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

4

RF

4

RF

RAFI
SOLUTIONS WITH PASSION

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:	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	

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RF

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

RF short-travel keyswitches

RAFI
SOLUTIONS WITH PASSION

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

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RF

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 into PCB
Terminals	contacts tin-plated, fix contact Ag plated
Contact system	snap-action contact
Contact arrangement	1 NO
Contact materials	Au/Ag
Illumination	spot-/fully illuminated
LED colour	see order block
LED type	see order block

Mechanical characteristics	
Operating force max.	2 ... 3 N
Operating travel	0.5 mm
Switching travel	0.5 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: 42 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
Contact resistance acc. to life max.	3 Ω
Insulation resistance	10^9 Ω
ESD strength (underneath overlay)	15 kV
Bouncing time max.	5 ms

Other specifications	
Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Storage temperature min.	-40 °C
Storage temperature max. (product)	+80 °C
Storage temperature max. (in tube)	+50 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Operating life min.	1,000,000
Soldering time max.	2,5 sec.
Soldering temperature max.	250 °C
Flammability of materials	UL 94 HB

Force/Travel Diagram – Keyswitch RF 15

Operation characteristic limits RF

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

Circuit Diagram – Keyswitch RF 15

Keyswitch,
non-illuminated

Keyswitch,
fully illuminated

Keyswitch,
spot-illuminated

Dimensional Drawing RF 15

Front mountig   RF 15   Recessed front mounting

1.25-1.50 with steel version
2-3 with aluminium version
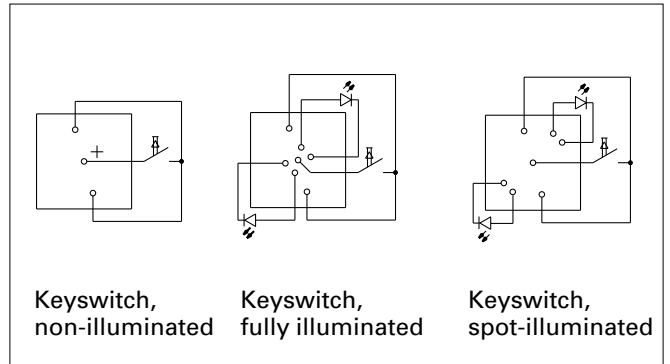
Thread stud welded-on with steel version,
pressed-in with aluminium version

No metal webs
between the keys

Overlay
Front panel
Sealing
Housing

bei Einpressbolzen M3
min 5.50

15.24   15.24   19.05

15.00

1.00

0.50

12.00±0.1

9.20±0.1

Spacer   RF15 with snap-on keycap   RF15 signal indicator   PCB

RF15 iluminated key   RF15 non iluminated

Hole Pattern RF 15

RF15, RF15H
*Spot-illuminated
5.00
3.21

Signal indicator
2.54
(5.8)

2.54

19.05
(15.24min.)
12.70

5.00

3.21

1.27
5.08

Diode

3.556   1.27

5.08

19.05   19.05
(15.24min.) (15.24min.)
No metal webs with 15.24 mm

Non illuminated key

Signal indicator

Fully illuminated key

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

Hole Pattern – Front Panel

□16.00

19.05

19.05

4

RF

RAFI
SOLUTIONS WITH PASSION

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.

4

RF

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

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

Pict.: red
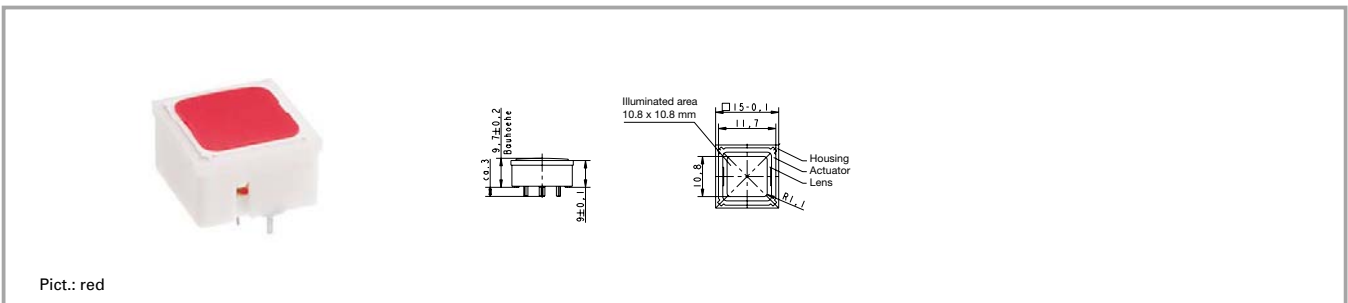
Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Ag	fully illuminated 2 LEDs	red	red	2 mm	**3.14.200.021/0000**
Ag	fully illuminated 2 LEDs	green	green	2 mm	**3.14.200.022/0000**
Ag	fully illuminated 2 LEDs	yellow	yellow	2 mm	**3.14.200.023/0000**
Ag	fully illuminated 2 LEDs	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.

4

RF

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

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

Pict.: red
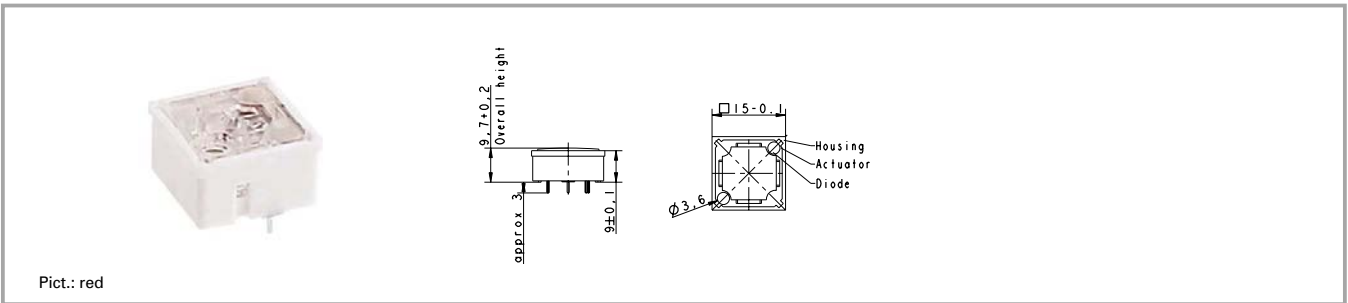
Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Ag	spot illumination 1 LED	opaque white	blue	3 mm	3.14.100.040/0000
Ag	spot illumination 1 LED	transparent	red	3 mm	**3.14.100.041/0000**
Ag	spot illumination 1 LED	transparent	green	3 mm	**3.14.100.042/0000**
Ag	spot illumination 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.

4

RF

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

RF short-travel keyswitches

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 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.	2 ... 3 N
Operating travel	0.5 mm
Switching travel	0.5 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: 42 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
Contact resistance acc. to life max.	3 Ω
Insulation resistance	10^9 Ω
ESD strength (underneath overlay)	15 kV
Bouncing time max.	5 ms

Other specifications

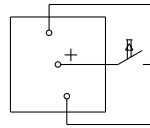|	
Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Storage temperature min.	-40 °C
Storage temperature max. (product)	+80 °C
Storage temperature max. (in tube)	+50 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Operating life min.	1,000,000
Soldering time max.	2,5 sec.
Soldering temperature max.	250 °C
Flammability of materials	UL 94 HB

4

RF

RF short-travel keyswitches

Force/Travel Diagram – Keyswitch RF 15 N

Operation characteristic limits RF
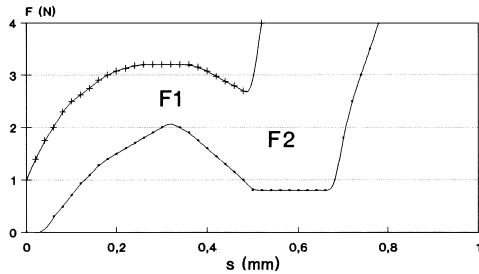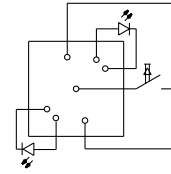
F (N)

F1

F2

s (mm)

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

Circuit Diagram – Keyswitch RF 15 N

Keyswitch,
non illuminated

Keyswitch,
spot-illuminated

Dimensional Drawings RF 15 N

□15,00-0,07   □15,00-0,07

Ø10,00   Ø15,00

Ø10,00

min 1.50

Key overall height X
variable from
8 to 22.5

Ø10.00(15)

4.80

X

Distance 5.30109.xxx

From overall height X = 12
illumination is possible
with 3mm LEDs
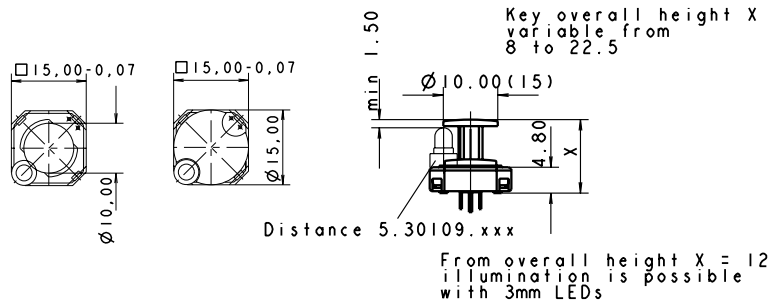
Front mounting   RF 15N   Recessed front mounting

1.25-1.50 with steel version
2-3 with aluminium version

With pressed-in stud
min.5.50

Thread stud welded-on with steel version,
pressed-in with aluminium version

M3   □16.00

0.50   0.50

0.50

5.75 ±0.1

19.05   15.24

No metal webs
between the keys

Spacer

Overlay
Front panel
Sealing
Housing

Ø10.00   Ø15.00

8...22.5

PCB   15.24   Spacer

4

RF

RF short-travel keyswitches

RAFI
SOLUTIONS WITH PASSION
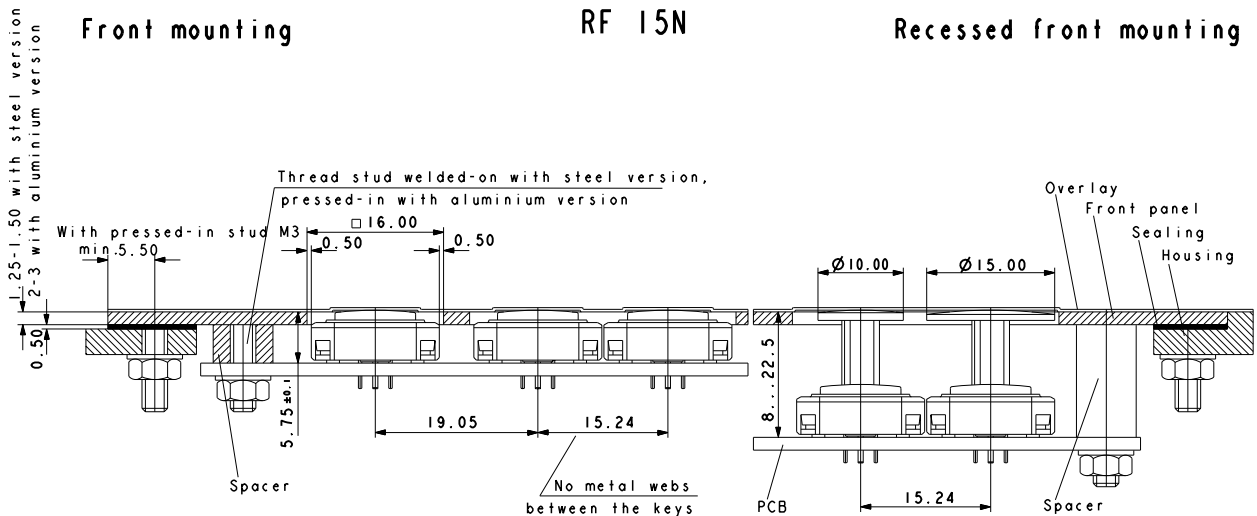
Hole Patterns – Front Panel RF 15 N

