General Data

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

Content

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 (full illumination of RF 15/19)

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

Calculating the series resistor:

$$R_V = \frac{U_B - U_F}{I_F}$$

Rated power of series:

$$P_V = I_F^2 \times R_V$$

Example for 5 Volt:

$$R_V = \frac{5V - 2{,}0\,V}{0{,}02\,A} = 150\ \Omega \text{ (= standard value)}$$

RF 15 - Short-travel keyswitch

General Data

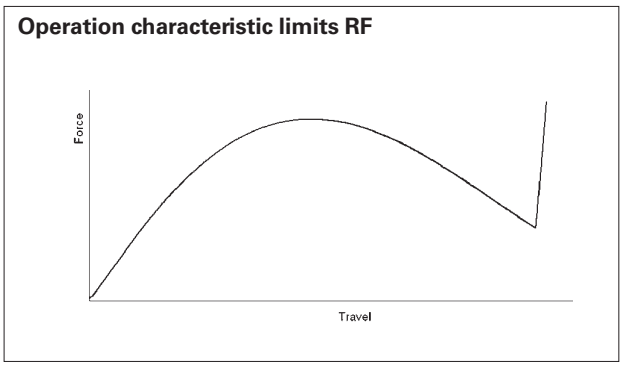
Low-profile keyboards with RF 15 components should be designed with a 19.05 mm grid. With this grid, frame webs remain free between the individual keys. The overlay can be glued onto these frame webs; we recommend area embossing over the keys for the overlays.

Technical Data

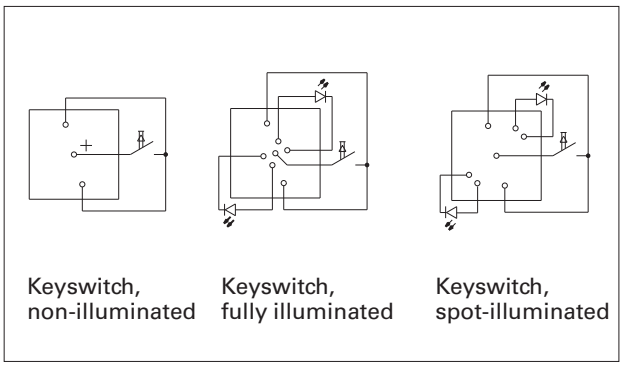
General information	
Colour of lens	see order block
Recommended key grid	19.05 mm
Dimensions	
Length	15 mm
Width	15 mm
Overall height	9.7 mm
Mechanical design	
Mounting	soldering in PCB
Terminals	THT
Contact system	snap-action contact
Contact arrangement	1 NO
Contact materials	see order block
Illumination	see order block
LED colour	see order block
LED type	see order block
Mechanical characteristics	
Operating force max.	$2.9^{\pm 0.6}$ N
Switching travel	$0.5^{+0.2}$ mm
Robustness min.	with through-plated PCB 100 N

Electrical characteristics	
Rated voltage min.	Au: 0.02 V, Ag: 3 V
Rated voltage max.	Au: 35 V, Ag: 50 V
Rated current min.	Au: 0.01 mA, Ag: 0.1 mA
Rated current max.	Au: 100 mA, Ag: 250 mA
Rated power max. (ohmic load)	Au: 2 W, Ag: 12.5 W
Contact resistance when new max.	100 mΩ
Insulation resistance	10^9 Ω
Other specifications	
Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Environmental restistance	acc. to IEC 60068-2 -14, -30, -33 and -78
Operating life min. (operations)	1,000,000
Solderability / solder heat resistance	according to E DIN IEC 600 28-2-20
Wave soldering	260 °C max.
Manual soldering	350 °C / 5 sec. max.

