Function Generators

PM 5136: 5 MHz
- **High performance at a budget price**

PM 5138A: 10 MHz
- **Output voltage of 40 Vpp**

PM 5139: 20 MHz
- **24 Arbitrary waveform-memories**

Fluke PM5136, PM5138A, PM5139 Synthesized Function Generators with arbitrary waveform

PM 5136
- High performance at a budget price
- Frequency range from 0.1mHz to 5MHz (20Vpp)
- High accurate signals, low distortion
- In practice proved mechanical and electronic design
- Large backlit display and easy menu controlled operation
- Continuously variable symmetry
- 7 Standard waveforms: sine, triangle, square, pos/neg pulse, pos/neg/ sawtooth
- Internal and external modulation modes: AM, FM, Lin. Sweep, Log. Sweep and Burst
- 9 Setting memories
- GPIB/IEEE 488.2 interface (optional)

PM5138A *as PM5136, incl.:*
- Output voltage of 40 Vpp for all waveforms, including arbitrary
- Frequency from 0.1 mHz to 10 MHz
- 24 Arbitrary waveform-memories
- Arbitrary functionality supported via AnyWave™ software package
- AnyWave™ software included
- 9 additional setting memories to store frequently used settings
- Arbitrary-waveforms, Gate and PSK modulation
- Selectable output impedance, 50Ω or 600Ω
- GPIB or RS 232 interface (optional)

PM5139 *as PM5138A, incl:*
- Frequency from 0.1 mHz to 20 MHz. *(20Vpp)*
- 10 Standard waveforms including sine and trainle pulses, haversine
- Programmable modulation frequencies
- Low output impedance Z_O.

Wide range of applications
These top-value generators, built on years of experience, combine high precision with easy operation, making it the ideal choice for a wide range of applications like automotive, mechanical, calibration, telecom, audio, component-testing, medical, education and training. Applications that require higher frequencies are perfectly suited for the PM5139, while the PM5138A is extremely usefull when higher output voltages are required. This higher output, 40 Vpp, available for the complete bandwidth up to 20 MHz and also for the 24 arbitrary waveforms, makes this instrument ideal for tranducer simulation up to 14 Vrms for the automotive industry.

Simple, menu-controlled operation
To change a setting, all that's needed is to make a selection from the 5-line menu and operate the corresponding buttons. Specific functions can be accessed directly via control buttons which are conveniently located in a separate field. For example: store or recall of instrument-settings. Numeric values are set precisely by a large rotary control (which can be disabled to secure the setting). At all times, you get a clear indication of the instrument setting by the large backlit LCD display.

Accurate setting of modulation parameters
Modulation parameters such as modulation depth, deviation, number of cycles and start/stop

phase can be set with high accuracy. The modulation/trigger source is programmable with a wide frequency range of 1 mHz to 100 kHz, and an accuracy of 0.1%. The sweep parameters f_{start}, f_{stop}, time, lin/log and sweep mode are independently programmable.

Versatile modulation mode selection
Modulation modes such as AM, FM and sweep are selected from the modulation mode menu. All waveforms can be modulated, even the user-defined arbitrary waveforms. The burst mode can be triggered via the internal modulation/trigger source or via the external modulation input. Bursts may also be manually triggered by a front panel key. The single-shot mode in burst can be used with all waveforms, including arbitrary.

Arbitrary waveform function via GPIB/IEEE-488 / RS232 link
Both the PM 5138A and PM 5139 with GPIB/IEEE-488 or RS232 installed, provide the arbitrary waveform capability, a powerful aid to the generation of custom test signals.

Application example:
In mechanical vibration analysis, such as shock testing, a DSO can capture the output of an accelerometer and transfer the vibration waveform either to a PC for modification or directly to the PM 5138A or PM 5139 to reproduce it when needed, without having to repeat the actual experiment. The waveform can then be sent continuously, as a burst for a defined number of cycles, or when triggered by an external source.