RF 15 N without plunger
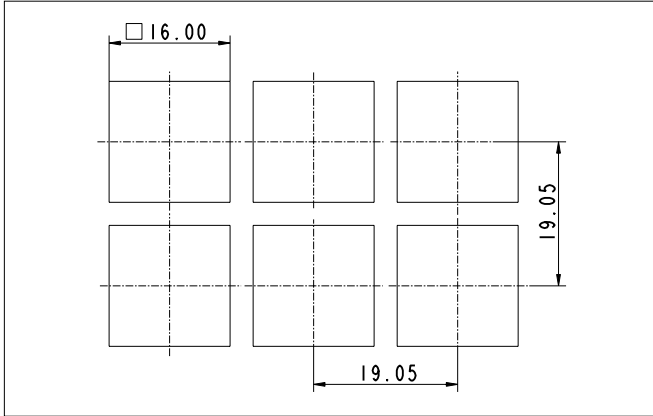
RF 15 N with plunger ø 10 mm, non-illuminated

RF 15 N with plunger ø 10 mm, illuminated

RF 15 N with plunger ø 15 mm, illuminated

Hole Pattern RF 15 N

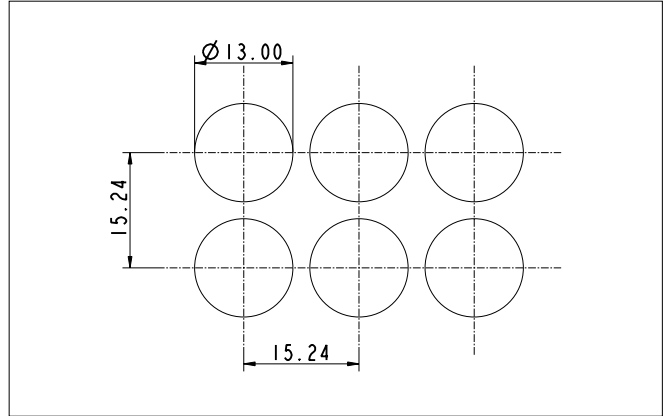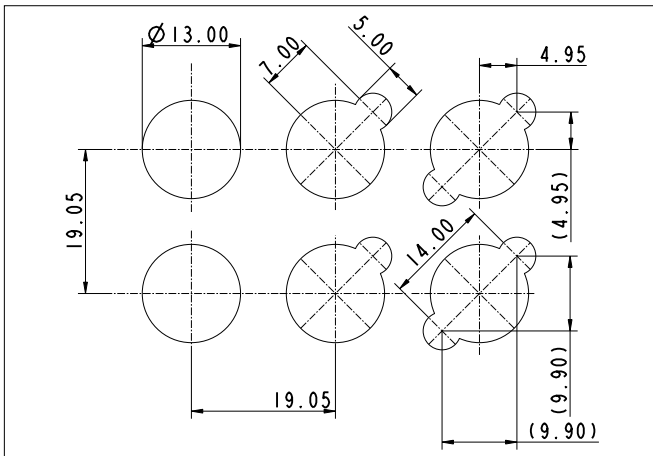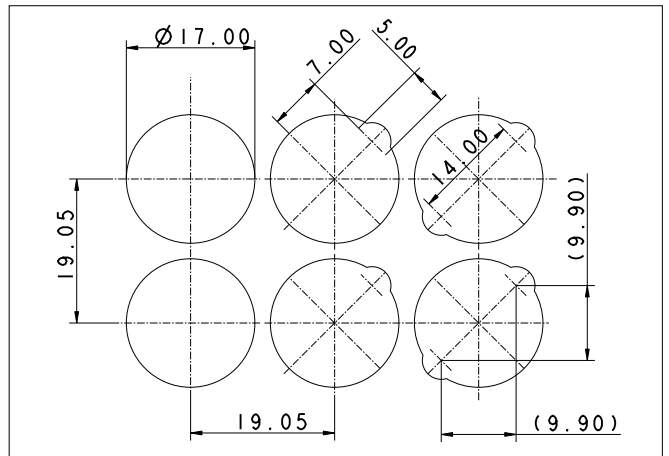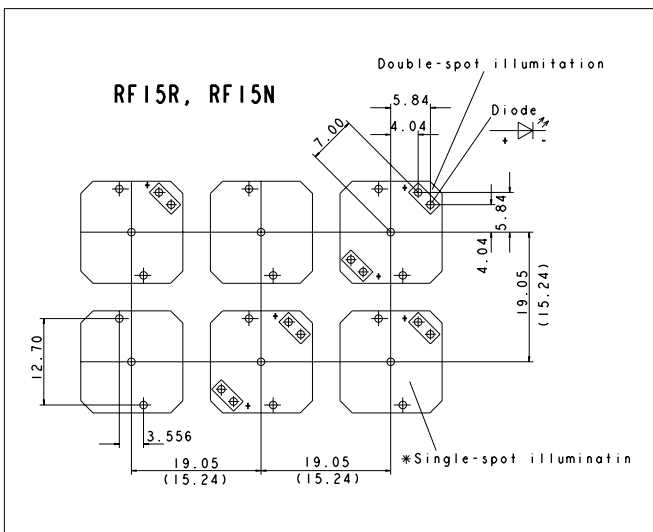View on component side
All hole diameters 1,1 $^{+/- 0,1}$ mm
PCB layout Keyswitch 1/400" grid

PCB Keyswitches

Accessories RF 15 N short-travel keyswitch

Description	Photo	Order no.	Page
LED yellow, 3mm		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		**5.46.011.028/0710**	
Extension plunger for RF 15 N, Ø 15 mm, overall height 22.5 mm		**5.46.017.028/0710**	

RF 15 N short-travel keyswitch, non-illuminated
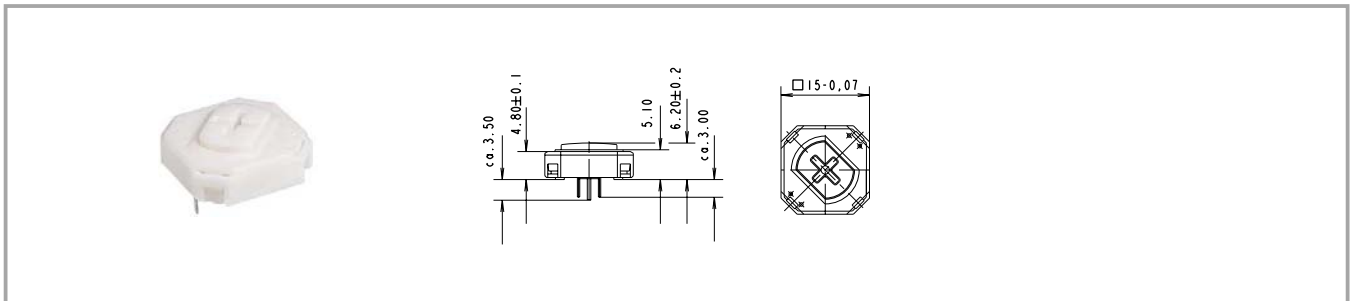
Contact materials	Illumination	Recommended key grid	Overall height	Order no.
Au	external 3 mm LED possible if height < 12 mm	19.05 mm	6.2 mm	**3.14.100.601/0000**
Ag	external 3 mm LED possible if height < 12 mm	19.05 mm	6.2 mm	**3.14.100.606/0000**

Technical data see page 4 - 32

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

4

RF

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

RF short-travel keyswitches

RF 15 R short-travel keyswitch

Pict.: with 2 mm LED, red

with 3 mm LED, green
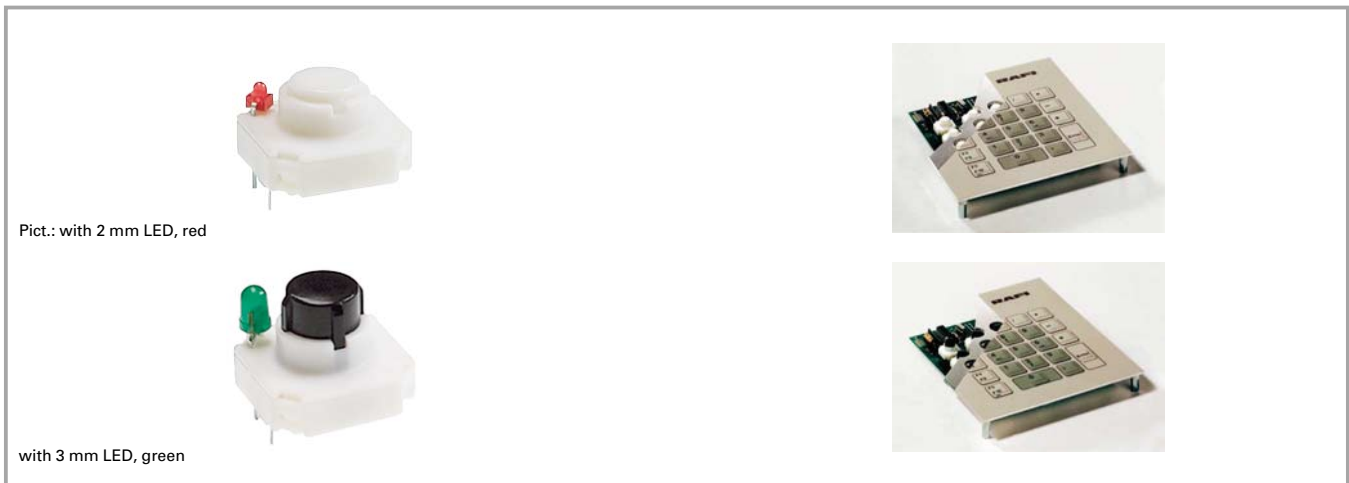
General data

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   9,7/12,5 mm

Mechanical design
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   spot illumination
LED colour   see order block
LED type   see order block

Mechanical characteristics
Operating force max.   2 ... 3 N
Operating travel   0.5 mm
Switching travel   0.5 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: 42 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
Contact resistance acc. to life max.   3 Ω
Insulation resistance 10^9 Ω
ESD strength (underneath overlay)   15 kV
Bouncing time max.   5 ms

Other specifications
Ambient temp. operating min. -25 °C
Ambient temp. operating max. +70 °C
Storage temperature min.   -40 °C
Storage temperature max. (product)   +80 °C
Storage temperature max. (in tube)   +50 °C
Resistance to constant environment   according to IEC 600 68-2-3 and 2-30
Resistance at variable environment   according to IEC 600 68-2-14 and 2-33
Operating life min.   1,000,000
Soldering time max.   2,5 sec.
Soldering temperature max.   250 °C
Flammability of materials   UL 94 HB

