QDTimes FY3900-10M

QDTimes FY3900 Dual-Channel Function/Arbitrary Waveform Generator

Model: FY3900-10M User Manual

1. Introduction

The QDTimes FY3900 series is a high-performance, cost-effective, and versatile dual-channel function/arbitrary waveform generator. It integrates the capabilities of a function generator, arbitrary waveform generator, pulse signal generator, noise generator, counter, and frequency meter into a single device. This manual provides essential information for the safe and efficient operation of your FY3900-10M unit.
Key features include:

- 3.2-inch (320x240) color display for clear parameter visualization.
- Maximum output frequency of 10MHz (Sine Wave) with a sampling rate of 250MSa/s and 14-bit vertical resolution.
- High frequency resolution of 1uHz across the full range.
- High amplitude resolution, with a minimum of 1mV.
- 64 sets of arbitrary waveform storage, each with 8192 * 14 bits depth.
- Output up to 99 sets of functions/arbitrary waveforms.
- DC bias function from -10V to +10V (for frequencies below 20MHz) with 1mV resolution.
- Powerful arbitrary waveform editing capabilities.

2. Safety Information

Please read and understand all safety instructions before operating the device. Failure to follow these instructions may result in injury or damage to the instrument.

- **Power Source:** Use only the specified power adapter. Ensure the voltage matches the device requirements.
- **Environment:** Operate the device in a dry, well-ventilated area, away from direct sunlight, high temperatures, humidity, and corrosive gases.
- **Ventilation:** Do not block ventilation openings. Ensure adequate airflow around the device.
- **Cleaning:** Disconnect power before cleaning. Use a soft, dry cloth. Do not use liquid or aerosol cleaners.
- **Servicing:** Do not attempt to service the device yourself. Refer all servicing to qualified personnel.
- **Connections:** Ensure all connections are secure before powering on the device.

3. Package Contents

Verify that all items are present in the package:

- QDTimes FY3900-10M Dual-Channel Function/Arbitrary Waveform Generator Unit
- Power Adapter
- USB Cable
- BNC to Alligator Clip Cable (2 pcs)
- User Manual (this document)

4. Product Overview

The FY3900-10M features a user-friendly interface with a color display and intuitive controls.

Figure 4.1: Front view of the FY3900-10M showing the display, control knob, and output ports.

The device is designed for efficient and stable operation with one-touch controls.