Model	PM 5136	PM 5138A	PM 5139
Frequency characteristics			
Nominal Range	0.1 mHz – 5 MHz	0.1 mHz – 10 MHz	0.1 mHz – 20 MHz
Operational Range			
Sine, pos/neg pulse	5 MHz	10 MHz	20 MHz
Square wave	5 MHz	10 MHz	20 MHz
Triangle	500 kHz	500 kHz	500 kHz
Pos./neg. sawtooth	20 MHz	50 kHz	50 kHz
Sine … , triangle pulse			50 kHz
Haversine			50 kHz
Resolution	4_ digits, max. 0.1 mHz		
	10 Hz (f_C>200kHz)[*3]		
Setting error	$\pm 2 \times 10^{-6}$ ($\pm$ 2 ppm)		
Residual FM deviation (measuring bandwidth 10Hz–20kHz)		(f_C≥5MHz) <10ppm, 1ppm typical	(f_C>10MHz) <10ppm, 1ppm typical
	<100Hz, 13Hz typical	(f_C≤5MHz) <100Hz, 13Hz typical	(f_C≤10MHz) <100Hz, 13Hz typical
Phase noise at 1kHz distance from carrier	< –80dBc/Hz		
Temperature coëfficient	<±0.2ppm / K		
Aging	<±1ppm / year		
Drift	<±0.3ppm in 7 hours		
Synchronization by an external reference	f_{REF}=10MHz/N, N=1, 2, 3…10		
Output characteristics			
Main Output			
Connector BNC socket	On front		
Impedance	50Ω	50Ω or 600Ω	50Ω or LOW Z_0
Load capability	Short circuit proof		
Max. external voltage	±15V < 3min	50Ω: ±15V	50Ω: ±15V < 3min
		600Ω: ±24V	LOW Z_0 : ±12V < 3min
AC voltage	independent of DC setting within: ….		
Ranges	± 10V window	± 20V window	± 10V window
I resolution 1 mV	0 – 0.200 Vpp	0 – 0.400 Vpp	0 – 0.200 Vpp
II resolution 10mV	0.20 – 2.00 Vpp	0.40 – 4.00 Vpp	0.20 – 2.00 Vpp
III resolution 100 mV	2.0 – 20.0 Vpp	4.0 – 40.0 Vpp	2.0 – 20.0 Vpp
Accuracy for AC voltages Basic setting error [*2]	> 10mVpp	> 20mVpp	> 10mVpp
	±2.0%, 1Hz < f_C < 200kHz		
Amplitude flatness [*2]			
f_C: 1Hz–200kHz	±0.03dB	±0.03dB	±0.03dB
f_C: 200kHz –5MHz	±0.07dB	±0.07dB	±0.07dB
f_C: 5MHz –10MHz		±0.1dB	±0.1dB
f_C: 10MHz –20MHz			±0.2dB
DC voltage	independent of AC setting within: …		
	± 10V window	± 20V window	± 10V window
Range (open circuit)	±10V resolution 100mV		
Error limits [*2]	±2.0% ±50mV	±2.0% ±100mV	±2.0% ±50mV
TTL Output 0/5V, Z_0=50Ω Fan-out	BNC on rear panel > 4 TTL inputs		

