

Specifications LED

3 mm LED

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

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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:

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

RF

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
Recommended key grid

see order block
19.05 mm

Electrical characteristics

Rated voltage min.
Rated voltage max.
Rated current min.
Rated current max.
Rated power max.
(ohmic load)
Contact resistance when new
max.
Insulation resistance

Au: 0.02 V, Ag: 3 V
Au: 35 V, Ag: 50 V
Au: 0.01 mA,
Ag: 0.1 mA
Au: 100 mA,
Ag: 250 mA
Au: 2 W, Ag: 12.5 W

Dimensions

Length
Width
Overall height

15 mm
15 mm
9.7 mm

Other specifications

Ambient temp. operating min.
Ambient temp. operating max.
Environmental resistance
Operating life min.
(operations)
Solderability / solder heat
resistance
Wave soldering
Manual soldering

-25 °C
+70 °C
acc. to IEC 60068-2
-14, -30, -33 and -78
1,000,000
according to E DIN
IEC 600 28-2-20
260 °C max.
350 °C / 5 sec. max.

Mechanical design

Mounting
Terminals
Contact system
Contact arrangement
Contact materials
Illumination
LED colour
LED type

soldering in PCB
THT
snap-action contact
1 NO
see order block
see order block
see order block
see order block

4

RF

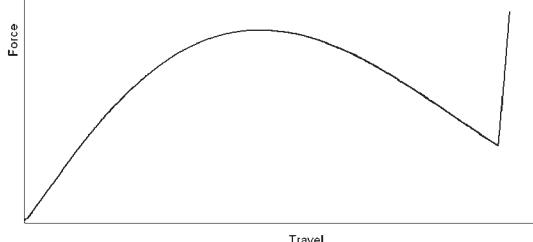
Mechanical characteristics

Operating force max.
Switching travel
Robustness min.

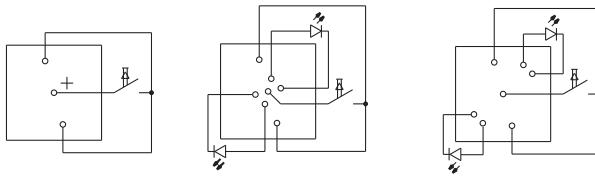
$2.9^{+0.6}$ N
 $0.5^{+0.2}$ mm
with through-plated
PCB 100 N