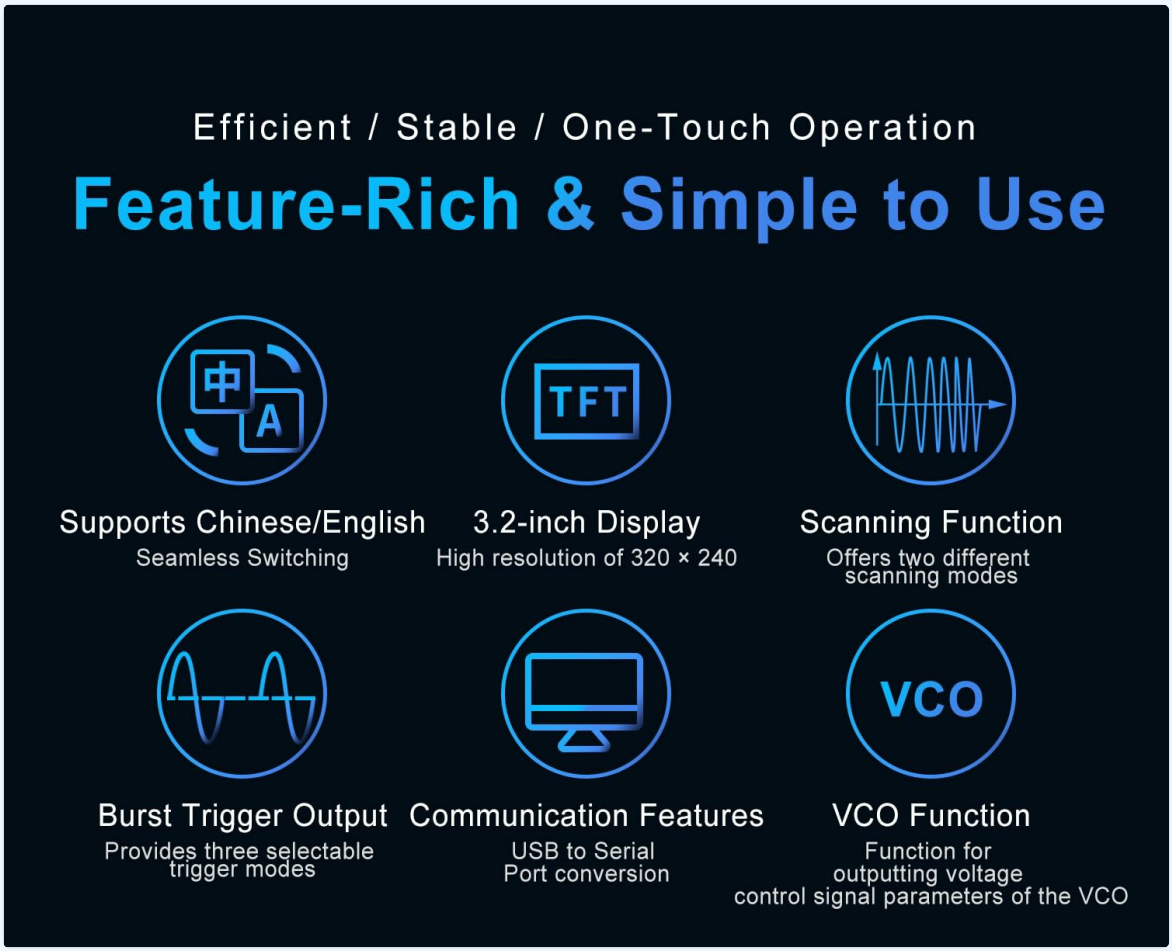


Figure 4.2: Overview of key features including language support, display, scanning, burst, communication, and VCO.

It functions as an all-in-one device, combining multiple signal generation and measurement capabilities.

Figure 4.3: Multi-functional capabilities of the FY3900.

Detailed views of the adjustable dial, display, and shortcut keys:

Product Introduction

Commitment to Quality Products, Independently Developed for a Worry-Free Purchase

01

360° Adjustable Dial

Featuring 360° phase adjustment, all setting parameters can be independently and precisely tuned.

02

3.2-Inch Large Color Display

Equipped with a 3.2-inch TFT (320x240) color LCD screen, displaying menus and parameter settings for current functions, system status, and prompt messages.

03

Shortcut Keys for Easy Operation

With abundant shortcut keys, the operation is greatly simplified. Users can achieve proficient use without spending extensive time learning or familiarizing themselves with the device.

Figure 4.4: Close-up of the adjustable dial, 3.2-inch display, and shortcut keys.

- **Adjustable Dial:** Features a 360° adjustable dial for precise parameter tuning.
- **3.2-inch Large Color Display:** A 320x240 TFT LCD screen displays current settings, system status, and prompt messages.
- **Shortcut Keys:** Abundant shortcut keys simplify operation and allow quick access to functions.

5. Setup

Follow these steps for initial setup:

1. **Unpacking:** Carefully remove the FY3900-10M and all accessories from the packaging.
2. **Power Connection:** Connect the provided power adapter to the DC input port on the rear panel of the device. Plug the adapter into a suitable power outlet.
3. **Initial Power On:** Press the power button located on the front panel. The device display should light up, indicating successful power-on.
4. **Output Connections:** Connect the BNC cables to the CH1 or CH2 output ports as needed. Connect the other end of the BNC cable to your test equipment (e.g., oscilloscope, circuit).
5. **USB Connection (Optional):** For PC control or arbitrary waveform editing, connect the device to your computer using the provided USB cable. Install the necessary drivers and software as instructed in the software documentation.

6. Operating Instructions

This section details the basic operation and various functions of the FY3900-10M.