Force/Travel Diagram – Keyswitch RF 15 R

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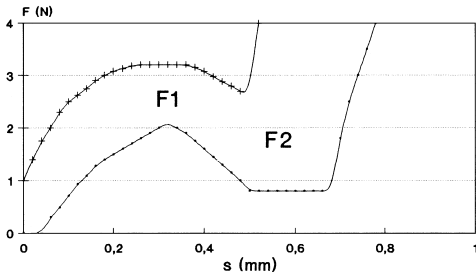
F 1 = Max. operating force
F 2 = Force at contact
F 2 is max. 55% of F 1

Circuit Diagram – Keyswitch RF 15 R

Keyswitch,
non-illuminated
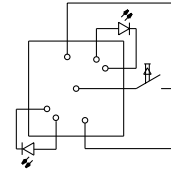
Keyswitch,
spot-illuminated

Dimensional Drawing RF 15 R

Front mounting   RF 15R   Recessed front mounting

Thread stud welded-on with steel version,
pressed-in with aluminium version

1,25-1,5 with steel version
2-3 with aluminium version

With pressed-in stud M3
min.5.50

Area embossing

Overlay
Front panel
Sealing
Housing

19.05   15.24   19.05

Spacer
RF15R with high actator
RF15R spot-iluminated
RF15R
RF15 signal indicator
PCB

4

RF

Hole Pattern RF 15 R

RF15R, RF15N

Double-spot illumination

Diode

5.84
4.04
7.00
5.84
4.04
19.05
(15.24)

12.70

3.556

19.05
(15.24)   19.05
(15.24)

*Single-spot illuminatin

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

RAFI
SOLUTIONS WITH PASSION

Hole Pattern – Front Panel RF 15 R

RF 15 R, non-illuminated
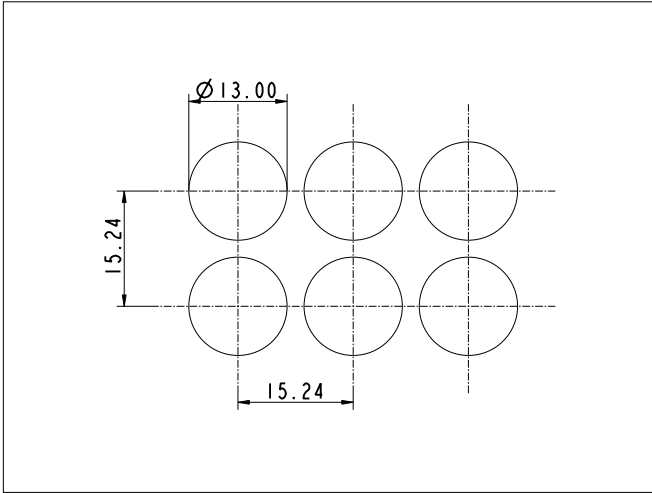
RF 15 R, illuminated
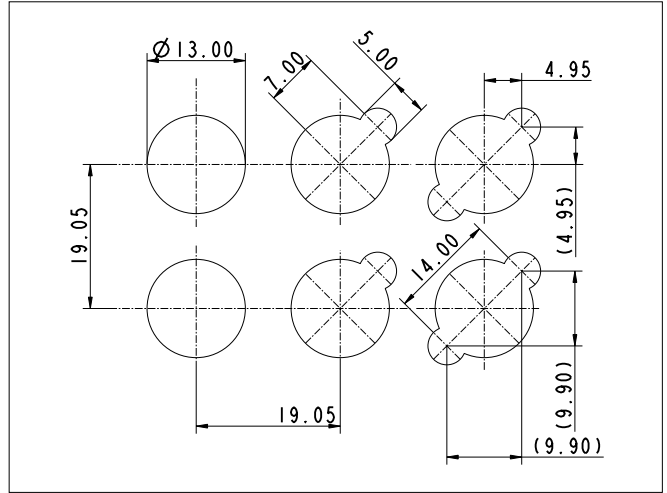
RF 15 R low short-travel keyswitch, non-illuminated
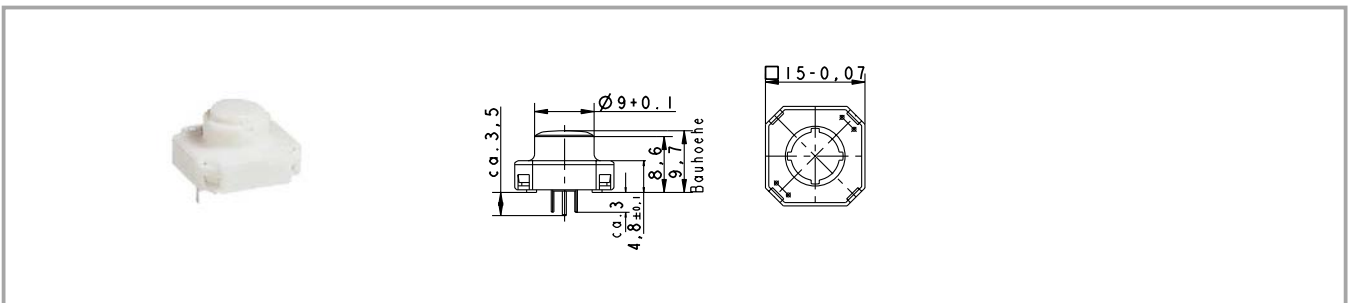
Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	9.7 mm	not illuminated			**3.14.100.501/0000**
Ag	9.7 mm	not illuminated			**3.14.100.506/0000**

Technical data see page 4 - 36

RF 15 R high short-travel keyswitch, non-illuminated
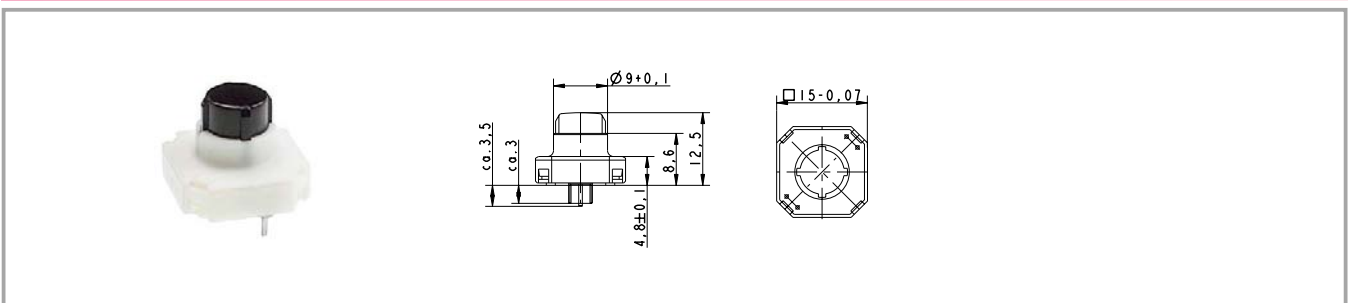
Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	12.5 mm	not illuminated			**3.14.100.801/0000**
Ag	12.5 mm	not illuminated			**3.14.100.806/0000**

Technical data see page 4 - 36

4

RF

RF 15 R low short-travel keyswitch, 1 LED spot-illumination
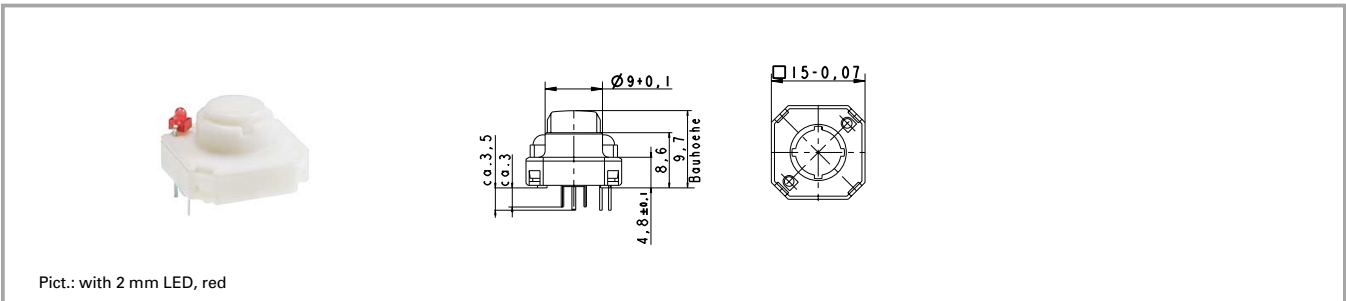
Pict.: with 2 mm LED, red

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 - 36

Versions with 2 LEDs available on request.
Technical data of LED see seperate page at the beginning of this chapter.

4

RF

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

RF 15 R high short-travel keyswitch, 1 LED spot-illumination
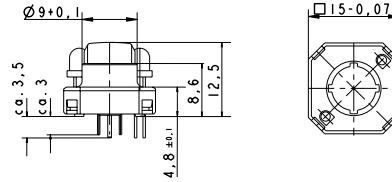
Pict.: with 3 mm LED, green

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
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.

4

RF

RF short-travel keyswitches

RAFI
SOLUTIONS WITH PASSION

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

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 into PCB
Terminals	see order block
Contact system	snap-action contact
Contact arrangement	1 NO
Contact materials	Au/Ag
Illumination	not illuminated / fully illuminated
LED colour	see order block
LED type	see order block

Mechanical characteristics

Operating force max.	2 ... 3 N
Operating travel	0.5 mm
Switching travel	0.5 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: 42 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
Contact resistance acc. to life max.	3 Ω
Insulation resistance	10^9 Ω
ESD strength (underneath overlay)	15 kV
Bouncing time max.	5 ms

Other specifications

Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Storage temperature min.	-40 °C
Storage temperature max. (product)	+80 °C
Storage temperature max. (in tube)	+50 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Operating life min.	1,000,000
Soldering time max.	2,5 sec.
Soldering temperature max.	250 °C
Flammability of materials	UL 94 HB

4

RF

RF short-travel keyswitches

Force/Travel Diagram – Keyswitch RF 15 H

Operation characteristic limits RF

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

Circuit Diagram – Keyswitch RF 15 H

Keyswitch,
non-illuminated

Keyswitch,
fully illuminated

Dimensional Drawing

Front mounting · RF 15H · Recessed front mounting

1.25-1.50 with steel version
2-3 with aluminium version

Thread stud welded-on with steel version
pressed-in with aluminium version

No metal webs between the keys

Overlay
Front panel
Sealing
Housing

With pressed-in stud M3 min.5.50

20   20   15.24

15.00

0.50

12.00 ±0.1

Spacer   Blocking by means of O-ring   RF15H   PCB

Hole Pattern

LED

5,72
□ 15.00
12.70
7,50
3.556
1.27
5.08
1.27
5.08

Taste unbeleuchtet
Keyswitch not illuminated

No metal webs with 15.24 mm. View on component side.
All hole diameters 1,1 +/- 0,1 mm. PCB layout Keyswitch 1/400" grid.

