

# SWR METER

## STANDING WAVE MEASURING DEVICE

### PEP WATTMETER



NEXTION TOUCH SCREEN DISPLAY

This device was designed as an SWR and power meter for Radio Amateurs.

In addition to SWR, it measures forward and backwards power, therefore can also be used as a wattmeter.

With a large measuring range from 1 to 1000 watts, it is suitable for use from QRP to QRO.

DJ9PK  
<http://dj9pk.de>

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### Summary:

- This standing wave measuring device —SWR Power Meter— was designed for a frequency range from 1.8 to 30 MHz. It can be used up to 50 MHz with a somewhat reduced accuracy.
- The transmitter and antenna connect via the PL-sockets on the meter's back.
- 6 to 16 volts @ 120 mA are required for operation. These can be from a plug-in power supply or from the transceiver's 12V supply.
- The graphic display has two display options on two different pages: Page 1 uses an analog format with a relatively small numerical display for the exact measured values. Page 2 has a bar graph and a significantly larger numerical display for the values measured. You can switch between the two pages by tapping on the display.
- For accuracy, to always achieve a good resolution, the *Power* readings on both, the analog and bar graph are auto-ranging.

### Note:

An automatic zero adjustment is made every time the device is switched on. If there is RF power present when the device is powered-on, zero is also displayed. To obtain correct values, the carrier must be momentarily removed. Only when the carrier is removed, then applied again, will the display values be correct. **Preferably turn the device on WITHOUT RF power!**

### Note 2:

If the displayed values of an RF carrier signal wobble in the "fast" setting (more than only the last digit), this is not caused by the SWR meter: This is hum in the RF source. This has been observed several times, especially with larger power amplifiers. In these cases, only fast/PEP display can help.

### Features:

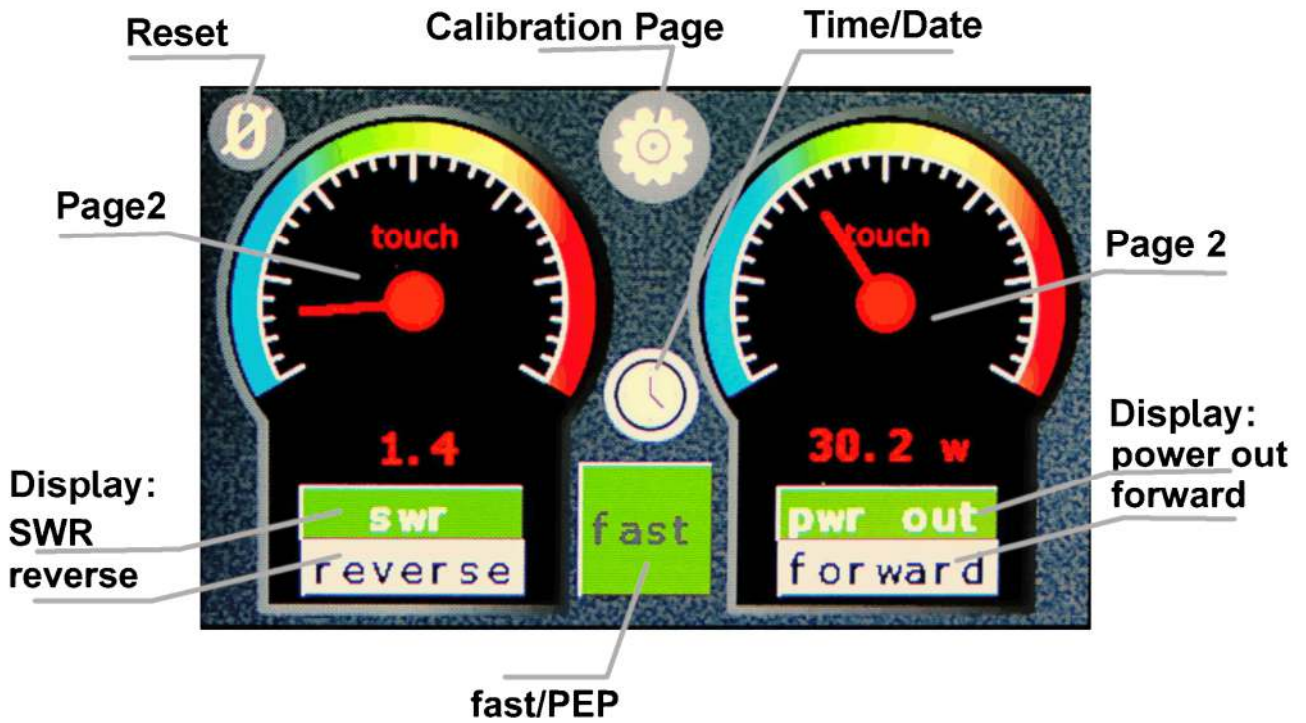
The display is touch sensitive (touch screen). All settings will be done by "tapping" the screen.