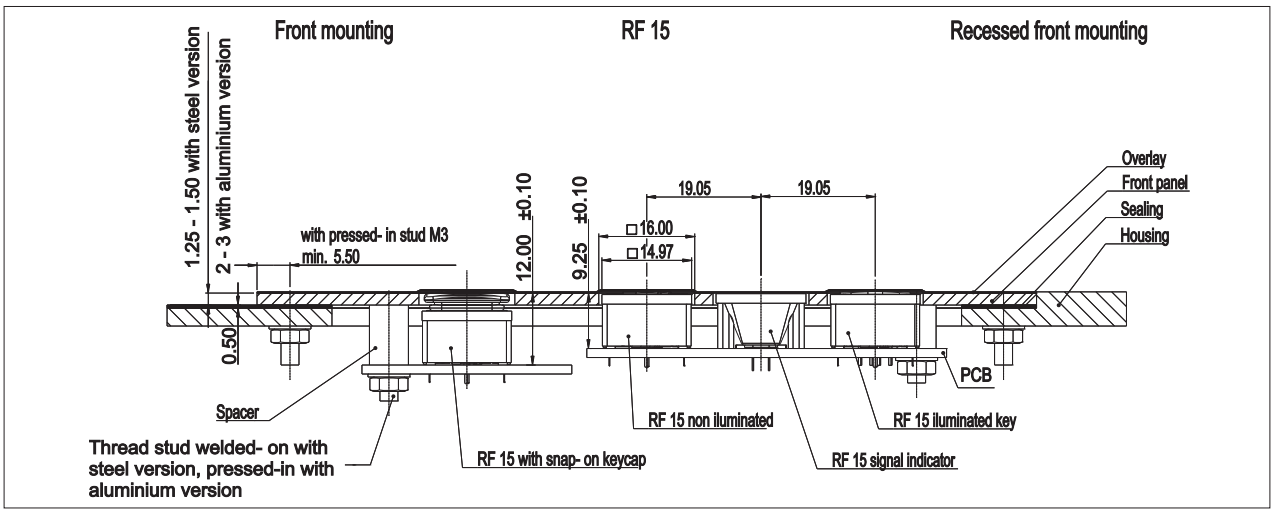
Force/Travel Diagram – Keyswitch RF 15



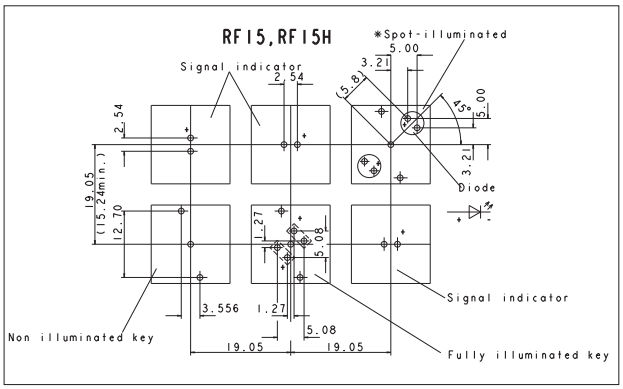
Circuit Diagram – Keyswitch RF 15



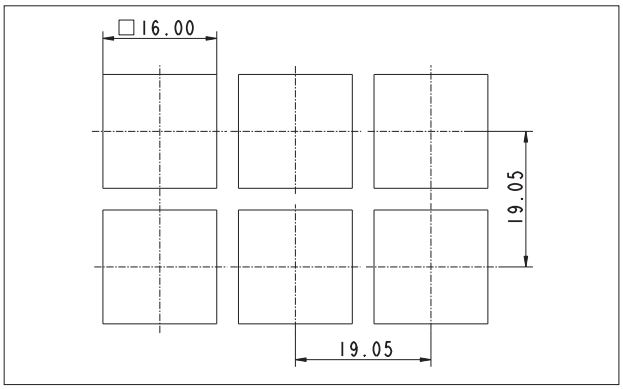
Dimensional Drawing RF 15



Hole Pattern RF 15

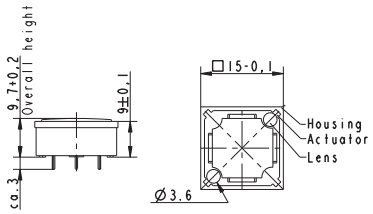


Hole Pattern – Front Panel



View on component side, all hole diameters 1,1 $^{+/- 0,1}$ mm

RF 15 - Short-travel keyswitch, non-illuminated



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

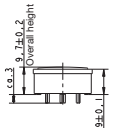
Technical data see page 4 - 42

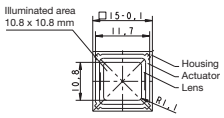
For keycaps, refer to chapter accessories and system RK 90.

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.

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

RF 15 - Short-travel keyswitch, fully illuminated with 2 LED





Pict.: red

Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	fully illuminated 2 LED	red	red	2 mm	**3.14.200.011/0000**
Au	fully illuminated 2 LED	green	green	2 mm	**3.14.200.012/0000**
Au	fully illuminated 2 LED	yellow	yellow	2 mm	**3.14.200.013/0000**
Au	fully illuminated 2 LED	orange	yellow	2 mm	3.14.200.014/0000
Au	fully illuminated 2 LED	blue	blue	2 mm	3.14.200.015/0000
Ag	fully illuminated 2 LED	red	red	2 mm	**3.14.200.021/0000**
Ag	fully illuminated 2 LED	green	green	2 mm	**3.14.200.022/0000**
Ag	fully illuminated 2 LED	yellow	yellow	2 mm	**3.14.200.023/0000**
Ag	fully illuminated 2 LED	orange	yellow	2 mm	3.14.200.024/0000
Ag	fully illuminated 2 LED	blue	blue	2 mm	3.14.200.025/0000

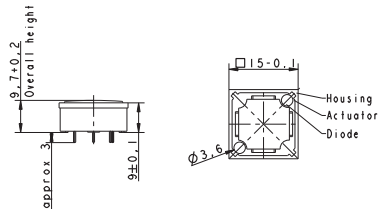
Technical data see page 4 - 42

For keycaps, refer to RK 90 system design.

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

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

RF 15 - 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	3.14.100.030/0000
Au	spot illumination 1 LED	opaque white	red	3 mm	**3.14.100.031/0000**
Au	spot illumination 1 LED	opaque white	green	3 mm	**3.14.100.032/0000**
Au	spot illumination 1 LED	opaque white	yellow	3 mm	**3.14.100.033/0000**
Ag	spot illumination 1 LED	opaque white	blue	3 mm	3.14.100.040/0000
Ag	spot illumination 1 LED	opaque white	red	3 mm	**3.14.100.041/0000**
Ag	spot illumination 1 LED	opaque white	green	3 mm	**3.14.100.042/0000**
Ag	spot illumination 1 LED	opaque white	yellow	3 mm	**3.14.100.043/0000**

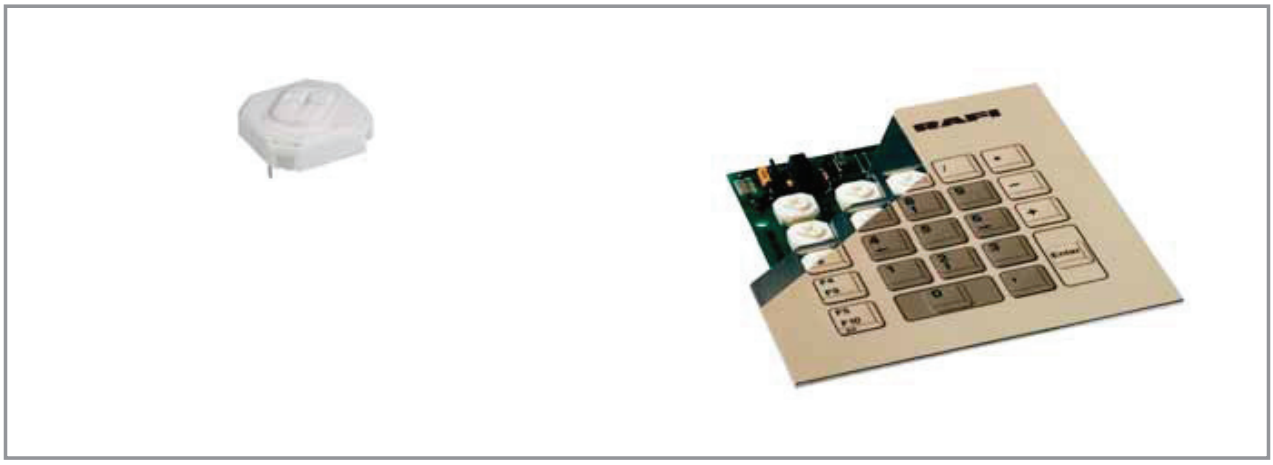
Technical data see page 4 - 42

Double-spot LED illumination available on request

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

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

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.