Hole Pattern – Front Panel

17
17
20
20   20

4

RF

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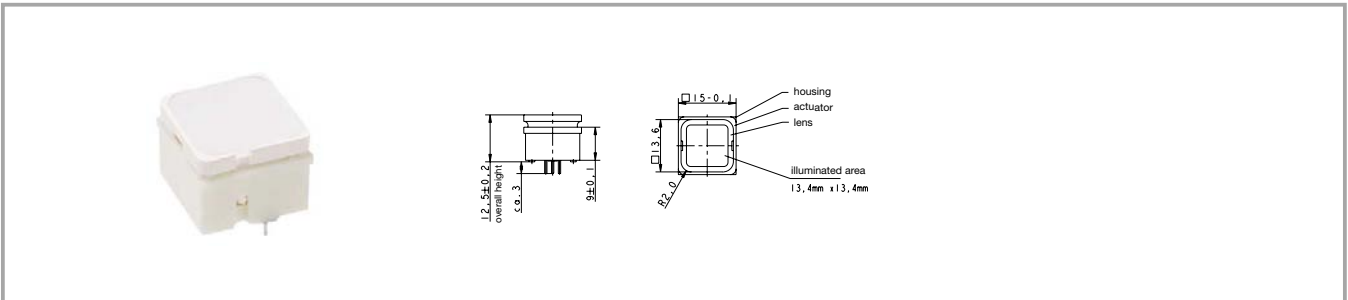
Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	not illuminated	white			**3.14.100.702/0000**
Ag	not illuminated	white			**3.14.100.707/0000**

Technical data see page 4 - 42

RAFI
SOLUTIONS WITH PASSION
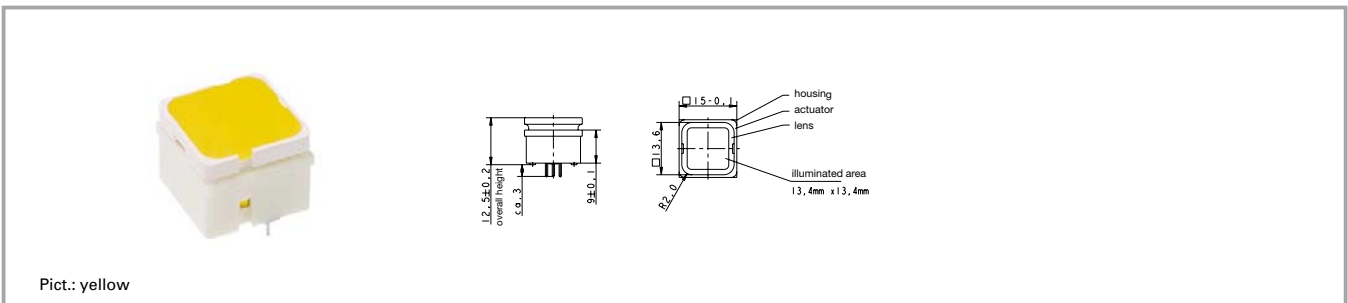
RF 15 H short-travel keyswitch, fully illuminated

Pict.: yellow

Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	fully illuminated 2 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

4

RF

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.

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

RAFI
SOLUTIONS WITH PASSION

RF 15 signal indicator

Pict.: green

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 into PCB
Illumination	fully illuminated 1 LED
LED colour	see order block
LED type	2 mm

Other specifications

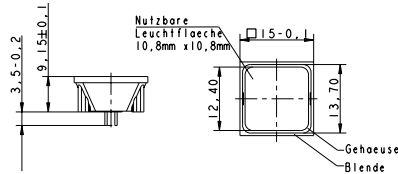|	
Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Storage temperature min.	-40 °C
Storage temperature max. (product)	+80 °C
Storage temperature max. (in tube)	+50 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Soldering time max.	2,5 sec.
Soldering temperature max.	250 °C
Flammability of materials	UL 94 HB

4

RF

RAFI
SOLUTIONS WITH PASSION

Dimensional Drawing Signal Indicator RF 15

4 - 47

Front mountig   RF 15   Recessed front mounting

1.25-1.50 with steel version
2-3 with aluminium version

Thread stud welded-on with steel version,
pressed-in with aluminium version

No metal webs between the keys

bei Einpressbolzen M3 min 5.50

15.24   15.24   19.05

Overlay
Front panel
Sealing
Housing

15.00
1.00
0.50
12.00±0.1
9.20±0.1

Spacer   RF15 with snap-on keycap   RF15 signal indicator   PCB

RF15 iluminated key   RF15 non iluminated

Hole Pattern

RF15, RF15H

*Spot-illuminated

Signal indicator

45°

Diode

Non illuminated key

Signal indicator

Fully illuminated key

No metal webs with 15.24 mm. View on component side.
All hole diameters 1,1 $^{+/- 0,1}$ mm.

Hole Pattern – Front Panel

□ 16.00

19.05

19.05

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 - 46

For more information, see LEDs.
Technical data of LED see seperate page of the beginning of this chapter.

4

RF

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

RF short-travel keyswitches

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

Technical data

General information

Colour of lens	see order block
Recommended key grid	23 mm

Dimensions

Length	19.05 mm
Width	19.05 mm
Overall height	9.7 mm

Mechanical design

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	spot-/fully illuminated
LED colour	see order block
LED type	see order block

Mechanical characteristics

Operating force max.	2 ... 3 N
Operating travel	0.5 mm
Switching travel	0.5 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: 42 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
Contact resistance acc. to life max.	3 Ω
Insulation resistance	10^9 Ω
ESD strength (underneath overlay)	15 kV
Bouncing time max.	5 ms

Other specifications

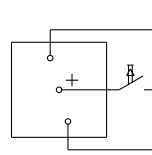|	
Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Storage temperature min.	-40 °C
Storage temperature max. (product)	+80 °C
Storage temperature max. (in tube)	+50 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Operating life min.	1,000,000
Soldering time max.	2,5 sec.
Soldering temperature max.	250 °C
Flammability of materials	UL 94 HB

Force/Travel Diagram – Keyswitch RF 19

Operation characteristic limits RF
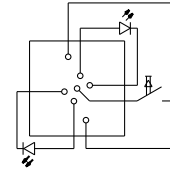
F (N)

F1

F2

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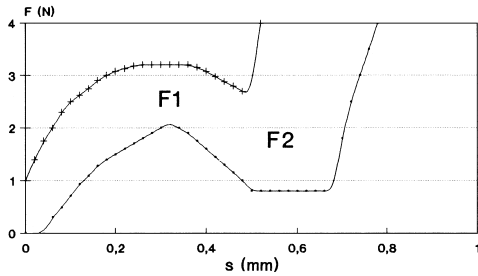
F 1 = Max. operating force
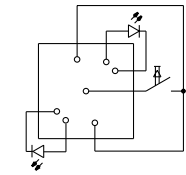F 2 = Force at contact
F 2 is max. 55% of F 1

Circuit Diagram – Keyswitch RF 19

Keyswitch,
non-illuminated

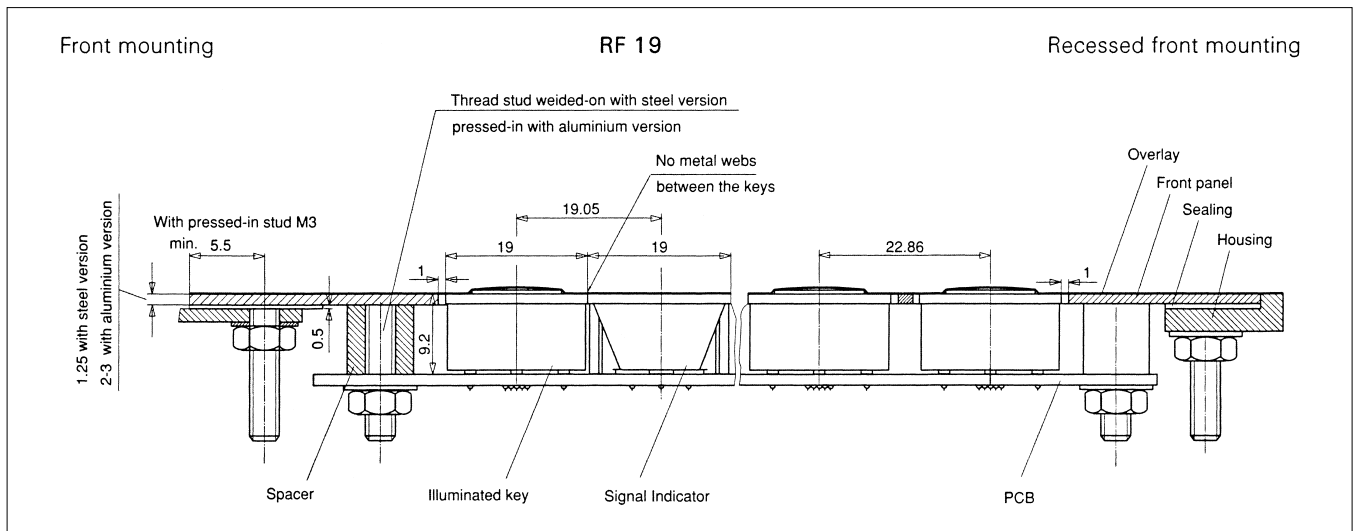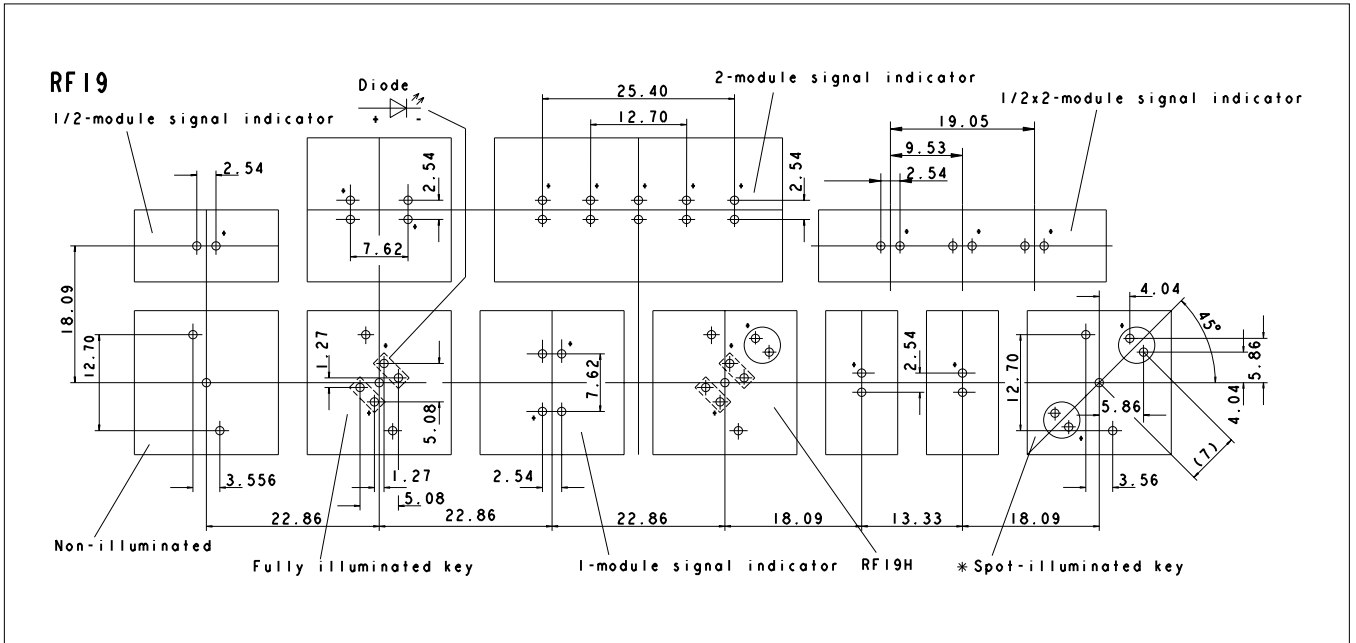Keyswitch,
fully illuminated

