Thank you for purchasing our products. Please carefully read the contents of the user’s manual before use, to ensure the normal use of the instrument.
Introduction of the instrument

This manual applies to each mode of FY3200S series DDS Function Signal Generator. In the series, the last two digits “xx” represent the upper limit frequency value (MHz) of Sine Wave for each mode. For example, FY3224S, “24” means the upper limit frequency of Sine Wave is 24MHz.

The instrument adopts large scale CMOS integrated circuit and high speed microprocessor. The internal circuit adopts active crystal oscillator as benchmark. So the signal stability is greatly strengthened. Surface mounting technology improves interference immunity and operational life span. It has Dual-channel DDS signal output, includes Sine wave, Square wave, Triangle wave, Sawtooth wave and user-defined waveform. The amplitude, offset and phase can be controlled. Meanwhile, it has TTL electric level output, External frequency measurement, counter and sweep functions including Linear sweep and Logarithmic sweep. Both the sweep frequency and time can be set arbitrarily. It’s the ideal instrument for electronic engineering, laboratories, production lines, teaching and scientific research.

Excellent technical indexes and function features:

◆ Sampling rate up to 250 MSa/s.
◆ Built-in arbitrary waveform with 250 MSa/s sampling rate.
◆ 4 downloadable 2048 dots arbitrary waveform memories
◆ With 12 bit wide waveform generator, the output waveform can be more delicate with low distortion.
◆ Fully numerical control. It can display and numerical control amplitude, offset, frequency, duty cycle of current signal output and phase difference of two channels.
◆ Each function can be adjusted by host computer.
◆ Preinstalled 14 common waveforms.
◆ High frequency accuracy: magnitude 10⁻⁶
◆ High resolution: Full range frequency resolution can be 10 mHz.
◆ Both main and subsidiary wave duty cycle are adjustable separately (0.1%~99.9%) .
◆ All range continuously adjustable, digital directly setting.
◆ High waveform accuracy: The output waveform synthesized by function calculation is of high accuracy and low distortion.
◆ Arbitrary waveform: User can load arbitrary waveform according to the need.
◆ Sweep Function: Linear sweep and Logarithmic sweep. Starting and stop points can be set optionally.
◆ Save function: 20 sets of parameters defined by the users can be saved and loaded anytime.
◆ Operation mode: Button and knob controlled with LCD1602 display, digital set directly or knob adjusted continuously.
◆ Highly reliable: Large scale integrated circuit, Surface mounting technology, reliable and durable.
◆ Frequency measurement: Frequency of internal / external signal can be measured through built-in 100MHz frequency meter.
◆ Follow function: Built-in parameter follow function covering frequency, amplitude, offset, duty cycle, waveform etc. for user’s convenience.
◆ Trigger output function: User can choose manual trigger, external trigger or CH2 trigger to control the main output to output waveforms of specified periodicity. This periodicity can also be
# User’s Manual for FY3200S Series

**Dual-channel DDS Function / Arbitrary Waveform Signal Generator FeelTech**

Defined by the user.

## Product Function and Technology Indexes

<table>
<thead>
<tr>
<th>Model</th>
<th>FY3206S</th>
<th>FY3212S</th>
<th>FY3220S</th>
<th>FY3224S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sine wave frequency range</td>
<td>0Hz~6MHz</td>
<td>0Hz~12MHz</td>
<td>0Hz~20MHz</td>
<td>0Hz~24MHz</td>
</tr>
<tr>
<td>Square wave frequency range</td>
<td>0Hz~6MHz</td>
<td>0Hz~6MHz</td>
<td>0Hz~6MHz</td>
<td>0Hz~6MHz</td>
</tr>
<tr>
<td>Triangle wave frequency range</td>
<td>0Hz~6MHz</td>
<td>0Hz~6MHz</td>
<td>0Hz~6MHz</td>
<td>0Hz~6MHz</td>
</tr>
<tr>
<td>Arbitrary wave frequency wave</td>
<td>0Hz~6MHz</td>
<td>0Hz~6MHz</td>
<td>0Hz~6MHz</td>
<td>0Hz~6MHz</td>
</tr>
</tbody>
</table>