The following two pictures show which functions can be set by tapping the corresponding buttons.

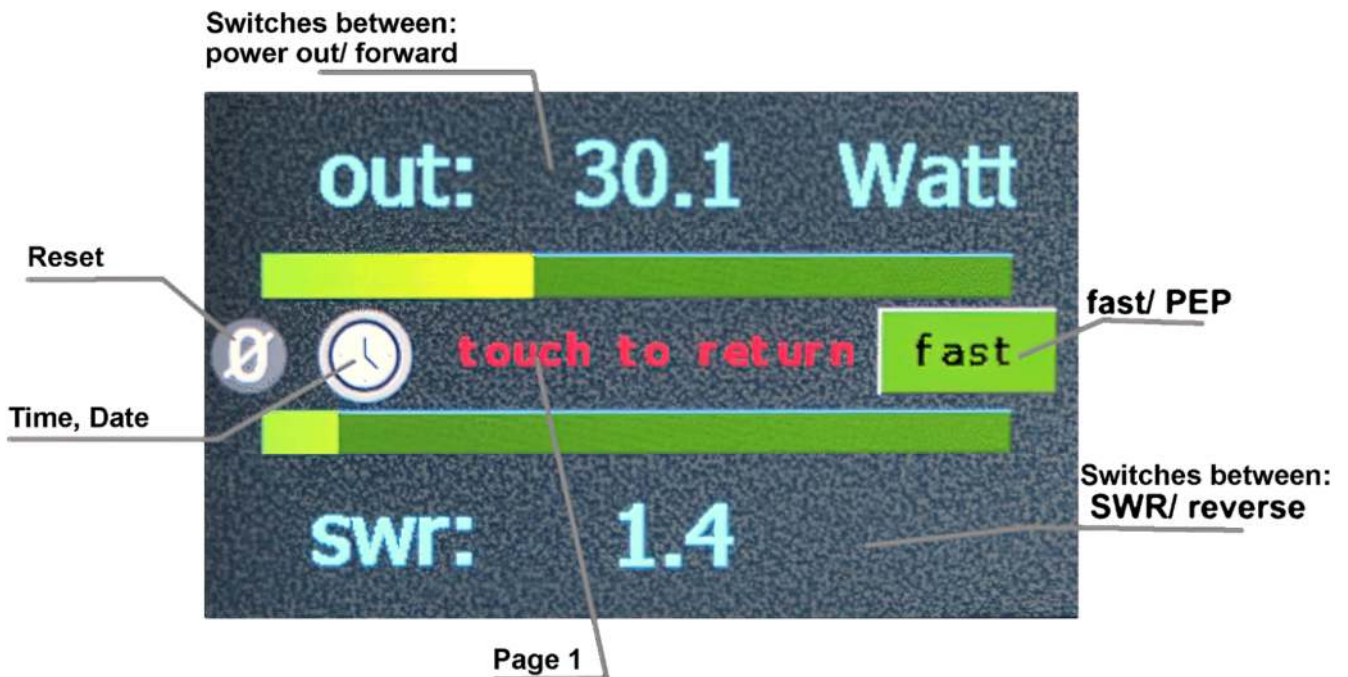
The display is the "Resistive" kind: This means that it reacts to a point pressure and not just to contact.

It is best to use a **plastic** pen (ballpoint pen without metal tip) or **your fingernail**. The fingertip is sometimes a little too big.

