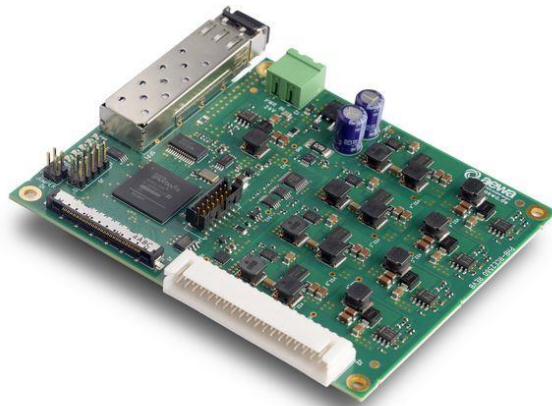




PHB-RCE2560
SEIKO RCE2560
PRINTHEAD DRIVER BOARD
HARDWARE USER GUIDE



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Version 1.0

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1 Overview

PHB-RCE2560 is a printhead driver board developed by AEWA for the Seiko RCE2560 printhead. It interfaces with the AEWA Print Manager Board (APMB) through an optical fiber connection, ensuring data transfer is immune to electromagnetic interference. Designed with the latest technologies, PHB-RCE2560 optimally manages all digital, analog, and power interfaces of RCE2560 printhead.

Features

- Supports RCE2560 printhead from Seiko.
- Optical fiber interface for long distances, 600 Mbits/sec.
- Generates accurate printhead driving voltages which are factory programmed. Printhead voltages can be further adjusted based on the ink type.
- Printhead voltage adjustment according to temperature.
- Ensures correct voltage sequencing during power ON and OFF cycles.
- Supports gray scale printing with up to 15 levels.
- Maintains continuous nozzle activity through tickling pulse generation logic.
- Features printhead temperature monitoring and over-temperature protection.
- Firmware update capability through the optical connection.
- Single 24V-32V input voltage featuring reverse polarity, overcurrent, and surge current protection.
- SHA encryption to ensure firmware copy protection.
- Small footprint measuring 92 mm by 115 mm.
- Compatible with the APMB Software Development Kit (SDK) for C++ and .NET, supporting both Windows and Linux operating systems.
- Compatible with the ApmbWave fire waveform designer which includes a dropwatcher interface.
- Fully compatible with APRINT RIP and Print software.



2 Board Components

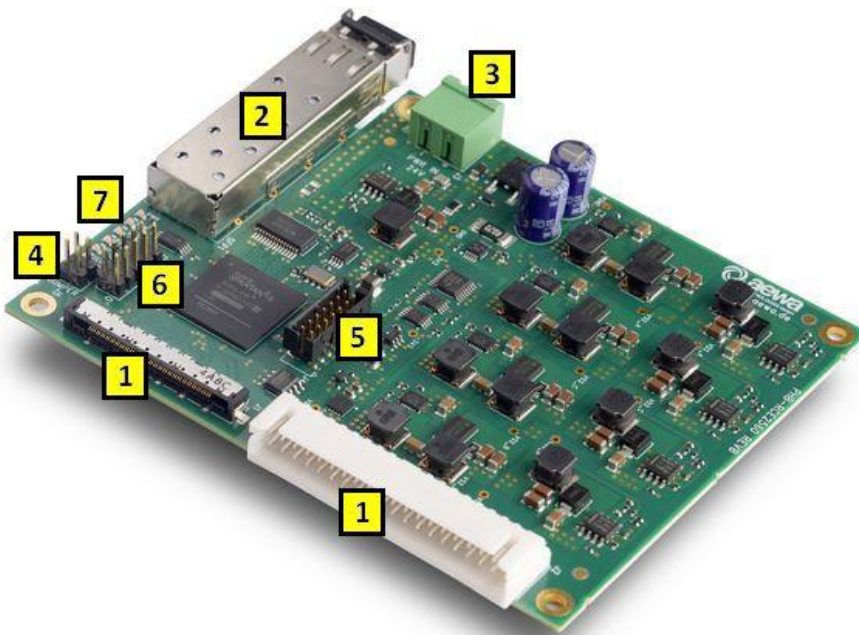


IMAGE 1 – PHB-RCE2560 BOARD COMPONENTS

2.1 Printhead Connector (J1 and J2)

The PHB-RCE2560 printhead driver board facilitates data communication with the printhead via a 51-pin, 0.5 mm pitch flat flexible cable (FFC) at the J1 connector. The J2 connector serves as the 40-pin power interface.

