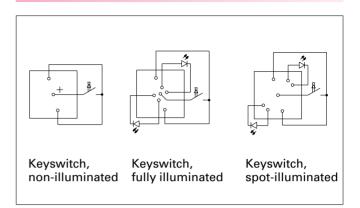
SOLUTIONS WITH PASSION

Force/Travel Diagram – Keyswitch RF 19

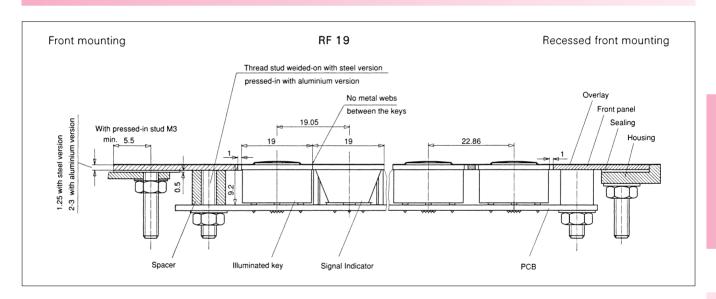
Operation characteristic limits RF F1 F2 1 0 0,2 0,4 s (mm) 0,6 0,8 1

F 1 = Max. operating force F 2 = Force at contact F 2 is max. 55% of F 1

Circuit Diagram - Keyswitch RF 19



Dimensional Drawing

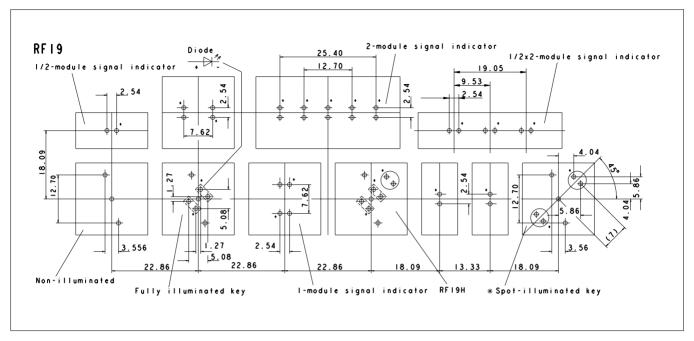


RF

PCB Keyswitches 4 - 51



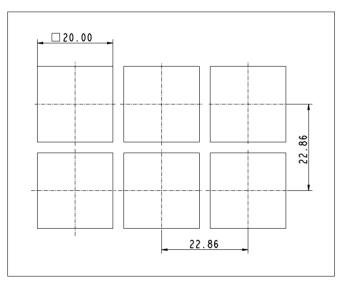
Hole Patterns RF 19



* The LED may be positioned either on the left-hand or right-hand side. Standard version: LED on left-hand side View on component side, all hole diameters 1,1 +/- 0,1 mm

Hole Patterns – Front Panel RF 19

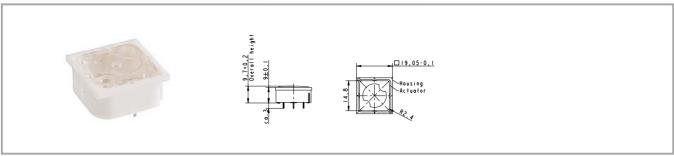
4



RF

4 - 52 PCB Keyswitches

RF 19 short-travel keyswitch, non-illuminated



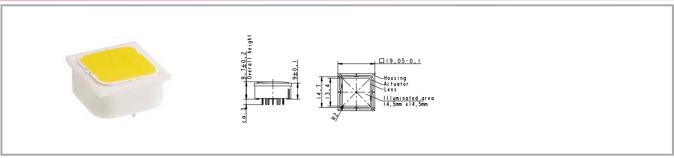
Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	not illuminated	transparent			3.14.001.001/0000
Ag	not illuminated	transparent			3.14.001.006/0000