## Parameters of signal output

<table>
<thead>
<tr>
<th>Output channel</th>
<th>CH1 and CH2 dual channel high speed output separately.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output waveform</td>
<td>Sine wave, square wave (duty cycle adjustable), triangle wave, sawtooth wave, arbitrary wave, common pulse, noise, electrocardiogram, AM, FM etc.</td>
</tr>
<tr>
<td>Output amplitude</td>
<td>≥20Vp-p (No load)</td>
</tr>
<tr>
<td>Output impedance</td>
<td>50Ω±10%</td>
</tr>
<tr>
<td>DC offset</td>
<td>±10V</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01Hz(10mHz)</td>
</tr>
<tr>
<td>Frequency accuracy</td>
<td>±5×10⁻⁶</td>
</tr>
<tr>
<td>Frequency Stability</td>
<td>±2×10⁻⁶/³ 小时</td>
</tr>
<tr>
<td>Sine wave distortion</td>
<td>≤0.8% (reference frequency 1kHz)</td>
</tr>
<tr>
<td>Triangle linearity</td>
<td>≥98% (0.01Hz~10kHz)</td>
</tr>
<tr>
<td>Rise and fall time</td>
<td>≤100ns</td>
</tr>
<tr>
<td>Square wave duty cycle range</td>
<td>0.1%~99.9%</td>
</tr>
</tbody>
</table>

### TTL output

- Dual-channel TTL electric level synchronize with CH1 and CH2. Phase differences are adjustable.
- Electric level range: >3.3Vp-p
- Fan-out: >20 TTL (Load)
- Level rise fall time: ≤20ns

### Frequency Counter function

- Counter range: 0-4294967295
- Frequency meter range: 1Hz~100MHz
- Input Voltage Range: 2Vp-p~20Vp-p

### Sweep function

- Only CH1 has this function.
- Sweep mode: Linear sweep, Logarithmic sweep
- Frequency setting range: Starting and stop points can be set optionally.
- Sweep range: fM1 (pre-set) ~ fM2 (pre-set)
- Sweep speed: 1s~99s /step-by-step

### Other features

- Display mode: LCD1602 in English
- Save and load: M0-M19 (Default: M0)
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<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buzzer warning tone</td>
<td>Can be turned On/Off by setting</td>
</tr>
<tr>
<td>Wide working voltage range</td>
<td>AC85V~AC260V</td>
</tr>
<tr>
<td>Production technology</td>
<td>Surface mounting technology, large scale integrated circuit, reliable and durable</td>
</tr>
<tr>
<td>Operating</td>
<td>Buttons controlled &amp; knob adjusted continuously.</td>
</tr>
<tr>
<td>Work condition</td>
<td>Temp.: 0~40℃  Humidity: &lt; 80%</td>
</tr>
<tr>
<td>Dimension</td>
<td>200mm (Long)×190mm(Wide) ×90mm(High)</td>
</tr>
<tr>
<td>Weight</td>
<td>500g (bare machine), Accessory (150g)</td>
</tr>
</tbody>
</table>

● structure function introduction

● Button introduction

1. 【PARM】 button can be used to toggle the interfaces among Waveform, Amplitude, Offset, Duty cycle and Phase.
2. 【WAVE】 button can be used to enter waveform selecting interface and toggle the type of current output waveform.
3. 【COUNT】 button is shortcut key for measurement and can be used to switch between frequency measurement interface and counter interface.
4. 【SWEEP】 button is shortcut key for sweep function and can be used to enter sweep and sweep time interfaces.
5. 【SYS】 button can be used to enter the interfaces of follow setting, save or load.
6. 【CH1】 Main waveform confirmation, Output/Stop.
7. 【CH2】 Subsidiary waveform confirmation, Output/Stop.
8. 【cursor left】 Cursor move to left.
9. 【cursor right】 Cursor move to right.
10. 【OK】 ADJ confirmation (move downward)
1、Channel selection

After starting up, “MF” or “SF” will be displayed in the top left corner to indicate current channel selection state.