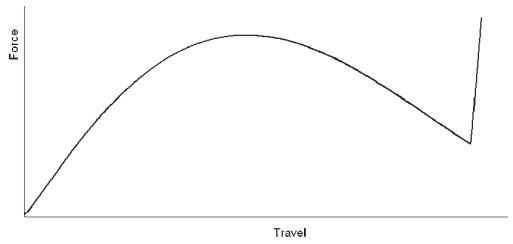
Technical Data

General information	
Colour of lens	see order block
Recommended key grid	19.05 mm
Dimensions	
Length	15 mm
Width	15 mm
Overall height	6.2 mm
Mechanical design	
Mounting	soldering in PCB
Terminals	THT
Contact system	snap-action contact
Contact arrangement	1 NO
Contact materials	see order block
Illumination	external 3 mm LED possible if height more than 12 mm
Mechanical characteristics	
Operating force max.	$2.9^{\pm 0.6}$ N
Switching travel	$0.5^{+0.2}$ mm
Robustness min.	100 with through-plated PCB N

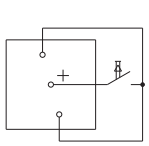
Electrical characteristics	
Rated voltage min.	Au: 0.02 V, Ag: 3 V
Rated voltage max.	Au: 35 V, Ag: 50 V
Rated current min.	Au: 0.01 mA, Ag: 0.1 mA
Rated current max.	Au: 100 mA, Ag: 250 mA
Rated power max. (ohmic load)	Au: 2 W, Ag: 12.5 W
Contact resistance when new max.	100 mΩ
Insulation resistance	10^9 Ω
Other specifications	
Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Storage temperature max. (in tube)	+50 °C
Environmental restistance	acc. to IEC 60068-2 -14, -30, -33 and -78
Operating life min. (operations)	1,000,000
Solderability / solder heat resistance	according to E DIN IEC 600 28-2-20
Wave soldering	260 °C max.
Manual soldering	350 °C / 5 sec. max.