Keyswitch,
spot-illuminated

Dimensional Drawing

Front mounting   RF 19   Recessed front mounting

Thread stud weided-on with steel version
pressed-in with aluminium version

No metal webs
between the keys

Overlay

Front panel

Sealing

Housing

With pressed-in stud M3
min. 5.5

19.05

19   19

22.86

1

1

1.25 with steel version
2-3 with aluminium version

0.5

9.2

Spacer   Illuminated key   Signal Indicator   PCB

4

RF
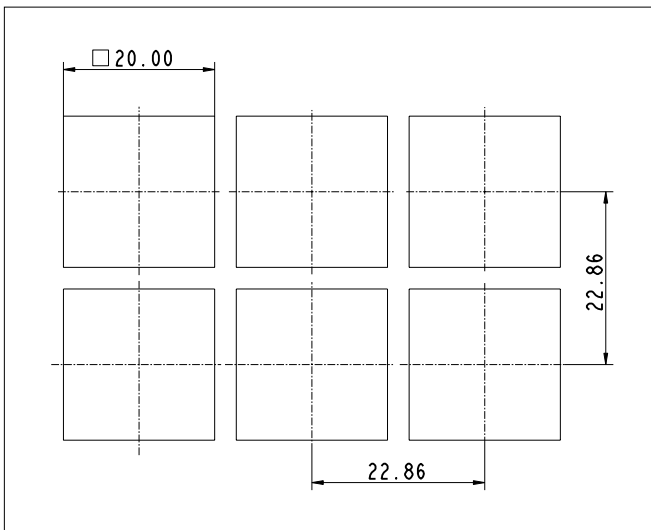
RAFI
SOLUTIONS WITH PASSION

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
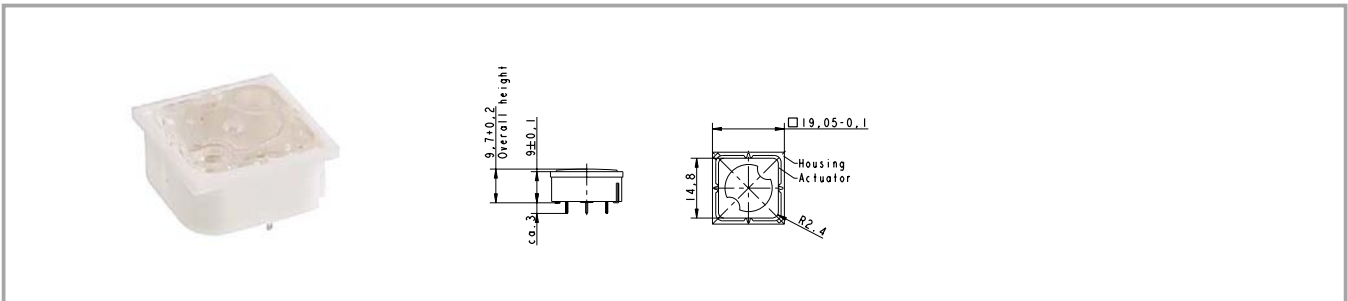 View on component side, all hole diameters 1,1 +/- 0,1 mm
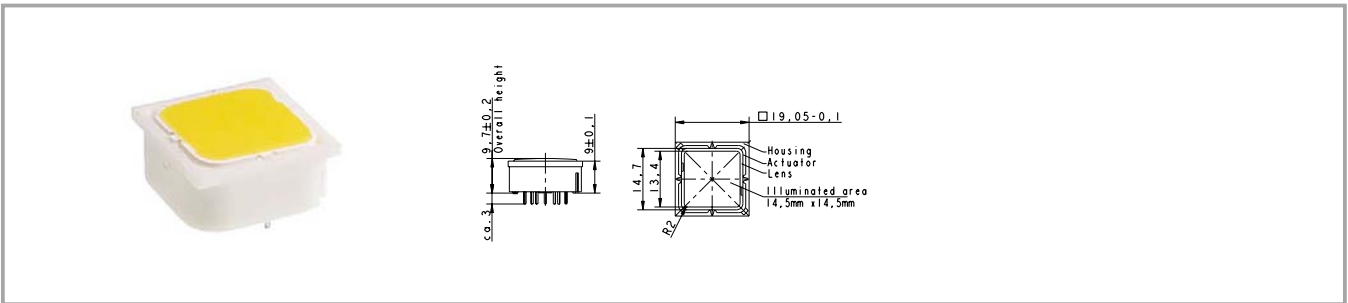
Hole Patterns – Front Panel RF 19

4

RF

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

## 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.

4

RF

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

RF short-travel keyswitches

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

Pict.: red
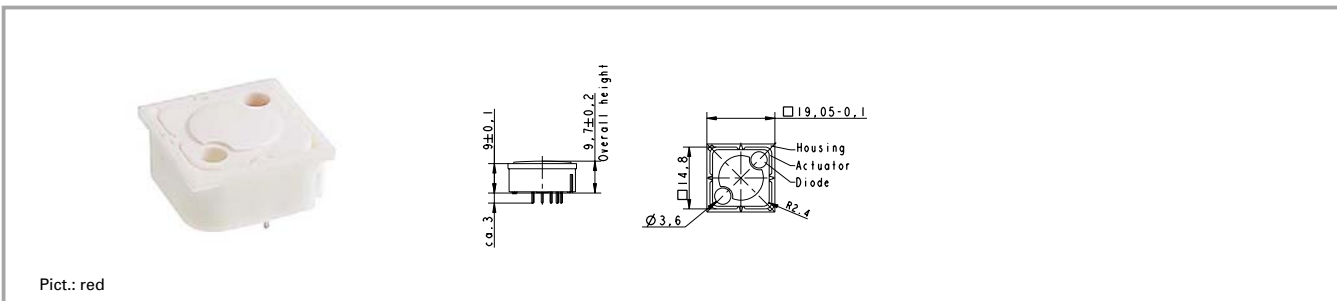
Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	spot illumination 1 LED	opaque white	blue	3 mm	3.14.001.030/0000
Au	spot illumination 1 LED	transparent	red	3 mm	**3.14.001.031/0000**
Au	spot illumination 1 LED	transparent	green	3 mm	**3.14.001.032/0000**
Au	spot illumination 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.

4

RF

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

Technical data

General information

Recommended key grid	23 mm

Dimensions

Length	19.05 mm
Width	19.05 mm
Overall height	9.7 mm

Mechanical design

Mounting	soldering into PCB
Terminals	contacts tin-plated, fix contact Ag plated
Contact system	bridge contact
Contact arrangement	1 NC + 1 NO
Contact materials	Au/Ag
Illumination	none

Mechanical characteristics

Operating force max.	2 ... 3 N
Operating travel	0.5 mm
Switching travel	0.5 mm
Robustness min.	with through-plated PCB 100 N

Electrical characteristics

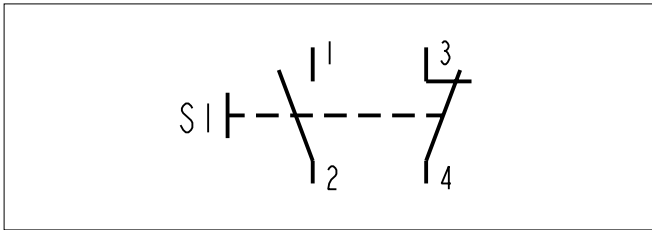|	
Rated voltage min.	Au: 0,02 V, Ag: 3 V V
Rated voltage max.	Au: 42 V, Ag: 50 V V
Rated current min.	Au: 0,01 mA, Ag: 0,1 mA mA
Rated current max.	Au: 100 mA, Ag: 250 mA mA
Rated power max. (ohmic load)	Au: 2 W, Ag: 12.5 W

For keycaps, refer to RK 90.

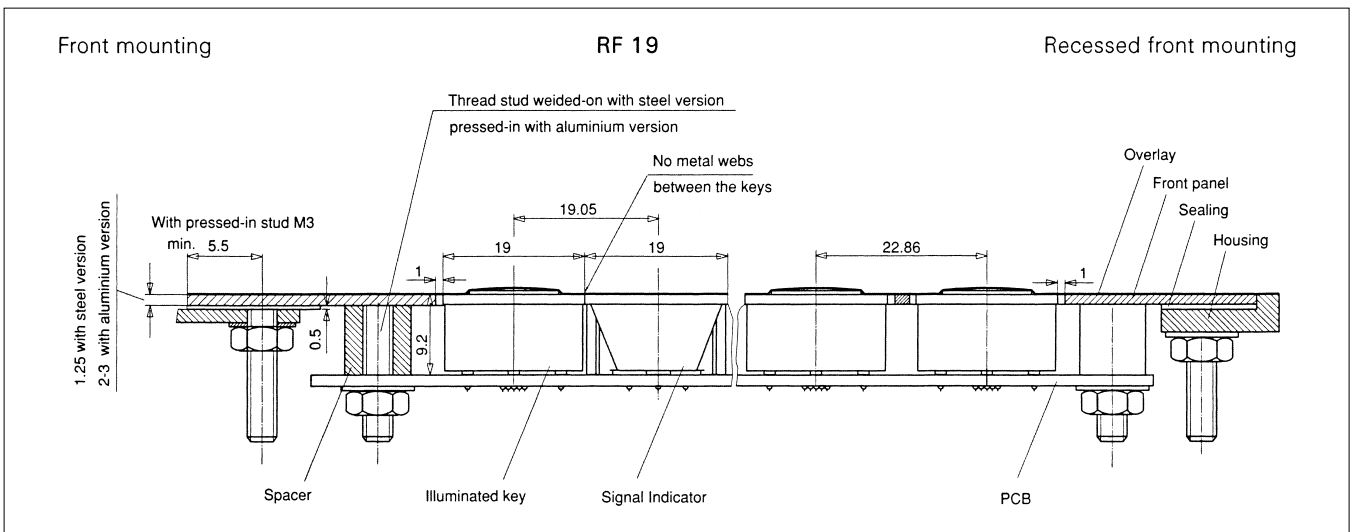|	
Contact resistance when new max.	100 mΩ
Contact resistance acc. to life max.	3 Ω
Insulation resistance	2×10^6 Ω
ESD strength (underneath overlay)	15 kV
Bouncing time max.	5 ms

Other specifications

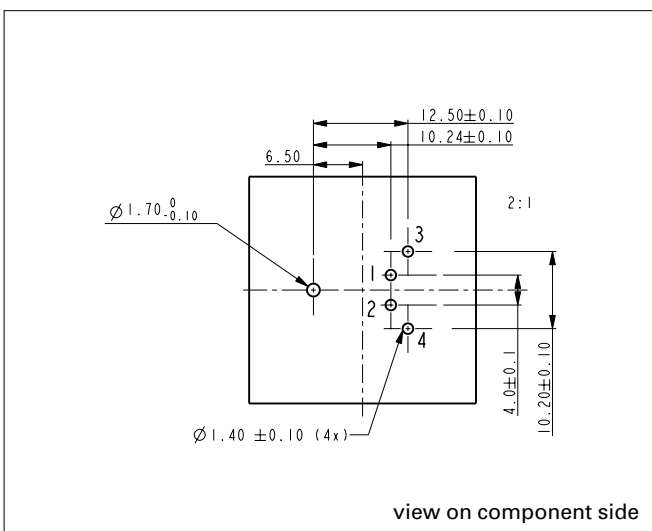|	
Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Storage temperature min.	-40 °C
Storage temperature max. (product)	+80 °C
Storage temperature max. (in tube)	+50 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Operating life min.	100000
Soldering time max.	5 sec.
Soldering temperature max.	265 °C
Flammability of materials	UL 94 HB