For the appropriate data and power cable part numbers, please refer to the ordering information section.

Important Safety Note: Always ensure the printhead board is powered off before connecting or disconnecting the printhead cable to avoid damaging the printhead and/or the printhead board.

2.2 Optical Interface (SFP1)

The PHB-RCE2560 printhead driver board interfaces with the AEWA Print Manager Board (APMB) via an optical fiber connection.



This setup utilizes a Small Form-factor Pluggable (SFP) transceiver module, which is included with the PHB-RCE2560. However, the optical fiber cable itself is not provided, as the required length varies depending on the specific system configuration.

For optimal performance, the following fiber optic cables are recommended:

Fiber Cable Type	Distance between PHB and APMB
OM2, 62.5µm/125µm, Multimode fiber, with LC connectors	0.5-300m
OM3, 50µm/125µm, Multimode fiber, with LC connectors	0.5-500m

TABLE 1 - SUPPORTED OPTICAL FIBER CABLES

The fiber cable is connected to an SFP transceiver module and plugged into the SFP connector as seen in the following picture:



IMAGE 2 - OPTICAL FIBER CONNECTION WITH SFP MODULE

2.3 Power Input Connector (J3)

The J3 connector on the PHB-RCE2560 printhead driver board is a 2-port terminal block designed for power input. It supports both switching mode and analog AC/DC power converters, depending on the application requirements. For improved efficiency and reduced power losses, using converters equipped with Power Factor Correction (PFC) is recommended.

The table below provides a guideline for estimating total current usage:

Parameter	Value
Vin-max: Input voltage maximum range	23V-32V
Vin: Recommended input voltage	24V or 28V
Vph-max : Maximum printhead voltage (*)	Vin - 3V



Max. current consumption, printhead connected, all nozzles firing with maximum speed	9.0A @24V
Max. current consumption, printhead connected, not printing	0.5A @24V
Max. current consumption, printhead not connected	0.25A @24V

TABLE 2 - INPUT POWER SPECIFICATIONS

Current consumption values provided are approximate and derived from printhead manuals. These values may vary depending on factors such as temperature, printhead voltage, drop settings, and waveform configurations. For precise and reliable values, please consult Seiko directly.

***Important Note:** Maximum printhead voltage is limited to 3V below the input voltage. With a 24V input, the maximum is 21V. For higher printhead voltages, switch to a 28V input.

2.4 Jumper (J5)

J5 is a 2-port jumper. Refer to the following table for its functions:

Jumper 1	Open	Closed
Jumper 0	No function.	No function.
Jumper1	No function.	No function.

TABLE 3 – JUMPER FUNCTION TABLE

Note: The jumper currently has no function implemented and is reserved for future use.

2.5 JTAG Connector (J4)

This connector is intended for internal use by AEWA for testing, debugging, and firmware updates. The PHB-RCE2560 firmware can also be updated via the optical interface using ApmbDiag or APRINT software.

2.6 Test Connector (J6)

Test Header. For AEWA internal use only.

2.7 LEDs

There are 6 diagnostics LEDs on the PHB-RCE2560 PCB.

The **PWR** LED is connected to the 3.3V voltage rail and turns ON when the board power is stable and functioning correctly.



The **DONE** LED turns ON when the FPGA firmware is successfully loaded; otherwise, none of the features of the PHB-RCE2560 will be available.

The **FIRE** LED turns ON when the printhead nozzles are active and printing, and switches OFF when printing stops.

The **RX** LED turns ON when the AEWA Print Manager Board is transmitting printing data to the PHB-RCE2560 board; otherwise, it remains OFF.

The **SEC** LED remains OFF when the SHA encryption keys programmed into the device are correct. If the SEC LED turns ON, the printing functions of the PHB-RCE2560 board are disabled.

The **TEST** LED serves as an error indicator. The following table details the errors reported by the TEST LED:

TEST LED Behavior	Meaning
OFF	No error. Image data stream is counting data.
ON	No error. Image data stream is not counting data.
Blink once, than OFF for 1 second	Checksum Error: Incoming data packets from the Print Manager Board contain CRC checksum errors.
Blink 2 times, than OFF for 1 second	Data packaging error: Incoming data packets from the Print Manager Board contain an incorrect number of bytes.
Blink 3 times, than OFF for 1 second	Speed error: The printing speed or row-to-row delay setting is too high
Blink 4 times, than OFF for 1 second	Waveform error: Either no waveform is loaded, or the loaded waveform contains errors.
Blink 5 times, than OFF for 1 second	ULVO error: Input under-voltage detected.
Blink 6 times, than OFF for 1 second	Printhead voltages are switched off due to an over-temperature, overcurrent, or voltage error condition.

