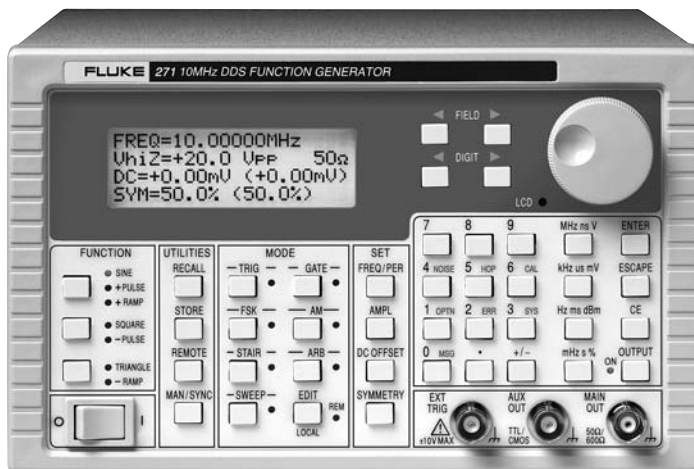


271 DDS Function Generator

High performance function generator

Technical Data

The 271 is a high performance function generator using direct digital synthesis techniques. A wide variety of standard waveforms is provided, and an arbitrary waveform capability allows it to be used to generate non-standard and user-defined waveforms. Extensive modulation capabilities make this a highly versatile signal source.



Key features:

- High stability 10 MHz DDS function generator
- Arbitrary capability with storage for five user defined waveforms
- Multiple standard and complex waveforms recalled from internal memory
- Extensive modulation capabilities include sweep, AM, Gating, Trigger/Burst, FSK and Hop
- GPIB and RS-232 interfaces

Waveforms

Standard waveforms are sine, square, positive pulse, negative pulse, triangle, ramp up, ramp down. Additionally arbitrary waveforms, multi-level squarewaves, waveform hopping and pseudo-random noise can be generated.

Direct digital synthesis for accuracy and stability

Direct digital synthesis (DDS) is a technique for generating waveforms digitally, using a phase accumulator, a look-up table and a DAC. The accuracy and stability of the resulting waveforms is related to that of the crystal master clock.

The DDS generator offers not only exceptional accuracy and stability but also high spectral purity, low phase noise and excellent frequency agility.

A wide range of waveforms

The Fluke 271 generates high quality sine, square and pulse waveforms over the full frequency range of 0.1 mHz to 10 MHz. Triangle waveforms, ramp waveforms and multi-level square waves can also be generated, subject to some limitations in the maximum useable frequencies. Variable symmetry/duty-cycle is available for all waveforms.

Arbitrary waveform capability

Arbitrary waveforms can be loaded via the digital interfaces and then used in a similar way to the standard waveforms.

Up to five arbitrary waveforms of 1024 10-bit words can be stored in non-volatile memory. The waveform clock is 27.48 MHz maximum. This facility considerably expands the versatility of the 271, making it suitable for the generation of highly complex waveform patterns.

In addition, the 271 offers numerous "complex" waveforms pre-defined in ROM. These include commonly used wave shapes such as sine x/x, decaying sinewave, and exponential rise and fall.

Locked generators

The signals from the Clock In/Out socket and the Sync Out socket can be used to phase lock two or more generators. This feature can be used to generate multi-phase waveforms or locked waveforms of different frequencies.

Powerful modulation modes

Sweep. All waveforms can be swept over their full frequency range at a rate variable between 10 milliseconds and 15 minutes. The sweep is fully phase continuous. Sweep can be linear or logarithmic, single or continuous. Single sweeps can be triggered from the front panel, the trigger input, or the digital interfaces.

Two sweep markers are provided, which are adjustable while sweep is running. The markers can provide a visual indication of frequency points on an oscilloscope or chart recorder.

AM. Amplitude modulation is available for all waveforms and is variable in 1 % steps, up to 100 %.

FSK. Frequency shift keying provides phase coherent switching between two selected frequencies

at a rate defined by the switching signal source. The rate can be set from dc to 50 kHz internally, or dc to 1 MHz externally.

Trigger/burst. All waveforms are available as a triggered burst, whereby each positive edge of the trigger signal will produce one burst of the carrier, starting and stopping at the phase angle specified by the start-stop phase setting. The number of cycles in the burst can be set between 0.5 and 1023.

