



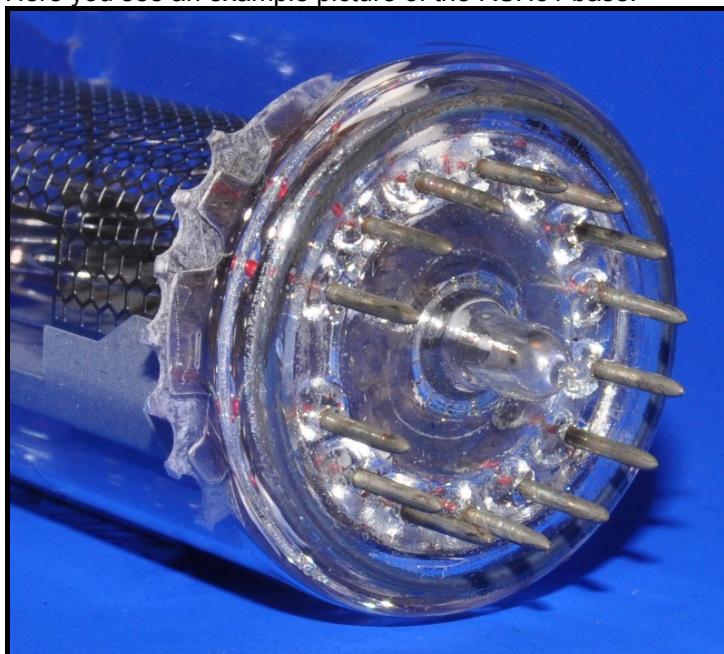
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1. Applications of the socket

The RSH31 Nixie tube socket with LED can be used for all tubes with RSH31 base.
The Russian spelling of this base is "РШ31".

Here you see an example picture of the RSH31 base:



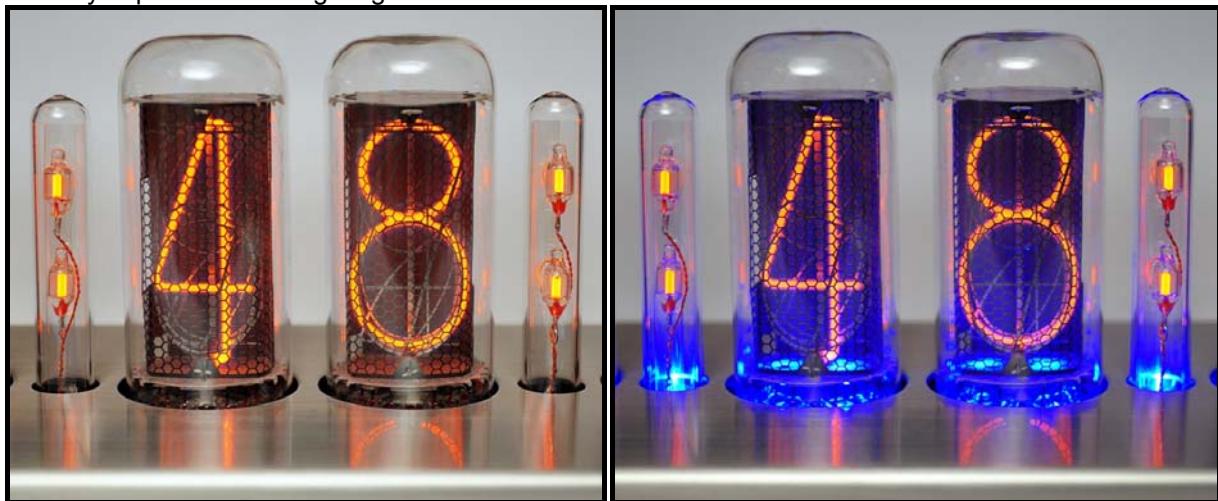
RSH31 Nixie Tube Socket with LEDs / Colon Tube CT-IN-18

The currently known Nixie tubes and Dekatrons with this base are:

- Nixie tube IN-18 (Russian spelling: ИН-18)
- Nixie tube IN-4 (Russian spelling: ИН-4)
- Nixie tubes IN-7, IN-7A and IN-7B (Russian spelling: ИН-7, ИН-7А, ИН-7Б)
- Dekatron tube A-201 (Polyatron)

Since the listed Nixie tubes IN-7, IN-7A and IN-7B and the Polyatron are unusual, this description does mainly concentrate at the Nixie tubes IN-18 and IN-4.

The socket provides the opportunity to apply one, two, three or four 3 mm LED under the tube to generate the very impressive floor lighting effect.



without floor lighting

with blue floor lighting

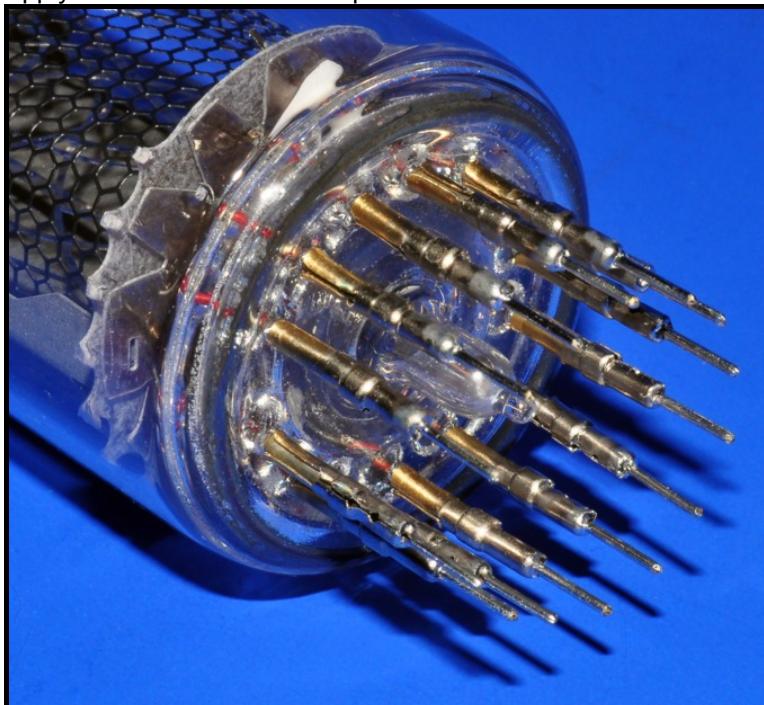
You can use other LEDs instead of the included ones, of course.

You can use the tube contacts in your own PCB layout, too. The contacts will fit for all tubes with 1 mm (0.04") pin diameter.

The socket has a black coated surface. This is very expedient for the case mounting at a Nixie clock, because the black surface looks neutral.