4

RF

RAFI
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Circuit Diagram

Dimensional Drawing

Front mounting   RF 19   Recessed front mounting

Thread stud weided-on with steel version
pressed-in with aluminium version

No metal webs
between the keys

Overlay
Front panel
Sealing
Housing

With pressed-in stud M3
min. 5.5

19.05

19   19   22.86   1

1.25 with steel version
2-3 with aluminium version

0.5   1   9.2

Spacer   Illuminated key   Signal Indicator   PCB

Hole Pattern

12.50±0.10
10.24±0.10

6.50

Ø1.70 ⁰₋₀.₁₀

2:1

3
1
2
4

Ø1.40 ±0.10 (4x)

4.0±0.1
10.20±0.10

view on component side

Hole Pattern – Front Panel

□20.00

22.86

22.86

4

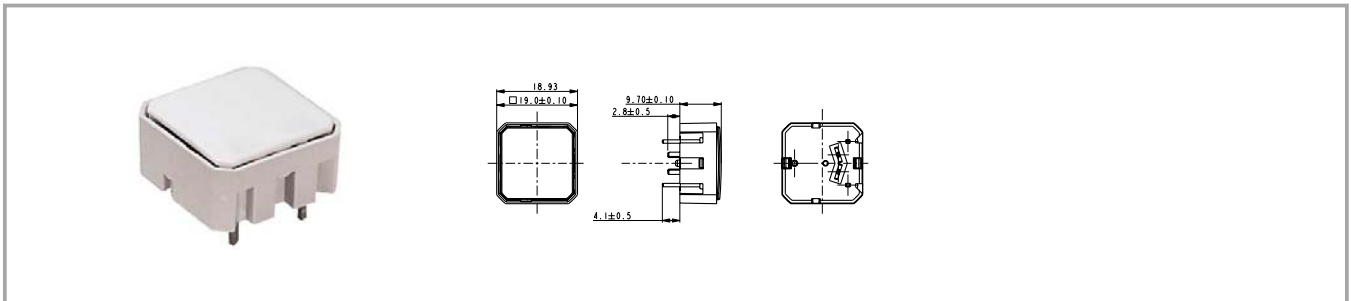**RF**
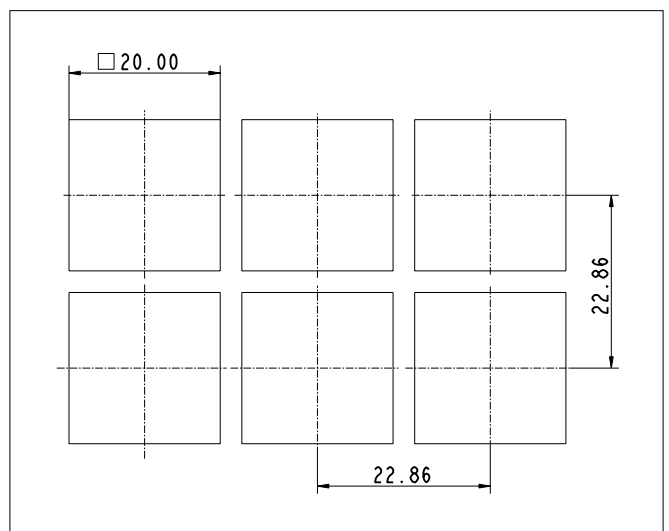
RF 19 short-travel keyswitch, non-illuminated

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

RF short-travel keyswitches

RAFI
SOLUTIONS WITH PASSION

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.

Technical data

General information

Colour of lens	see order block
Recommended key grid	24 mm

Dimensions

Length	19.05 mm
Width	19.05 mm
Overall height	12.5 mm

Mechanical design

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	spot-/fully illuminated
LED colour	see order block
LED type	see order block

Mechanical characteristics

Operating force max.	2 ... 3 N
Operating travel	0.5 mm
Switching travel	0.5 mm
Robustness min.	with through-plated PCB 100 N

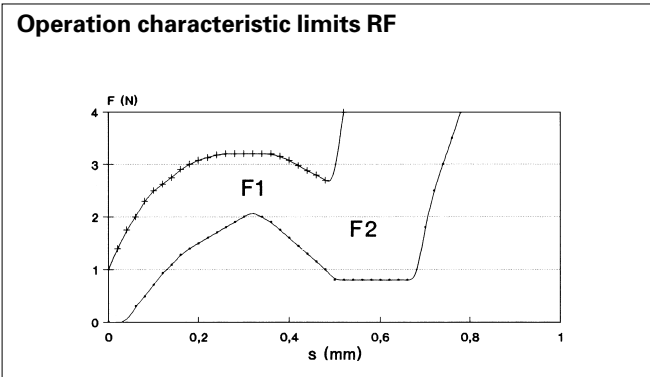**Electrical characteristics**

Rated voltage min.	Au: 0.02 V, Ag: 3 V
Rated voltage max.	Au: 42 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
Contact resistance acc. to life max.	3 Ω
Insulation resistance	10^9 Ω
ESD strength (underneath overlay)	15 kV
Bouncing time max.	5 ms

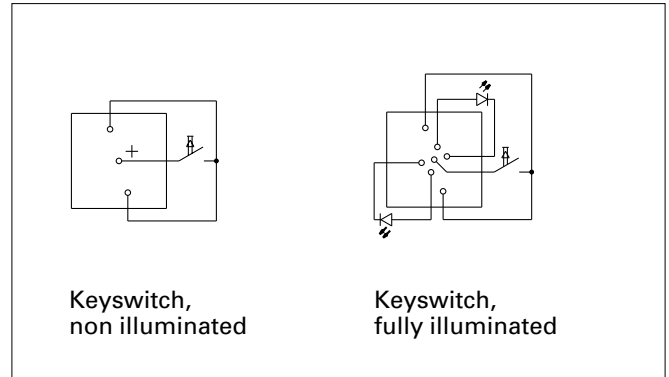**Other specifications**

Ambient temp. operating min.	-25 °C
Ambient temp. operating max.	+70 °C
Storage temperature min.	-40 °C
Storage temperature max. (product)	+80 °C
Storage temperature max. (in tube)	+50 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Operating life min.	1,000,000
Soldering time max.	2,5 sec.
Soldering temperature max.	250 °C
Flammability of materials	UL 94 HB

4

RF

RAFI
SOLUTIONS WITH PASSION

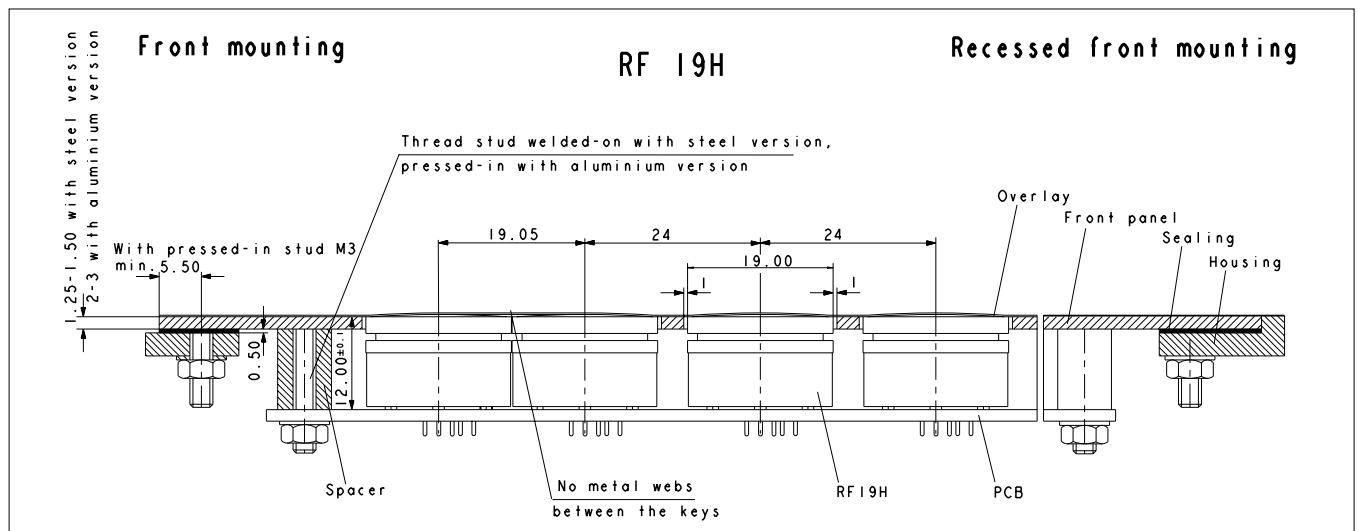## Force/Travel Diagram – Keyswitch RF 19 H

Operation characteristic limits RF

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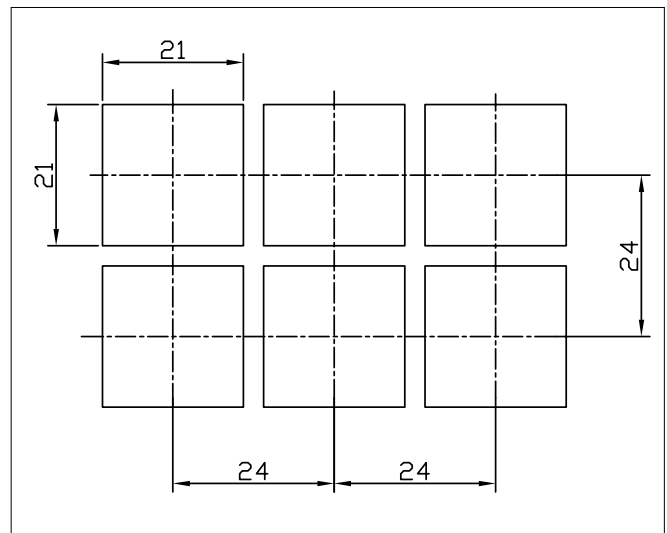F 2 is max. 55% of F 1

Circuit Diagram – Keyswitch RF 19 H

Keyswitch,
non illuminated

Keyswitch,
fully illuminated

Dimensional Drawing

4

RF

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Hole Pattern RF 19 H
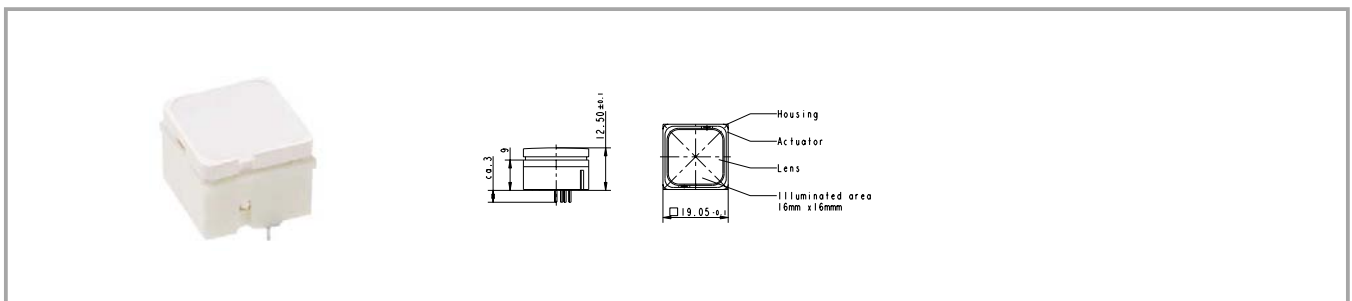

Keyswitch not illuminated

LED

* 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 Pattern – Front Panel RF 19 H

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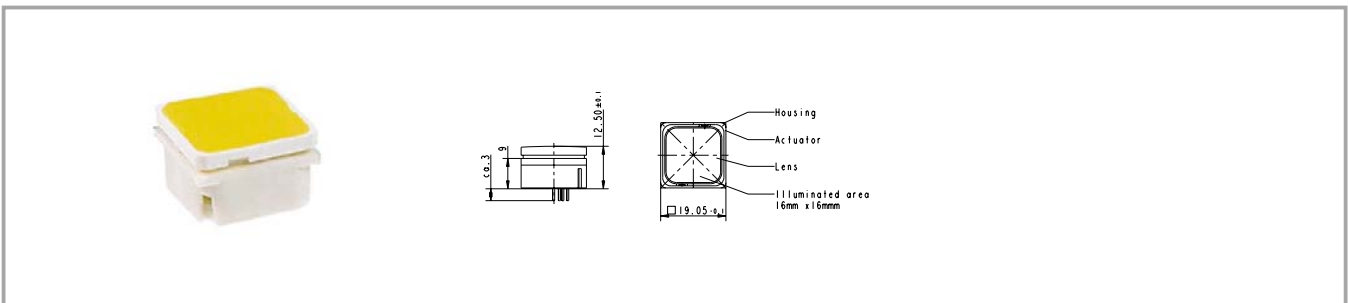
Stock items are marked
by **bold printed** order numbers.