**Buttons on Page 1:**



**Buttons on Page 2:**



### Technical Details:

The microprocessor corrects the Non-Linearity of the Rectifier Diodes in the SWR sensor. This ensures a high level of accuracy is achieved (typically 3%) over the range from 1 to 1000 watts.

The resolution for low power is 10mW. This is reduced at higher outputs due to the number of digits available on the display.

A "fast" display and a slower *Peak Value* display (PEP) are provided. The latter shows the maximum value that occurs within an observation period of 1 second.

A sample rate of 20 kHz is used (20,000 measurements per second). This ensures that even short peaks are recorded and makes it suitable for Peak Performance readings on SSB and CW modes.

### Date and time:

The date and time feature is only included if requested. It requires a different display, which unfortunately is a bit more expensive. Since it is displayed on a separate page, it makes the Meter suitable as a station clock when not used for SWR.



The clock continues to run when the Meter is switched off thanks to its back-up battery. The date and time can be manually set on another page. The accuracy is 1-2 seconds per week.

The clock is set on a separate page that can be accessed by tapping on "adj. clock". There, all numbers can be changed with the "+" and "-" buttons.

A good technique is to set the time approx. 10 to 20 seconds ahead of the actual time, then while watching a reference clock, press the "set clock" button when this time is reached. This allows you to set the device to the exact time.

The clock has an automatic feature: The button on the bottom right of the page allows switching between "fix" and "auto" modes. In "fix" mode, the time display always remains on. In "auto" mode, the device switches automatically to the last selected screen as soon as RF power is applied.

### Cleaning:

Do **not use Tempo tissues** or other paper towels to clean the screen surface; they cause scratches. It is best to use alcohol and a **microfiber cloth**. Microfiber cloths are available free of charge from opticians as a cleaning cloth for glasses.

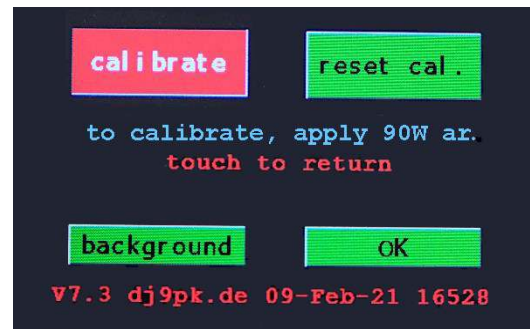
### Technical Details:

Power supply	6 - 15 V DC
Power consumption	120 mA
Displayed values	Forward RF power Reflected RF power SWR (Standing Wave Ratio) Radiated Power (forward power minus reflected power)
Measuring range (power)	1 - 1000 Watts
Resolution	3 Digits (10 mW with low power)
Accuracy	+/- 3% (1 - 1000 Watts at 1.8 - 30 MHz)
Insertion loss (30 MHz)	0.02 dB
Insertion SWR	1.01
Dimensions	113 x 76 x 49 mm (4.4 x 3 x 1.9 in.)
Display size	3.2" Diagonal (400 x 240 pixels)

### Calibrating and changing the background:

The Meter is calibrated with high-precision measuring devices before shipping and recalibration is not necessary. However, users can calibrate it to their own standards if desired, as described below:

An exact 50 Ohm “dummy load” must be connected and precisely 90 watts of power applied to the unit.



Screen with black background

You can get to the calibration page by clicking on the gear wheel, top center, on page 1.

The calibration page is shown in the picture above.

There you click on the “calibrate” button and follow the instructions in the scrolling text.