- “MF” means choosing main channel for operation. “SF” means choosing subsidiary channel for operation. It can be chosen by pressing 【CH1】 or 【CH2】 accordingly.
- When the main channel has been chosen, press button 【CH1】 again and the main channel output will be shut down and the corresponding LED goes out.
- Press the button 【CH1】 again and the main channel output will be activated again and the corresponding LED illuminates.
- “SF” of 【CH2】 operating the same way as above.

2、Frequency adjustment

If you want to adjust frequency of chosen main and subsidiary waveform, you need to make the cursor point to frequency value. If the cursor is in other functions, you can use 【PARM】 button to change position.

(Note: The frequency value displayed for arbitrary waveform is referenced. The actual output frequency = Display value × periodicity of waveform defined by user).

- Use 【ADJ】 knob to change the frequency value of the cursor position. Rotate clockwise to increase the frequency. Rotate anticlockwise to reduce the frequency.
- If you want to change frequency value significantly, you can use 【△】 and 【▲】 to move the position of cursor.
- 【OK】 button can change the unit of frequency displayed (Hz, kHz and MHz). Rotate the 【ADJ】 knob to change the number displayed to change the frequency.
In the interface of chosen main and subsidiary waveform, press 【WAVE】 button can toggle among Sine wave, Square wave, Triangle wave, Arbitrary wave and so on. You can also toggle the waveform quickly by rotating the 【ADJ】 knob. Press 【PARM】 button to quit waveform selection interface.

- **Main output of waveform is Sine wave.**
- **Main output of waveform is Square wave.**
- **Main output of waveform is Triangle wave.**
- **Main output of waveform is Arbitrary wave 1.**
- **Main output of waveform is Arbitrary wave 2.**
- **Main output of waveform is Arbitrary wave 3.**
- **Main output of waveform is Arbitrary wave 4.**
- **Main output of waveform is Lorentz Pulses.**
- **Main output of waveform is Multitone.**
- **Main output of waveform is Random Noise.**

Frequency unit is MHz.
### Main Output of Waveform

<table>
<thead>
<tr>
<th>MF</th>
<th>AMPL</th>
<th>Waveform</th>
</tr>
</thead>
<tbody>
<tr>
<td>0021.0000 kHz</td>
<td>05.00 V</td>
<td>Electrocardiogram</td>
</tr>
<tr>
<td>0021.0000 kHz</td>
<td>05.00 V</td>
<td>Trapezoidal Pulse</td>
</tr>
<tr>
<td>0021.0000 kHz</td>
<td>05.00 V</td>
<td>Sinc Pulse</td>
</tr>
<tr>
<td>0021.0000 kHz</td>
<td>05.00 V</td>
<td>Narrow Pulse</td>
</tr>
<tr>
<td>0021.0000 kHz</td>
<td>05.00 V</td>
<td>White Gaussian Noise</td>
</tr>
<tr>
<td>0021.0000 kHz</td>
<td>05.00 V</td>
<td>Amplitude Modulated Wave</td>
</tr>
<tr>
<td>0021.0000 kHz</td>
<td>05.00 V</td>
<td>Frequency-Modulated Wave</td>
</tr>
</tbody>
</table>

### Subsidiary Output of Waveform

<table>
<thead>
<tr>
<th>MF</th>
<th>AMPL</th>
<th>Waveform</th>
</tr>
</thead>
<tbody>
<tr>
<td>0021.0000 kHz</td>
<td>05.00 V</td>
<td>Sine Wave</td>
</tr>
<tr>
<td>0021.0000 kHz</td>
<td>05.00 V</td>
<td>Square Wave</td>
</tr>
<tr>
<td>0021.0000 kHz</td>
<td>05.00 V</td>
<td>Triangle Wave</td>
</tr>
</tbody>
</table>
### Subsidiary Output of Waveform