Force/Travel Diagram – Keyswitch RF 15 N

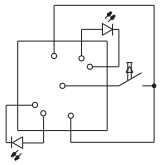
Operation characteristic limits RF



Circuit Diagram – Keyswitch RF 15 N

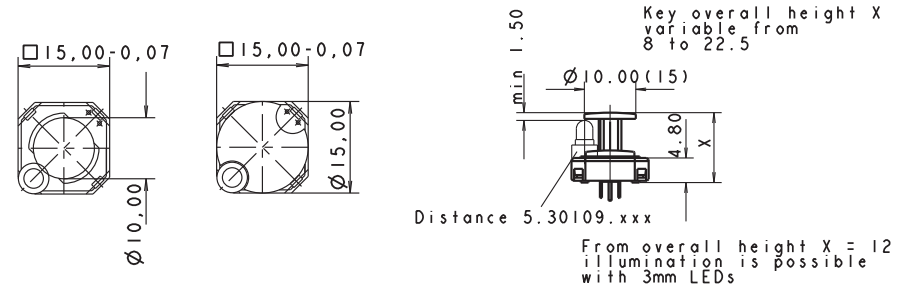


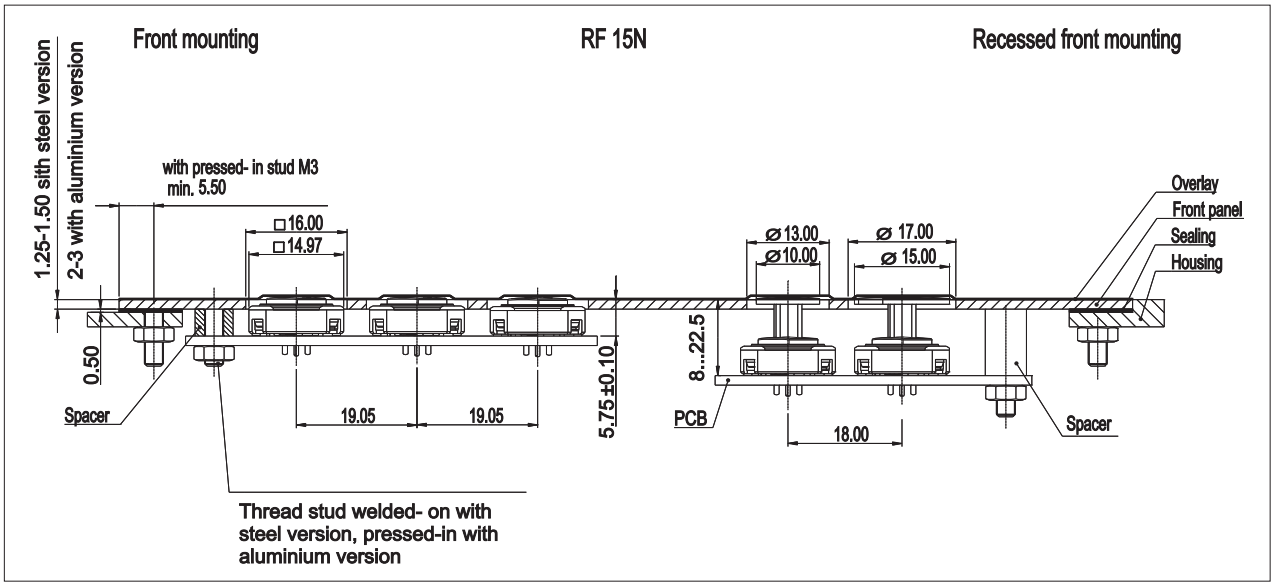
Keyswitch,
non illuminated



Keyswitch,
spot-illuminated

Dimensional Drawings RF 15 N



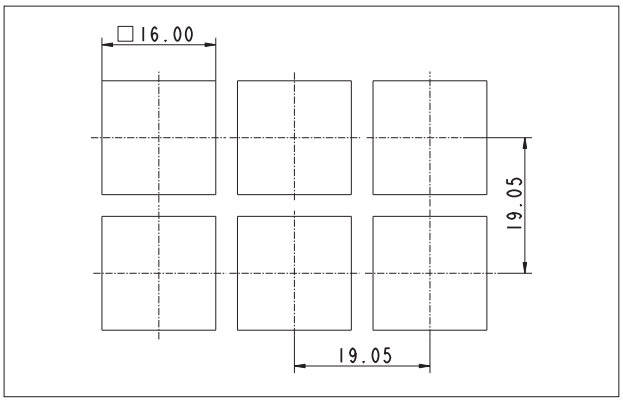


4

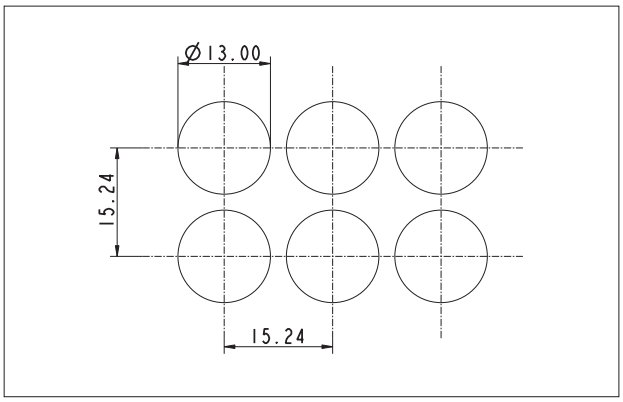
RF

Hole Patterns – Front Panel RF 15 N

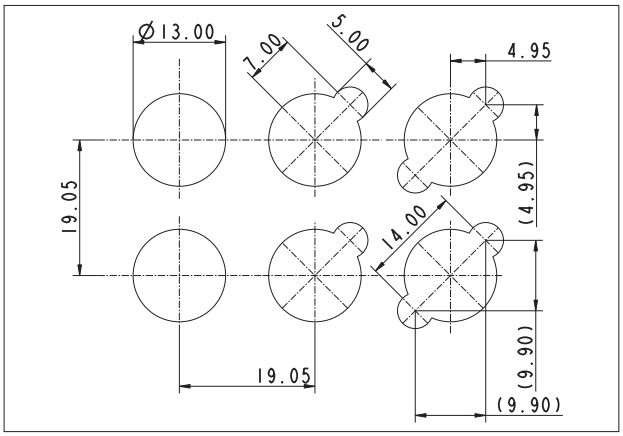
RF 15 N without plunger



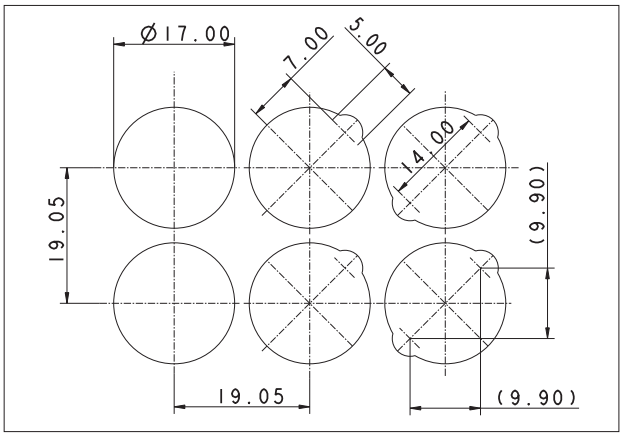
RF 15 N with plunger ø 10 mm, non-illuminated



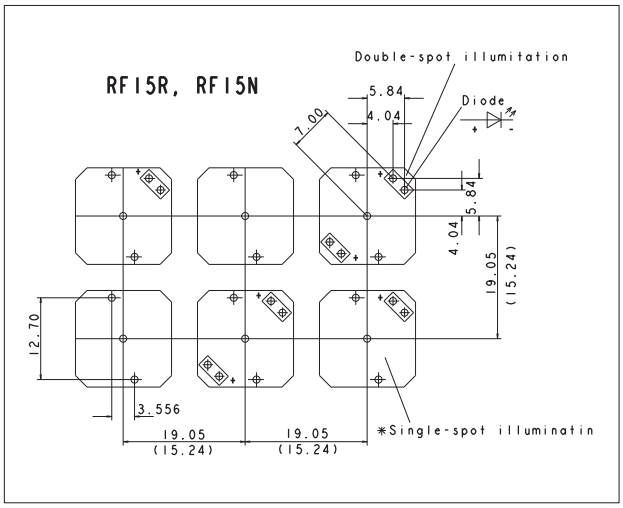
RF 15 N with plunger ø 10 mm, illuminated



RF 15 N with plunger ø 15 mm, illuminated



Hole Pattern RF 15 N

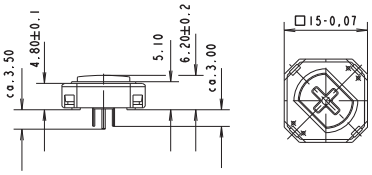


View on component side
All hole diameters 1.1 $^{+/- 0.1}$ mm
PCB layout keyswitch 1/400" grid

Typical accessories RF 15 N - Short-travel keyswitch

Description	Photo	Order no.	Additional accessories see page
RF 15 N - LED spacer Ø 5 mm, spacing length 2.2 mm, light grey, for use with overall height of 12.5 mm		5.30.109.010/0756	4 - 84
RF 15 N - Extension plunger, Ø 10 mm, overall height 22.5 mm		**5.46.011.028/0710**	4 - 80
RF 15 N - Extension plunger, Ø 15 mm, overall height 22.5 mm		5.46.017.028/0710	4 - 81

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 more than 12 mm	19.05 mm	6.2 mm	**3.14.100.601/0000**
Ag	external 3 mm LED possible if height more than 12 mm	19.05 mm	6.2 mm	**3.14.100.606/0000**

Technical data see page 4 - 48

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

RF 15 R - Short-travel keyswitch

Pict.: with 2 mm LED, red

with 3 mm LED, green

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.