Force/Travel Diagram – Keypad RF 15

Operation characteristic limits RF



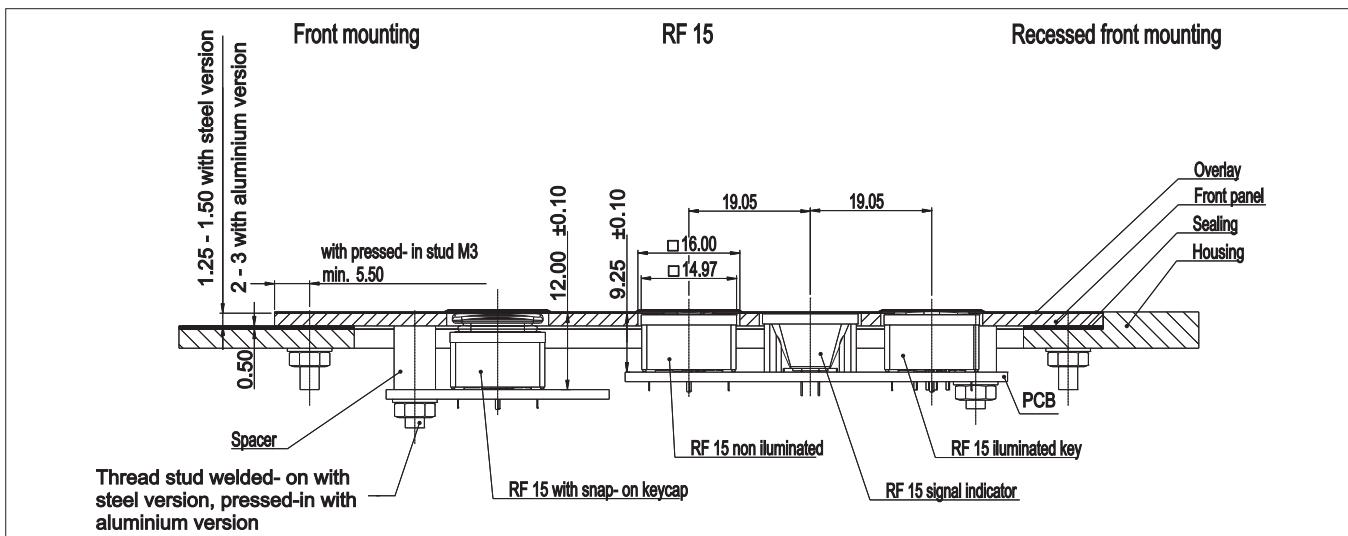
Circuit Diagram – Keyswitch RF 15



Keyswitch,
non-illuminated Keyswitch,
fully illuminated

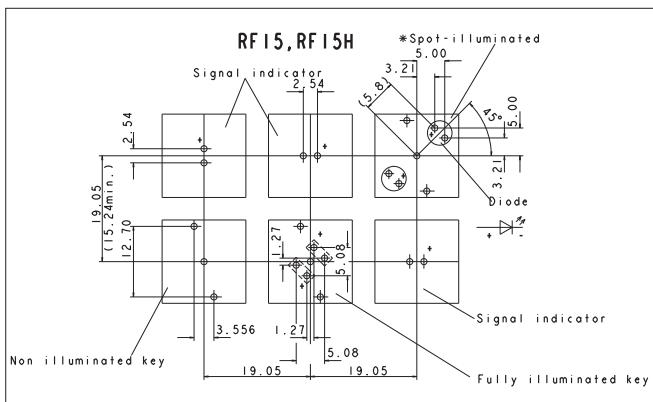
Keypad,
spot-illuminated

Dimensional Drawing RF 15



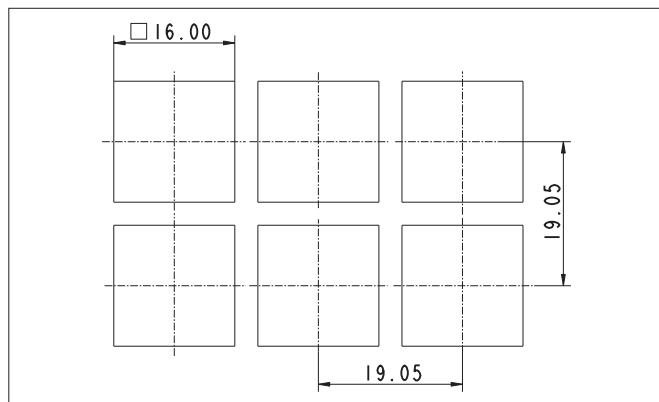
4

Hole Pattern RF 15

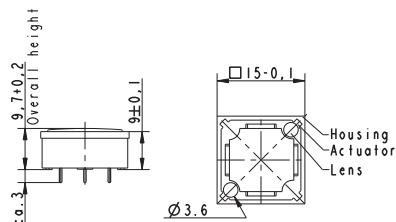


View on component side, all hole diameters $1,1^{+0,1}$ mm

Hole Pattern – Front Panel



RF 15 - Short-travel keyswitch, non-illuminated



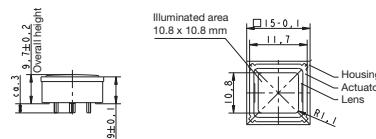
Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	not illuminated	transparent	-	-	3.14.100.001/0000
Ag	not illuminated	transparent	-	-	3.14.100.006/0000

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.