Technical data see page 4 - 50

4



RF 19 short-travel keyswitch, fully illuminated with 2 LEDs



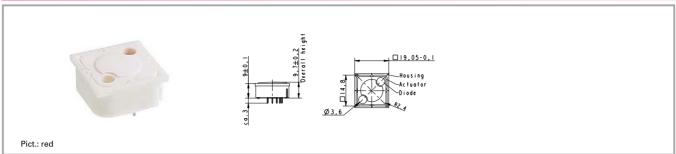
Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	fully illuminated 2 LEDs	red	red	2 mm	3.14.002.011/0000
Au	fully illuminated 2 LEDs	green	green	2 mm	3.14.002.012/0000
Au	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.002.013/0000
Au	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.014/0000
Au	fully illuminated 2 LEDs	blue	blue	2 mm	3.14.002.015/0000
Ag	fully illuminated 2 LEDs	red	red	2 mm	3.14.002.021/0000
Ag	fully illuminated 2 LEDs	green	green	2 mm	3.14.002.022/0000
Ag	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.002.023/0000
Ag	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.024/0000
Ag	fully illuminated 2 LEDs	blue	blue	2 mm	3.14.002.025/0000

Technical data see page 4 - 50

Technical data of LED see seperate page of the beginning of this chapter.



RF 19 short-travel keyswitch, 1 LED spot-illumination



Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	spot illumination 1 LED	opaque white	blue	3 mm	3.14.001.030/0000
Au	spot illumination 1 LED	transparent	red	3 mm	3.14.001.031/0000
Au	spot illumination 1 LED	transparent	green	3 mm	3.14.001.032/0000
Au	spot illumination 1 LED	transparent	yellow	3 mm	3.14.001.033/0000
Ag	spot illumination 1 LED	opaque white	blue	3 mm	3.14.001.040/0000
Ag	spot illumination 1 LED	transparent	red	3 mm	3.14.001.041/0000
Ag	spot illumination 1 LED	transparent	green	3 mm	3.14.001.042/0000
Ag	spot illumination 1 LED	transparent	yellow	3 mm	3.14.001.043/0000

Technical data see page 4 - 50

Versions with 2 LEDs available on request.

Technical data of LED see seperate page of the beginning of this chapter.

nг



RF 19 short-travel keyswitch, 1 NC + 1 NO



Technical data

General information	
Recommended key grid	23 mm

Dimensions Lenath 19.05 mm Width 19.05 mm Overall height 9.7 mm

Mechanical design Mounting

Contact system Contact arrangement Contact materials Illumination

Terminals

Mechanical characteristics

Operating force max. Operating travel Switching travel Robustness min.

2 ... 3 N 0.5 mm 0.5 mm with through-plated PCB 100 N

soldering into PCB

contact Ag plated

bridge contact

1 NC + 1 NO

Au/Ag

none

contacts tin-plated, fix

Electrical characteristics

Rated voltage min. Rated voltage max. Rated current min.

Rated current max.

Rated power max. (ohmic load)

For keycaps, refer to RK 90.

Au: 0,02 V, Ag: 3 V V Au: 42 V, Ag: 50 V V Au: 0,01 mA, Ag: 0,1 mA

Au: 100 mA, Ag: 250 mA mA

Au: 2 W, Ag: 12.5 W

Contact resistance when new max. Contact resistance acc. to life max.

Insulation resistance ESD strength (underneath overlay)

Bouncing time max.

Other specifications Ambient temp. operating min.

Ambient temp. operating Storage temperature min.

Storage temperature max. (product) Storage temperature max.

(in tube) Resistance to constant environment

Resistance at variable

environment Operating life min. Soldering time max.

Soldering temperature

Flammability of materials

100 m Ω

 3Ω $2 \times 10^6 \Omega$

> 15 kV 5 ms

-25 °C

+70 °C

-40 °C

+80 °C

+50 °C

according to IEC 600 68-2-3 and 2-30

according to

IEC 600 68-2-14 and 2-33

100000 5 sec.