Model	PM 5136	PM 5138A	PM 5139
Waveforms			
Asymmetrie			
$f_C \leq 20kHz$	1% – 99%, resolution 1%	sine, square, triangle, pos./neg. pulses	
f_C : 20kHz – 5MHz	20% – 80%, resolution 1%	square, pos./neg. pulses	
Sinewave			
Frequency range	0.1 mHz – 5 MHz	0.1 mHz – 10 MHz	0.1 mHz – 20 MHz
Output range open circuit	0 – 20 Vpp	0 – 40 Vpp	0 – 20 Vpp
Distortion for output voltages and frequencies	10–70% of voltage range maximum[*2] 1Hz – 500kHz	25–100% of voltage range maximum[*2] 1Hz – 500kHz	10–70% of voltage range maximum[*2] 1Hz – 500kHz
Total harm.distortion	< 0.4%, 0.1% typical	< 0.4%, 0.1% typical	< 0.4%, 0.1% typical
Harmonics fc:1Hz – 500kHz	<–48dBc	<–42dBc	<–48dBc
Harmonics fc:500kHz-5MHz	<–40dBc	<–34dBc	<–40dBc
Harmonics fc:5MHz–10MHz		<–30dBc	<–36dBc
Harmonics fc:10MHz–20MHz			<–34dBc
Subharmonics fc < 5MHz	<–60dBc	<–60dBc	<–60dBc
Subharmonics fc > 5MHz		<–38dBc	<–38dBc
Square, Positive / Negative Pulses			
Frequency range	0.1 mHz – 5 MHz	0.1 mHz – 10 MHz	0.1 mHz – 20 MHz
Output range open circuit	0 – 20Vpp	0 – 40Vpp	0 – 20Vpp
Pos/Neg. pulse open circuit	0 – 10 Vpp	0 – 20 Vpp	0 – 10 Vpp
Rise-/Fall time (at 50 % symmetry)[*2]			
f_C: 0.1 mHz – 500 kHz	≤ 30 ns		
f_C > 500 kHz	≤ 20 ns		
Aberration [*2]	< 2% (AC > 200 mVpp)		
Asymmetry	See Waveforms		
Triangle			
Frequency range	0.1 mHz – 500 kHz		
Output range	0 – 20 Vpp	0 – 40 Vpp	0 – 20 Vpp
Linearity error	< 0.2% (f_C<20 kHz)		
Asymmetry	See Waveforms		
Positive / negative sawtooth			
Frequency range	0.1 mHz – 50 kHz		
Output range	0 – 10 Vpp	0 – 20 Vpp	0 – 10 Vpp
Linearity error	<0.2% (f_C < 20kHz)		
Sine pulse, triangle pulse, haversine			
Frequency range			0.1 mHz – 50 kHz
Output range			0 – 10 Vpp
Arbitrary (Instruments with interface)			
Frequency range		0.1 mHz – 20 kHz	
Sample frequency		max. 20.48 MS/s	
Waveform memories		24 (non volatile)	
Memory length		1024 (10 bits)	
Vertical resolution		1023 (10 bits)	
Programmable		via interface with a PC or direct with a DSO	
Full scale output range		0 – 40Vpp open circuit	0 – 20Vpp open circuit

Model	PM 5136	PM 5138A	PM 5139
Modulation			
Modes	AM, FM, Burst, Sweep	AM, FM, Burst, Sweep, Gate, PSK	
AM			
Carrier frequency	0.1 mHz – 5 MHz	0.1 mHz – 10 MHz	0.1 mHz – 20 MHz
Carrier waveforms	All	All incl. arbitrary[*1], except PSK	
Internal AM			
Modulation frequency	1 kHz ± 0.01%	10 Hz – 100 kHz, max. resolution 1 Hz ± 0.1%	
Modulation waveform		Sine	
Modulation Depth		0–100%, resolution 1%	
Mod. depth: ≤ 90%	<0.5%, <0.15% typical		<0.7%,
≤ 90% and f_C ≤ 15MHz			<0.5%, <0.15% typical
External AM			
Modulation frequency		0 to 200 kHz	
Modulation Depth		0–100%	
Mod. depth: ≤ 90%	<0.5%, <0.15% typical		<0.7%,
≤ 90% and fC ≤ 15MHz			<0.5%, <0.15% typical
[*]with (.. Ω) output impedance of modulation signal source			
FM			
Carrier frequency	0.1 mHz – 5 MHz	0.1 mHz – 10 MHz	0.1 mHz – 20 MHz
Carrier waveforms	All	All incl. arbitrary*1, except PSK	
Internal FM			
Modulation frequency	1 kHz ± 0.01%	10 Hz – 100 kHz, max. resolution 1 Hz ± 0.1%	
Modulation waveform		Sine	
Deviation		0 – 2 % resolution ± 0.01%	
Modulation distortion,		<0.4%, typ. 0.12%	
THD		for 1% deviation	
External FM			
Modulation frequency		10 Hz to 200 kHz	
Deviation		0 – 2 %	
Phase Shift Keying (PSK)		Carrier phase keying between 0° and 180°, non-coherent	
Carrier waveforms		Sine, triangle, square	
Carrier frequency range		Total range	
PSK, internal keying freq.		10Hz – 100kHz, 50% duty cycle	
PSK, external keying freq.		0 – 200kHz, TTL signal	
Burst			
Carrier frequency		0.1 mHz – 2 MHz	
Carrier waveform		All, phase-coherent on/off – switching	
On periods per Burst		1 – 2000	
Start/Stop – Phase	0°	0° –180° ...+180°, resolution 1° for sine, triangle and f_C ≤ 20kHz	
Burst trigger modes			
Internal (Manually)	Single & Continuous with 1kHz ± 0.01% rep. freq	Single & Continuous with 1mHz – 100kHz repetition frequency	
External via Mod. input	with 0 – 200kHz repetition frequency		

