Instruction sheet 522 63

Power Function Generator (522 63)

1 Description

The power function generator supplies a choice of sinusoidal, triangular and square-wave voltage signals in the frequency range from 0.1 Hz to 100 kHz. The frequency is continuously adjustable over six decadic ranges. The amplitude can be varied continuously up to 30 Vpp; additionally, it is possible to superpose a DC voltage between -10 V and +10 V. The set frequency can be modulated (swept) within a frequency decade by supplying an external signal.

The output of the power function generator has a load capacity of up to 3 A. It is thus possible to connect loudspeakers, coils, lamps and other (low-ohm) loads without an additional amplifier.

In addition, the power function generator can be used as a frequency counter or power amplifier for external voltage signals.

Safety notes

The power function generator fulfills the safety requirements for electrical equipment for measurement, control and laboratory use according to DIN EN 61010 part 1 and is constructed so as to fulfill the requirements of protection class I. It is intended for operation in dry rooms which are suitable for electrical operating equipment or installations. Operational safety is ensured when the device is used as intended. However, safety cannot be guaranteed if the device is used improperly or handled carelessly. Whenever there are grounds for assuming that safe operation may no longer be possible (e.g. when the device is visibly damaged), shut off the device immediately and make sure that it cannot be activated inadvertently.

- Before putting the device into operation, always inspect the housing, the control and display elements and the power lead for visible damage.
- The device may only be repaired or maintained by an authorized technician.
- Always be sure to unplug the power lead from the mains socket before opening the housing and changing the fuse.

The heat sink on the rear of the device can become very hot, particularly when drawing high currents over longer periods.
- Set up the device so that the natural circulation in the vicinity of the heat sink is not obstructed.
2 Technical data

Functions:
Signal forms: sinusoidal, triangle, square-wave
Device functions: generator (free-running and external sweep frequency) with internal frequency counter, amplifier (non-inverting), bipolar voltage source, external frequency counter

Frequency properties:
Frequency range: 0.1 Hz to 100 kHz (switchable in 6 decadic ranges)
Frequency offset: ± 2 %
Frequency deviation ± 3 digits
Stability: 1 × 10⁻³ /K to 10 kHz
3 × 10⁻³ /K to 100 kHz
5 × 10⁻³ in 8 h (after 30 min. warm-up time)

Function output:
Output amplitude: 100 mVpp to 30 Vpp
DC offset: 0 V to ± 10 V and switchable
Output impedance: approx. 0 Ω
Frequency response: 0.5 dB; 1 dB above 10 kHz (sinusoidal, triangular)

Function specifications:
Sinusoidal: Distortion < 1 % up to 100 kHz
Triangular: Symmetry error < 1 % up to 100 kHz, linearity error < 1 % up to 100 kHz
Square-wave: Transition time 1 ms, excursion 5 % (for max. output voltage with 5 Ω load)

Amplifier:
Gain: 6 x (15.5 dB)
DC up to 100 kHz
Input voltage: 0 V to approx. ± 5 V
Distortion: < 1 % up to 100 kHz

Frequency counter:
Frequency range: 0.1 Hz to 1000 kHz below 0.1 Hz the underflow indicator Fq,UFL lights up above 1000 kHz the overflow indicator Fq,OFL appears.
Resolution: 4-digit with automatic range switching
Accuracy: 1 × 10⁻⁴ ± 2 digits
External signals (UEXTERN): AC-coupled sensitivity approx. 100 mVms 10 Hz up to 1000 kHz

Signal inputs:
Input UWOBBLE: approx. 4.5 V for frequency variation > 1 frequency decade
Input UEXTERN: max. input voltage ±30 V
input impedance approx. 10 kΩ

Protection functions:
Electrical protection: The output is short-circuit proof and no-load protected and protected against external voltages of up to ± 120 V, output protected with fuse link, 4 A fast-acting, fuse type: F 4 A acc. to DIN 41661, IEC 127-2-II and VDE
Thermal protection: The output amplifier is provided with thermal overload protection; when the thermal overload protection is actuated, the output is switched off and the message TEMP appears in the display.

Fuses:
Primary fuse (rear panel of housing): see fuse rating
Secondary fuse (front panel): F 4

General data:
Mains voltage: see rating plate
Power consumption: max. 120 VA
Working temperature: 0 °C to 40 °C
Dimensions: 300 mm × 145 mm × 280 mm
Weight: approx. 5.3 kg
Housing material: plastic
3 Control elements

Mains switch and mains connection:
Plug the device into the wall socket and press the mains switch: the power function generator is ready for operation.