265 °C UL 94 HB

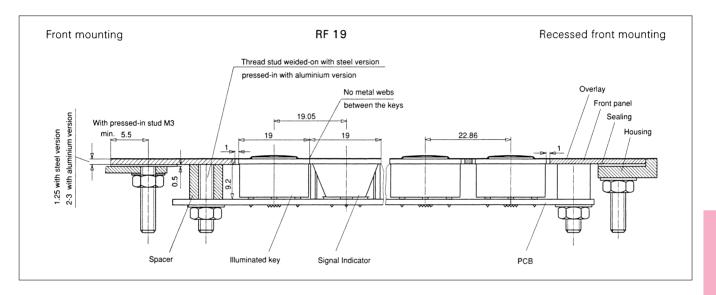
RF

4 - 56 **PCB** Keyswitches

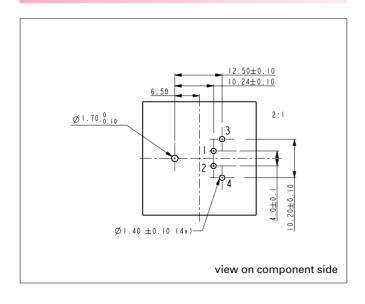
Circuit Diagram

$$S \mid F - \begin{cases} 1 \\ - - - \end{cases}$$

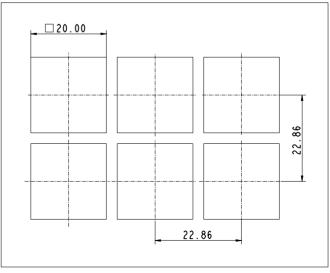
Dimensional Drawing



Hole Pattern



Hole Pattern – Front Panel

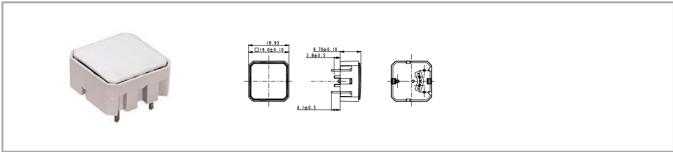


4

RF

PCB Keyswitches

RF 19 short-travel keyswitch, non-illuminated



Contact materials	Contact arrangement	Illumination	Colour of lens	Order no.
Au	1 NC + 1 NO	not illuminated	opaque white	1.16.000.991/0000
Ag	1 NC + 1 NO	not illuminated	opaque white	1.16.000.990/0000

Technical data see page 4 - 56

4



RF 19 H short-travel keyswitch



General data

Application notes:

The RF 19H key has an overall height of 12.5 mm and can be fully illuminated. When designing membrane keyboards, we recommend using a key grid of at least 23 mm and a 0.13 mm overlay with area embossing over the keys. You can use the O-ring (accessory) to block the key and use it as an indicator field or blank spaceholder.

Rated power max.

Resistance at variable

Operating life min.

Soldering time max.

Soldering temperature

Flammability of materials

according to

1,000,000

2,5 sec.

250 °C

UL 94 HB

IEC 600 68-2-14 and 2-33

environment

Technical data

General information

Robustness min.

Electrical characteristics

Rated voltage min.

Rated voltage max.

Rated current min.

Rated current max.

Colour of lens	see order block	(ohmic load)	Au: 2 W, Ag: 12.5 W
Recommended key grid	24 mm	Contact resistance when	
		new max.	100 m Ω
Dimensions		Contact resistance acc.	
Length	19.05 mm	to life max.	3 Ω
Width	19.05 mm	Insulation resistance	$10^9 \Omega$
Overall height	12.5 mm	ESD strength (underneath	
		overlay)	15 kV
Mechanical design		Bouncing time max.	5 ms
Mounting	soldering into PCB		
Terminals	contacts tin-plated, fix	Other specifications	
	contact Ag plated	Ambient temp. operating	
Contact system	snap-action contact	min.	-25 °C
Contact arrangement	1 NO	Ambient temp. operating	
Contact materials	Au/Ag	max.	+70 °C
Illumination	spot-/fully illuminated	Storage temperature min.	-40 °C
LED colour	see order block	Storage temperature max.	
LED type	see order block	(product)	+80 °C
		Storage temperature max.	
Mechanical characteristics		(in tube)	+50 °C
Operating force max.	2 3 N	Resistance to constant	
Operating travel	0.5 mm	environment	according to
Switching travel	0.5 mm		IEC 600 68-2-3 and 2-30