Technical Data

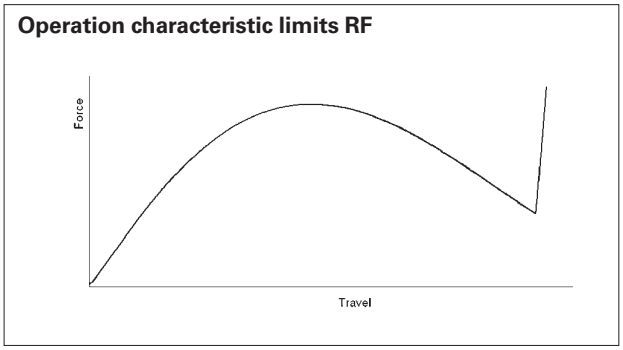
4

RF

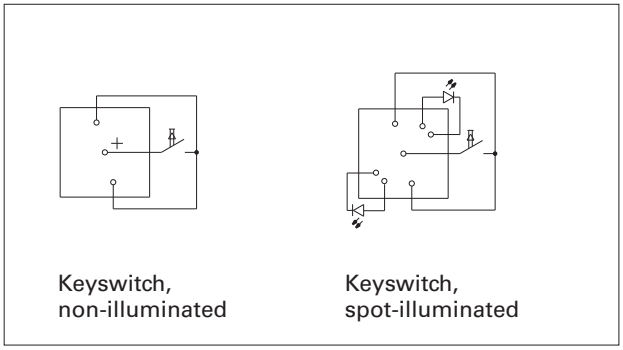
General information	
Recommended key grid	15.24 mm
Dimensions	
Length	15 mm
Width	15 mm
Overall height	see order block
Mechanical design	
Mounting	soldering in PCB
Terminals	THT
Contact system	snap-action contact
Contact arrangement	1 NO
Contact materials	see order block
Illumination	see order block
LED colour	see order block
LED type	see order block
Mechanical characteristics	
Operating force max.	$2.9^{\pm 0.6}$ N
Switching travel	$0.5^{+0.2}$ mm
Robustness min.	with through-plated PCB 100 N

Electrical characteristics	
Rated voltage min.	Au: 0.02 V, Ag: 3 V
Rated voltage max.	Au: 35 V, Ag: 50 V
Rated current min.	Au: 0.01 mA, Ag: 0.1 mA
Rated current max.	Au: 100 mA, Ag: 250 mA
Rated power max. (ohmic load)	Au: 2 W, Ag: 12.5 W
Contact resistance when new max.	100 mΩ
Insulation resistance	10^9 Ω
Other specifications	
Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Environmental restistance	acc. to IEC 60068-2 -14, -30, -33 and -78
Operating life min. (operations)	1,000,000
Solderability / solder heat resistance	according to E DIN IEC 600 28-2-20
Wave soldering	260 °C max.
Manual soldering	350 °C / 5 sec. max.

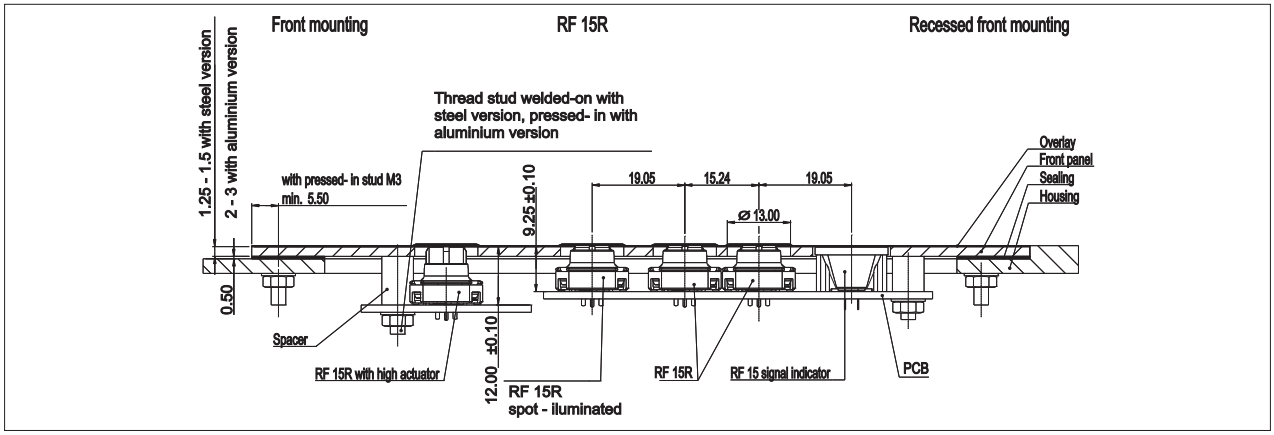
Force/Travel Diagram – Keyswitch RF 15 R



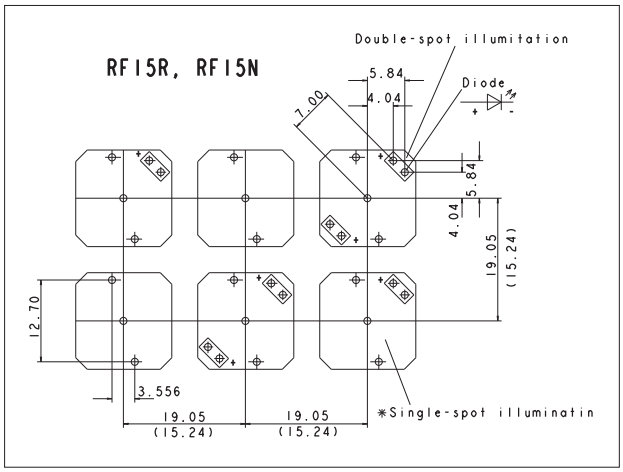
Circuit Diagram – Keyswitch RF 15 R



Dimensional Drawing RF 15 R



Hole Pattern RF 15 R



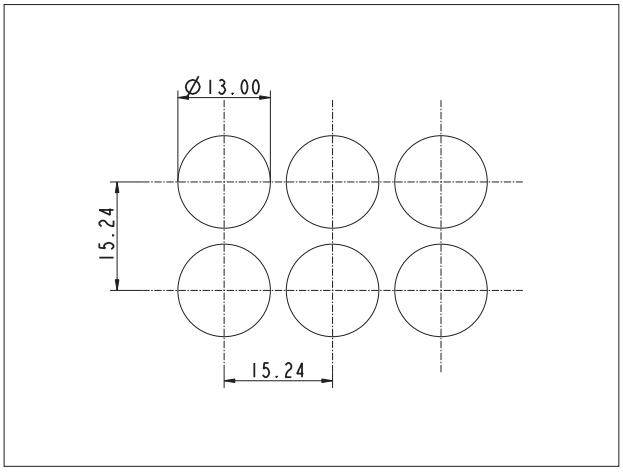
View on component side
All hole diameters 1.1 $^{+/- 0.1}$ mm
PCB layout keyswitch 1/400" grid