6.1 Basic Waveform Generation

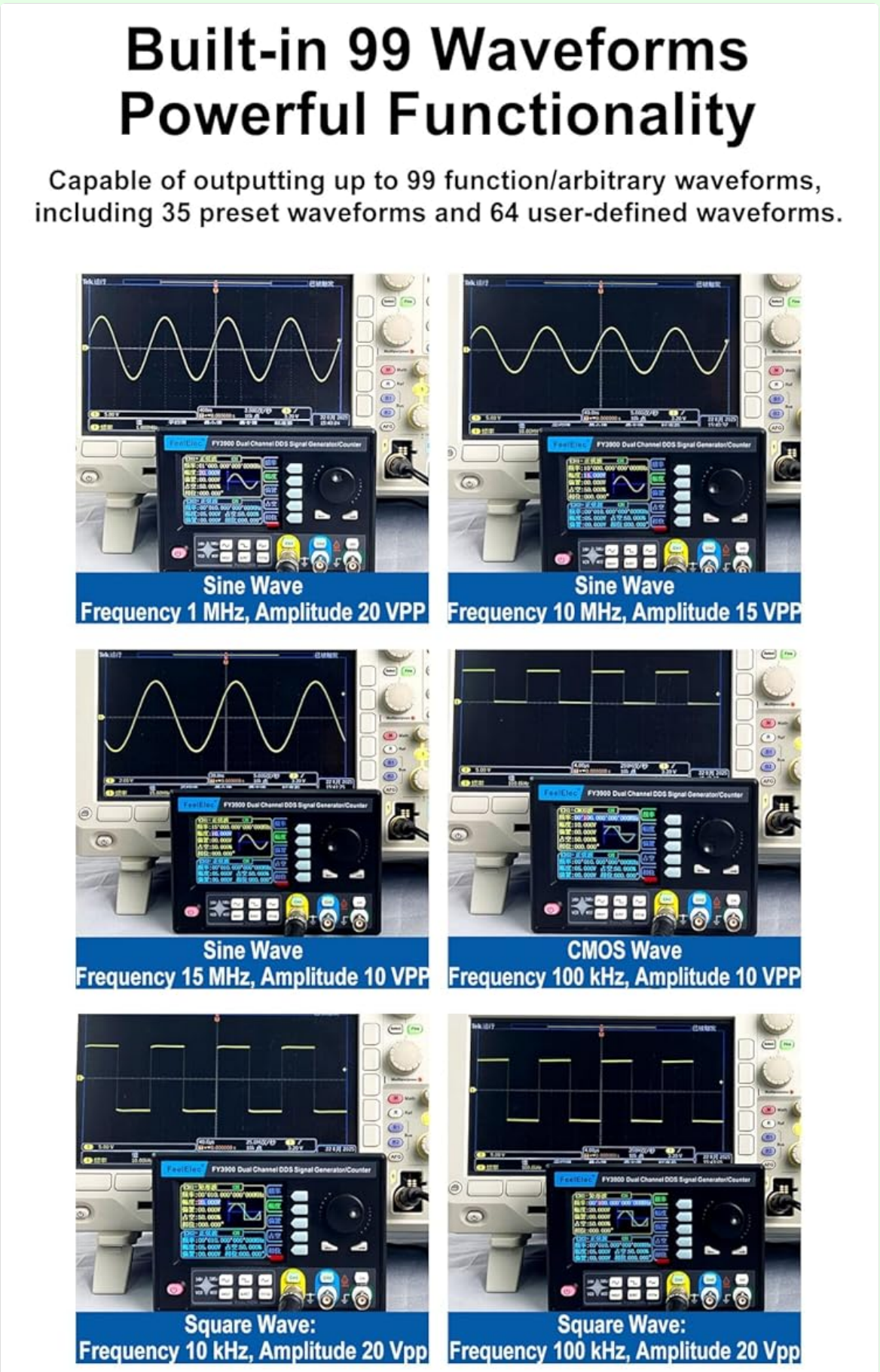
The FY3900-10M can generate various standard waveforms and arbitrary waveforms.