with through-plated PCB

Au: 0,01 mA, Ag: 0,1 mA

Au: 100 mA, Ag: 250 mA

Au: 0.02 V, Ag: 3 V

Au: 42 V, Ag: 50 V

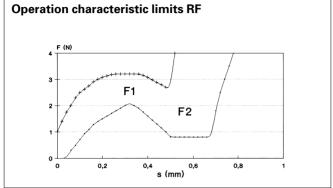
100 N

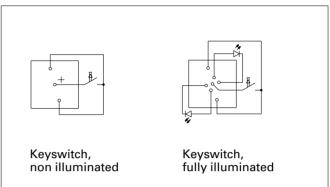
RF

4 - 60 PCB Keyswitches

Force/Travel Diagram - Keyswitch RF 19 H

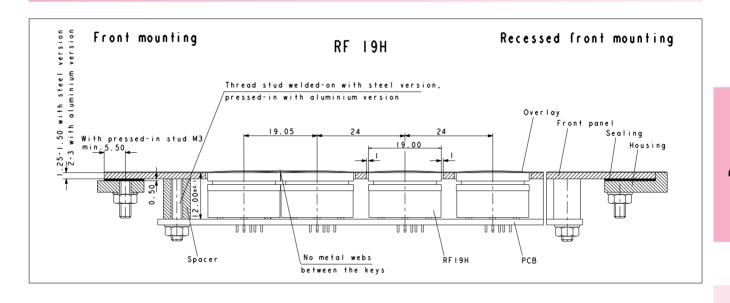
Circuit Diagram - Keyswitch RF 19 H





- F 1 = Max. operating force
- F 2 = Force at contact
- F 2 is max. 55% of F 1

Dimensional Drawing



RF

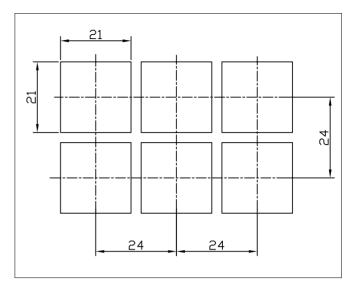
PCB Keyswitches 4 - 61



Hole Pattern RF 19 H

Z4,00 LED 7,75 90'61 3,55 1.27 Keyswitch not illuminated

Hole Pattern – Front Panel RF 19 H



* The LED may be positioned either on the left-hand or right-hand side. Standard version: LED on left-hand side View on component side, all hole diameters 1,1 +/- 0,1 mm

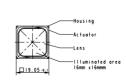
Accessories RF 19 H short-travel keyswitch

Description	Photo	Order no.	Page
O-ring, black, 17.0 x 1.5, for blocking RF 19H keys	0	5.30.125.003/0100	5 - 27

RF 19 H keyswitch, non-illuminated





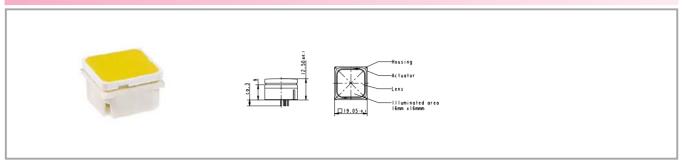


Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	not illuminated	white			3.14.001.501/0000
Ag	not illuminated	white			3.14.001.506/0000