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



Pict.: red

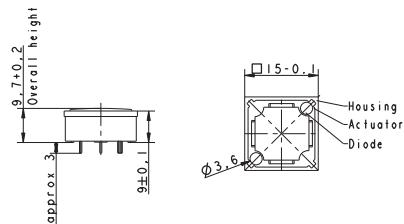
Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	fully illuminated 2 LED	red	red	2 mm	3.14.200.011/0000
Au	fully illuminated 2 LED	green	green	2 mm	3.14.200.012/0000
Au	fully illuminated 2 LED	yellow	yellow	2 mm	3.14.200.013/0000
Au	fully illuminated 2 LED	orange	yellow	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 separate 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.
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 separate 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

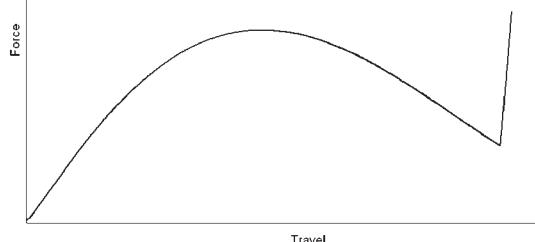
4

RF

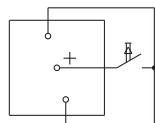
General information		Electrical characteristics	
Colour of lens	see order block	Rated voltage min.	Au: 0.02 V, Ag: 3 V
Recommended key grid	19.05 mm	Rated voltage max.	Au: 35 V, Ag: 50 V
Dimensions		Rated current min.	Au: 0.01 mA, Ag: 0.1 mA
Length	15 mm	Rated current max.	Au: 100 mA, Ag: 250 mA
Width	15 mm	Rated power max.	Au: 2 W, Ag: 12.5 W
Overall height	6.2 mm	(ohmic load)	
Mechanical design		Contact resistance when new	100 mΩ
Mounting	soldering in PCB	max.	
Terminals	THT	Insulation resistance	10 ⁹ Ω
Contact system	snap-action contact	Other specifications	
Contact arrangement	1 NO	Ambient temp. operating min.	-25 °C
Contact materials	see order block	Ambient temp. operating max.	+70 °C
Illumination	external 3 mm LED	Storage temperature max.	+50 °C
Mechanical characteristics		(in tube)	
Operating force max.	2.9 ^{±0.6} N	Environmental resistance	acc. to IEC 60068-2 -14, -30, -33 and -78
Switching travel	0.5 ^{±0.2} mm	Operating life min.	1,000,000
Robustness min.	100 with through-plated PCB N	(operations)	
		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

