



P3160-4A

Funktionsgenerator 30 MHz, mit Verstärker



Usage and characteristic properties:

The Demo Funktionsgenerator P3160-4A is a state-of-the-art two-channel function generator, consisting of a digital signal source and a powerful output amplifier. Digital communication via the standard USB interface and the convenient application software also enables complete control of the device via a virtual panel, which can of course also be displayed on a large screen using a projector. The two optionally coupled or independent channels also allow experiments with amplitude modulation (AM), frequency modulation (FM), phase modulation (PM) and frequency shift keying (FSK) to be carried out directly with one device instead of the two previously required. It is also easy to generate quadrature signals for lock-in amplifiers. The device can also be used purely as a frequency measuring device without generation. This configuration enables the device to fulfil all relevant requirements in demonstration and student experiments.

Technical data:

Power supply:	230 V 50...60 Hz, maximum 90 VA
Display:	4,3 inches illuminated TFT LCD Display 480×272 Pixel
Control elements:	• 19 buttons • 6 Softkeys (Buttons with alternating function) • 1 Rotary Encoder
Signal types:	• Sinus • Rectangle with freely selectable duty cycle • Triangle or sawtooth shaped with freely selectable duty cycle • Noise level • Arbitrary - 24 special curves are pre-programmed for this purpose. experienced users can load curves they have created themselves.

Output 1:

Frequency range:	DC – 100 kHz With reduced modulation and increased distortion, signals with frequencies of up to 300 kHz can also be sensibly output.
Output voltage max:	14 V _{eff} / 40 V _{ss} Der Wert der Ausgangsspannung beträgt etwa das Doppelte wie auf dem Display angezeigt.
Output current max.:	1,5 A _{eff}
Rise time:	around 15 V/μs
Output power max.:	20 W For square-wave signals, the output voltage or load may have to be reduced for frequencies above 30 kHz, the output voltage or load may have to be reduced so that the overcurrent protection is not effective. The output is permanently short-circuit-proof and protected against reverse voltage up to ± 20V. It can drive any inductive loads as well as capacitive loads up to 1 μF. If larger capacitances are to be driven, a resistor with approx. 2 Ω 20 W must be connected in series! Overcurrent protection through PTC thermistor.

Output 2:

Frequency range:	DC – max 30 MHz
Output voltage max.:	7 V _{eff} / 20 V _{ss} (1 MΩ Load) The amplitude of the output voltage without load is approximately as shown on the display. Under load however, the high internal resistance of the output, which can be up to 100 Ω, must be taken into account!

Technical data (continued)

Output voltage max.: 50 mAeff
Overcurrent protection through PTC thermistor

Rise time: 25 ns / 20 V = 800 V/μs (110pF || 1MΩ Last)

Upper frequency limits :

- Sinus 30 MHz
- Rectangle 15 MHz
- Triangle 400 kHz
- Noise 30 MHz
- Arbitrary 10 MHz

Frequency counter: 0,1 Hz ... 100 MHz, TTL compatible input, 7 digits

Connection sockets – front of the device

Two pairs of 4mm safety sockets
Out 1 and Out 2 for extracting
the signals.



Connection sockets – rear of the device:

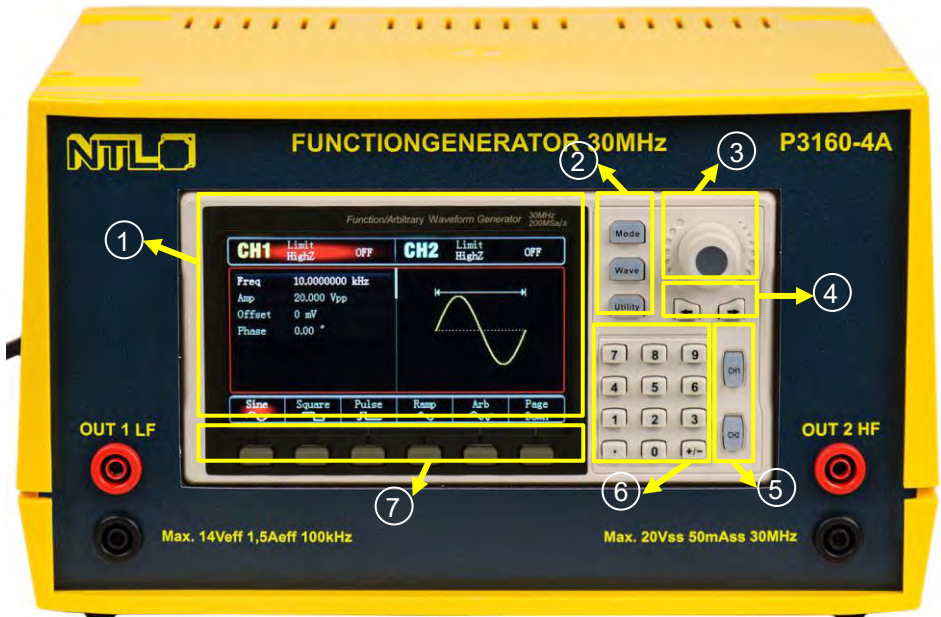
- ① Mains voltage connection for 3-pin IEC C13 socket (protection class I).
Mains switch (rocker) integrated in the IEC connector system.
- ② Fuse compartment integrated in the IEC plug-in system for 1 or 2 500 mA slow-blow HBC fuses (ceramic housing with extinguishing agent).
- ③ Two 4mm safety sockets Sync / CNT / FSK. Optionally for extracting the synchronisation signals, as an input for the frequency counter and as an input for the switching signal in 'Frequency shift keying with external signal source' mode. Caution: This connection is not specially fused and should - also due to its function depending on the settings dependent on the settings - should only be used by experienced experimenters.
- ④ USB type B socket for connecting a PC or laptop with installed software 'Instrument Manager'.



Operating elements and displays:

The device offers users a simple, intuitive and easy-to-use front panel.

In offline mode, it is controlled entirely via the control panel with display on the front panel of the device. In online mode, the control panel with display is shown virtually.



① Display:

The 4.3 inch TFT LCD colour screen displays the output status, function menu and other key information of CH1 and CH2 by different colours.

The user-friendly graphic style of the display improves work efficiency.

② Function keys:

There are function buttons for Mode, Wave and Utility. Users can use these buttons to these buttons to set the modulation, basic wave and auxiliary functions.

③ **Multifunction knob:**

Adjust the multifunction knob to change the digits (clockwise to increase) or use the knob as a direction button, press the multifunction knob to select the functions or set parameters.

④ **Directional buttons:**

Use the direction keys to change the digits, press the backspace key, delete the previous digits or move the cursor.

⑤ **Control buttons for the outputs CH1 / CH2:**

To change the current channel. When the CH1 label is highlighted, the current channel is CH1 (the CH1 waveform parameters are displayed and adjustable), users can press CH1 or CH2 to enable or disable the channel output. The backlight of CH1 / CH2 will be on when the channel is switched on, indicating the output function mode with signal output. Otherwise, the backlight is off, OFF is displayed on the label and the output is off.

⑥ **Numerical keypad:**

Used to enter the required parameters, including numeric keys 0 to 9, decimal point '.' and symbol keys '+/-'. Press the left direction button to go back and delete the previous digits.

⑦ **Menu control buttons (softkeys):**

Select or check the current meaning of the corresponding button. Then set the parameters using the numeric keypad, the multifunction knob and the direction buttons.

First start-up – setting the setup values

Connect the appliance to the mains (230 V / 50...60 Hz) and switch on.
Wait until the operating screen appears.

Press the 'Utility' button.

Press the 'CH1 Setting' softkey.

