ZMK400 Single-Pass Printer

English User Manual

Production Date : 2024-01-08

High-speed single-pass digital printer for corrugated board, cartons, paper bags, kraft paper, and other flat packaging materials.

Contents

Note: This edition standardizes the original bilingual source into polished English and improves heading hierarchy, spacing, and readability.

1. Pre-Installation Preparation

Confirm the installation environment, power supply, and computer configuration before unpacking or powering on the printer.

Item	Requirement / Recommendation
Computer	At least 8 GB RAM, 120 GB hard disk space, and a processor equivalent to Pentium(R) 4 dual-core 3.00 GHz or above.
Socket	Use a dedicated power outlet that meets the printer's electrical requirements. Avoid frequent power cycling.
Voltage	220 V AC.
Power Cord	Do not use damaged power cords. If an extension cord is required, it must be reliably grounded and rated for the full electrical load.

Item	Requirement / Recommendation
Work Platform	Prepare a stable installation platform before setting up the printer.

Environmental Requirements

- Place the printer indoors in a relatively dust-free area, away from heat sources, fire, direct sunlight, vibration, and large temperature fluctuations.
- Do not allow strong airflow to blow directly toward the printer. Fans and air-conditioners should not face the machine.
- The support table must be level, stable, and larger than the printer base. It must safely support a machine weight of approximately 150 kg.

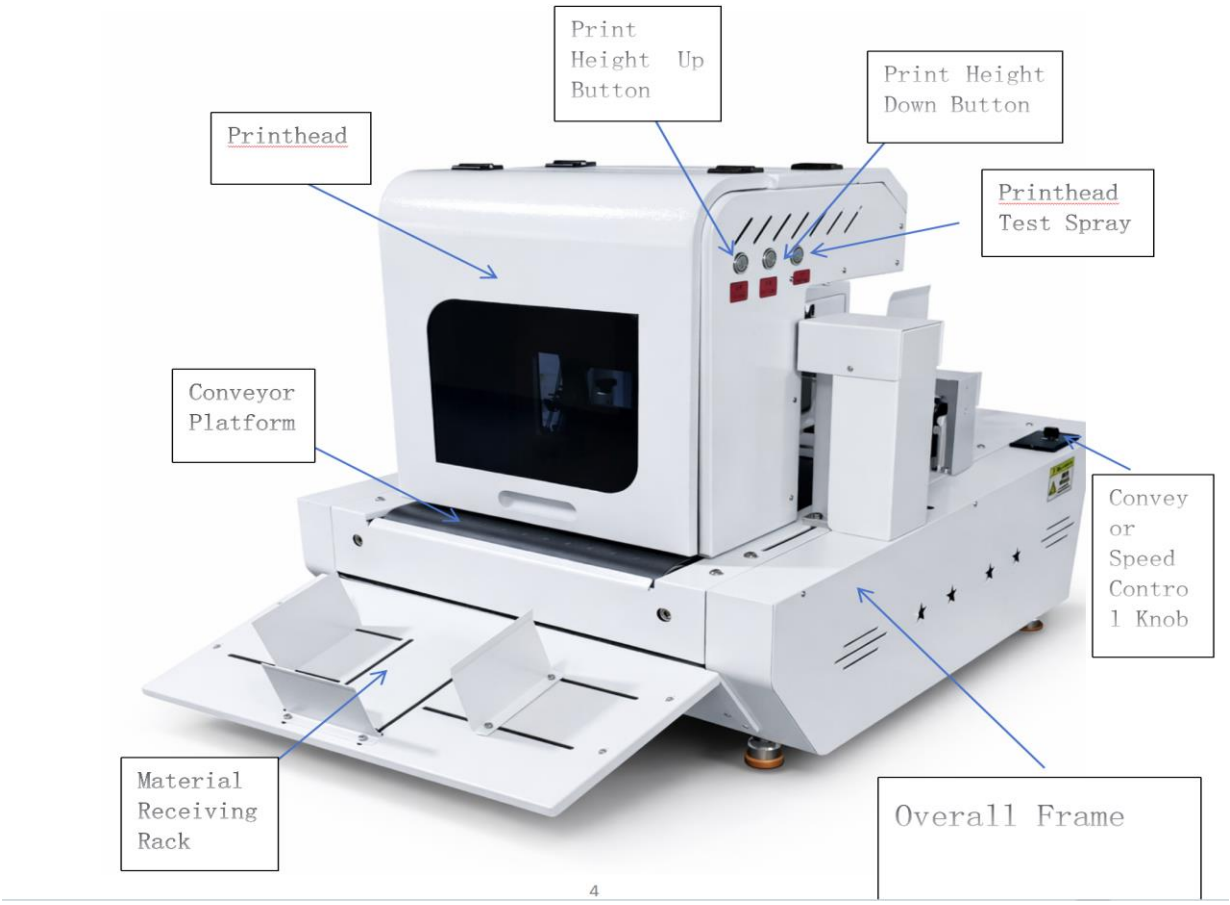
Before Connecting Power

- Verify that all positive and negative electrical connections are correct before turning on the machine.
- Keep the computer system away from strong electromagnetic interference sources such as speakers or cordless-phone base stations.