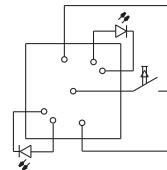
Operation characteristic limits RF



Circuit Diagram – Keyswitch RF 15 N

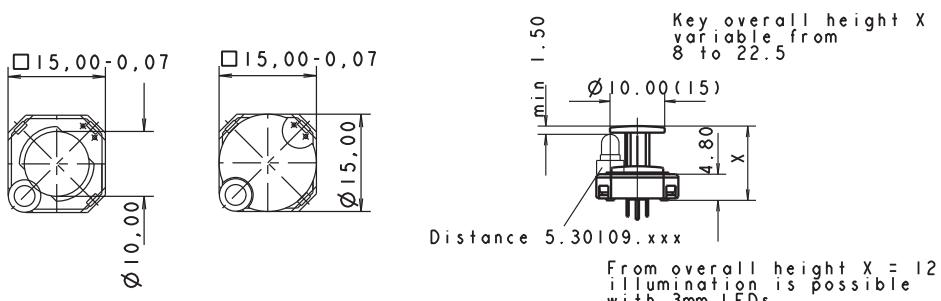


Keyswitch,
non illuminated



Keyswitch,
spot-illuminated

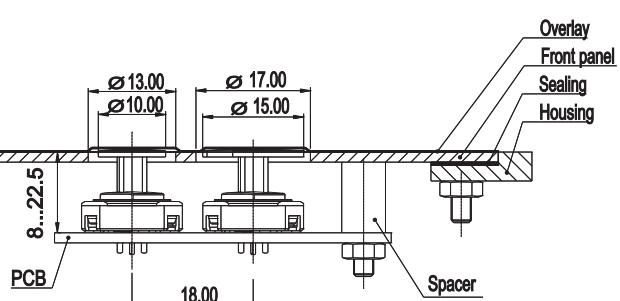
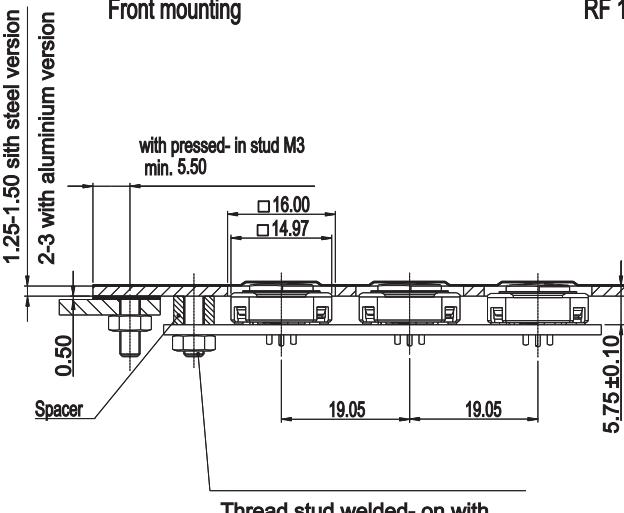
Dimensional Drawings RF 15 N