1. **Select Channel:** Use the CH1/CH2 buttons to select the desired output channel.
2. **Select Waveform:** Press the 'FUNCTION' button to cycle through standard waveforms (Sine, Square, Triangle, Pulse, etc.) or select 'ARB' for arbitrary waveforms.
3. **Adjust Frequency:** Use the rotary knob to adjust the frequency. Press the 'FREQ' button to select the digit to modify.
4. **Adjust Amplitude:** Press the 'AMPL' button. Use the rotary knob to set the desired peak-to-peak amplitude.
5. **Adjust Offset:** Press the 'OFFS' button. Use the rotary knob to set the DC offset voltage.
6. **Adjust Duty Cycle (for Pulse/Square):** Press the 'DUTY' button. Use the rotary knob to set the duty cycle percentage.
7. **Adjust Phase:** Press the 'PHAS' button. Use the rotary knob to set the phase shift.

8. **Enable Output:** Press the 'ON/OFF' button for the selected channel to enable or disable the waveform output.

6.2 Arbitrary Waveform Generation

The device supports up to 99 built-in and user-defined arbitrary waveforms.



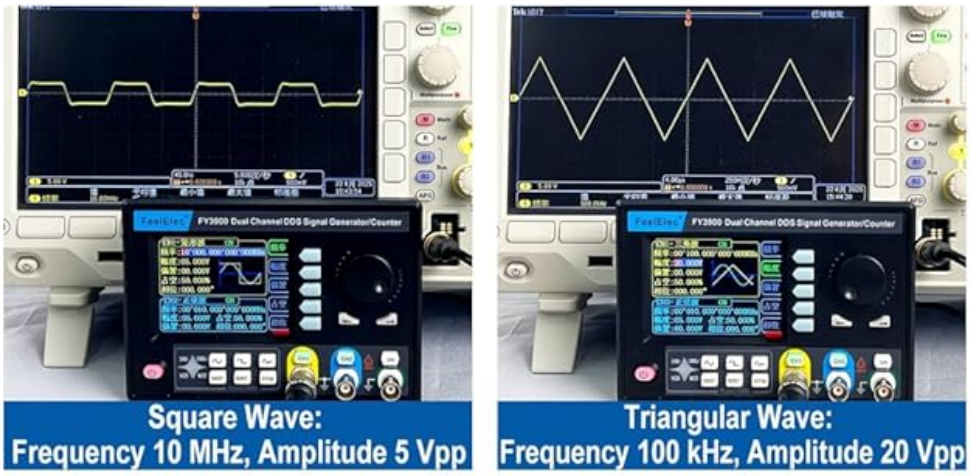


Figure 6.1: Examples of various waveforms generated by the FY3900.

You can create and edit arbitrary waveforms using the provided PC software.