2. Solder instructions of the socket

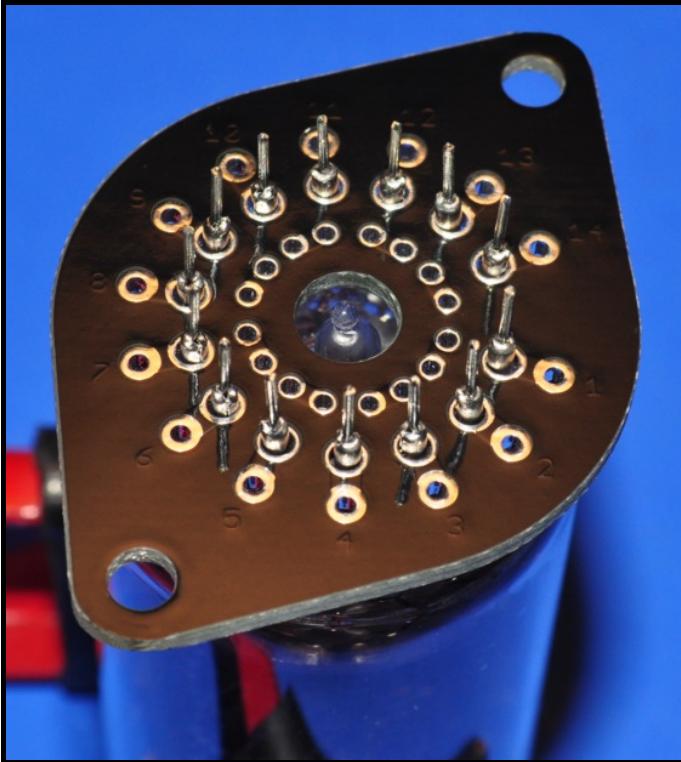
- Apply all contacts to the tube pins



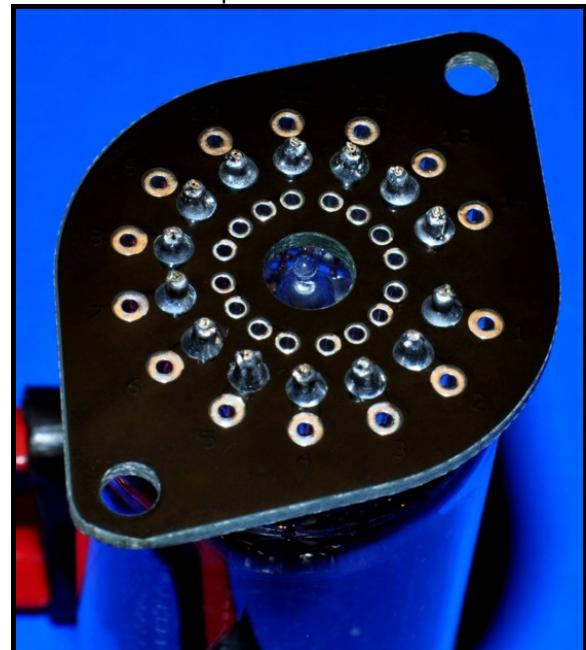
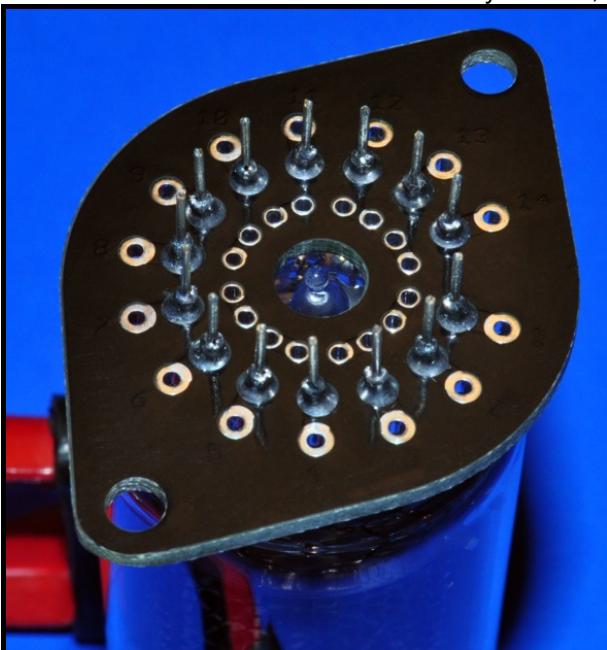
- Insert the tube with the contacts into the drills of the board and align the tube right-angled to the board surface. The top side of the board is marked with "FRONT". The marking "FRONT" is only valid the IN-18 tubes. The standard alignment for IN-18 tubes you can learn from the "Drawing of the assembled socket"

RSH31 Nixie Tube Socket with LEDs / Colon Tube CT-IN-18

below. The marking "FRONT" can be ignored for all other tubes.

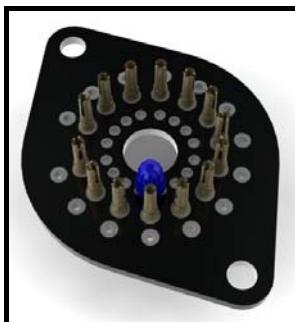


Solder the contacts carefully from the bottom side. Don't use too much solder, otherwise the solder may flow into the inner side of the contacts. If you want, you can cut the thin part of the contacts.



- Pull the tube out of the socket.
- The following step only is necessary if you want to use the floor lighting feature by LEDs:
Solder the LEDs to the board. They must be assembled from the top side, of course. The distance between LEDs and tube bottom should be kept small. Note the drawing "Section drawing of the socket with IN-18 tube" below for that. Record the position of the anode and the cathode of the LED. You can choose the direction freely.
You can use one, two, three or four LEDs. For a balanced glow in combination with IN-18 tubes I recommend 2 or 3 LEDs, **at which if 3 LEDs are used, the front LED should not be assembled (see pictures)**. For a balanced glow in combination with IN-4 tubes I recommend 2 or 4 LEDs. The following 4 pictures show the socket in all 4 variants (computer animation):