Front mounting

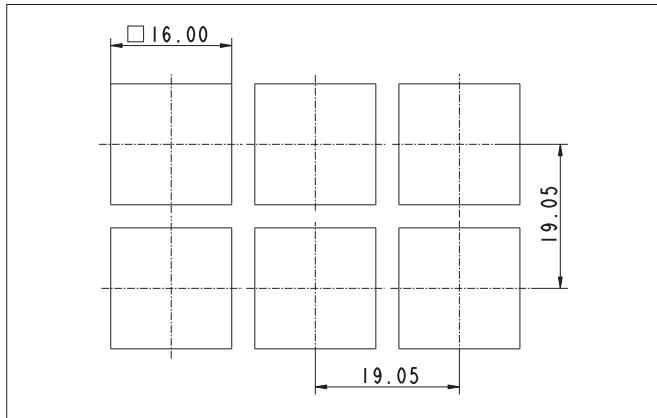
RF 15N

Recessed front mounting

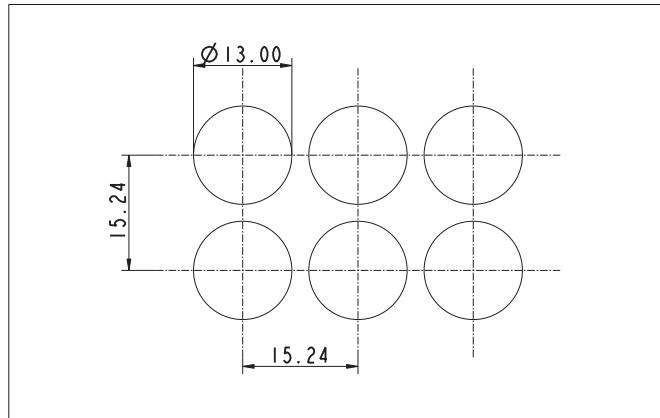


Hole Patterns – Front Panel RF 15 N

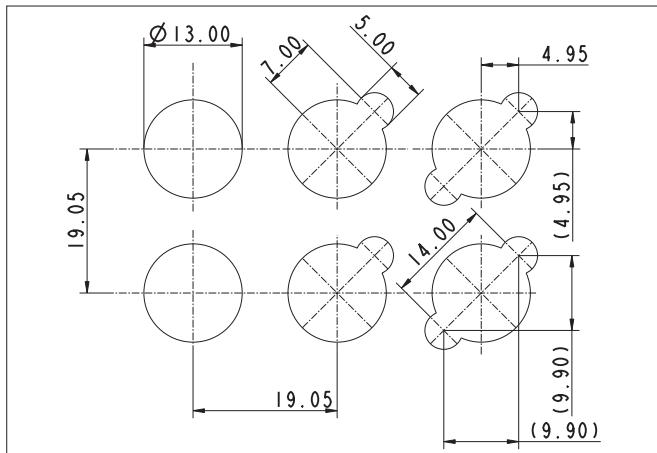
RF 15 N without plunger



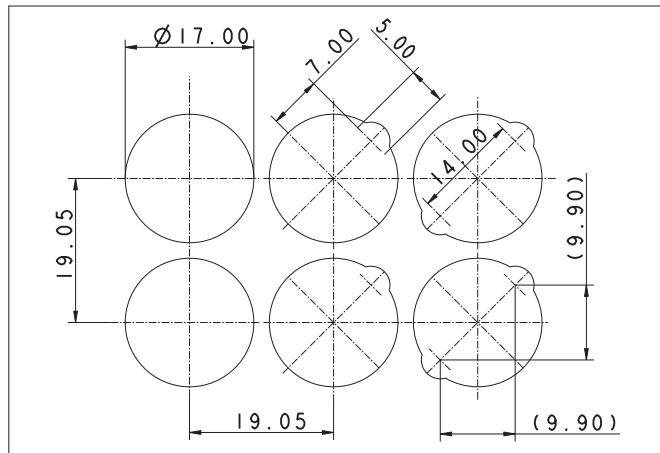
RF 15 N with plunger ø 10 mm, non-illuminated



RF 15 N with plunger ø 10 mm, illuminated



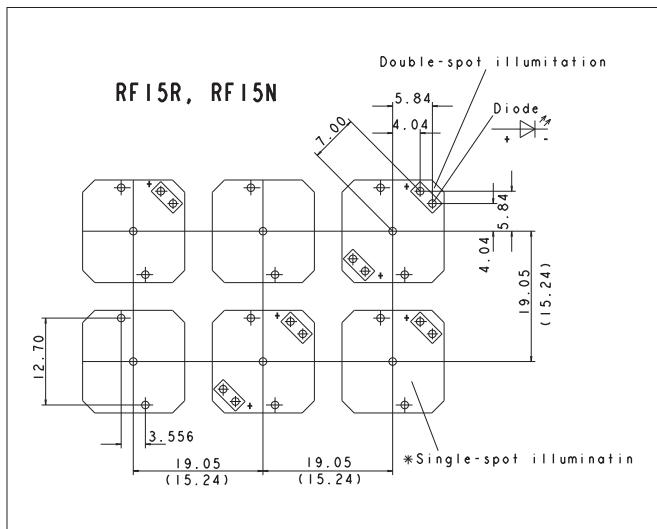
RF 15 N with plunger ø 15 mm, illuminated



4

Hole Pattern RF 15 N

RF

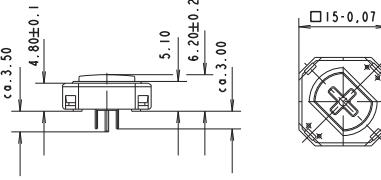


View on component side
All hole diameters 1.1 ± 0.1 mm
PCB layout keyswitch 1/400" grid

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

	
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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

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

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,

Rated current max.

Ag: 0.1 mA

Rated power max.

Au: 100 mA,

(ohmic load)

Ag: 250 mA

Contact resistance when new

100 mΩ

max.

Insulation resistance

$10^9 \Omega$

Other specifications

Ambient temp. operating min.

-25 °C

Ambient temp. operating max.

+70 °C

Environmental resistance

acc. to IEC 60068-2

-14, -30, -33 and -78

1,000,000

Operating life min.

(operations)

Solderability / solder heat

resistance

Wave soldering

Manual soldering

according to E DIN

IEC 600 28-2-20

260 °C max.

350 °C / 5 sec. max.

Mechanical characteristics

Operating force max.