Warning: During transport and storage, do not invert the printer, place heavy pressure on it, or drop it.

2. Machine Overview

The following components are the main user-facing parts of the DZ-400H single-pass digital printer.



Component	Description
Printhead	Responsible for ink ejection and image formation. Keep the printhead surface clean and protected when the machine is idle.
Print Height Up Button	Raises the printhead assembly to match product thickness.
Print Height Down Button	Lowers the printhead assembly and is also used when sealing against the maintenance pad after use.
Printhead Test Spray Button	Triggers a quick spray/purge test for nozzle condition checking.
Conveyor Platform	Transports the material under the print zone at the set speed.
Material Receiving Rack	Supports the printed material as it enters or exits the printing area.
Conveyor Speed Control	Adjusts belt speed during production.

Component	Description
Knob	
Overall Frame	Main chassis structure supporting the mechanical and electrical assemblies.

3. Software Overview

1. Click Open and select a PRN file.
2. Click Send and wait until data transmission is completed.
3. Start the conveyor belt, place the cardboard or other material, and the machine will print automatically when the sensor is triggered.

4. Hardware Overview

- Each printhead uses one dedicated control board. The boards are interchangeable and distinguished by DIP switch settings.
- The main control board DIP code is 0000. Printhead boards are assigned sequentially according to the installed head number.

Board	DIP Code
Main Control Board	0000
Printhead 1	0001
Printhead 2	0010
Printhead 3	0011
Printhead 4	0100
Printhead 5	0101

- The DIP switch reference chart is printed directly on the board. Up = 0; Down = 1.
- Board supply voltage is 33.8 V.
- All boards are connected through a gigabit network switch to the computer. A 10G network card and 10G switch may be used to increase transmission speed.
- The main control board connects to the encoder wheel, photoelectric sensor, and X/Y/Z motor drivers.
- All boards use an RS-485 bus to synchronize encoder and sensor signals. Use a 2-core shielded twisted-pair cable and connect all interfaces in series.
- Each printhead uses one 36P FPC cable and one 38P FPC cable. Identify them carefully before insertion or removal.
- After power-on, several red LEDs should light continuously to indicate correct voltage supply. Three additional status LEDs should flash slowly to indicate the board is running normally.

5. Initial Setup

Network Parameter	Setting
PC IP Address	192.168.0.100 to 192.168.0.200
Subnet Mask	255.255.255.0
Gateway	192.168.0.1

1. Install the RIP software and the printer driver used by the RIP software.
2. Copy the upper-computer control software to any folder on the PC hard drive.
3. Set the number of installed printheads and enable the corresponding control boards in software.

4. Configure the photoelectric sensor. The sensor uses reflected light measurement. The red value is the measured reflected light level, and the green value is the threshold.
   - Use a black conveyor belt and measure the belt red value.
   - Place yellow cardboard under the sensor and measure the paper red value.
   - Set the green threshold value according to: Green = (Paper Red - Belt Red) / 2 + Belt Red.
   - Quick method: in a simple setup, the green value may be set to approximately half of the paper red value.
   - Incorrect sensitivity will affect normal printing, so observe the red indicator carefully during testing.
5. Print a 1000 mm rectangle and measure the actual output length. Adjust the Y Zoom (encoder scaling) value according to the printing error.
6. Print the alignment pattern and check whether the horizontal lines and diagonal lines from each printhead are aligned. Use X-Adj and Y-Adj to correct the offsets, always using Printhead 1 as the reference.
7. After image scale and printhead alignment are correct, the printer is ready for normal operation.

Y-Adj controls front/back alignment. X-Adj controls left/right alignment. All later printheads must be adjusted relative to Printhead 1, and cumulative offsets should be considered.

6. Maintop RIP Installation and Basic Operation

6.1 Install Maintop RIP

1. Install the software from the supplied USB drive or download the latest version from the official Maintop website.
2. After installation, insert the security dongle before launching the software.

3. Install the HP pagewide printer driver inside the RIP software.
   - Open File -> Printer Set.
   - Click Install Maintop Printer.
   - Choose Custom Printer.
   - Browse to the printer driver folder and select H452.inf.
   - A new printer named #H452 Printer will be added. Set it as the default printer and confirm.