Check the setup values and correct them if necessary:

- | | | | |
|--------------|-------|--------------|-----------|
| • Output: | Off | • Amp Limit: | Off |
| • Inversion: | Off | • Upper: | 10.000 V |
| • Load: | HighZ | • Lower: | -10.000 V |

Press the 'Utility' button to return to the next higher operating level.

Press the 'CH2 Setting' softkey.

Check the setup values and correct them if necessary:

- | | | | |
|--------------|-------|--------------|-----------|
| • Output: | Off | • Amp Limit: | Off |
| • Inversion: | Off | • Upper: | 10.000 V |
| • Load: | HighZ | • Lower: | -10.000 V |

Press the 'Utility' button to return to the next higher operating level.

Press the 'System' softkey.

Check the setup values and correct them if necessary:

- | Page 1 | Page 2 | | |
|---------------|---------|--------------|-----|
| • SYNC Out: | Off | • BackLight: | 90% |
| • Phase Sync: | Sync | • ScrnSvr: | Off |
| • Language: | English | | |
| • Beep: | Off | | |
| • NumFormat: | None | | |

Press the 'Wave' button to return to the operating level for the application.

This completes the setup. The values are retained even after switching off.

Basic operation:

In most cases, the device is used in the classroom to generate basic periodic AC voltage signals with increased power requirements.

To do so, connect the load to output 1.

Press the button **Wave**, to select the desired waveform.

Sine **Sine** and rectangle function **Square** are directly accessible.

Triangle and sawtooth are via the menu item **Ramp** accessible.

To generate the triangular oscillation, select the 50% setting by pressing the button **Symmetry**

To generate a rising sawtooth oscillation, Symmetry must be set to 100%.

Press the button **Amp**, to get the desired output voltage.

First enter the numerical value using the numeric keys or encoder.

If you have used the numeric keys, you must then select the desired unit using the softkeys.

Please note that the voltage at output 1 is approximately twice the value displayed on the screen.

Please note that although the ratio between the peak-to-peak value and the effective value is in the region of 3, the details depend on the shape of the curve!

If you want to superimpose a DC voltage on the AC voltage, you can select this in the same way after pressing the **Offset** softkey

This completes the definition of the oscillation characteristics. The output voltage is switched on by pressing the **CH1** button.

Further applications and operation on the PC:

The description of the necessary operating steps for more complex applications such as modulation, generation of quadrature signals and operation on a PC can be found in the detailed manual in English. Please note that this requires advanced knowledge of electrical engineering and data processing.

Safety:

This device may only be operated by qualified persons or persons instructed by such persons.

Both outputs on the front of the appliance are protected against overcurrent by self-resetting PTCs. If the output switches off in the event of a fault, unplug the connections, allow to cool for ten seconds and restart with a corrected set-up.

The input/output on the back of the device is not specially fused. Before using this connection, it is strongly recommended that you read the manual carefully regarding the correct use of this connection and follow the instructions in order to avoid undesirable operating conditions or even destruction.

Do not expose the device to dripping or splashing water. Only use a damp cloth or glass cleaner to clean the appliance, never use corrosive substances, abrasive cleaners or organic solvents.

Only use fuses of the specified type and rated current. Under no circumstances may glass tube fuses be used!

There are no components inside the appliance that require maintenance by the user. If unexpected problems occur during installation or operation of the appliance, switch off the appliance and contact your specialist dealer.

If the mains cable shows visible signs of damage, such as external insulation pulled back from the connections, it must be disposed of immediately and a new one in perfect condition used.

Ensure that the device does not fall from elevations. If this does happen, have the appliance properly checked or repaired by authorised specialists.

High HF voltages can be emitted at output 2, which may contravene the relevant regulations. It is the responsibility of the user to take suitable measures (extremely short cables, correct earthing, shielding, selection of minimum signal amplitudes) to minimise the emission of electromagnetic interference signals and to comply with the statutory regulations!