RSH31 Nixie Tube Socket with LEDs / Colon Tube CT-IN-18



1 LED
(not recommended)



2 LEDs (recommended
for IN-18 – standard
intensity and IN-4 tubes
– low intensity)

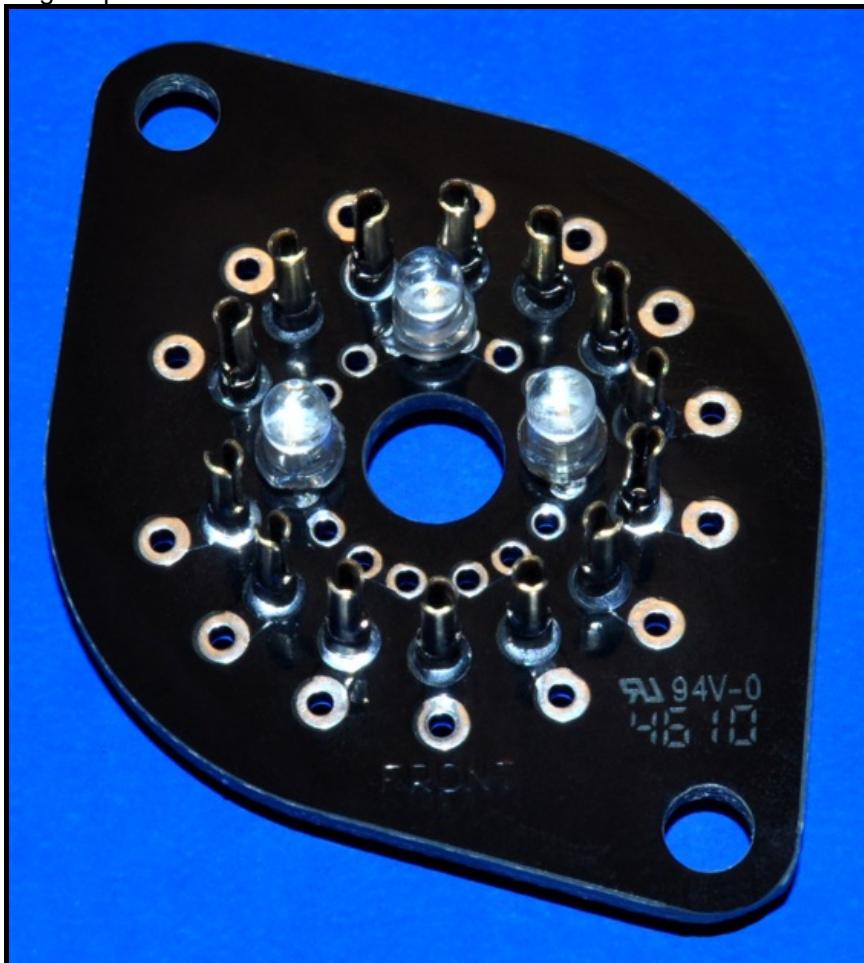


3 LEDs
(for IN-18 tubes – very
high intensity)



4 LEDs (recommended
for IN-4 tubes – very
high intensity) – **do not
use for IN-18 tubes!**

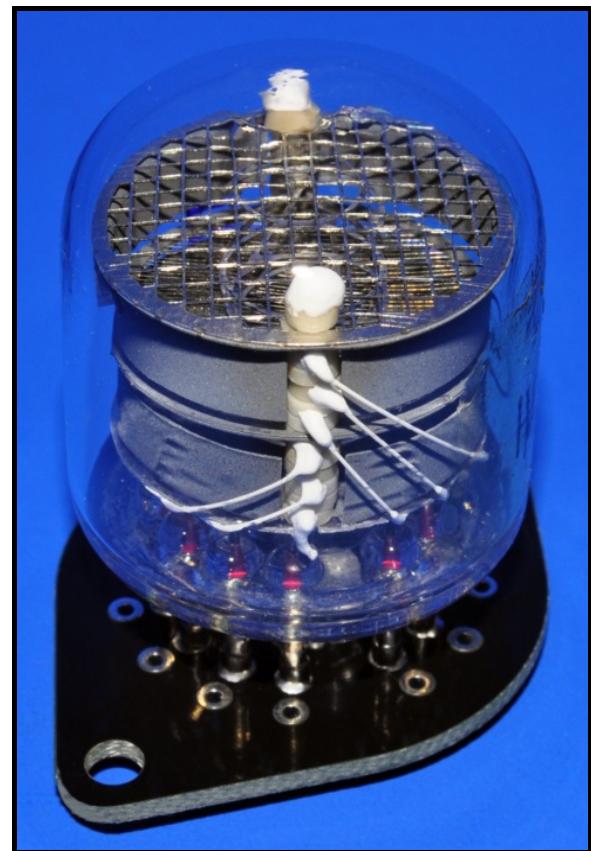
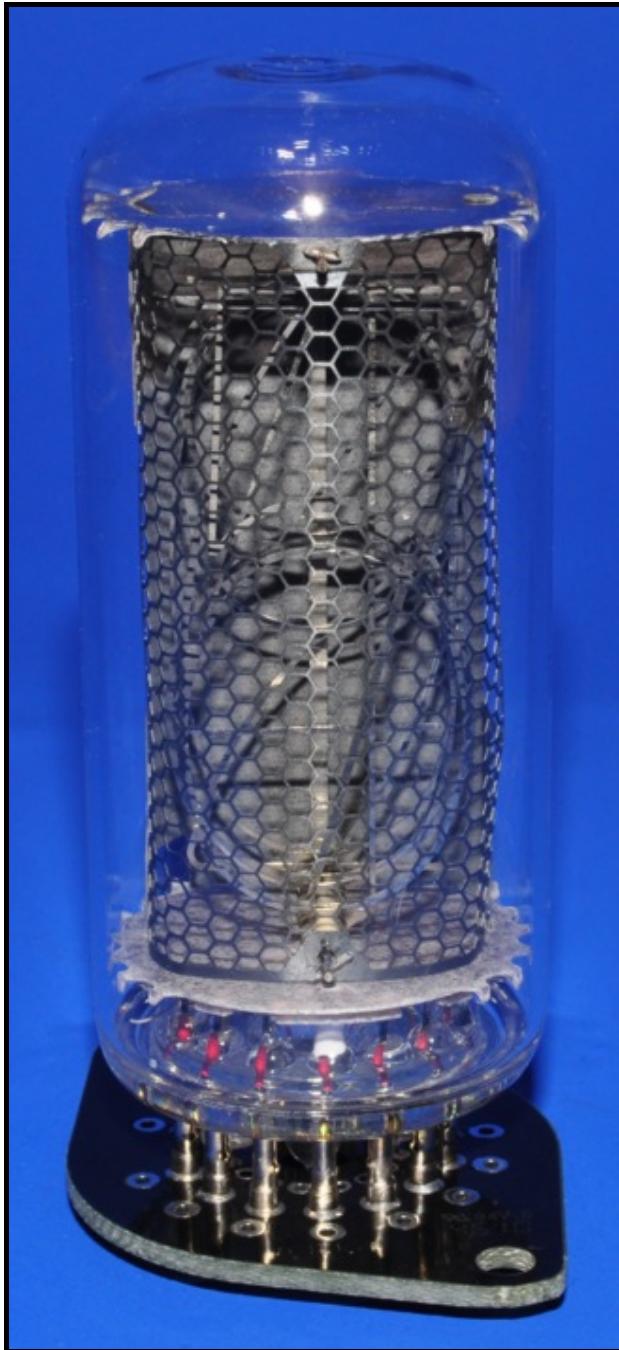
Original picture with 3 LEDs



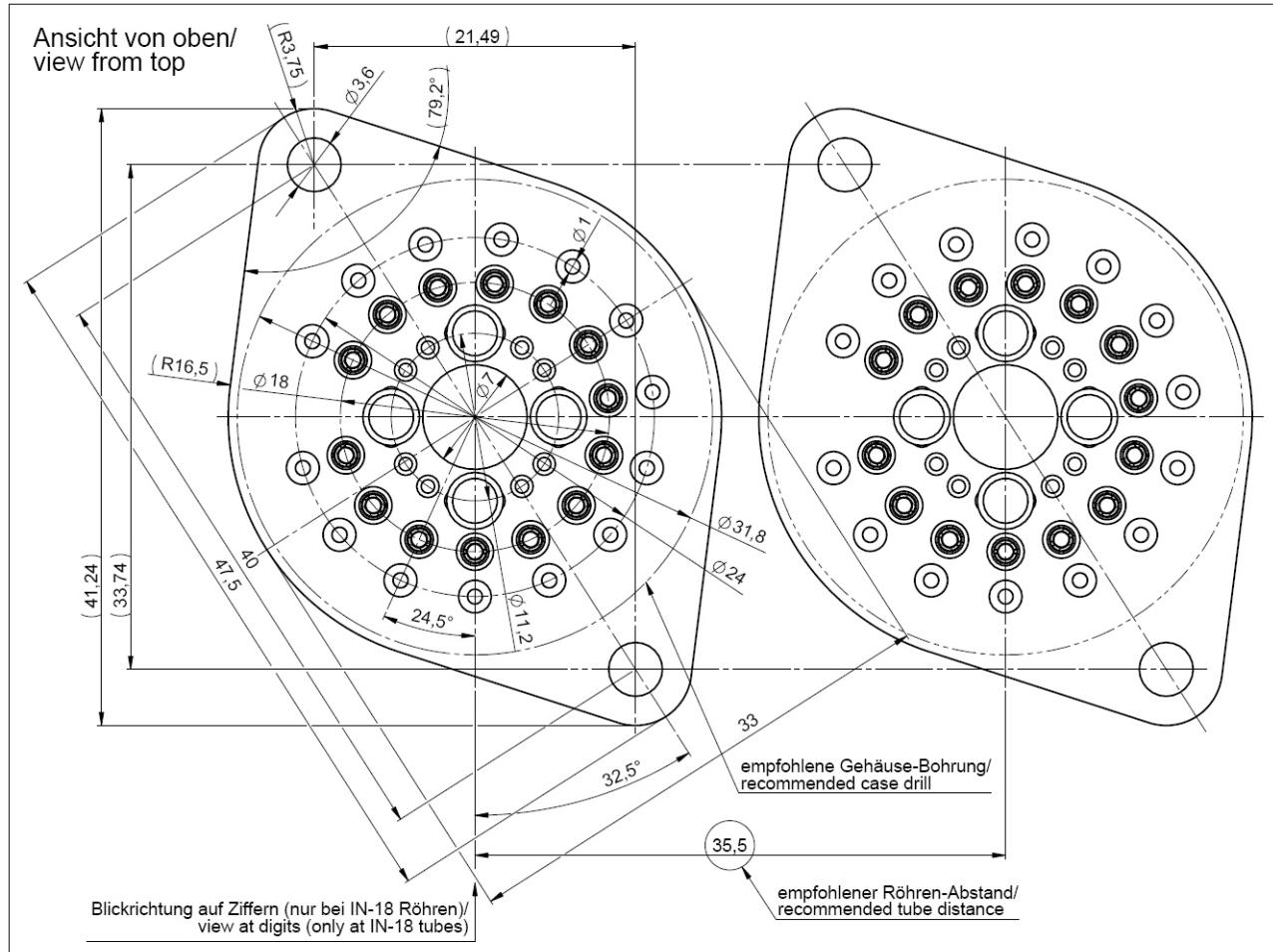
- Solder the connection wires from the bottom side to the corresponding solder pads of the socket. The pinout for the IN-18 and IN-4 tubes you will find below.

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- Put the tube into the socket.