Technical data see page 4 - 60



RF 19 H short-travel keyswitch, fully illuminated



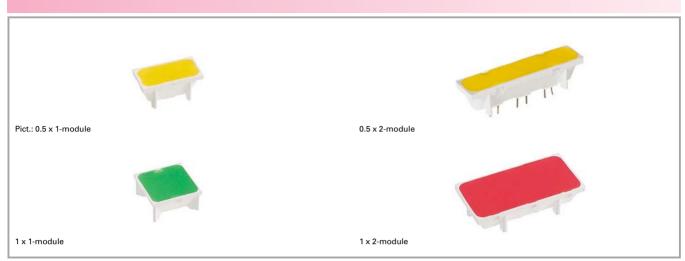
Illumination	Colour of lens	LED colour	LED type	Order no.
fully illuminated 2 LEDs	red	red	2 mm	3.14.002.613/0000
fully illuminated 2 LEDs	green	green	2 mm	3.14.002.632/0000
fully illuminated 1 LED	green	green super bright	3 mm	3.14.002.633/0000
fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.002.653/0000
fully illuminated 1 LED	white	white	3 mm	3.14.002.684/0000
fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.673/0000
fully illuminated 2 LEDs	white	multi colour	3 mm	3.14.001.672/0000
fully illuminated 1 LED	blue	blue	3 mm	3.14.002.683/0000
fully illuminated 2 LEDs	red	red	2 mm	3.14.002.623/0000
fully illuminated 2 LEDs	green	green	2 mm	3.14.002.642/0000
fully illuminated 1 LED	green	green super bright	3 mm	3.14.002.643/0000
fully illuminated 1 LED	blue	blue super bright	3 mm	3.14.002.688/0000
fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.002.663/0000
fully illuminated 1 LED	white	white	3 mm	3.14.002.689/0000
fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.678/0000
fully illuminated 2 LEDs	white	multi colour	3 mm	3.14.001.682/0000
	fully illuminated 2 LEDs fully illuminated 2 LEDs fully illuminated 1 LED fully illuminated 2 LEDs fully illuminated 1 LED fully illuminated 2 LEDs fully illuminated 2 LEDs fully illuminated 2 LEDs fully illuminated 1 LED fully illuminated 2 LEDs fully illuminated 1 LED fully illuminated 2 LEDs fully illuminated 1 LED fully illuminated 2 LEDs fully illuminated 1 LED fully illuminated 1 LED fully illuminated 2 LEDs fully illuminated 2 LEDs fully illuminated 2 LEDs fully illuminated	fully illuminated 2 LEDs fully illuminated 2 LEDs fully illuminated 3 green 1 LED fully illuminated 4 yellow 2 LEDs fully illuminated 5 white 1 LED fully illuminated 6 orange 2 LEDs fully illuminated 6 blue 1 LED fully illuminated 7 red 2 LEDs fully illuminated 8 green 1 LED fully illuminated 9 green 2 LEDs fully illuminated 1 pred 2 LEDs fully illuminated 9 green 1 LED fully illuminated 1 preen 1 LED fully illuminated 2 preen 1 LED fully illuminated 1 preen 1 LED fully illuminated 2 preen 1 LED fully illuminated 3 preen 1 LED fully illuminated 4 preen 1 LED fully illuminated 5 preen 1 LED fully illuminated 6 preen 1 LED fully ill	fully illuminated 2 LEDs fully illuminated 2 LEDs fully illuminated 3 green 3 green 3 green 4 green 5 green 5 green 6 green 7 green 8 green 8 green 9 green	fully illuminated 2 LEDs fully illuminated 2 LEDs fully illuminated 3 green 3 green 2 mm fully illuminated 4 green 3 green 2 mm fully illuminated 5 green 6 green 8 green 8 green 8 green 8 green 8 green 8 green 9 green 8 green 9

Technical data see page 4 - 60

When using the keyswitches with multicolour LEDs the illumination colour can be varied from red to green by change of polarity. Due to the frequency of the polarity-changes the colours red, green, yellow as well as all secondary colours from these are possible. Technical data of LED see seperate page of the beginning of this chapter.



RF 19 signal indicator



Technical data

_				
Gen	eral	into	rma	ation

Colour of lens Recommended key grid

Dimensions

Length Width Overall height

Mechanical design

Mounting Illumination LED colour LED type

Other specifications

Ambient temp. operating min.

see order block 23/x mm

see order block see order block 9.15 mm

soldering into PCB see order block see order block see order block

-25 °C

Ambient temp. operating max.