6.2 Basic Workflow

1. Create a new file and set the page size.
2. Insert the image to be printed.
3. In image import settings, select No Adjustment if the source file is already prepared at the correct size.
4. Right-click the image, open object or frame properties, and choose to keep the original image size.
5. For vertical-output machines, rotate the image to 270 degrees and reset X and Y offsets to 0.
6. Open Paper Size and enter the appropriate media length and width.
7. Choose Print, open Printer Setting, enable Auto Paper Size, and generate the PRN file to the desired folder.
8. Open the generated PRN file in the printer control software, click Send, and start production.

6.3 Resolution and Output Notes

Printing Condition	Recommended Resolution
Normal output	1200 x 600 dpi
File length over 2000 mm	1200 x 300 dpi

Printing Condition	Recommended Resolution
File length over 4000 mm	1200 x 150 dpi
Maximum file length	8000 mm
Vertical output without image rotation	600 x 1200 dpi
Vertical output over 2000 mm	300 x 1200 dpi
Vertical output over 4000 mm	150 x 1200 dpi

- Use Intensity Control in Printer Settings for overall density adjustment.
- Use Color Adjustment if one color is too dark or too light.
- Before the main artwork, it is recommended to print a CMYK color bar to prevent the printhead from drying during idle time.

7. Troubleshooting

7.1 Update the PC Software

- The software package is compressed. Extract it directly before use.
- The configuration file name is MyConfigH1.INI.
- Copy this configuration file from the old program folder to the new program folder when upgrading.

7.2 Update Board Firmware

- Firmware is stored on the TF card on the back of the control board.
- Extract the firmware package and copy the file to the root directory of the TF card.
- Reinsert the TF card into the board after copying.

7.3 Printhead Does Not Perform Test Spray

- Check whether the board signal LEDs are flashing. If not, the board may not have started. Re-seat the board and restart the machine.
- Check whether the 5.9 V indicator is lit. If it is off, unplug the printhead FPC cable and test again. If the LED returns, the cable or printhead may be shorted; if not, the board may be faulty.
- Press the test-spray button. The white indicator on the purple module should flash quickly. If it does not, inspect the button and board connection.
- Move the printhead to a neighboring known-good board for comparison. If the printhead works on the other board, replace the original board. If not, replace the cable and test again. If the problem remains, replace the printhead.

7.4 Board Cannot Connect to the PC

- Verify that the PC IP address is within 192.168.0.100-192.168.0.200 and that the subnet mask is 255.255.255.0.
- Unplug and reconnect the network cable. The local network adapter should show cable disconnected when unplugged and unrecognized network when reconnected.
- Check whether the network switch is powered on and whether the link lights are normal.
- If necessary, connect the PC directly to the main control board to isolate the network switch.
- If board LEDs are not flashing, the board may not have started correctly.

7.5 Printhead Can Test Spray but Will Not Print the Image

- Check the status information shown at the bottom and right side of the printer control software. If the main board data does not change, inspect the main control board connection.

- Start the conveyor and observe Run Distance. If it decreases instead of increasing, swap the encoder A/B signals. If the value is far from the actual distance, inspect encoder wiring.
- Check the second column of each board status entry. If the values do not change, inspect the RS-485 bus wiring.
- Observe whether Print Count increases when the material passes the sensor. If not, the photoelectric sensor is not detecting the sheet correctly.
- When material is present, the sensor red LED should be on. When material is absent, it should be off. Adjust the green threshold accordingly.

7.6 No Board Response After Sending Data

- Check whether the image length exceeds 2 m or 4 m. For long files, choose a lower print resolution as listed in the RIP section.
- Recreate the file if necessary, and then power-cycle the board and resend the data.

7.7 Some Printheads Do Not Print

- Resend the data.
- Check whether the corresponding board LED is on and flashing normally.
- Verify the DIP switch code and whether the board appears online in software.
- If the board information is missing in software, inspect the RS-485 cable and communication status.

7.8 Misalignment Between Printheads

- If the offset is fixed, adjust X-Adj and Y-Adj values in the printer software.
- If the offset happens occasionally, check for material dragging, contact with the carriage, or conveyor slippage.
- If the error appears near the leading edge, check for overly long media, insufficient pinch force, or rear feeding interference.

- If the error appears near the trailing edge, check whether the receiving side needs a pressure roller and whether the output path is level and unobstructed.
- If the offset is random, inspect material flatness, vacuum performance, encoder installation, encoder contact surface cleanliness, and belt tension consistency.

7.9 White Lines in the Print

- The printhead may require cleaning. Perform a test spray or purge first.
- If necessary, wipe the printhead surface gently with a wet lint-free cloth and test again.
- Check whether nozzle masking or shielding parameters are set correctly, or reinstall the printer control software.

7.10 Large Area Missing in One Color

- Air may be trapped in the printhead. Remove air either on site or by factory service.
- For on-site venting, connect a syringe to the vent port, draw ink first, then press ink back in to purge the internal air.