RF 19 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	3.14.002.613/0000
Au	fully illuminated 2 LEDs	green	green	2 mm	3.14.002.632/0000
Au	fully illuminated 1 LED	green	green super bright	3 mm	3.14.002.633/0000
Au	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.002.653/0000
Au	fully illuminated 1 LED	white	white	3 mm	3.14.002.684/0000
Au	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.673/0000
Au	fully illuminated 2 LEDs	white	multi colour	3 mm	3.14.001.672/0000
Au	fully illuminated 1 LED	blue	blue	3 mm	3.14.002.683/0000
Ag	fully illuminated 2 LEDs	red	red	2 mm	3.14.002.623/0000
Ag	fully illuminated 2 LEDs	green	green	2 mm	3.14.002.642/0000
Ag	fully illuminated 1 LED	green	green super bright	3 mm	3.14.002.643/0000
Ag	fully illuminated 1 LED	blue	blue super bright	3 mm	3.14.002.688/0000
Ag	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.002.663/0000
Ag	fully illuminated 1 LED	white	white	3 mm	3.14.002.689/0000
Ag	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.678/0000
Ag	fully illuminated 2 LEDs	white	multi colour	3 mm	3.14.001.682/0000

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
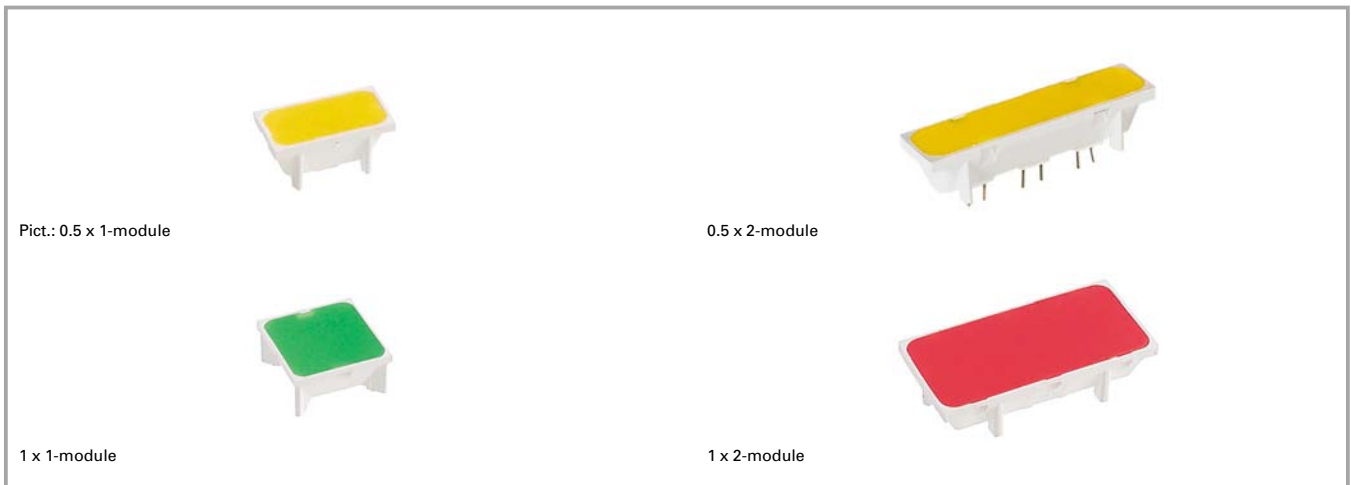
Pict.: 0.5 x 1-module

0.5 x 2-module

1 x 1-module

1 x 2-module

Technical data

General information

Colour of lens	see order block
Recommended key grid	23/x mm

Dimensions

Length	see order block
Width	see order block
Overall height	9.15 mm

Mechanical design

Mounting	soldering into PCB
Illumination	see order block
LED colour	see order block
LED type	see order block

Other specifications

Ambient temp. operating min.	-25 °C

|	
Ambient temp. operating max.	+70 °C
Storage temperature min.	-40 °C
Storage temperature max. (product)	+80 °C
Storage temperature max. (in tube)	+50 °C
Resistance to constant environment	according to IEC 600 68-2-3 and 2-30
Resistance at variable environment	according to IEC 600 68-2-14 and 2-33
Soldering time max.	2,5 sec.
Soldering temperature max.	250 °C
Flammability of materials	UL 94 HB

4

RF

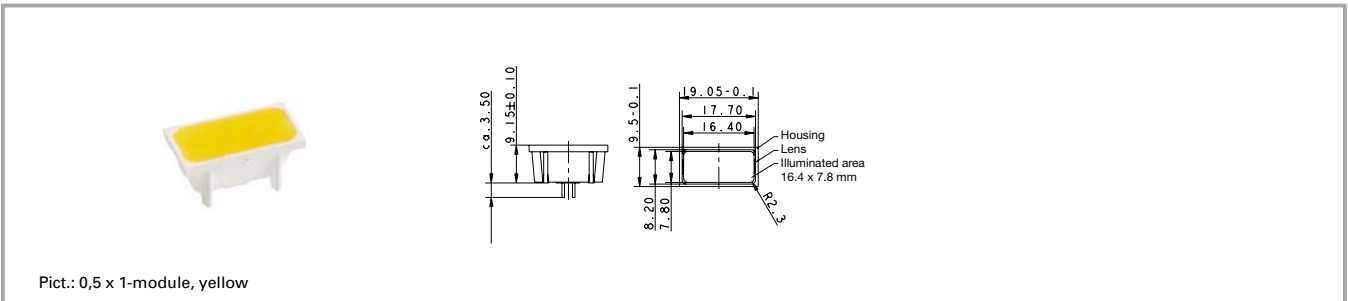## Dimensional Drawing Signal Indicator RF 19
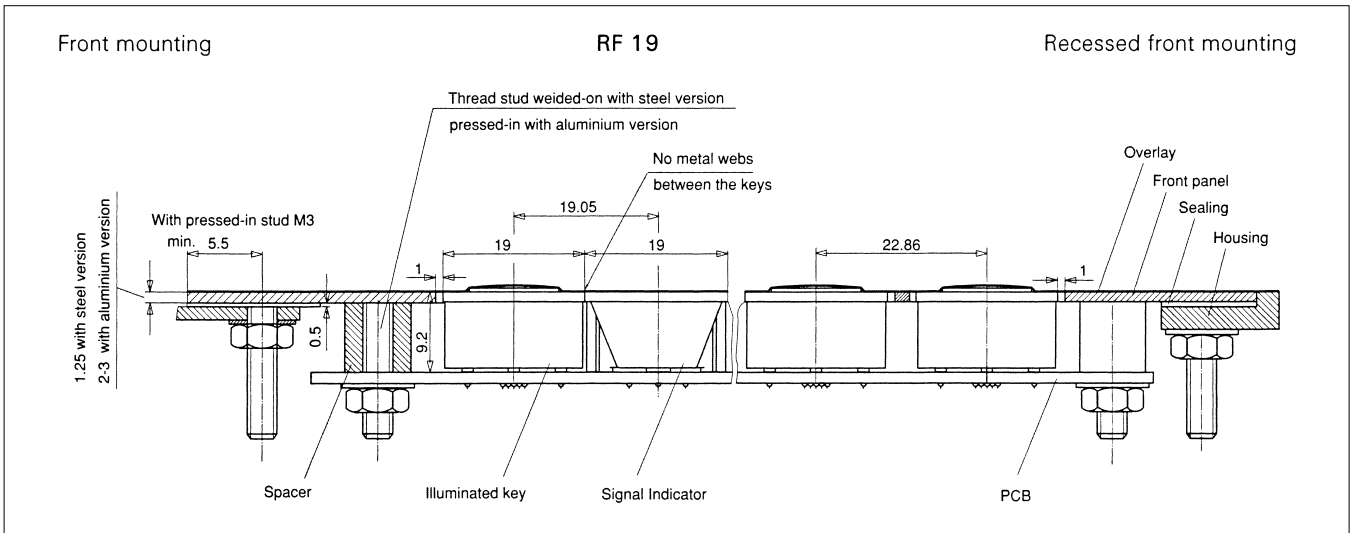
Hole Patterns RF 19
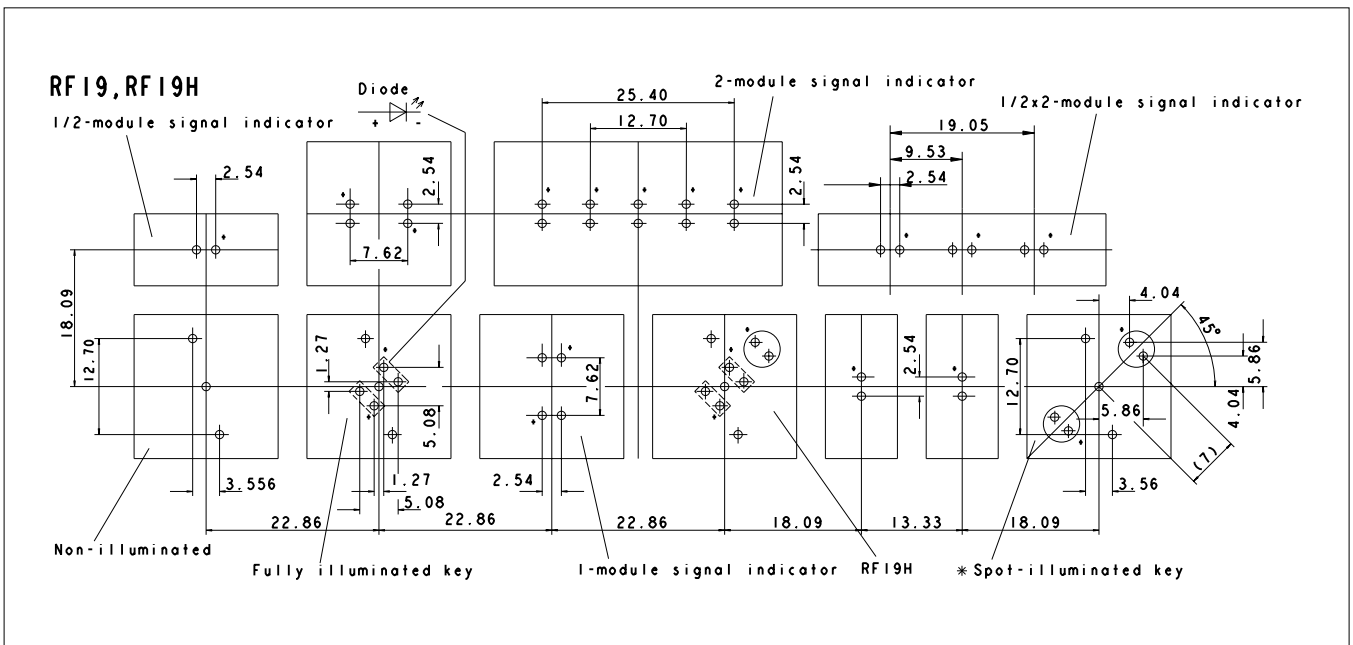
* The LED may be positioned either on the left-hand or right-hand side.
  Standard verstion: LED on left-hand side
  View on component side, all hole diameters 1,1 +/- 0,1 mm