4

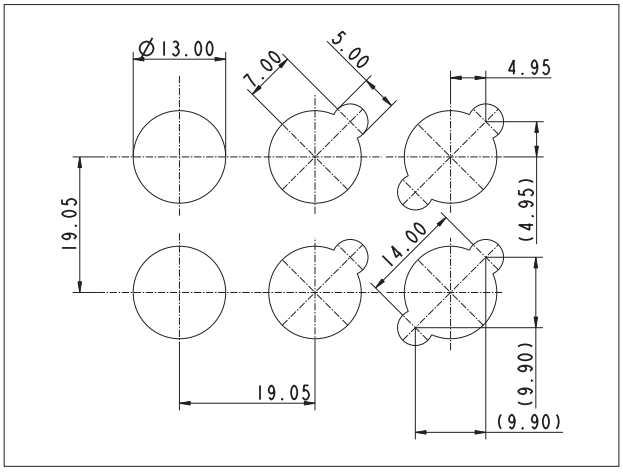
RF

Hole Pattern – Front Panel RF 15 R

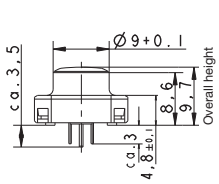
RF 15 R, non-illuminated

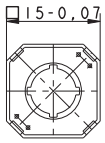


RF 15 R, illuminated



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

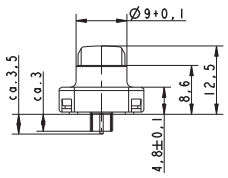


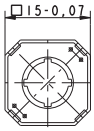


Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	9.7 mm	not illuminated	-	-	**3.14.100.501/0000**
Ag	9.7 mm	not illuminated	-	-	**3.14.100.506/0000**

Technical data see page 4 - 52

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



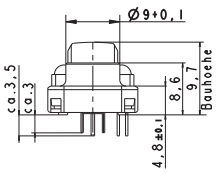


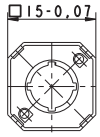
Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	12.5 mm	not illuminated	-	-	**3.14.100.801/0000**
Ag	12.5 mm	not illuminated	-	-	**3.14.100.806/0000**

Technical data see page 4 - 52

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

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





Pict.: with 2 mm LED, red

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

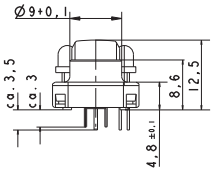
Technical data see page 4 - 52

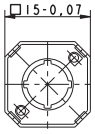
Versions with 2 LEDs available on request.

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

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

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





Pict.: with 3 mm LED, green

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

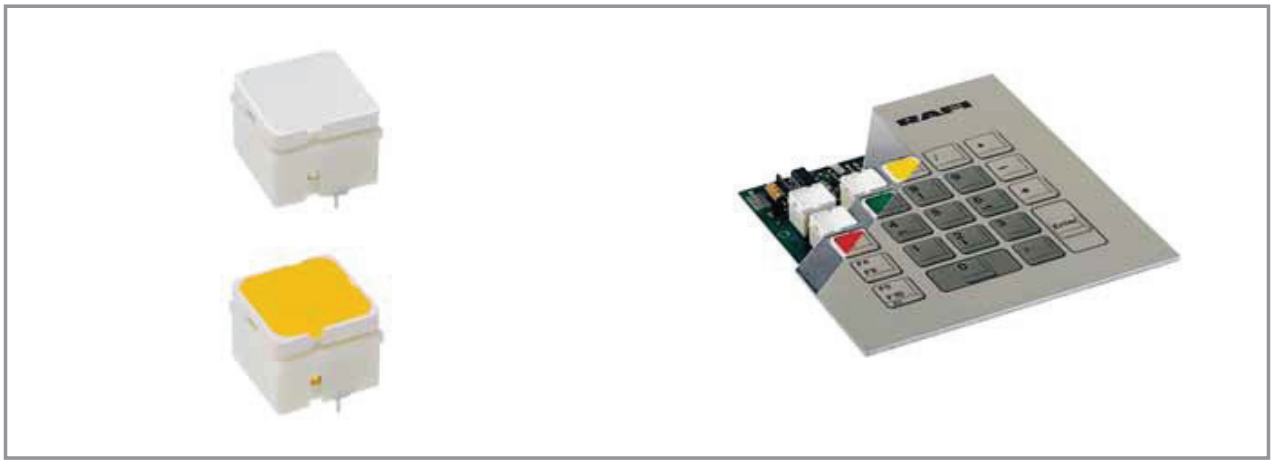
Technical data see page 4 - 52

Versions with 2 LEDs available on request.

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

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

RF 15 H - Short-travel keyswitch



General Data

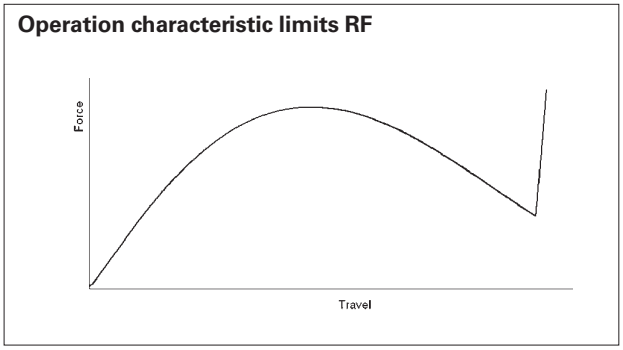
Application notes:
The RF 15 H key has an overall height of 12.5 mm and can be fully illuminated. When designing membrane keyboards, we recommend using a key grid of at least 20 mm and a 0.13 mm overlay with area embossing over the keys.
You can use the O-ring (accessory) to block the key and use it as an indicator field or blank spaceholder.