<table>
<thead>
<tr>
<th>Waveform Type</th>
<th>Subsidiary Output Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arbitrary wave 1</td>
<td>SF=0021.00000kHz AMPL=05.00V ARB2</td>
</tr>
<tr>
<td>Arbitrary wave 2</td>
<td>SF=0021.00000kHz AMPL=05.00V ARB3</td>
</tr>
<tr>
<td>Arbitrary wave 3</td>
<td>SF=0021.00000kHz AMPL=05.00V ARB4</td>
</tr>
<tr>
<td>Lorentz Pulses</td>
<td>SF=0021.00000kHz AMPL=05.00V PRE1</td>
</tr>
<tr>
<td>Multitone</td>
<td>SF=0021.00000kHz AMPL=05.00V PRE2</td>
</tr>
<tr>
<td>Random Noise</td>
<td>SF=0021.00000kHz AMPL=05.00V PRE3</td>
</tr>
<tr>
<td>Electrocardiogram</td>
<td>SF=0021.00000kHz AMPL=05.00V PRE4</td>
</tr>
<tr>
<td>Trapezoidal Pulse</td>
<td>SF=0021.00000kHz AMPL=05.00V PRE5</td>
</tr>
<tr>
<td>Sinc Pulse</td>
<td>SF=0021.00000kHz AMPL=05.00V PRE6</td>
</tr>
<tr>
<td>Narrow Pulse</td>
<td>SF=0021.00000kHz AMPL=05.00V PRE7</td>
</tr>
<tr>
<td>White Gaussian Noise</td>
<td>SF=0021.00000kHz AMPL=05.00V PRE8</td>
</tr>
</tbody>
</table>
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noise.

Subsidiary output of waveform is amplitude modulated wave.

Subsidiary output of waveform is frequency-modulated wave.

4. Amplitude adjustment
   In chosen main and subsidiary waveform interface, press 【PARM】button to make the cursor point to the value of amplitude (AMPL=). The value (Vpp) is peak value of the signal. Use 【<】 and 【>】 buttons and 【ADJ】 knob to change the value. As follows:

5. Offset adjustment
   In chosen main and subsidiary waveform interface, press 【PARM】 button to make the cursor point to the value of offset (Offset=). Use 【<】 and 【>】 buttons and 【ADJ】 knob to change the value. As follows:

6. Duty cycle adjustment
   In chosen main and subsidiary waveform interface, press 【PARM】 button to make the cursor point to the value of duty cycle (DUTY=). Use 【<】 and 【>】 buttons and 【ADJ】 knob to change the value. (Duty cycle adjustment is invalid for Sine wave). As follows:
   - Duty cycle for Square wave can be adjusted from 0.1% to 99.9%.

   Triangle wave adjustable among 50% (standard TRGL), above 50% and below 50% (both are different sawtooth waves).
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MF=0021.00000kHz
DUTY=51.0% TRGL

(WAVE=TRGL)

MF=0021.00000kHz
DUTY=49.0% TRGL

(WAVE=TRGL)

7、Phase adjustment

In chosen Subsidiary waveform interface, press 【PARM】 button to make the cursor point to the value of phase (Phase=). Use 【】 and 【】 buttons and 【ADJ】 knob to change the value of DC offset. The phase difference of main wave and subsidiary wave can be adjusted from 0° to 359°. As follows:

SF=0021.00000kHz
Phase=000° SQR

8、Measurement function

Press 【COUNT】 button in any interface to enter measurement function. This instrument offers frequency and counter two measurement functions. Input the signal from “Input” port on the front panel. Press 【COUNT】 button again to switch between frequency measurement and counting pulse.

