

IV-18 tube and breakout board kit

Thanks for your purchase! Please find enclosed —

- 1x IV-18 VFD tube, original stock (typically manufactured in the USSR in the 1990s, but otherwise unused)
- 1x breakout board for the tube



There are several datasheets available for this tube. The QR codes to the left and right take you to these links.



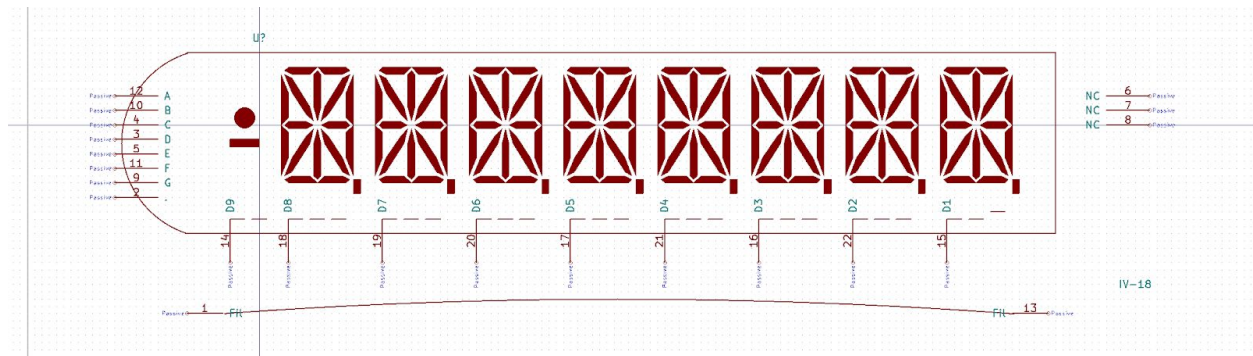
- <https://github.com/blinden/nixie-clock/blob/main/datasheets/iv-18/IV-18.pdf>
- <https://github.com/blinden/nixie-clock/blob/main/datasheets/iv-18/IV-18%20-%20detailed%20specifications.pdf> (Russian language, but more detailed).

Here's the specifications copied from the first datasheet:

Brightness	400 kd/m2
Filament voltage (Uf)	5V
Filament current (If)	85mA typical (75-95mA)
Anode-Grid voltage	20-30Vdc
Grid Current	11 mA
Total segment Current (for one digit):	8 mA
Total Anode-Grid current (everything lit up)	25-30mA

The tube pins are wired similar to this schematic. You will need two voltages available to drive the tube:

- High voltage grid drive @ 30V DC (though it can be driven higher to around 60V, at the expense of shortening the life of the tube)
- Low voltage filament drive: 25mA (constant current). **Do not exceed this current through the filament or you will burn it out!**



Wiring

Be extremely careful when wiring up the tube to the breakout board. **If you accidentally connect the 30V DC grid drive to the filament, you will instantly burn it out.** Double check all wiring before powering up!

1. Inspect the tube carefully and note the three wires which are not connected to anything inside. They should be at the front of the tube.
2. Line up these wires with the holes in the breakout board marked "NC".
 - a. The tube display side should line up with "FRONT" on the breakout board.
3. Solder all other tube wires sequentially.
4. Using a multimeter, verify a resistance of approximately 10-15Ω between the FIL+ and the GND pins on the breakout board. **This is important to make sure you've wired it correctly, and avoid burning out the filament!**

Operation

The tube works when the filament is heated, producing a stream of electrons from the hot metal wire. These electrons are accelerated through the grid in front of each digit, and hit the luminescent material on the anode, which lights up.

You control which digits are displayed applying a voltage between the desired anode pins and the desired grid. You can display multiple grids (digits) by cycling quickly between them.

The MAX6921 driver chip is helpful to connect the tube to a microcontroller (samples are available free from Maxim!) and Adafruit has published a simple boost converter design at <https://learn.adafruit.com/diy-boost-calc>, to produce the higher grid voltage at 5V input.



Very important notes

- VFD tubes of this era are **delicate and consumable**. You should expect a lifespan of only a few thousand hours of operation, when driven correctly.
- Be extremely careful when wiring up the tube to the breakout board. If you accidentally connect the 30V DC grid drive to the filament, you will instantly burn it out. Double check all wiring before powering up - the three wires not connected to anything inside the tube must line up with the three "NC" pins on the breakout board.
- Be careful when working with high voltages!

<https://github.com/blinken/nixie-clock> will remain updated with resources and tips. If you need any further assistance, please reach out at patrick@blinkenlight.co.uk.



Finally - please leave us a review on Amazon! It is incredibly helpful.

Good luck and have fun!

-Patrick