Technical Data

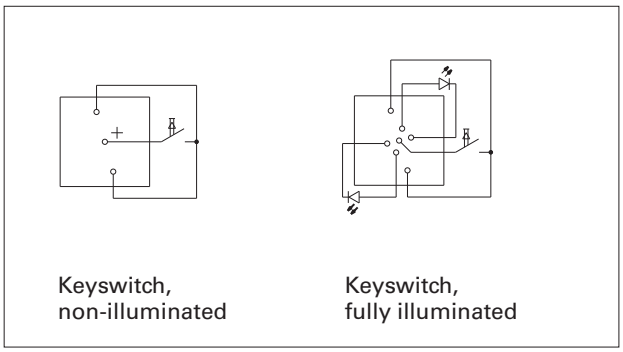
General information	
Colour of lens	see order block
Recommended key grid	20 mm
Dimensions	
Length	15 mm
Width	15 mm
Overall height	12.5 mm
Mechanical design	
Mounting	soldering in PCB
Terminals	THT
Contact system	snap-action contact
Contact arrangement	1 NO
Contact materials	see order block
Illumination	see order block
LED colour	see order block
LED type	see order block
Mechanical characteristics	
Operating force max.	$2.9^{\pm 0.6}$ N
Switching travel	$0.5^{+0.2}$ mm
Robustness min.	with through-plated PCB 100 N

Electrical characteristics	
Rated voltage min.	Au: 0.02 V, Ag: 3 V
Rated voltage max.	Au: 35 V, Ag: 50 V
Rated current min.	Au: 0.01 mA, Ag: 0.1 mA
Rated current max.	Au: 100 mA, Ag: 250 mA
Rated power max. (ohmic load)	Au: 2 W, Ag: 12.5 W
Contact resistance when new max.	100 mΩ
Insulation resistance	10^9 Ω
Other specifications	
Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Environmental restistance	acc. to IEC 60068-2 -14, -30, -33 and -78
Operating life min. (operations)	1,000,000
Solderability / solder heat resistance	according to E DIN IEC 600 28-2-20
Wave soldering	260 °C max.
Manual soldering	350 °C / 5 sec. max.

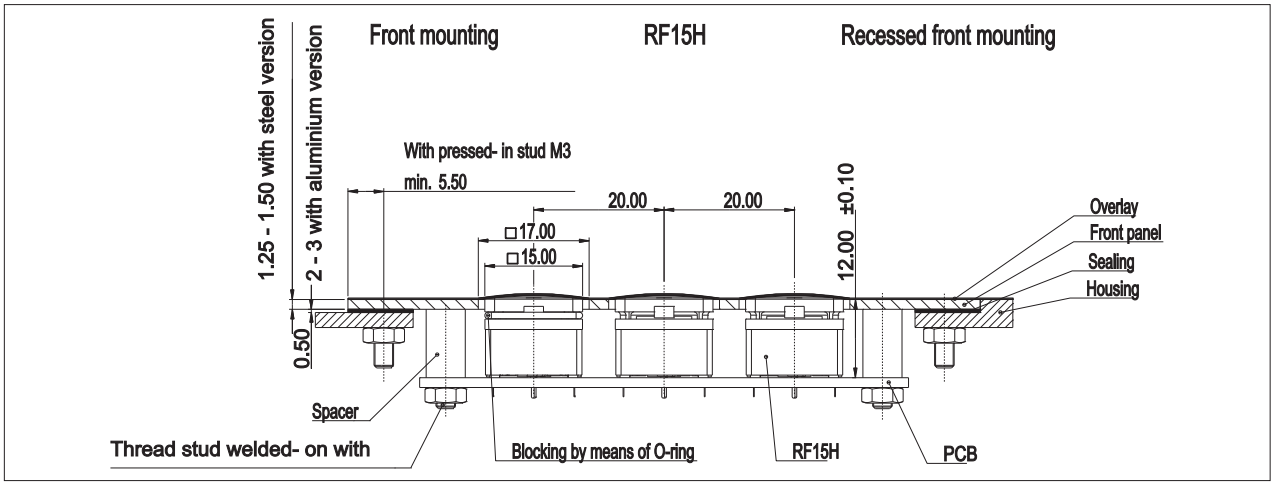
Force/Travel Diagram – Keyswitch RF 15 H



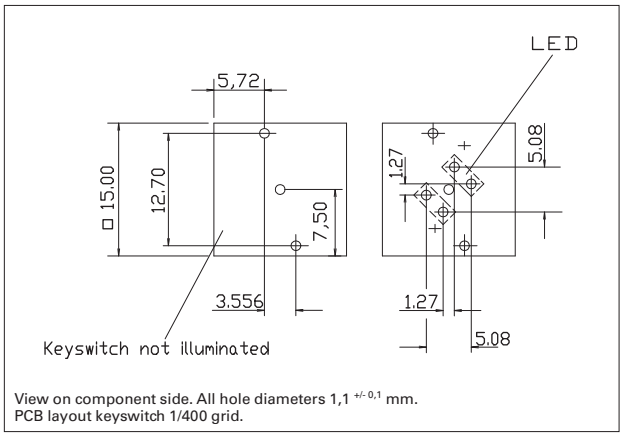
Circuit Diagram – Keyswitch RF 15 H



Dimensional Drawing

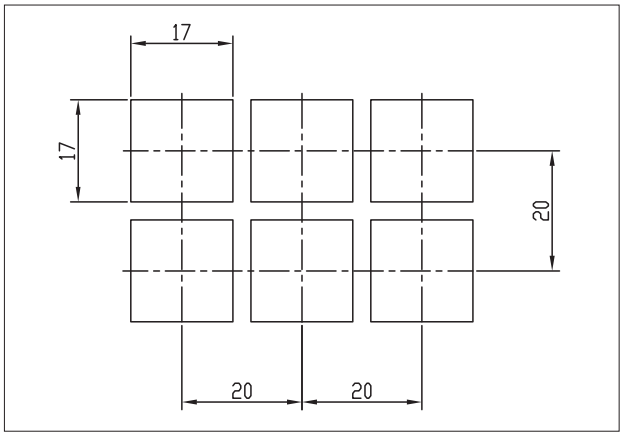


Hole Pattern



View on component side. All hole diameters 1,1 $^{+/-0,1}$ mm.
PCB layout keyswitch 1/400 grid.

Hole Pattern – Front Panel



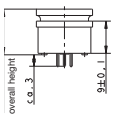
4

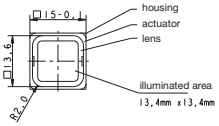
RF

Typical accessories RF 15 H - Short-travel keyswitch

Description	Photo	Order no.	Additional accessories see page
O-ring, black, for blocking the operating stroke		5.30.120.009/0100	5 - 25

RF 15 H - Short-travel keyswitch, non-illuminated



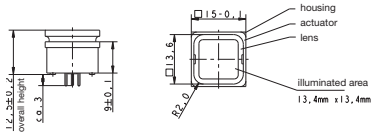


Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	not illuminated	white	-	-	3.14.100.702/0000
Ag	not illuminated	white	-	-	3.14.100.707/0000

Technical data see page 4 - 58

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

RF 15 H - Short-travel keyswitch, fully illuminated



Pict.: yellow

Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	fully illuminated 2 LED	red	red	2 mm	3.14.200.731/0000
Au	fully illuminated 2 LED	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 LED	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 LED	orange	yellow	2 mm	3.14.200.738/0000
Au	fully illuminated 1 LED	blue	blue	3 mm	3.14.200.739/0000
Au/Ag	fully illuminated 2 LED	yellow	multi colour	3 mm	3.14.101.903/0000
Ag	fully illuminated 2 LED	red	red	2 mm	**3.14.200.741/0000**
Ag	fully illuminated 2 LED	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 LED	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 LED	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 LED	white	multi colour	3 mm	3.14.100.744/0000

Technical data see page 4 - 58

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 separate page at the beginning of this chapter.