Model	PM 5136	PM 5138A	PM 5139
Sweep			
Carrier waveform	All		
Sweep functions	Single Continuous Hold/Release Reset to start frequency		
Sweep characteristics	Linear or logarithmic Up or down		
Sweep modes	Sweep and flyback Sweep and hold Sweep from f_{start} to f_{stop} and back to f_{start}		
Sweep ranges max.	1mHz – 5MHz	1mHz – 5MHz 50kHz – 10MHz	1mHz – 10MHz 50kHz – 20MHz
Sweep time	10ms – 1000s		
Number of frequency steps	Sweep time / 1ms		
Gate	Non-coherent signal keying		
Carrier frequencies		All	
Carrier waveforms		All	
Gate, internal			
Keying frequency		10Hz – 100kHz	
Duty cycle		50%	
Gate, external			
Keying frequency		0 – 200kHz, TTL signal	
Interface bus remote control			
Isolation	in- and outputs galvanically separated with opto-couplers		
Control capability	all functions and characteristics		
GPIB/IEEE-488.2	Address range 0 – 30 and listen only mode		
RS232			
Baud rate / data ../ stop bits		110-19200 / 7 or 8 / 1 / odd, even or no parity	
Handshake		hardware or software (Xon/Xoff)	
Miscellaneous			
Instrument settings	1 + 9		
Rear connectors	modulation input / triggering input / reference input / TTL output / modulation output / penlift output / sweep output / 10 MHz reference output / interface bus connector [1] / power connector		
Dimensions (HxWxD)	105 x 315 x 405 mm		
Weight	6.7 kg	6.1 kg	6.7 kg
Operating conditions			
Temperature	Reference 23°C ± 1°C, Operating + 5 .. +40°C Storage –40 .. +70°C		
Safety	According to CE regulation 73/23: EN 61010-1, CAT II, Pollution Degree 2		
EMC	According to CE regulation 89/336: Emission according to EN 55 011 Group 1 Class B, respectively CISPR 11. Immunity according to EN 50 082-1, inclusive IEC 801-2, -3, -4.		
Power / line frequency	100,120,220,240V / 50 – 60 Hz ± 5%		
Power consumption	42W	66W	58W

[1] Instruments with GPIB/IEEE 488.2 or RS232 interface

[2] Zo=50Ω, Rl=50Ω, Modulation off

[3] Via GPIB interface

Ordering Information

PM 5136/00n 5 MHz Programmable Function Generator
PM 5136/02n 5 MHz Programmable Function Generator with GPIB/IEEE 488.2 interface

PM 5138A/10n 10 MHz Programmable Function Generator
PM 5138A/12n inclusive GPIB/IEEE–488.2 interface and Arbitrary
PM 5138A/13n inclusive RS232 interface and Arbitrary

PM 5139/00n 20 MHz Programmable Function Generator
PM 5139/02n inclusive GPIB/IEEE-488.2 interface and Arbitrary
PM 5139/03n inclusive RS232 interface and Arbitrary.

Power options
n = 1 Universal European 220 V
n = 3 Standard North American 120V
n = 4 United Kingdom 240 V
n = 5 Switzerland 220 V
n = 8 Australia 240 V

Accessories
PM 9051 BNC to 4 mm banana adapter
PM 9551 50 ohm to 600 ohm Adapter
PM 9581/01 50 ohm feed–through termination 3 W
PM 9585/01 50 ohm feed–through termination 1 W
Y8021 Shielded DEEE–488 Cable, 1m
Y8022 Shielded DEEE–488 Cable, 2m
Y8023 Shielded DEEE–488 Cable, 4m
PM 9564 19 inch Rackmount kit for PM5136/38A/39

Factory Warranty
One year product warranty

Manuals
Operators Manual included with instrument