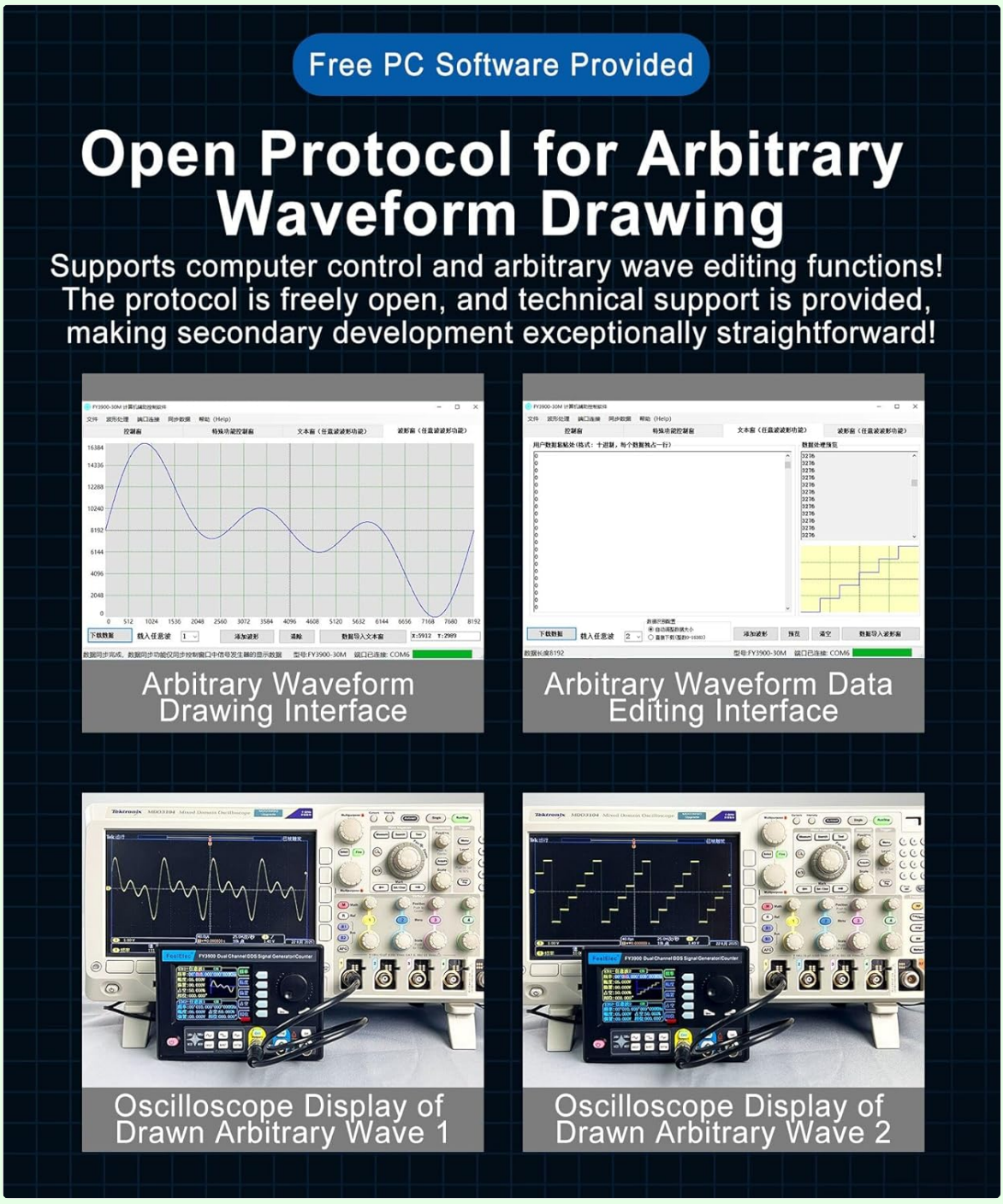


Figure 6.2: PC software interface for arbitrary waveform drawing and editing.

1. **Access ARB Mode:** Press the 'FUNCTION' button until 'ARB' is selected.
2. **Select Waveform:** Use the rotary knob to select from the 64 user-defined arbitrary waveforms or 35 preset waveforms.
3. **Edit Arbitrary Waveforms (PC Software):**
    - Connect the FY3900-10M to your PC via USB.
    - Launch the arbitrary waveform editing software.
    - Draw or import waveform data.
    - Upload the custom waveform to one of the 64 storage slots on the device.

6.3 Scanning Function

The FY3900-10M offers two different scanning modes (e.g., linear and logarithmic) for frequency, amplitude, or duty cycle.

1. **Enter Scan Mode:** Press the 'SWEEP' button.
2. **Configure Scan Parameters:** Set the start frequency/amplitude/duty cycle, end frequency/amplitude/duty cycle, and scan time using the rotary knob and corresponding parameter buttons.
3. **Select Scan Type:** Choose between linear or logarithmic scan modes.
4. **Start Scan:** Enable the output to begin the scanning process.

6.4 Burst Trigger Output

The device provides selectable trigger modes for burst output.

1. **Enter Burst Mode:** Press the 'BURST' button.
2. **Set Burst Count:** Specify the number of waveform cycles per burst.
3. **Select Trigger Source:** Choose between internal, external, or manual trigger modes.
4. **Enable Burst:** Activate the burst function and trigger as per the selected source.

6.5 VCO Function

The Voltage Controlled Oscillator (VCO) function allows external voltage to control signal parameters.