RF 15 - Signal indicator

Technical Data

General information

Colour of lens	see order block
Recommended key grid	19.05 mm

Dimensions

Length	15 mm
Width	15 mm
Overall height	9.7 mm

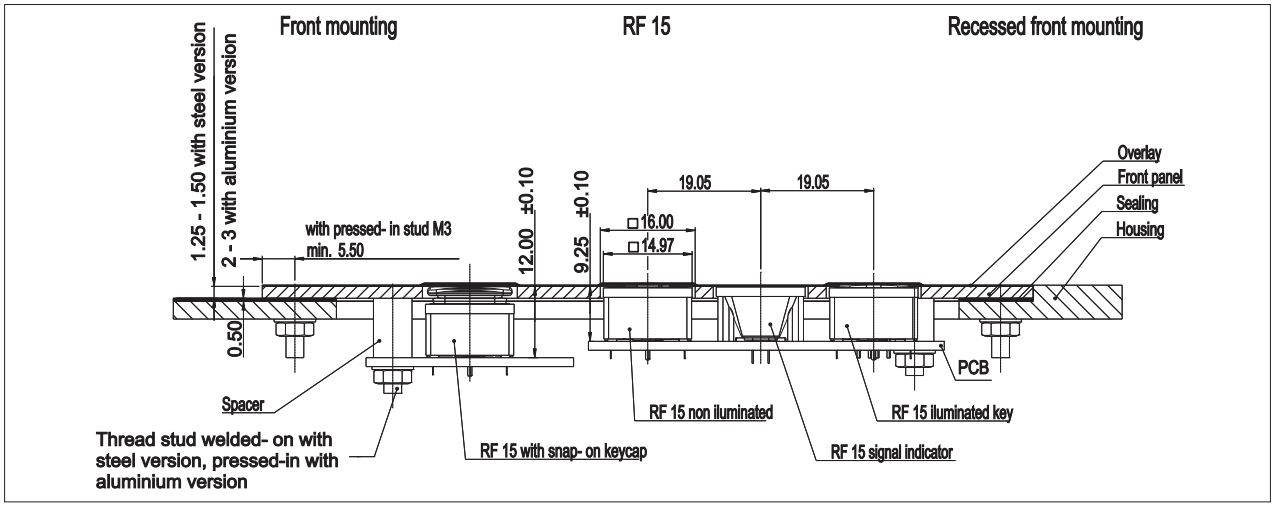
Mechanical design

Mounting	THT soldering in PCB
Illumination	fully illuminated 1 LED
LED colour	see order block
LED type	2 mm

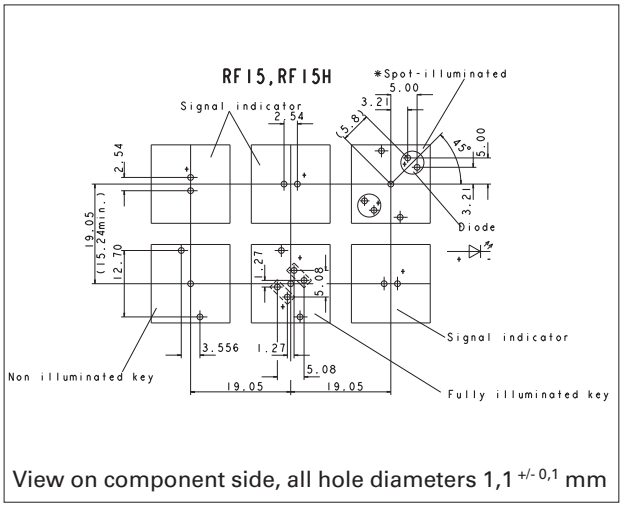
Other specifications

Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Environmental restistance	acc. to IEC 60068-2 -14, -30, -33 and -78
Solderability / solder heat resistance	according to E DIN IEC 600 28-2-20
Wave soldering	260 °C max.
Manual soldering	350 °C / 5 sec. max.

Dimensional Drawing Signal Indicator RF 15

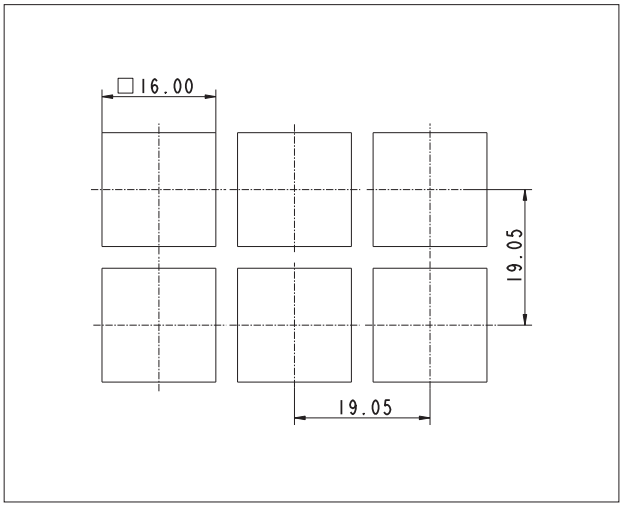


Hole Pattern



View on component side, all hole diameters 1,1 $^{+/-0,1}$ mm

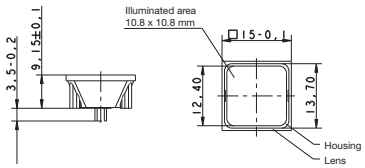
Hole Pattern – Front Panel



4

RF

RF 15 - Signal indicator, fully illuminated, 1 LED



Pict.: green

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 - 62

Technical data of LED see separate page at the beginning of chapter 4 PCB Keyswitches.

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