Storage temperature min. Storage temperature max. (product) Storage temperature max.

(in tube)
Resistance to constant
environment

Resistance at variable environment

Soldering time max. Soldering temperature max.

Flammability of materials

+70 °C -40 °C

+80 °C

+50 °C

according to IEC 600 68-2-3 and 2-30

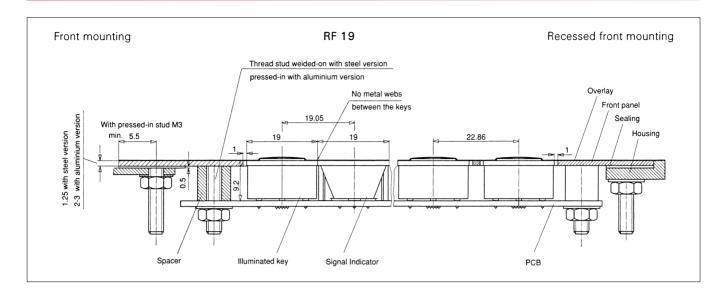
according to IEC 600 68-2-14 and 2-33 2,5 sec.

250 °C UL 94 HB

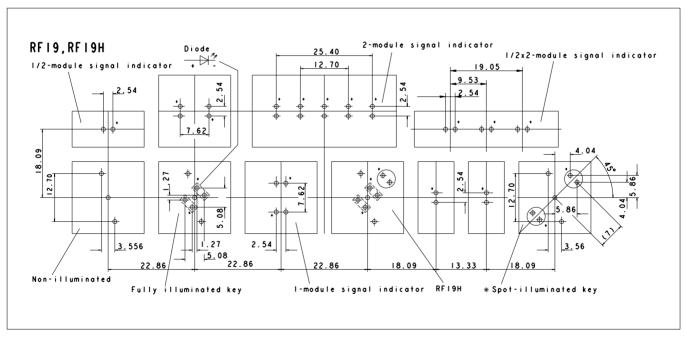
RF

4 - 64 PCB Keyswitches

Dimensional Drawing Signal Indicator RF 19



Hole Patterns RF 19



* The LED may be positioned either on the left-hand or right-hand side. Standard verstion: LED on left-hand side View on component side, all hole diameters 1,1 +/- 0,1 mm

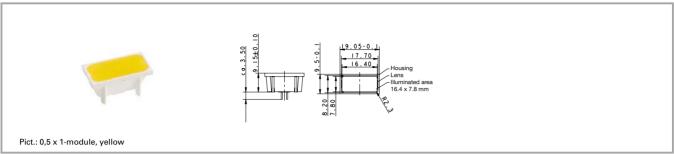
Front panel cut-out = outer keyswitch size + 1 mm

4

RF

PCB Keyswitches 4 - 65

RF 19 signal indicator, 1/2 x 1-module

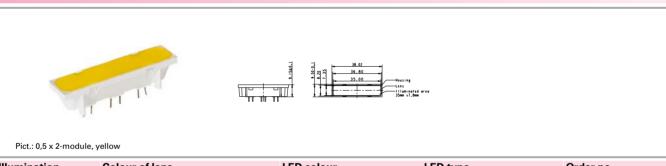


Illumination	Colour of lens	LED colour	LED type	Order no.
fully illuminated 1 LED	red	red	2 mm	3.14.002.061/0000
fully illuminated 1 LED	green	green	2 mm	3.14.002.062/0000
fully illuminated 1 LED	yellow	yellow	2 mm	3.14.002.063/0000
fully illuminated 1 LED	orange	yellow	2 mm	3.14.002.064/0000

Technical data see page 4 - 64

For more information, see LEDs.