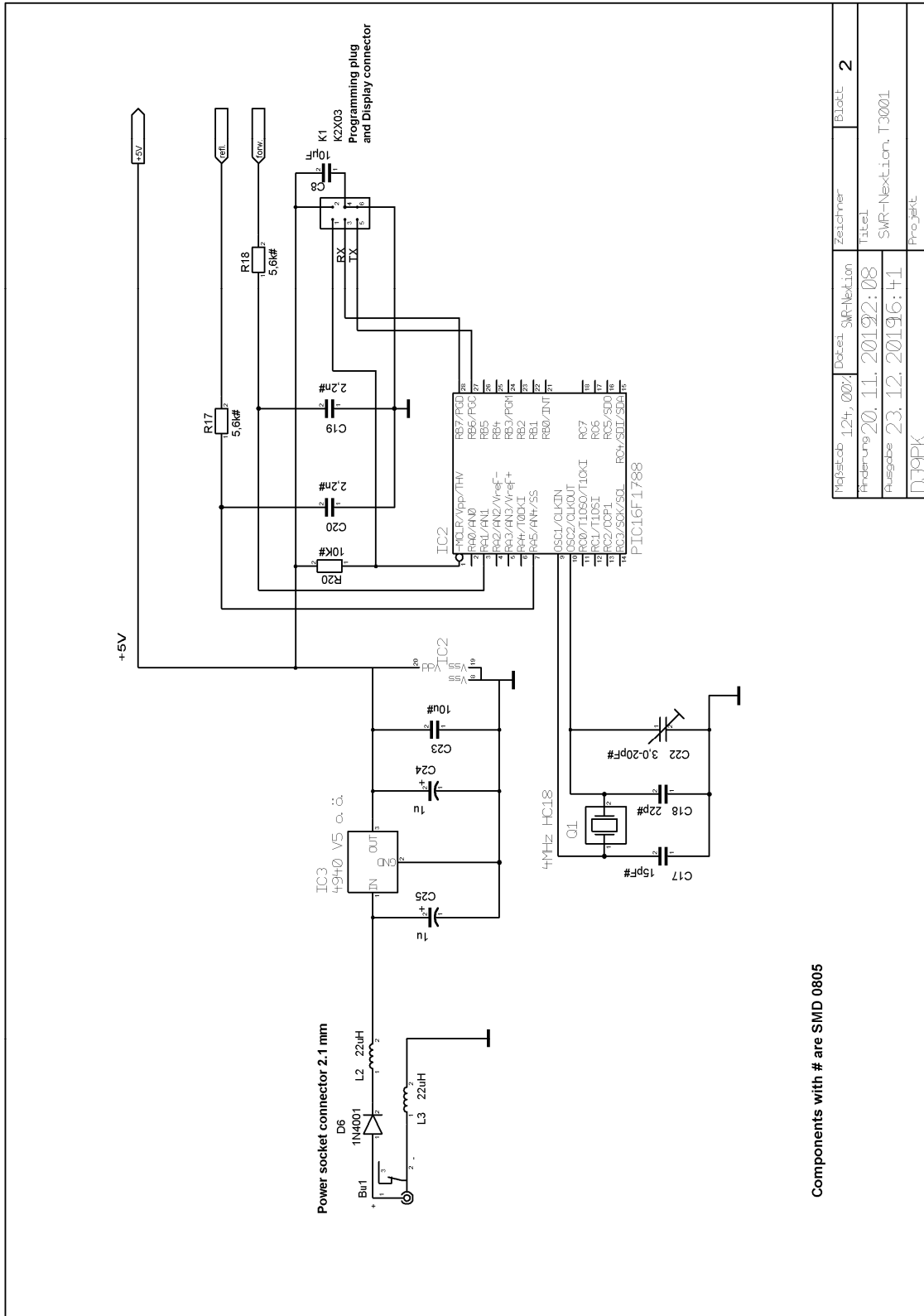
It is also possible to do a *Factory Reset* to restore the settings to what they were upon delivery.

Access the calibration page as described above and then click the “reset cal.” button.

The “background” button is new. It allows switching the background from the previous speckled gray to black.

The black background provides a higher contrast. The background setting then applies to all pages.