7.11 One or More Segments Missing All Colors

- The control board or printhead may be damaged.
- Move the printhead to a neighboring working board. If printing becomes normal, the original board is faulty.
- If the problem remains, replace the FPC cable and test again. If there is still no recovery, replace the printhead.

8. Unboxing and First Power-On Procedure

Required software: printer control software, Maintop RIP software, and Adobe Photoshop (PS).

1. Open the wooden crate, remove the protective film, inspect the machine appearance, and verify that the accessories are complete.
2. Connect the power cord and network cable between the machine and the computer, then turn on the machine.
3. Open the printer control software, change the PC IP address as required, and confirm that the computer is connected to the printer.
4. Fill ink according to the color markings on the ink bottles.
5. Press the board test-spray button or use the ink-press function in software. Check whether the test pattern is complete.
   - If ink output is incomplete, wipe the printhead with a wet tissue or lint-free cloth.
   - If there is ink stringing, wipe the surface with a dry tissue or lint-free cloth.
   - If ink breaks during printing, inspect the ink chamber for trapped air and vent it in time.
6. Adjust printhead height according to product thickness. Move a sample product under the sensor and verify that the red sensor light turns on when the product is present and off when it is removed. (This is usually set at the factory and normally does not require change.)
7. Measure the product with a tape measure or caliper, adjust artwork size and image position in Photoshop, import the file into Maintop, set the actual size, choose the curve, and export the PRN file.
8. Before printing, use the printer control software to set the print position, including front blank, left, right, or centered alignment. Place the product in the matching physical position.
9. Turn the speed control knob to a suitable speed, place the product, and start printing.
10. If an image problem appears during printing, turn off the speed control switch immediately and reduce the knob to the minimum position to stop the conveyor belt. Check the nozzle test condition before resuming production.

11. After printing, lower the printhead onto the maintenance pad and power off the machine.

9. Daily Operating Procedure

1. At the beginning of each workday, print a test strip for every printhead.
2. If any nozzles are missing, gently wipe the printhead surface with a dust-free cloth dampened with warm water, then print another test strip to confirm.
3. If missing nozzles remain after wiping, press the test-spray button for about three seconds and move the absorbent paper back and forth to restore the pattern.
4. Use a scrap board or other waste substrate to print solid color blocks. Repeat the test print at least twice before starting formal production.
5. At the end of the day, lower the printhead onto the maintenance pad to seal it and retain moisture.
   - Use a maintenance pad that matches the size of the printhead surface.
   - Align the printhead carefully with the pad before lowering it.
   - Lower only until the printhead is gently pressed onto the pad and sealed.

10. Maintenance and Care

10.1 Dust Prevention

- Place the printer in a dust-free room with approximately 70% humidity and a temperature around 25 C when possible.
- Avoid direct airflow onto the machine.
- When the printer is not in use, keep the sealing or maintenance pad in place to prevent dust from entering the printhead.
- Even after shutdown, keep the printhead sealed to maintain humidity and reduce the risk of dried ink.

- Maintain stable room temperature and humidity and operate the machine regularly.

10.2 Cleaning

- Clean the exterior of the machine regularly, preferably once a week.
- Use a soft damp cloth for exterior cleaning. Only use neutral cleaning liquids such as water on painted surfaces.
- Open the covers and carefully remove dust from the inside of the printer.
- If ink or dirt is present on the printhead or internal plate surfaces, wipe it carefully with alcohol where appropriate.

10.3 Regular Inspection

- Lubricate the lifting screw with grease once every month.
- Lubricate the belt-drive chain with grease once every month.

10.4 Avoid Overloading and Unsafe Contact

- Do not place foreign objects on top of the printer, as they may affect cooling or fall into the machine.
- Do not allow liquid to splash inside the printer.
- Do not place your hands inside the machine or touch moving parts or printheads while printing.
- Do not place objects heavier than 30 kg on the printing platform.
- Do not place objects underneath the printing platform, as this may affect lifting movement.

10.5 Printhead Maintenance

- Do not touch the printhead electrical connector with your fingers to avoid oxidation.
- During installation, align the connector carefully. Never force the connector into place.

- Keep ink, cleaning liquid, and other contaminants away from the printhead connector. Clean contaminated connectors with alcohol.
- Maintain good heat dissipation during operation, otherwise the printhead circuit may be damaged.
- Static electricity can seriously damage printhead electronics. Remove static from your body before touching the printhead or control board.
- If short lines appear during printing, pause the job and perform automatic cleaning. If the printhead is severely clogged, power off first, then clean with dedicated cleaning solution and draw out the remaining ink. Severe cleaning may cause color differences.
- Always use a dedicated printhead cleaning solution.
- Most nozzle blockage is the result of long-term accumulation. Keep the printhead in good operating condition at all times.
- Clean printheads in use regularly. If a printhead will not be used for a long period, remove it and store it in a sealed condition.