1. **Access VCO Mode:** Press the 'VCO' button.
2. **Configure Parameters:** Set the control range and sensitivity for frequency, amplitude, or duty cycle.
3. **Connect External Voltage:** Apply the controlling voltage to the designated input port.

6.6 Frequency Meter / Counter

The FY3900-10M can also function as a frequency meter and counter.

1. **Enter Counter Mode:** Press the 'SYSTEM' button and navigate to the 'Counter' or 'Frequency Meter' option.
2. **Connect Input Signal:** Apply the signal to be measured to the designated input port (e.g., EXT. IN).

3. **Read Measurement:** The display will show the measured frequency or count.

7. Maintenance

Proper maintenance ensures the longevity and optimal performance of your FY3900-10M.

- **Cleaning:** Regularly clean the exterior of the device with a soft, dry, lint-free cloth. Do not use abrasive cleaners, solvents, or harsh chemicals. Ensure the device is powered off and unplugged before cleaning.
- **Storage:** When not in use for extended periods, store the device in a cool, dry place, away from direct sunlight and extreme temperatures. Keep it in its original packaging or a protective case to prevent dust accumulation and physical damage.
- **Ventilation:** Ensure that the ventilation openings are clear of dust and debris to prevent overheating.
- **Cable Care:** Inspect all cables (power, USB, BNC) regularly for any signs of wear or damage. Replace damaged cables immediately to prevent electrical hazards or signal integrity issues.

8. Troubleshooting

This section addresses common issues you might encounter with your FY3900-10M.

Problem	Possible Cause	Solution
Device does not power on.	Power adapter not connected or faulty; power outlet not working.	Check power adapter connection. Try a different power outlet. Ensure the power button is pressed.
No waveform output.	Output channel not enabled; incorrect cable connection; amplitude set to zero.	Press the 'ON/OFF' button for the selected channel. Verify BNC cable connections. Increase amplitude setting.
Display is blank or frozen.	Software error; temporary glitch.	Power off the device, wait a few seconds, then power it back on. If the problem persists, contact support.
PC software cannot connect to device.	USB cable faulty; drivers not installed; incorrect COM port selected.	Ensure USB cable is securely connected. Install or reinstall USB drivers. Check device manager for COM port and select it in the software.

Problem	Possible Cause	Solution
Inaccurate frequency/amplitude readings on external equipment.	Improper calibration; impedance mismatch; faulty cables.	Ensure external equipment is properly calibrated. Check for 50Ω termination if required. Replace cables.

If you encounter a problem not listed here or if the suggested solutions do not resolve the issue, please contact QDTimes customer support for assistance.

9. Specifications

Detailed technical specifications for the FY3900-10M model.