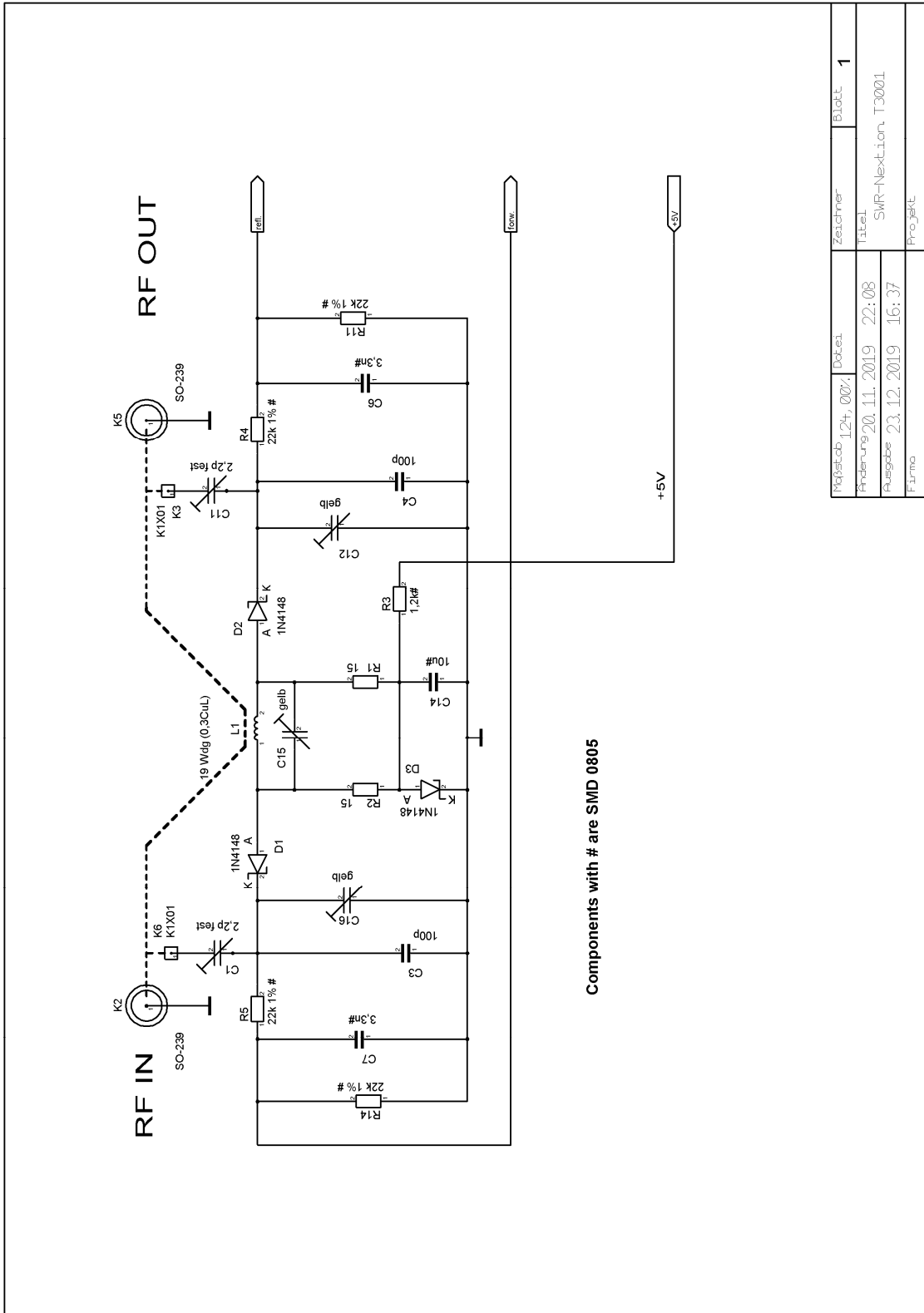
# Circuit Diagram (Display):



Components with # are SMD 0805

Maßstab 1:24, 00%	Dokument SWR-Nex-Lion	Zeichner	Blatt 2
Änderung 20.11.2019 2:08		Titel	
Ausgabe 23.12.2019 6:41		SWR-Nex-Lion, T3001	
DJ9PK		Projekt	

# Circuit Diagram (SWR Sensor):



Meßstab 1:24, 00%	Datent.	Zeichner	Blatt	1
Änderung 20.11.2019	22:08	Titel		
Ausgabe 23.12.2019	16:37	SWR-Nextion T3001		
Firma		Projekt		

## Layout and Placement Diagram