$2.9^{+0.6} \text{ N}$

Switching travel

$0.5^{+0.2} \text{ mm}$

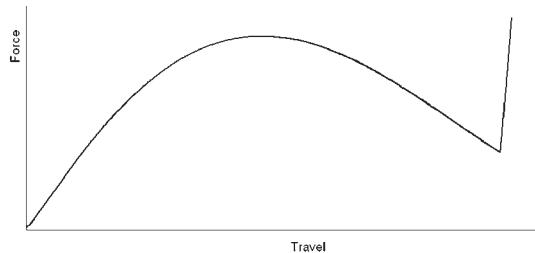
Robustness min.

with through-plated

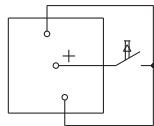
PCB 100 N

Force/Travel Diagram – Keyswitch RF 15 R

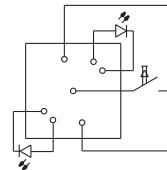
Operation characteristic limits RF



Circuit Diagram – Keyswitch RF 15 R

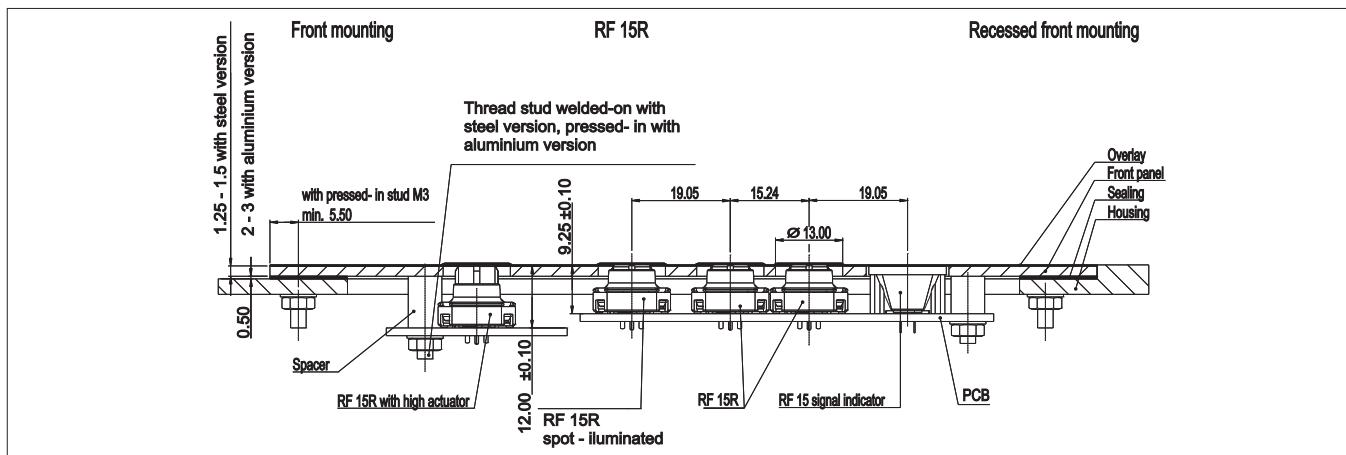


Keyswitch,
non-illuminated



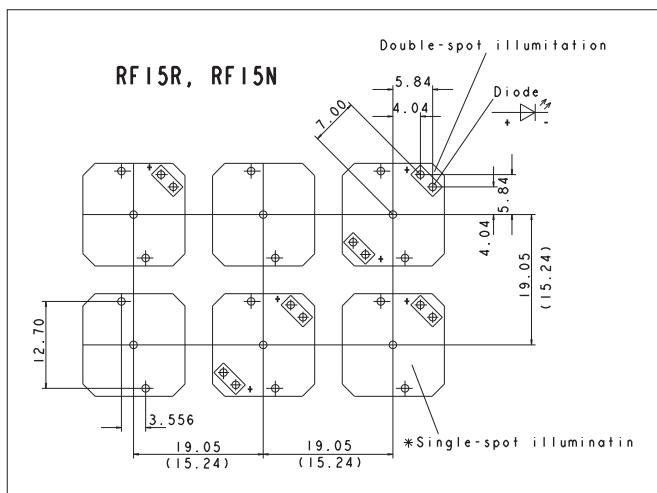
Keyswitch,
spot-illuminated

Dimensional Drawing RF 15 R



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Hole Pattern RF 15 R

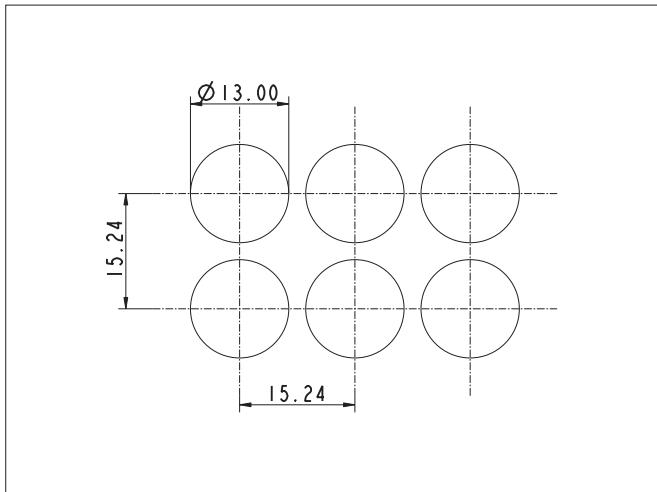


View on component side
All hole diameters 1.1 \pm 0.1 mm
PCB layout keyswitch 1/400" grid

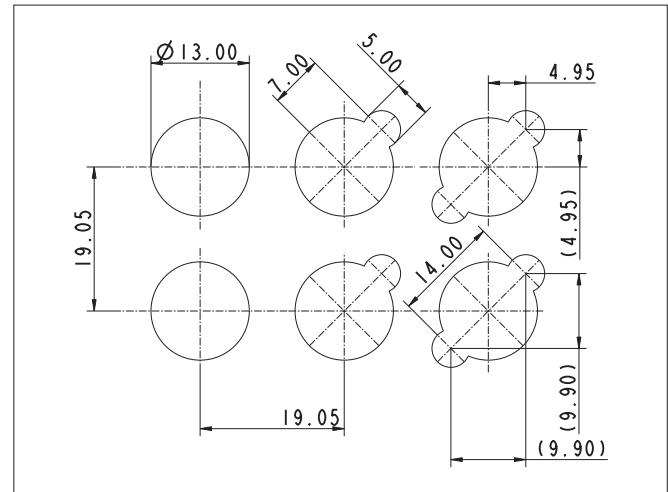
RF

Hole Pattern – Front Panel RF 15 R

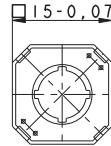
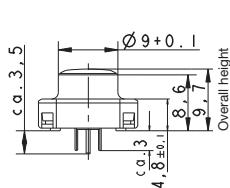
RF 15 R, non-illuminated



RF 15 R, illuminated



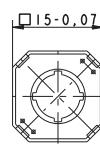
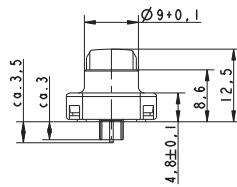
RF 15 R - Low short-travel keyswitch, non-illuminated



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

RF 15/19 - Special accessories



Pict.: opaque light grey

round and triangular versions

Technical Data

Dimensions

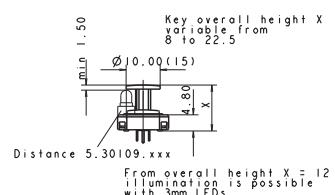
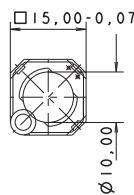
Length

see order block
see order block

Width

Overall height
Diameter
Coloursee order block
see order block
see order block

RF 15 N - Extension plunger, round head



Pict.: opaque light grey

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.