Frequency knob:
The FREQUENCY knob is used to set the frequency in the frequency range selected using the RANGE Hz knob. The adjustment range is a little bit greater than one decade.

Frequency counter:
Depending on how the FUNCTION switch is set, the frequency counter counts either the internal generator frequency (for sine, triangular or square-wave settings) or the frequency of an external signal supplied to input UEXTERN (position EXT.FREQ.).
In the positions UEXT and DC of the FUNCTION switch, the frequency counter is deactivated and the display shows the message FC.oFF.

Rotary potentiometer “FREQ. OFFSET”
The rotary potentiometer FREQ. OFFSET is used for fine adjustment of the frequency with a variation of approx. ±2% within the decade set using the RANGE Hz switch.

Selector switch “RANGE HZ”
The rotary switch RANGE Hz sets the desired frequency decade to one of six ranges.

“FUNCTION” switch
Use the FUNCTION switch to select the curve form (sine, triangle or square-wave), amplifier mode (UEXT), bipolar voltage source (DC) or external frequency counter (EXT.FREQ.).
In the positions UEXT and DC the frequency counter is deactivated and the message FC.oFF appears in the display.

Rotary potentiometer “DC OFFSET”, with pull switch
When you actuate the integrated pull switch, a DC voltage is superposed on the output signal. Use the DC OFFSET knob to set the DC voltage between 0 V and ±10 V.

Rotary potentiometer “AMPLITUDE”:
The rotary potentiometer AMPLITUDE sets the amplitude of the output signal. The amplitude can be set to a maximum of approx. 30 Vpp with a variation range of approx. 50 dB.

Input UWOBBLE:
By supplying an external voltage to input UWOBBLE it is possible to modulate the frequency within the current frequency range. The change in frequency with reference to the frequency set using the FREQUENCY knob is proportional to the external voltage as long as the limits of the frequency decade are not exceeded.
A sweep signal of approx. ±0.5 V causes a frequency change of ±1 unit.

Input UEXTERN
Input UEXTERN is used as an amplifier input when the FUNCTION switch is set to position UEXTERN (display FC.oFF), and as a counter input when the FUNCTION switch is set to the position EXT. FREQ.

Output:
The output is short-circuit proof and no-load protected with an extremely low input resistance (approx. 0 Ω). The output signal can be tapped via two 4 mm sockets or one BNC socket.

External-voltage protection:
The output is internally connected to a special electronic module to protect the output amplifier from externally supplied voltages. After applying an external voltage, you may need to change the fuse on the front panel.
Fuse type: see section “Technical data”.
4 Applications

4.1 Operation as a function generator:
- Select the desired signal form (sine, triangle or square-wave) using the FUNCTION switch.
- Set the desired frequency range with RANGE Hz.
- Set the FREQ.OFFSET control to 0 and set the desired frequency using the FREQUENCY knob.
- Read off the frequency from the frequency counter and carry out fine adjustment using the FREQ.OFFSET knob.
- Set the amplitude of the output signal with the rotary potentiometer AMPLITUDE.
- Tap the output signal using the 4-mm sockets or the BNC socket of the output.

a) Without DC voltage component:
- Reset the pull switch of the DC OFFSET control as necessary.

b) With DC voltage component:
- Actuate the pull switch of the DC OFFSET knob and superpose the desired DC voltage on the output signal using DC OFFSET.

c) Sweep mode:
- Apply an external, time-dependent sweep signal of any form to input UWOBBLE.

4.2 Special functions

a) Operation as frequency counter:
- Set the FUNCTION switch to EXT. FREQ.
- Supply the external signal at input UEXTERN.
- Read off the frequency from the frequency counter.

b) Operation as power amplifier:
- Set the function switch to UEXTERN.
- Supply the external input signal at input UEXTERN.
- Tap the amplified output signal using the 4-mm sockets or the BNC socket of the output.

c) Operation as bipolar voltage source:
- Set the FUNCTION switch to DC.
- Actuate the pull switch of DC OFFSET and select the desired DC voltage with the DC OFFSET knob.
- Switch on the power function generator using the mains switch and tap the signal at the output.

5 Changing the fuses

5.1 Primary fuse:

To replace the primary fuse on the rear of the housing:
- Unplug the device from the mains.
- Pry out the fuse holder.
- Replace the blown fuse with a new fuse.
- Re-insert the fuse holder.

5.2 Fuse for external voltage protection:

To replace the fuse for the external voltage protection on the front panel:
- Unplug the device from the mains.
- Turn the fuse holder counterclockwise using a screwdriver and remove it from its seat.
- Replace the blown fuse with a new fuse.
- Insert the fuse holder and turn it clockwise.