RF 19 signal indicator, 1/2 x 2-module



Colour of lens **LED** colour **LED** type Order no. Illumination fully illuminated 2 mm 3.14.002.908/0000 red 3 LÉDs fully illuminated 3.14.002.909/0000 green green 2 mm 3 LÉDs fully illuminated yellow yellow 2 mm 3.14.002.910/0000 3 LEDs fully illuminated orange 2 mm 3.14.002.911/0000 yellow 3 LEDs

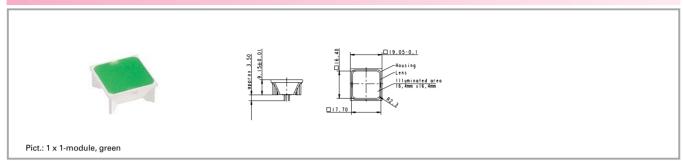
Technical data see page 4 - 64

For more information, see LEDs.





RF 19 signal indicator, 1 x 1-module



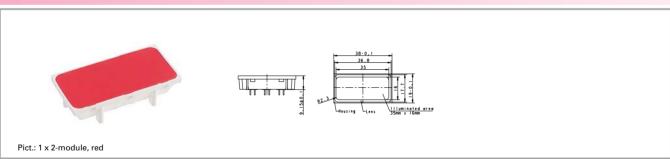
Illumination	Colour of lens	LED colour	LED type	Order no.
fully illuminated 2 LEDs	red	red	2 mm	3.14.002.051/0000
fully illuminated 2 LEDs	green	green	2 mm	3.14.002.052/0000
fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.002.053/0000
fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.054/0000
fully illuminated 2 LEDs	blue	blue	2 mm	3.14.001.659/0000

Technical data see page 4 - 64

For more information, see LEDs.

Suitable for RK 90 system design, illuminated for 2-module keycap.

RF 19 signal indicator, 1 x 2-module



Illumination	Colour of lens	LED colour	LED type	Order no.
fully illuminated 5 LEDs	red	red	2 mm	3.14.002.071/0000
fully illuminated 5 LEDs	green	green	2 mm	3.14.002.072/0000
fully illuminated 5 LEDs	yellow	yellow	2 mm	3.14.002.073/0000
fully illuminated 5 LEDs	orange	yellow	2 mm	3.14.002.074/0000

Technical data see page 4 - 64

For more information, see LEDs.

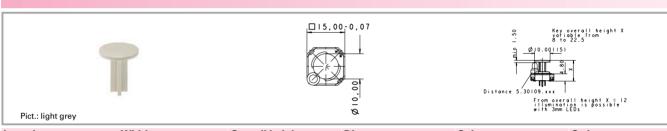




Pict.: light grey

round and triangular versions

Extension plunger for RF 15 N, round head

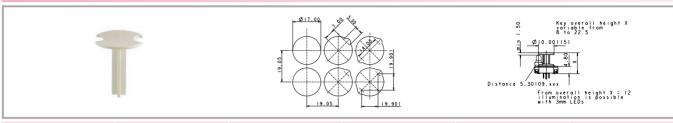


Length	Width	Overall height	Diameter	Colour	Order no.
		9 mm	10 mm		5.46.011.036/0710
		9.7 mm	10 mm		5.46.011.030/0710
		12.5 mm	10 mm		5.46.011.037/0710
		13 mm	10 mm		5.46.011.038/0710
		22.5 mm	10 mm		5.46.011.028/0710

Length of plunger = Overall height - 4.25 mm.

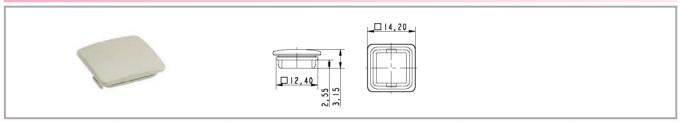


Extension plunger for RF 15 N, round head, with recess for LED



Length	Width	Overall height	Diameter	Colour	Order no.
		9 mm	15 mm		5.46.017.036/0710
		9.7 mm	15 mm		5.46.017.030/0710
		12.5 mm	15 mm		5.46.017.037/0710
		13 mm	15 mm		5.46.017.038/0710
		22.5 mm	15 mm		5.46.017.028/0710

