

Minipuls Universal

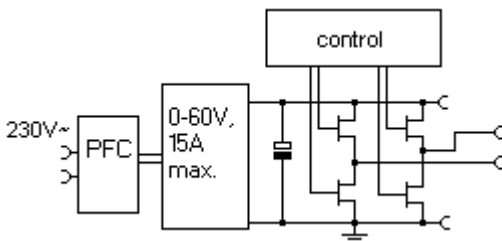
Full bridge square wave generator for driving high frequency transformers

The Minipuls-Universal signal generator is intended for easy driving of switch mode power supply transformers respectively transformer cascades. The primary design was for driving a Minipuls 6 cascade, but it also can be used for driving a Minipuls 4 or any other cascade or arbitrary switch mode power supply transformer which fits to the output signal range.

It delivers at the outputs two square wave signals which can be controlled by their phase, frequency and amplitude.

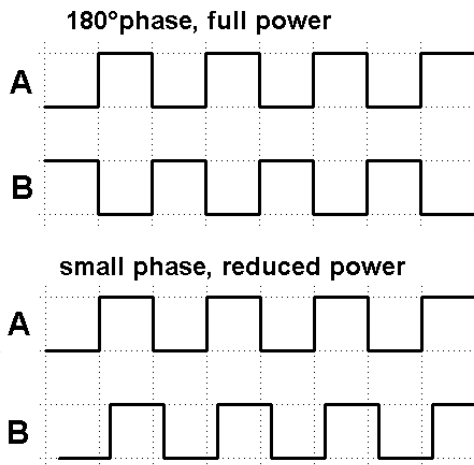
Adjusting phase is the fastest way to control output power. Phase may be directly adjusted (open loop) or by setting a peak current limit or by peak monitor voltage (closed loop).

Technical data



Principal schematics

The generator consists of a low voltage power supply connected to a full bridge. The full bridge delivers two square wave signals with 50% duty cycle but shifted phase.



If the (adjustable) maximum pulse current is exceeded, the pulse will be stopped respectively the phase of the output B will be shifted. The peak current can be set to an arbitrary level. This is very useful in case of driving less powerful transformers with the Minipuls Universal.

In closed loop mode, the evaluated peak

voltage is used for control. In open loop mode, just the phase is set.

Frequency, waveform

- Pulse frequency can be adjusted in the range 0.5-50 kHz
 - Duty cycle is 50% for both outputs.
 - Rise and fall times are around 50...100ns.
- Phase between the two outputs is adjustable in the range 0-180°, or controlled by the set peak current or the set peak monitor voltage.

Current and voltage

- Primary voltage 0-60V, adjustable. The negative output of the primary power supply is connected to ground.
- 700W maximum output power.
- Maximum average output current of the primary power supply: 15A.
- Maximum RMS output current: 42A
- Maximum peak output current 0-60A, adjustable.
- Voltage monitor input: +/-12V max, 1 MOhm input impedance, >1 MHz bandwidth.
- Set value peak voltage: 0-10V adjustable.

Control, connections and displays

front side

- Grid supply switch
- Pushbuttons for power on and off
- Ten-turn potentiometer for frequency
- Ten-turn potentiometer for primary voltage
- Ten-turn potentiometer for peak current
- Ten-turn potentiometer for phase or peak voltage (closed loop)
- Switch open loop / closed loop control
- Monitor output for differential primary

voltage, 1:10

- Monitor output primary current, 0.1V/A
- Voltage monitor output (buffered voltage monitor input)
- Monitor output for secondary current (just 1:1 feedthrough from rear side input / shunt at transformer)
- Display for primary power supply voltage and current
- LED for current regulated to limit and overtemperature
- Interlock (integrated into D25 remote control plug)

rear side

- BNC plug voltage monitor input, normally connected to voltage divider at transformer
- BNC plug current monitor input (from shunt at transformer, just feed through to front side)
- 2*4mm-screw plugs for signal output, to connect transformer
- Screw plug ground
- Screw plug DC voltage output (20A fuse)
- Plug for connecting the external 10 k Ω NTC-thermistor, typically for surveillance of transformer temperature.
- Grid supply plug

Mechanically and environment

- 19"-insert, 460mm deep, 177 mm high (4HE), width 482mm
- Weight around 12kg
- Environmental temperature 0-35 °C
- Humidity 0-80%, the device is intended for operation in dry laboratory rooms.
- Protection class I, IP 20
- Grid supply 230V~, 4A max.

Safety

The output voltage of this signal generator is limited to low voltage (<60V), therefore the outputs are accessible and can be handled without special precautions. However, power is still significant, and any connected transformer may carry dangerous voltages!

Option remote control

Analog interface (SUB-D25-plug) with 0...10V signals. Control possibilities for voltage, phase,

and frequency, monitor signals for phase, primary power supply voltage and current.

Pin	Remote control interface function
1	Power off / interlock
2	Power off / interlock
3	Power on
4	Power on
8	Monitor output primary voltage 1:6
9	Monitor output primary current 0.5V/A
12	Flag overtemperature
13	GND
14	+10.0V reference voltage
15	GND
16	Current limit set voltage (0-10V for a peak current of 0-60 A)
17	Frequency control voltage (0-10V for a frequency from 0.5 to 50 kHz)
18	Remote (for remote control, short this pin to ground)
19	Phase or output voltage set (0-2V corresponds to device off, 2-10V corresponds to Phase 0-180° for open loop control, or it corresponds to monitor output peak voltage 0-10 V)
20	Monitor signal phase (output error amplifier in case of peak voltage regulation)
21	Set voltage primary power supply (0-10V corresponds to 0-60V output voltage]
22	Switch open loop control / closed loop control
25	GND

Option DC output

The positive output of the primary power supply is accessible by a plug on the rear side and allows to use the Minipuls Universal as DC power supply. However, there is no fast-current limiting circuit in this output, just an internal 20A fuse.

Option OEM

The full bridge circuit board inside the Minipuls Universal is also sold separately. In this case the primary power supply is not included, but remote control, frequency generation and phase control.

16.01.18 Jörg Brutscher (GBS-Elektronik GmbH)