Gated. The gated mode turns the output signal on when the gating signal is high and off when it is low. Both triggered and gated modes can be operated from the internal trigger generator (0.005 Hz to 50 kHz) or from an external source (dc to 1 MHz).

Waveform hop. The generator can be set up to "hop" between a number of different waveform setups, either at a pre-determined rate or in response to a manual or bus trigger. Up to 16 different hop waveforms can be defined in terms of frequency, amplitude, function, offset and duration, which is variable in 1 ms steps up to 60 seconds.

Noise generation. The Fluke 271 can be set to simulate wide band random noise with adjustable amplitude and offset.

271 Specifications

Waveforms

| Frequency | |
|---|---|
| All waveforms are available up to 10 MHz. However, the purity of triangle, ramp, and multi-level square wave waveforms is not specified above the frequencies indicated in the following section. | |
| Range | 0.1 mHz to 10 MHz |
| Resolution | 7 digits or 0.1 mHz |
| Accuracy | Typically < ± 10 ppm for 1 year, 18 °C to 28 °C |
| Tempco. | Typically < 1 ppm/°C outside 18 °C to 28 °C |
| Sinewave | |
| Distortion | < -60 dBc to 20 kHz, < -50 dBc to 300 kHz, < -35 dBc to 10 MHz |
| Spuri | Non -harmonically related spuri typically < - 60 dBc to 10 MHz |
| Squarewave | |
| Rise and fall times | < 22 ns |
| Triangle | |
| Linearity error | < 0.5 % to 30 kHz |
| Positive and Negative Ramp | |
| Linearity error | < 0.5 % to 30 kHz |
| Positive and Negative Pulse | |
| Rise and fall times | < 22 ns |
| Multi-Level Squarewave | |
| Up to 16 steps available per cycle, each step selectable for amplitude (10 bit resolution) and duration (1 to 1024 samples). Above 27 kHz a 36 ns edge uncertainty is introduced. | |
| Rise and fall times | < 22 ns |
| Arbitrary (and complex) | |
| A number of "complex" waveforms are pre-programmed in ROM . A further five, user defined, waveforms may be loaded via the digital interfaces and stored in non-volatile RAM. | |
| Frequency range | All waveform points can be continuously output up to 27 kHz, beyond which they are sampled. |
| No. of samples | 1024 10 bit samples |
| Noise | Wideband noise with variable amplitude and offset. |
| Symmetry | |
| Range | Sine – 1 % to 99 % at all frequencies; Other waveforms – 1 % to 99 % to 30 kHz, 20 % to 80 % to 10 MHz |
| Resolution | 0.1 % |

271 Specifications cont.

Main output

| | |
|-------------------|--|
| Output impedance | 50 Ω or 600 Ω switchable |
| Amplitude | 5 mV to 20 V pk-pk open circuit (2.5 mV to 10 V into 50 Ω/600 Ω). Output can be specified as EMF (open circuit value) or PD (Voltage into the characteristic impedance) in pk-pk, RMS or dBm. Note that in positive or negative pulse modes the amplitude range is 2.5 mV to 10 V p-p O/C. |
| Accuracy | Typically ±3 % ±1 mV at 1 kHz into 50 Ω/600 Ω |
| Flatness | ±0.2 dB to 500 kHz; ±1 dB to 10 MHz |
| Pulse aberrations | < 5 % + 2 mV |
| DC offset | ± 10 V from 50 Ω/600 Ω offset plus signal peak limited to ± 10 V from 50 Ω/600 Ω |
| Resolution | 3 digits or 1 mV for both amplitude and offset |

Modulation

| | |
|---|--|
| Amplitude Modulation | |
| Carrier frequency | 0.1 mHz to 10 MHz |
| Carrier waveforms | All |
| Depth | 0 to 100 %, resolution 1 % |
| Internal source | 1 kHz fixed sinewave or 0.005 Hz to 50 kHz square wave |
| External | See "VCA In" section |
| Frequency Shift Keying (FSK) | |
| Phase coherent switching between two frequencies at a rate defined by the switching signal source | |
| Carrier frequency | 0.1 mHz to 10 MHz |
| Carrier waveforms | All |
| Switch repetition rate | dc to 50 kHz internal, dc to 1 MHz external |
| Switching signal source | Internal from keyboard or trigger generator. External from EXT TRIG input or remote interface. |