ExtF=21.000kHz
*FUNC: EXT.TREQ

(Measure=FREQ)

- Press 【ADJ】 button to reset the counter.
- Rotate the 【ADJ】 knob anticlockwise to pause (Doesn’t disturb counter).
- Rotate the 【ADJ】 knob clockwise to cancel the pause.

CNTR=0
*FUNC: COUNGTER

(Measure=COUNT)

9、Trigger output function

In counter function interface, press 【COUNT】 button to enter waveform trigger output function. This instrument offer manual trigger, external trigger and CH2 trigger for options. Rotate the 【ADJ】 knob to adjust the waveform amount for single trigger. Press 【COUNT】 button to toggle among manual trigger, external trigger, CH2 trigger and measurement function.

CP_CNT=0000001
Manual Trigger

(Manual trigger. Single trigger output 1 period of waveform. Press 【ADJ】 button to trigger.)
10、Sweep function
Press the 【SWEEP】 button in any interface to enter sweep function. This instrument has LIN-SWEEP and LOG-SWEEP. The sweep signal outputs from CH1.

- The default sweep mode is LIN-SWEEP. You can change the mode by rotating the 【ADJ】 knob before sweep.
- Press the 【ADJ】 knob to start or stop sweep function. The frequency of sweep signal changes from fM1 to fM2 (Refer to function10). The value of M1 and M2 need to be set by SAVE function. The sweep time need to be set by TIME function.

### Examples

<table>
<thead>
<tr>
<th>Sweept Mode</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIN-SWEEP: STOP</td>
<td>F=0021.00000kHz</td>
</tr>
<tr>
<td>LIN-SWEEP: RUN</td>
<td>F=0021.00000kHz</td>
</tr>
<tr>
<td>LOG-SWEEP: STOP</td>
<td>F=0021.00000kHz</td>
</tr>
<tr>
<td>LOG-SWEEP: RUN</td>
<td>F=0021.00000kHz</td>
</tr>
</tbody>
</table>

- In sweep interface, Press 【SWEEP】 button again to switch between the interfaces of sweep begin and sweep time adjustment. The sweep time refers to the time length from fM1 (starting frequency) to fM2 (stopping frequency). The time can be adjusted from 1s to 99s.

11、Save function
In chosen main and subsidiary waveform interface, press 【SYS】 button to enter follow function and set if the parameters of subsidiary waveform follow the parameters of main waveform. In this way, the corresponding parameters of CH2 will follow the change if the parameters of CH1 have been changed.

- Frequency follow setting: Press 【ADJ】 button to change the frequency follow status.

### Examples

<table>
<thead>
<tr>
<th>Follow Status</th>
<th>Frequency of CH2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>The frequency of CH2 will not follow CH1</td>
</tr>
<tr>
<td>OK</td>
<td>The frequency of CH2 will follow CH1</td>
</tr>
</tbody>
</table>
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- Amplitude follow setting: Rotate the [ADJ] knob in follow mode setting interface to enter amplitude follow interface. Press [ADJ] button to change the amplitude follow status.

  **AMPL CH1=CH2? NO Following**
  
  The amplitude of CH2 will not follow CH1.

  **AMPL CH1=CH2? OK Following**
  
  The amplitude of CH2 will follow CH1.

- Offset follow setting: Rotate the [ADJ] knob in follow mode setting interface to enter offset follow interface. Press [ADJ] button to change the offset follow status.

  **Offs CH1=CH2? NO Following**
  
  The offset of CH2 will not follow CH1.

  **Offs CH1=CH2? OK Following**
  
  The offset of CH2 will follow CH1.

- Duty cycle follow setting: Rotate the [ADJ] knob in follow mode setting interface to enter duty cycle follow interface. Press [ADJ] button to change the duty cycle follow status.

  **DUTY CH1=CH2? NO Following**
  
  The duty cycle of CH2 will not follow CH1.