Technical Specifications

FY3900 Series Technical Specifications

MODEL		FY3900 -05M	FY3900-10M	FY3900-15M	FY3900-20M	FY3900-30M
Frequency Characteristics						
Sine Wave Frequency Range		0~5MHz	0~10MHz	0~15MHz	0~20MHz	0~30MHz
Rectangular Wave Frequency Range		0~5MHz	0~10MHz	0~10MHz	0~10MHz	0~15MHz
Triangle Wave Frequency Range		0~5MHz	0~10MHz	0~10MHz	0~10MHz	0~10MHz
Pulse Wave Frequency Range		0~5MHz	0~10MHz	0~10MHz	0~10MHz	0~10MHz
Arbitrary Wave Frequency Range		0~5MHz	0~10MHz	0~10MHz	0~10MHz	0~10MHz
TTL/CMOS Digital Wave Range		0~5MHz	0~10MHz	0~10MHz	0~10MHz	0~15MHz
Minimum Adjustable Pulse Width		20ns(All models can achieve a minimum adjustable pulse width of 20ns)				
Minimum Frequency Resolution (Full Range)		1μHz (The minimum frequency resolution across the entire frequency band can reach 1μHz, ensuring the instrument's adjustment precision at high frequencies. For example, it can output a high-precision signal of 10.000000000001MHz.)				
Frequency Accuracy		±20ppm				
Frequency Stability		±5ppm/3h				
Waveform Characteristics						
Waveform Catalog		Sine wave, square wave (duty cycle adjustable), pulse wave (pulse width and cycle time can be accurately set), triangle wave, rising sawtooth wave, falling sawtooth wave, CMOS wave, DC level, half wave, full wave, positive ladder wave, anti ladder wave, exponential rise, exponential fall, Lorentz pulse wave, multi sound wave, irregular noise wave, ECG wave, trapezoid pulse wave, cinke pulse wave, narrow Pulse wave, Gaussian white noise wave, amplitude modulation wave, frequency modulation wave, and 64 user-defined waves.				
Nonvolatile storage (64)		64 user-defined arbitrary waveforms can be stored				
Waveform Length		8192 points (8K points) * 14bits				
Sampling rate		250MSa/s				
Vertical Resolution		14 bits				
Sine Wave	Harmonic suppression system	⩾50dBc(<1MHz);≥45dBc(1MHz~20MHz);				
	Total harmonic distortion	<0.5% (20Hz~20kHz,0dBm)				
Sawtooth wave	Rising and falling time	⩽7ns(VPP<5V)				
	overshoot	⩽5%				
Square and Pulse wave	Duty Cycle Adjustment Range	0.01%~99.99% (Resolution 0.01%)				
	linearity	⩾98% (0.01Hz~10kHz)				

Figure 9.1: Technical Specifications Table for FY3900 Series.

Characteristic	Specification (FY3900-10M)
Frequency Characteristics	
Sine Wave Frequency Range	0-10MHz
Rectangular Wave Frequency Range	0-10MHz
Triangle Wave Frequency Range	0-10MHz
Arbitrary Wave Frequency Range	0-10MHz
TTL/CMOS Digital Wave Range	0-10MHz
Minimum Adjustable Pulse Width	20ns (All models can achieve a minimum adjustable pulse width of 20ns)
Minimum Frequency Resolution (Full Range)	1uHz (The minimum frequency resolution across the entire frequency band can reach 1uHz, ensuring the instrument's adjustment precision at high frequencies.)
Frequency Accuracy	±20ppm
Frequency Stability	±5ppm/3h
Waveform Characteristics	
Waveform Catalog	Sine wave, square wave (duty cycle adjustable), pulse wave (pulse width and cycle time can be accurately set), triangle wave, rising sawtooth wave, falling sawtooth wave, CMOS wave, DC level, half wave, full wave, positive ladder wave, anti ladder wave, exponential rise, exponential fall, Lorentz pulse wave, multi sound wave, regular noise wave, ECG wave, trapezoid pulse wave, sinker pulse wave, narrow pulse wave, Gaussian white noise wave, amplitude modulation wave, frequency modulation wave, and 64 user-defined waves.

Characteristic	Specification (FY3900-10M)
Nonvolatile storage (64)	64 user-defined arbitrary waveforms can be stored
Waveform Length	8192 points (8K points) * 14 bits
Sampling rate	250MSa/s
Vertical Resolution	14 bits
Harmonic Suppression (Sine Wave)	≥50dBc (1MHz); ≥45dBc (1MHz~20MHz)
Total harmonic distortion (Sine Wave)	<0.5% (20Hz~20KHz, 0dBm)
Rising and falling time (Square Wave)	≤7ns (VPP<5V)
Overshoot (Square Wave)	≤5%
Duty Cycle Adjustment Range (Square and Pulse wave)	0.01%~99.99% (Resolution 0.01%)
Linearity (Triangle Wave)	≥98% (0.01Hz~10KHz)

10. Warranty and Support

The QDTimes FY3900-10M comes with a **1-Year Warranty** from the date of purchase, covering manufacturing defects and malfunctions under normal use. This warranty does not cover damage caused by misuse, accidents, unauthorized modifications, or improper operation.
For technical support, warranty claims, or service inquiries, please contact QDTimes customer service through the retailer where you purchased the product or visit the official QDTimes website for contact

information.
Please retain your proof of purchase for warranty validation.