Operating modes

| | |
|---|---|
| Trigger/Burst | |
| Phase coherent signal keying – each positive edge of the trigger signal will produce one burst of the carrier, starting and stopping at the phase angle specified by the start/stop phase setting | |
| Carrier frequency | 0.1 mHz to 10 MHz |
| Carrier waveforms | All |
| Number of cycles | 1 to 1023 (resolution 1 cycle) or 0.5 to 511.5 (resolution 1/2 cycle) |
| Trigger rep. rate | dc to 50 kHz internal, dc to 1 MHz external |
| Source | Internal from keyboard or trigger generator. External from EXT TRIG input or remote interface |
| Gated | |
| Non phase-coherent signal keying – output is On while Gate signal is high and Off while low. | |
| Carrier frequency | From 0.1 mHz to 10 MHz |
| Carrier waveforms | All |
| Trigger rep. rate | dc to 50 kHz internal dc to 1 MHz external |
| Gate source | Internal from keyboard or trigger generator. External from EXT TRIG input or remote interface |
| Sweep | |
| Carrier waveforms | All |
| Sweep mode | Linear or logarithmic, single or continuous |
| Sweep width | 0.1 mHz to 10 MHz. Phase continuous. Independent setting of the start and stop frequency. |
| Sweep time | 10 ms to 999 s (3 digit resolution) |
| Markers | Two markers variable during sweep. Available at the TRIG/SWEEP OUT socket |
| Sweep trigger source | The sweep may be free run or triggered from: keyboard, EXT TRIG input, remote interface |
| Hop | |
| Up to 16 different "hop" waveforms can be defined in terms of function, frequency, amplitude, offset and duration. Duration setable per step 1 ms to 60 s. | |
| Start/Stop Phase | |
| Carrier frequency: | 0.1 mHz to at least 1 MHz |
| Carrier waveforms | All |
| Range | -360 to +360 degrees |
| Resolution | 1 degree |
| Accuracy | Typically 1 degree to 30 kHz |
| Trigger Generator | |
| Internal source 0.005 Hz to 50 kHz squarewave adjustable in 20 us steps. 3 digit resolution. Available for external use from TRIG/SWEEP OUT socket. | |

271 Specifications cont.

Auxiliary outputs

| | |
|-----------------------|--|
| Aux Out | CMOS/TTL levels with symmetry and frequency of main output and phase of start-stop phase setting |
| Trig/Sweep Out | Multi-function output depending upon mode. Except in sweep mode, the output is that of the trigger generator at CMOS/TTL levels from 1 k Ω . In Sweep mode the output is a 3-level waveform, changing from high (+4 V) to low (0 V) at the start of sweep, with narrow 1 V pulses at each marker point. |

Inputs

| | |
|------------------|---|
| Ext Trig | |
| Frequency range | DC to 1 MHz |
| Signal range | TTL (1.5 V) threshold; maximum input \pm 10 V |
| Min. pulse width | 50 ns |
| VCA In | |
| Frequency range | DC - 100 kHz |
| Signal range | 2.5 V for 100 % level change at maximum output |
| Input impedance | Typically 6 k Ω |

Phase locking

| | |
|--------------|--|
| Clock in/out | TTL/CMOS threshold levels; output impedance typically 50 Ω as an output |
| Sync out | TTL/CMOS logic levels from typically 50 Ω . The signals from these sockets are used to phase lock two or more generators. |

Interfaces

| | |
|----------|---|
| RS-232 | Variable Baud rate, 9600 Baud maximum. 9-pin D-connector. |
| IEEE-488 | Conforming with IEEE488.1 and IEEE488.2 |

General

| | |
|-----------------|---|
| Display | 20 character x 4 row alphanumeric LCD |
| Data entry | Keyboard selection of mode, waveform etc.; value entry direct by numeric keys or by rotary control. |
| Stored settings | Up to 9 complete instrument set-ups may be stored and recalled from battery-backed memory. |
| Size | 3U (130 mm) height; half-rack (212 mm) width, 330 mm long |
| Weight | 4.1 kg (9 lb) |
| Power | 100 V ac, 110 to 120 V ac or 220 to 240 V ac \pm 10 %, 50/60 Hz ac by internal adjustment; 30 VA max. |
| Operating range | +5 $^{\circ}$ C to 40 $^{\circ}$ C, 20 to 80 % RH |
| Storage range | -20 $^{\circ}$ C to +60 $^{\circ}$ C |
| Options | IEEE-488 interface; 19-in rack mounting kit |

Ordering Information

Models

271 10 MHz DDS Function Generator with Serial Cable

Options and Accessories

Y200H Rackmount Kit – half rack

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