  **DUTY CH1=CH2? OK Following**
  
  The duty cycle of CH2 will follow CH1.

- Waveform follow setting: Rotate the [ADJ] knob in follow mode setting interface to enter waveform follow interface. Press [ADJ] button to change the waveform follow status.

  **WAVE CH1=CH2? NO Following**
  
  The waveform of CH2 will not follow CH1.

  **WAVE CH1=CH2? OK Following**
  
  The waveform of CH2 will follow CH1.

- Follow setting information saving: Rotate the [ADJ] knob in follow mode setting interface to enter follow setting information saving interface. Press [ADJ] button to set follow status. (Next starting machine will affect follow status.)
Save configuration Following

Follow setting information saving complete.

12. Save function

Press【SYS】button in follow function interface to enter save function. Current frequency value, amplitude value, offset value, duty cycle, waveform and phase of main and subsidiary waveform can be saved. This instrument provides 20 memory positions (M0~M19) for saving and can be loaded easily next time.

- Rotate the【ADJ】knob to choose saving position (M0~M19). Then press the【ADJ】button and “M” will display in the top right corner for a short while which means all the current parameters have been saved to this position.
- Position 0 (M0) is used to save the boot default parameters. The instrument will load all the parameters from this position next boot. As follows:

```
MF=0021.00000kHz
*SAVE P_ON FREQ
```

- Position 1 (M1) is used to save starting frequency for sweep function which will be loaded by sweep function automatically. As follows:

```
MF=0021.00000kHz
*SAVE BEGIN FREQ
```

- Position 2 (M2) is used to save stop frequency for sweep function which will be loaded by sweep function automatically. As follows:

```
MF=0021.00000kHz
*SAVE END FREQ
```

- Positions 03~19 (M3~M19) are for user defined waveform. As follows:

```
MF=0021.00000kHz
*SAVE ADDR=03
```

13. Load function

Press 【PARM】button in save function interface to enter load function. It will enable the user to load the frequency value, amplitude value, offset value, duty cycle, waveform and phase of main and subsidiary waveform from memory (M0~M19).

- Rotate the【ADJ】knob to select the position (M0~M19) for loading. Press 【ADJ】button to confirm. “OK” will display in the top right for a short while which means loading complete.
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MF=0021.0000kHz
*FUNC:LOAD=00 OK

● If “Non” displays, it means no information in this position. Loading can’t be done.

MF=0021.0000kHz
*FUNC:LOAD=00 Non

● Other functions

1. Dual TTL output are CH1 and CH2 waveform synchronized TTL waveform.
2. Buzzer function. Each time when you press a button or rotate a knob, an impulse will be generated and the buzzer will beep once. It will beep longer if invalid operation is conducted. The buzzer can be turned off by pressing and holding 【ADJ】 button and then turning on the power switch in shutdown state if you don’t like the sound. The buzzer can be turned on by repeating above operations.
Safety Notes

1. Before using this instrument, please check if the power supply is normal, to ensure the normal use and personal safety.
2. This instrument must be used in the technical index range.
3. Please do not change the instrument circuit arbitrarily, so as to avoid damaging equipment or endangering the safety.

Warning and personal injury

Do not apply the product in the safety protection device or emergency stop device, or any other applications that the product failure could result in personal injury, unless there is special purpose or use authorization. Before the installation and use, each parameter of the technical indexes in this manual should be referred to. If this suggestion is not obeyed, death or serious personal injury could be caused. In this condition the company will not be responsible for any compensation of personal injury or death, and all the company managers and employees and auxiliary agents, distributors, other personnel concerned will be released from any claim (including all the costs, expenses, attorney fees etc.) that may result in.

Accessories

1. FY3200S Function Signal Generator 1 Set
2. Power cord 1 Piece
3. Square port USB wire 1 Piece
4. Q9 clip wire 2 Pieces
5. User’s manual 1 (PDF format)

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