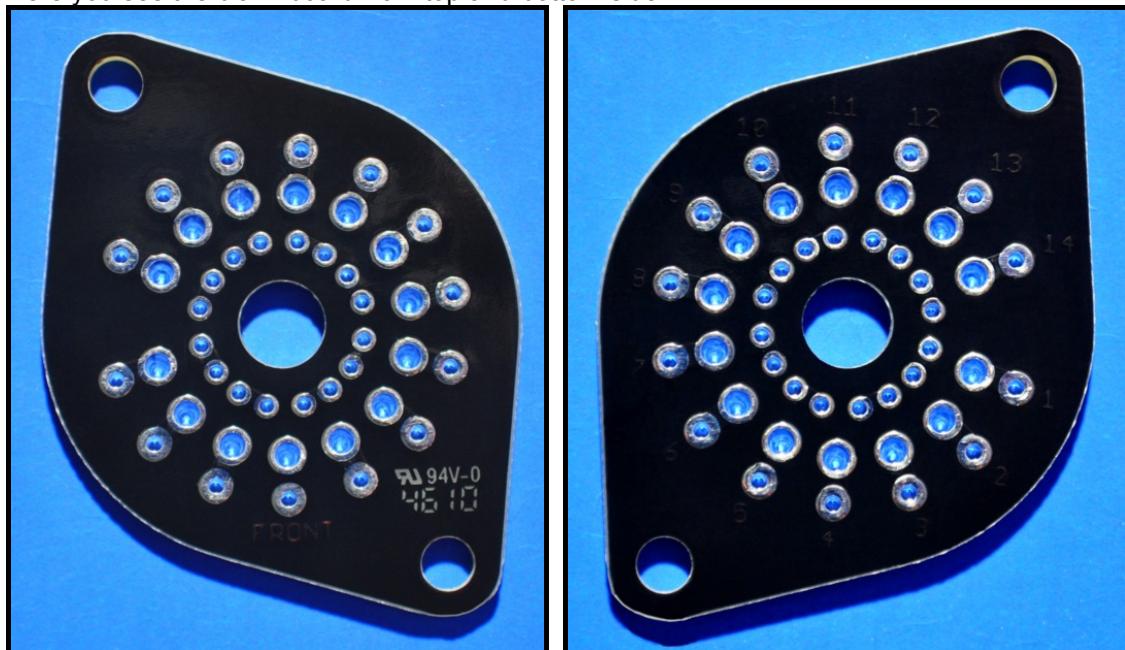
3. Drawing of the assembled socket



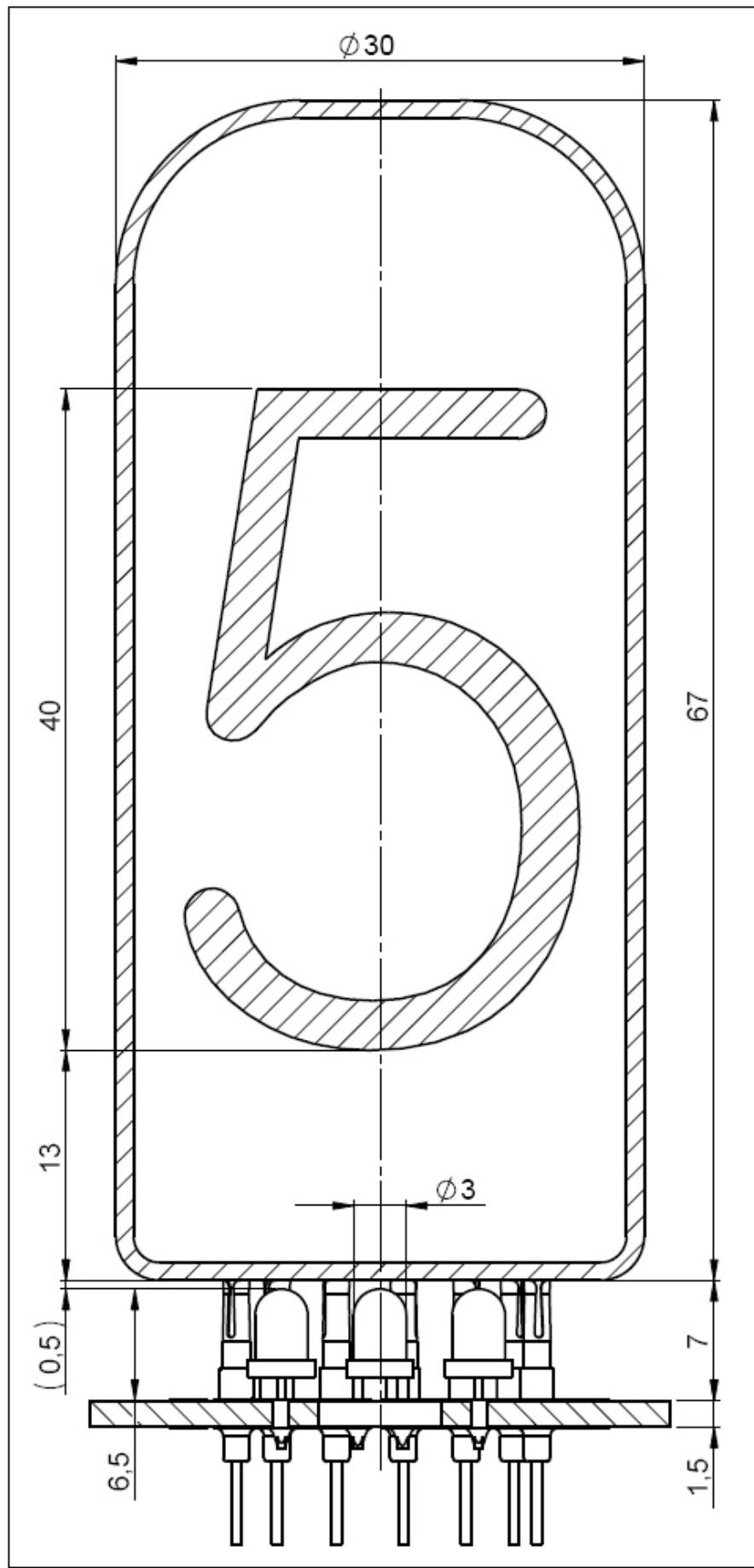
Remarks:

- all dimensions in mm
- The drawing shows the standard alignment for IN-18 tubes, at which the tube front (pin 4) shows an angle of 32.5° to the mounting holes. IN-4 tubes and other tubes have to be aligned different, of course
- The Drawing shows the 4 LED positions. Please note that for the IN-18 tube only 3 or 4 LEDs are recommended. **The LED in front should not be used in combination with IN-18 tubes!**

Here you see the blank board from top and bottom side:

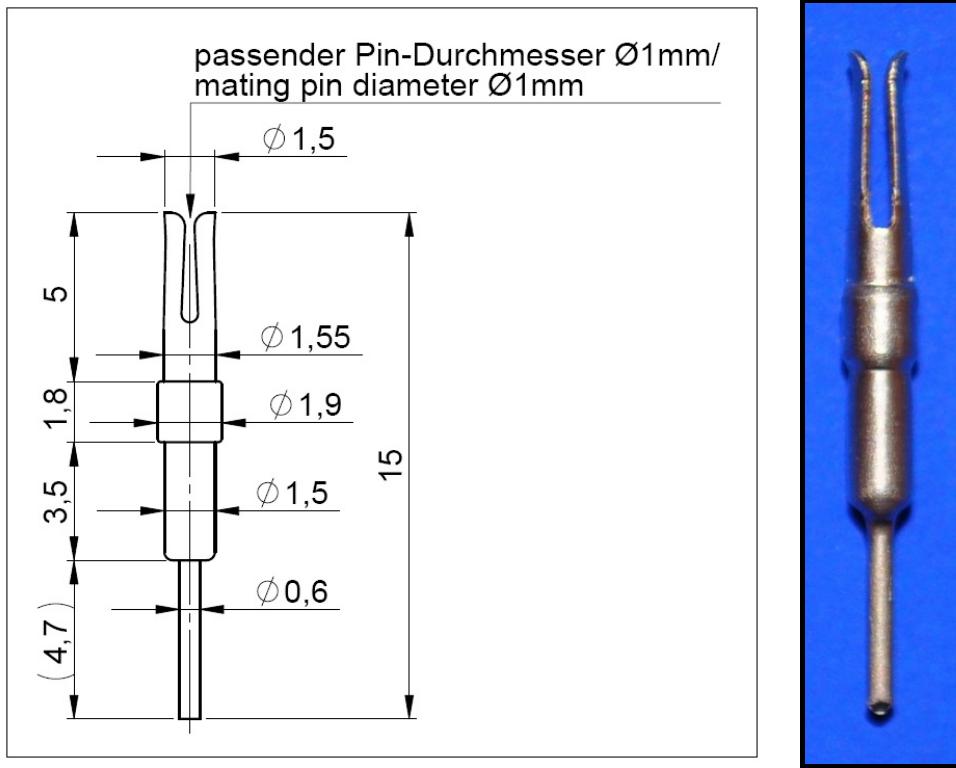


4. Section drawing of the socket with IN-18 tube



all dimensions in mm

5. Drawing and technical data of the tube contacts



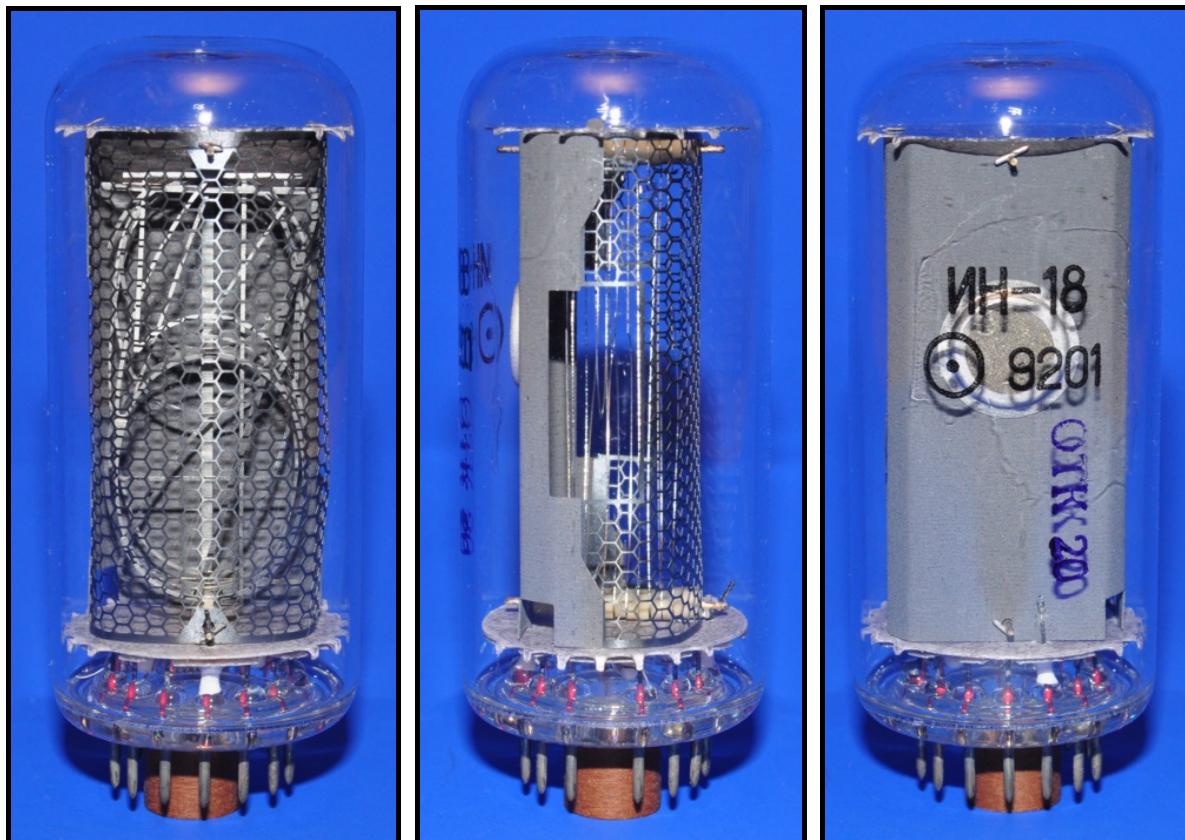
all dimensions in mm



Technical data:

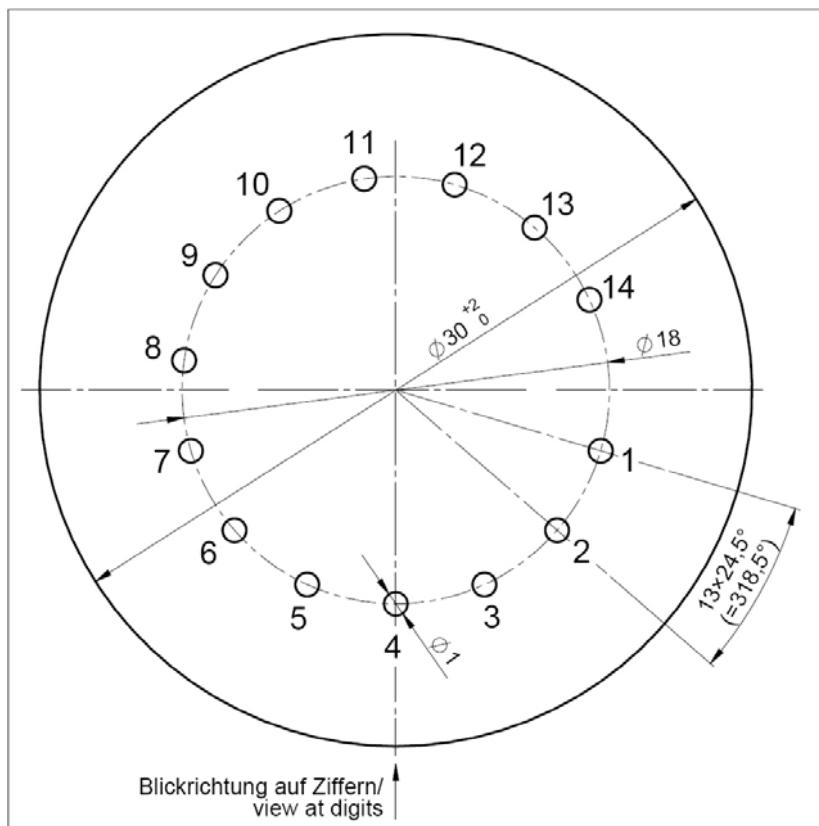
- Material: tinned brass, fully gold plated
- Diameter of the pad drill for the 1.5 mm diameter: 1.6 ± 0.05 mm (0.063 ± 0.002 ")
- Diameter of the pad drill for the 0.6 mm diameter: 0.75 ± 0.1 mm (0.03 ± 0.004 ")

6. Technical data and pinout of the IN-18 (ИН-18) Nixie tube



Tube type		IN-18 (ИН-18)
Displayed symbols		0-9
Base and socket		RSH31 (РШ31)
Digit height		40 mm (1.58")
Digit width		22 mm (0.87")
Dimension tube bottom to digits		13 mm (0.51")
Tube diameter nominal		30 mm (1.18")
Tube diameter maximal		32 mm (1.22")
Tube height bottom to top		75 mm (2.95")
Tube height total		68 mm (2.68")
Ignition voltage	U_Z	170 V
Anode voltage nominal	U_A	170 V
Anode voltage minimal	$U_{A \min}$	170 V
Voltage drop	$U_{A/K}$	150 V
Cathode current minimal	$I_{K \min}$	4 mA
Cathode current nominal	I_K	6 mA
Cathode current maximal	$I_{K \max}$	8 mA
Mass	m	35 g
Luminance	L	100 cd/m ²

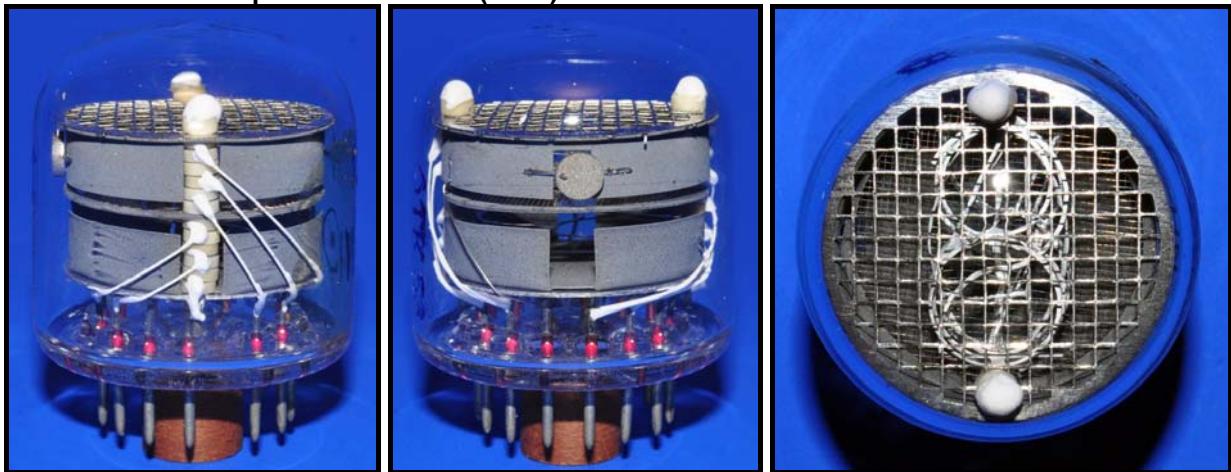
Pinout of the Nixie tube IN-18 (ИН-18):