Keycap for RF 15, snap-on, for overall height 12.5 mm

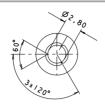


Length	Width	Overall height	Diameter	Colour	Order no.
14.2 mm	14.2 mm	12.5 mm		beige	5.46.654.059/0227

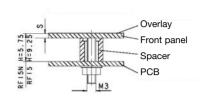


Spacers, round







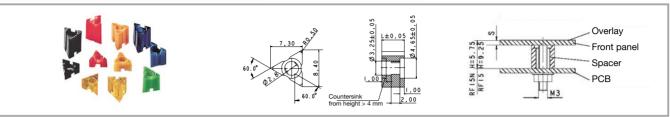


Length	Width	Overall height	Diameter	Colour	Order no.
3.50 mm				blue transparent	5.30.759.023/0000
4 mm				green	5.30.759.025/0000
4.25 mm				blue	5.30.759.026/0000
4.50 mm				red	5.30.759.027/0000
4.75 mm				blue transparent	5.30.759.028/0000
5 mm				black	5.30.759.029/0000
5.25 mm				yellow orange transparent	5.30.759.030/0000
5.50 mm				yellow	5.30.759.031/0000
5.75 mm				green	5.30.759.032/0000
6 mm				blue	5.30.759.033/0000
6.2 mm				blue	5.30.759.251/0000
6.25 mm				red	5.30.759.034/0000
6.50 mm				blue transparent	5.30.759.035/0000
6.75 mm				black	5.30.759.036/0000
7 mm				yellow orange transparent	5.30.759.037/0000
7.25 mm				yellow	5.30.759.038/0000
7.50 mm				green	5.30.759.039/0000
7.75 mm				blue	5.30.759.040/0000
8 mm				red	5.30.759.041/0000
8.25 mm				blue transparent	5.30.759.042/0000
9.00 mm				green	5.30.759.046/0000
10.00 mm				black	5.30.759.043/0104

4



Spacers, triangular



Length	Width	Overall height	Diameter	Colour	Order no.
2.50 mm				blue	5.30.759.094/0000
2.75 mm				red	5.30.759.095/0000
3 mm				blue transparent	5.30.759.096/0000
3.25 mm				black	5.30.759.097/0000
3.50 mm				yellow orange transparent	5.30.759.098/0000
3.75 mm				yellow	5.30.759.099/0000
4 mm				green	5.30.759.100/0000
4.25 mm				blue	5.30.759.101/0000
4.50 mm				red	5.30.759.102/0000
4.75 mm				blue transparent	5.30.759.103/0000
5 mm				black	5.30.759.104/0000
5.25 mm				yellow orange transparent	5.30.759.105/0000
5.50 mm				yellow	5.30.759.106/0000
5.75 mm				green	5.30.759.107/0000
6 mm				blue	5.30.759.108/0000
6.2 mm				blue	5.30.759.253/0000
6.25 mm				red	5.30.759.109/0000
6.50 mm				blue transparent	5.30.759.110/0000
6.75 mm				black	5.30.759.111/0000
7 mm				yellow orange transparent	5.30.759.112/0000
7.25 mm				yellow	5.30.759.113/0000
7.50 mm				green	5.30.759.114/0000
7.75 mm				blue	5.30.759.115/0000



Length	Width	Overall height	Diameter	Colour	Order no.
8 mm				red	5.30.759.116/0000
8.25 mm				blue transparent	5.30.759.117/0000
9 mm				blue	5.30.759.254/0000
10.00 mm				black	5.30.759.124/0000
10.25 mm				yellow orange transparent	5.30.759.125/0000

LED spacer for RF 15 N



Pict.: light grey

Length Characteristic 1	Width Characteristic 2	Overall height	Diameter	Colour	Order no.
2.2 mm		12.5 mm	5 mm	light grey	5.30.109.010/0756
12 mm		22.5 mm	5 mm	black	5.30.109.019/0105