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

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RF 19 signal indicator, $^1/_2$ x 1-module

Pict.: 0,5 x 1-module, yellow

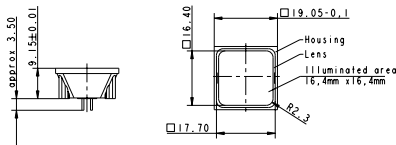| Illumination	Colour of lens	LED colour	LED type	Order no.
fully illuminated 1 LED	red	red	2 mm	**3.14.002.061/0000**
fully illuminated 1 LED	green	green	2 mm	**3.14.002.062/0000**
fully illuminated 1 LED	yellow	yellow	2 mm	**3.14.002.063/0000**
fully illuminated 1 LED	orange	yellow	2 mm	3.14.002.064/0000

Technical data see page 4 - 64

For more information, see LEDs.

RF 19 signal indicator, $^1/_2$ x 2-module
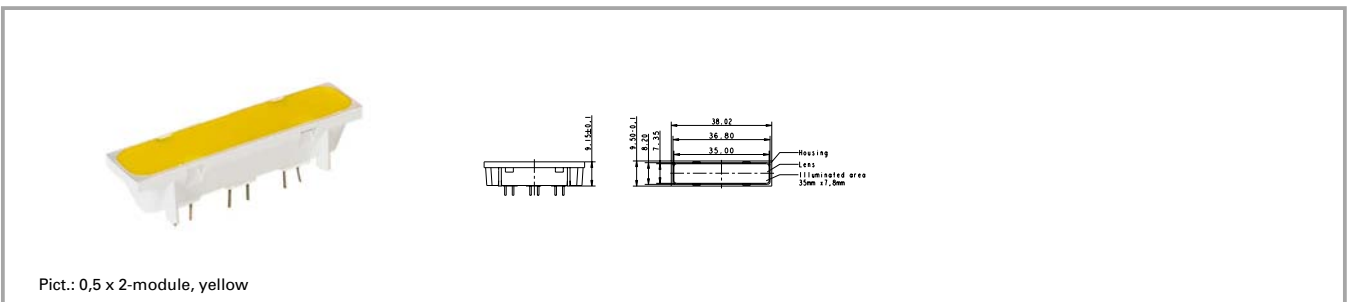
Pict.: 0,5 x 2-module, yellow

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

Technical data see page 4 - 64

For more information, see LEDs.

4

RF

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PCB Keyswitches

RF 19 signal indicator, 1 x 1-module

Pict.: 1 x 1-module, green

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
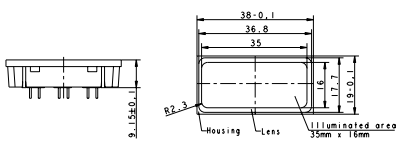
Pict.: 1 x 2-module, red

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.

4

RF

RF special accessories
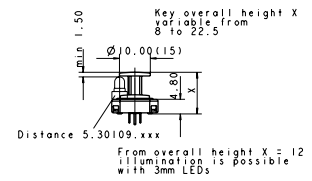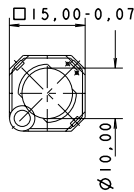
Pict.: light grey   round and triangular versions

Extension plunger for RF 15 N, round head

Pict.: 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.

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Extension plunger for RF 15 N, round head, with recess for LED
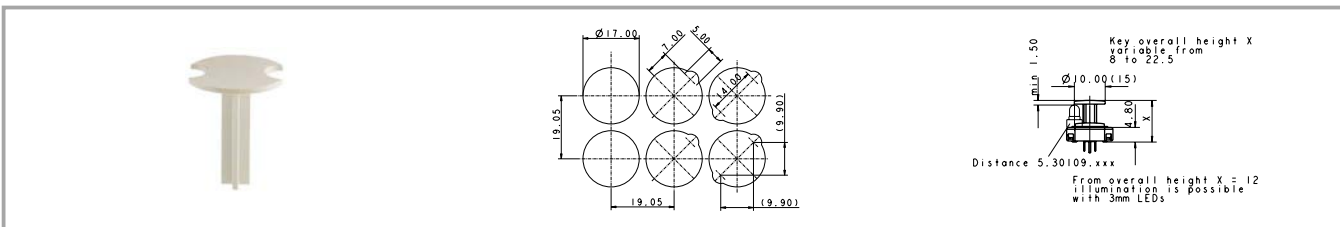
Length	Width	Overall height	Diameter	Colour	Order no.
		9 mm	15 mm		**5.46.017.036/0710**
		9.7 mm	15 mm		**5.46.017.030/0710**
		12.5 mm	15 mm		**5.46.017.037/0710**
		13 mm	15 mm		**5.46.017.038/0710**
		22.5 mm	15 mm		**5.46.017.028/0710**

Keycap for RF 15, snap-on, for overall height 12.5 mm
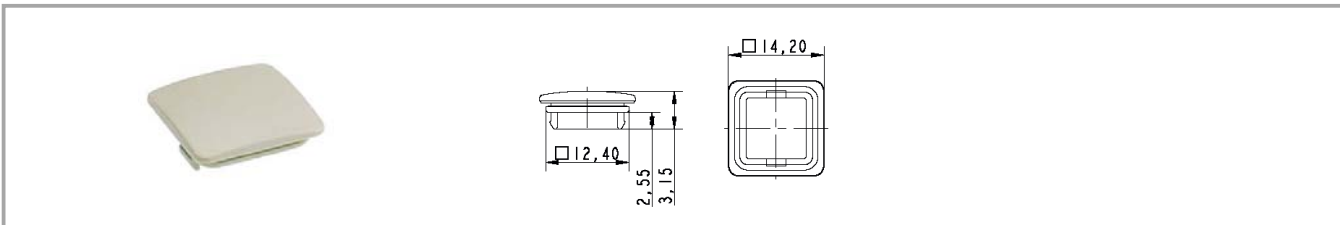
Length	Width	Overall height	Diameter	Colour	Order no.
14.2 mm	14.2 mm	12.5 mm		beige	5.46.654.059/0227

4

RF

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Spacers, round
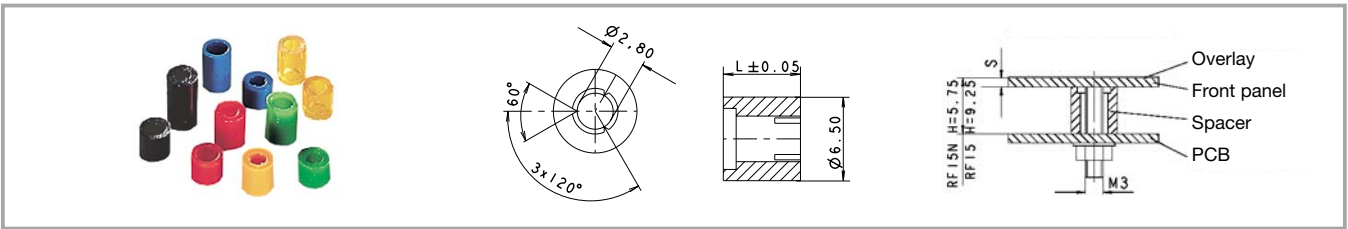
Length	Width	Overall height	Diameter	Colour	Order no.
3.50 mm				blue transparent	**5.30.759.023/0000**
4 mm				green	**5.30.759.025/0000**
4.25 mm				blue	**5.30.759.026/0000**
4.50 mm				red	**5.30.759.027/0000**
4.75 mm				blue transparent	**5.30.759.028/0000**
5 mm				black	**5.30.759.029/0000**
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**

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

Spacers, triangular
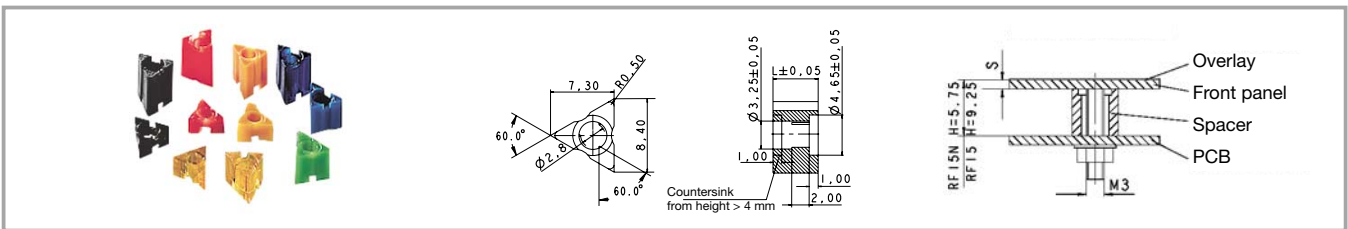
Length	Width	Overall height	Diameter	Colour	Order no.
2.50 mm				blue	**5.30.759.094/0000**
2.75 mm				red	**5.30.759.095/0000**
3 mm				blue transparent	**5.30.759.096/0000**
3.25 mm				black	**5.30.759.097/0000**
3.50 mm				yellow orange transparent	**5.30.759.098/0000**
3.75 mm				yellow	**5.30.759.099/0000**
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**

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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
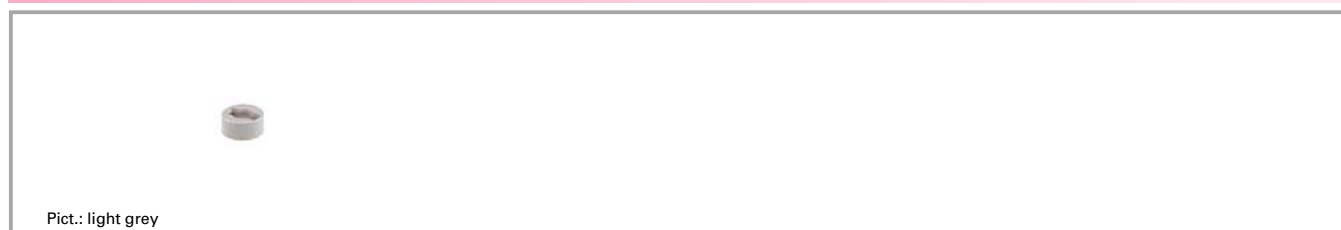
Pict.: light grey

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

4

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