Pin	Connection
1	(Giver Pill)
2	Cathode digit 4
3	Cathode digit 5
4	Anode
5	Cathode digit 6
6	Cathode digit 7
7	Cathode digit 3
8	(Giver Pill)
9	Cathode digit 8
10	Cathode digit 2
11	Cathode digit 1
12	Anode
13	Cathode digit 0
14	Cathode digit 9

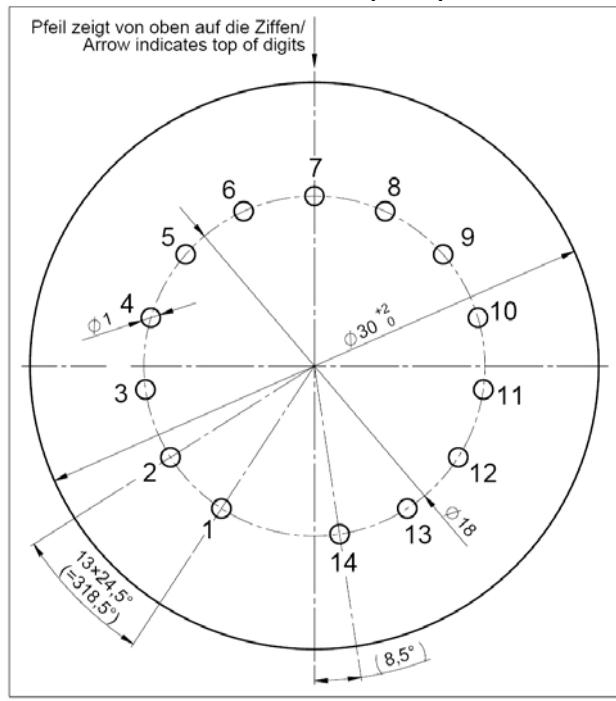
Bottom view

7. Technical data and pinout of the IN-4 (ИН-4) Nixie tube



Tube type	IN-4 (ИН-4)
Displayed symbols	0-9
Base and socket	RSH31 (РШ31)
Digit height	17 mm (0.67")
Digit width	9 mm (0.35")
Tube diameter nominal	30 mm (1.18")
Tube diameter maximal	32 mm (1.26")
Tube height bottom to top	31 mm (1.22")
Tube height total	41 mm (1.61")
Ignition voltage	170 V
Anode voltage nominal	170 V
Anode voltage minimal	170 V
Voltage drop	150 V
Cathode current nominal	2.5 mA
Cathode current maximal	3 mA
Luminance	100 cd/m ²

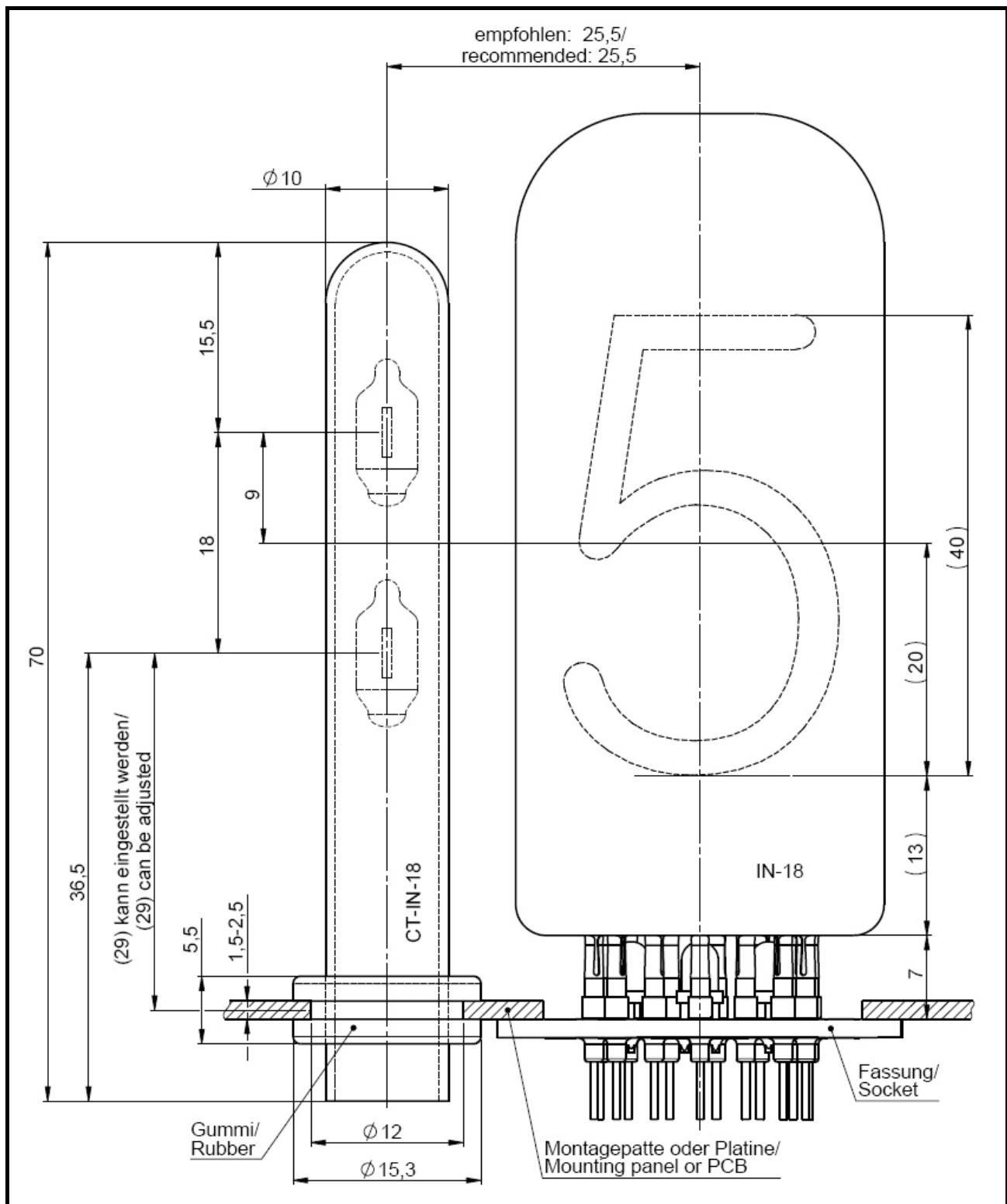
Pinout of the Nixie tube IN-4 (ИН-4):



Bottom view

Pin	Connection if connected not biquinary	Connection if connected biquinary
1	Cathode digit 4	Cathode digit 4
2	Cathode digit 6	Cathode digit 6
3	Cathode digit 8	Cathode digit 8
4	Anode	Screen
5	Cathode digit 9	Cathode digit 9
6	Cathode digit 7	Cathode digit 7
7	not connected	not connected
8	Cathode digit 0	Cathode digit 0
9	Cathode digit 2	Cathode digit 2
10	not connected	Anode for even digits
11	Cathode digit 3	Cathode digit 3
12	Cathode digit 5	Cathode digit 5
13	not connected	Anode for odd digits
14	Cathode digit 1	Cathode digit 1

8. Drawing of colon tube CT-IN-18

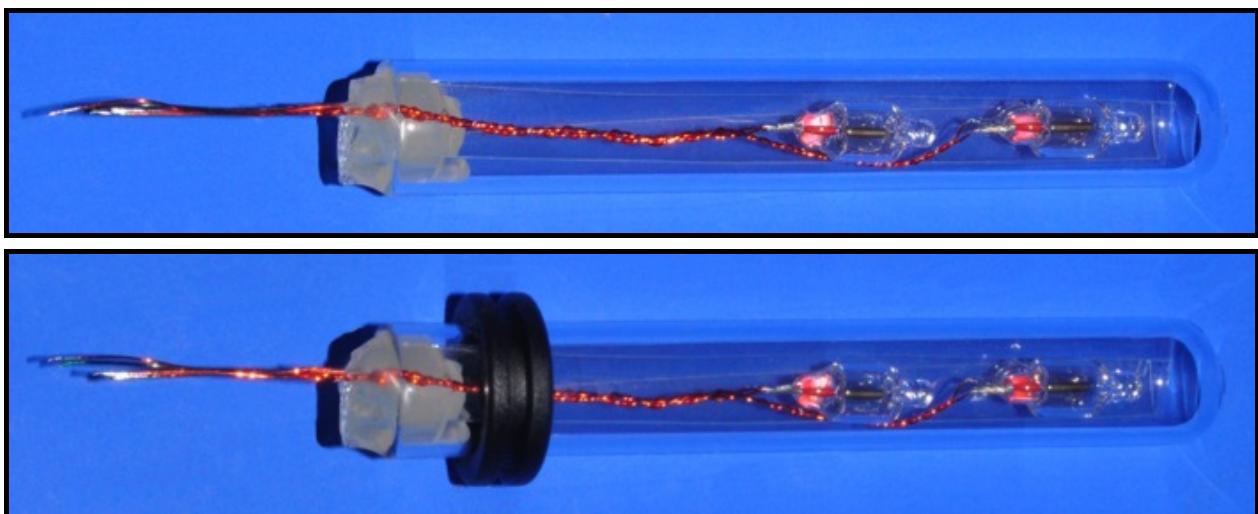


Remarks:

- all dimensions in mm
- The dimension 29 mm can be adjusted for other mounting situations by sliding of the colon tube in the rubber

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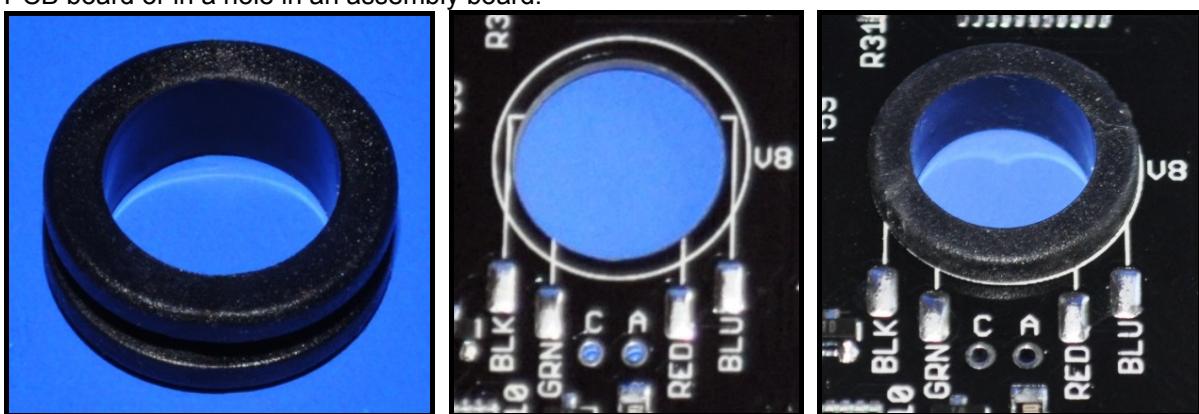
9. Technical data of colon tube CT-IN-18:



Tube type	CT-IN-18
dimensions	see drawing
voltage drop	59 V
recommended Resistor at 170 V	180 kΩ
nominal current	0.6 mA
Terminal assignment	Connection
blue wire	rear upper electrode (+)
red wire	rear lower electrode (+)
black wire	front upper electrode (-)
green wire	front lower electrode (-)

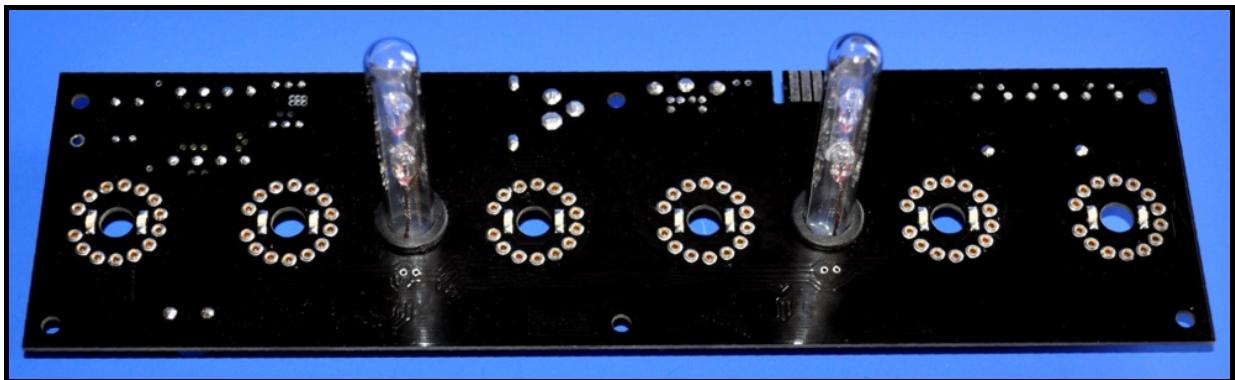
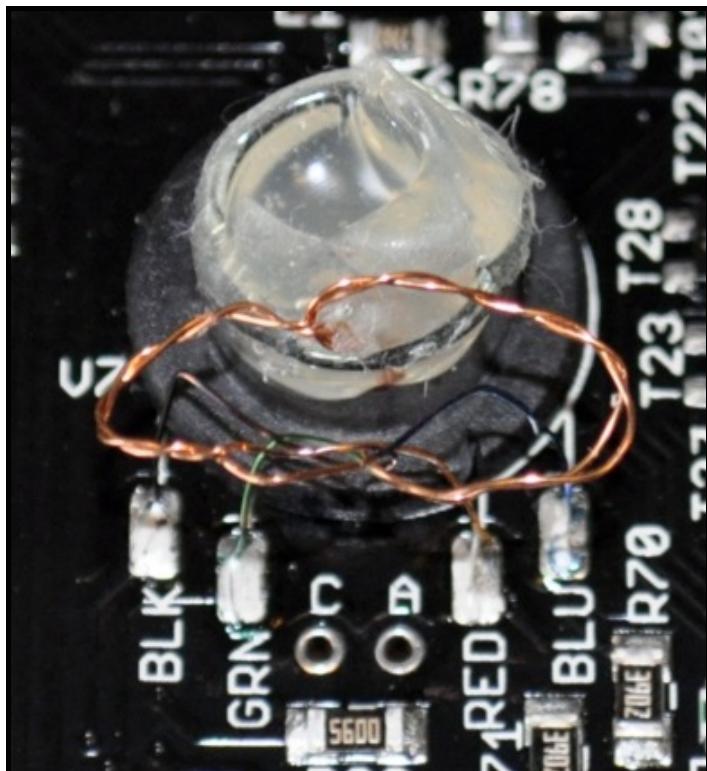
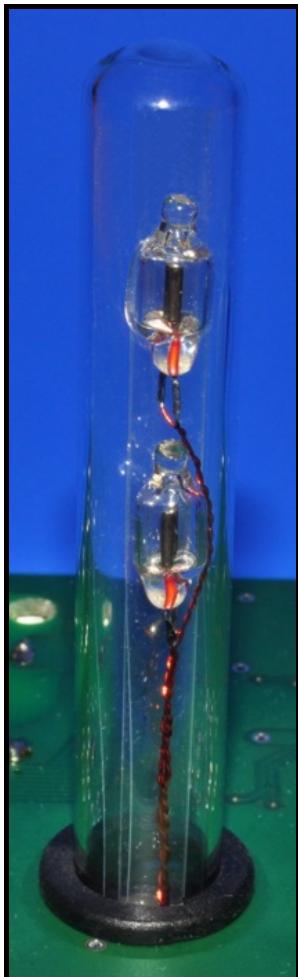
10. Mounting notes and floor lighting of colon tube CT-IN-18

Fasten the colon tube by using the included mounting rubber. You can mount the rubber in a hole in a PCB board or in a hole in an assembly board.



RSH31 Nixie Tube Socket with LEDs / Colon Tube CT-IN-18

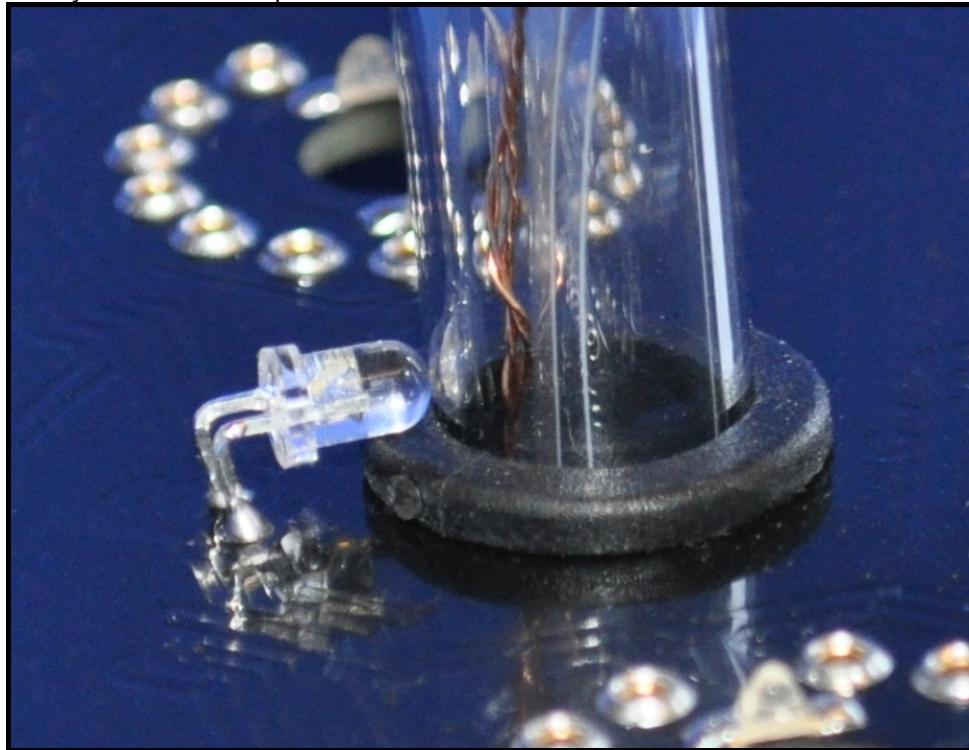
After mounting the rubber, insert the colon tube from the bottom side into the rubber. Note the drawing "Drawing of colon tube CT-IN-18" above for that. After this, connect the colon tube.



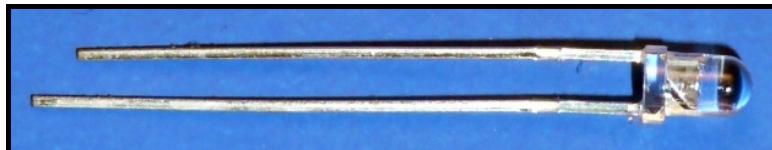
If you want to use the floor lighting with LEDs at the colon tubes attach one LED at the front side (face side) of each colon tube. **Do NOT illuminate the colon tube from the back side!** I recommend to solder the LED directly to the PCB board. If you use an assembly board instead of a PCB board, you can glue the LEDs to it or build an appropriate holder for the LEDs.

RSH31 Nixie Tube Socket with LEDs / Colon Tube CT-IN-18

Here you see an example for the illumination of the colon tubes:



11. Technical data of the included LEDs



- Color: blue
- Wave length: approx. 430 nm
- Light intensity: 2000 mcd
- Angle of radiation: approx. 15°
- Luminous flux: 0.1 lm
- Rated current: 20-30 mA
- Voltage drop: 3.3 V
- Power consumption at current 20 mA: 66 mW
- Diameter: 3 mm (0.12")

12. Example of use: Sockets and colon tubes mounted on an assembly board

The following pictures show how to mount the sockets and colon tubes at an assembly board as example (computer animation)



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You could mount the assembly board in a case as shown in the next picture (computer animation)

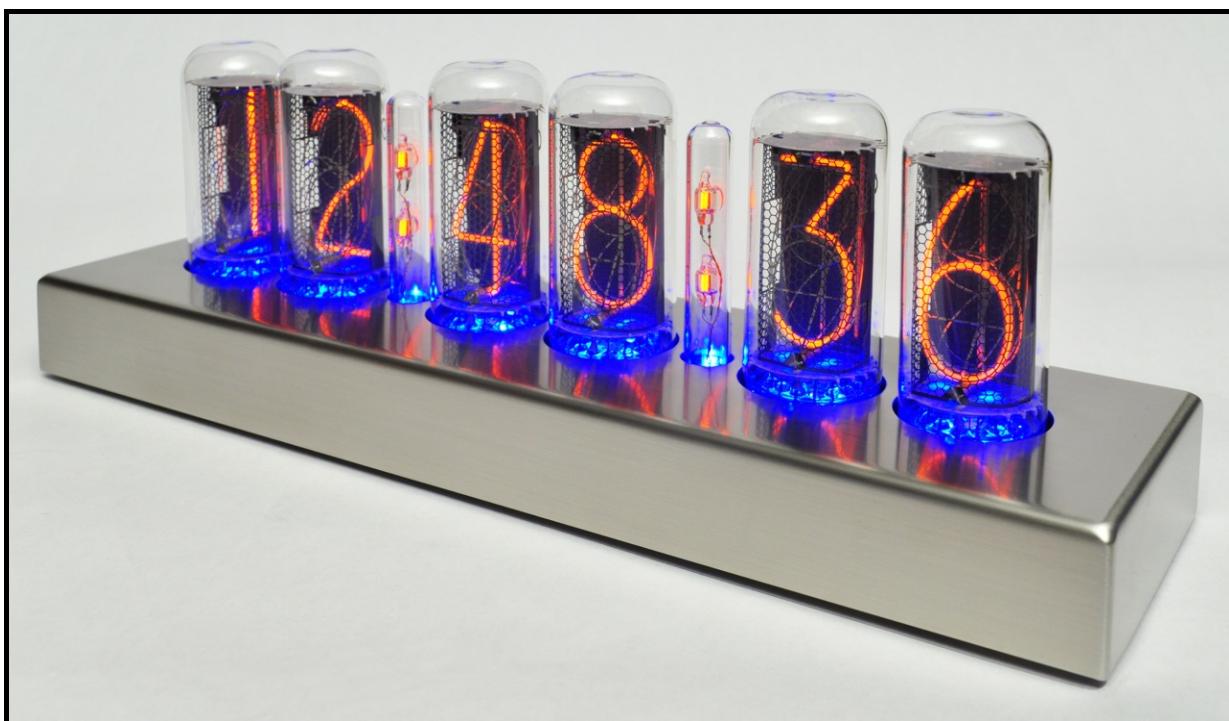
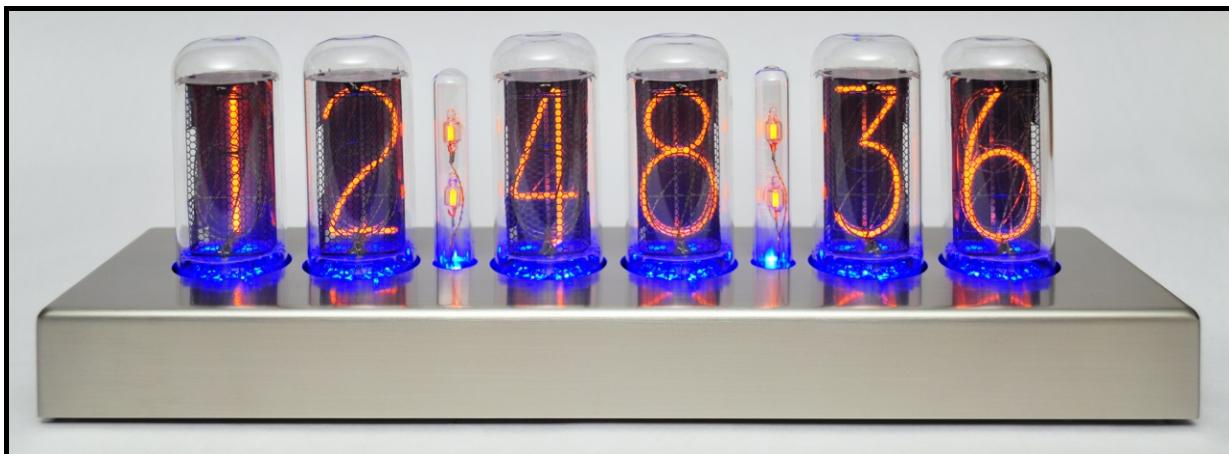


13. Example of use: Nixie clock with IN-18 tubes mounted in a case

At the following pictures you see a IN-18 Nixie clock mounted in a gorgeous stainless steel case as example. Exactly the same principle as described precedent was used here. There's no limit for your fantasy for the case, of course. Have fun building it!



RSH31 Nixie Tube Socket with LEDs / Colon Tube CT-IN-18



RSH31 Nixie Tube Socket with LEDs / Colon Tube CT-IN-18









14. Example of use: IN-4 Nixie tube