TABLE 4 – TEST LED FUNCTIONS

More detailed error information can be retrieved from the PHB using the APMB SDK or APRINT software.



3 Mechanical Dimensions

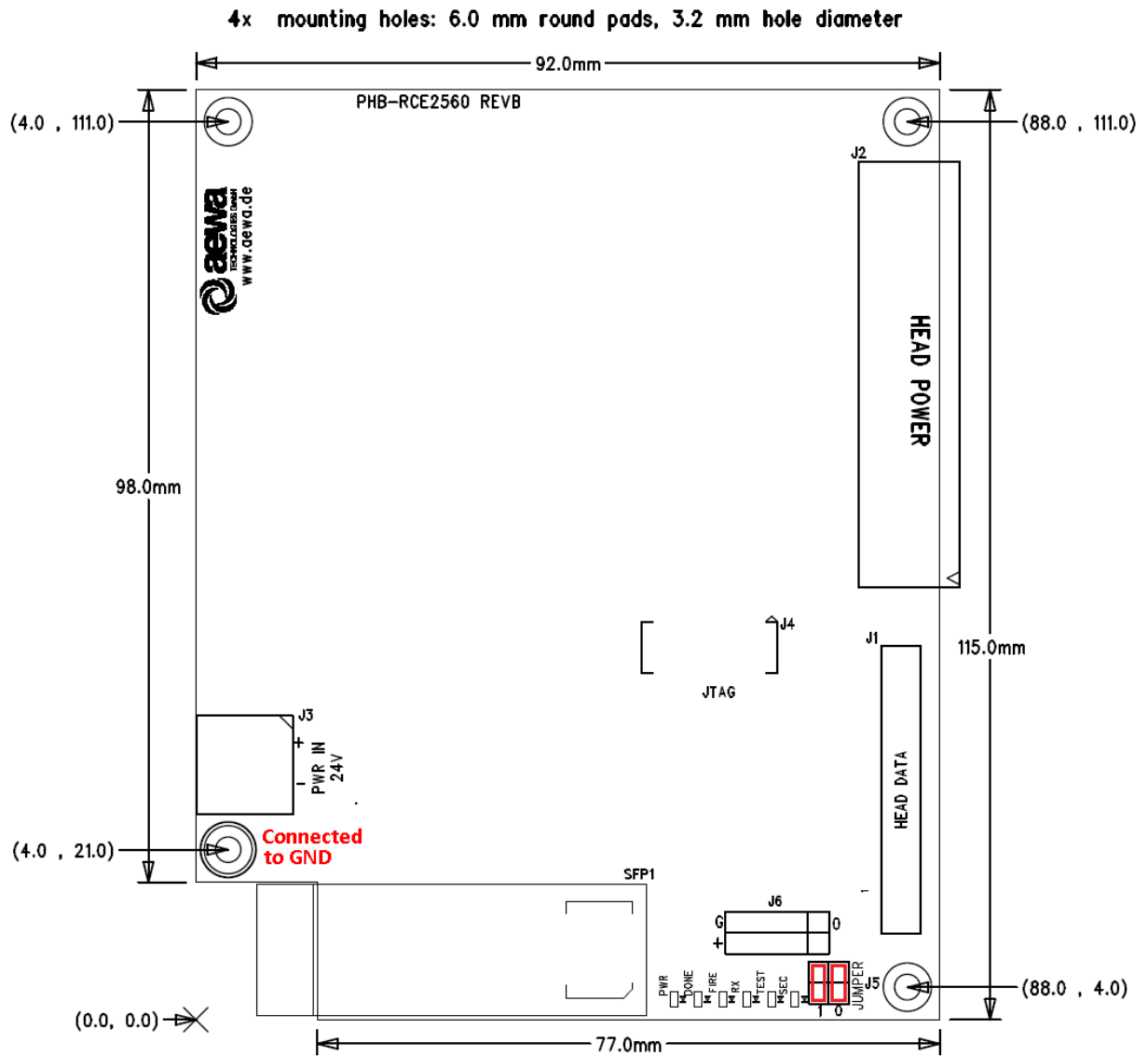


IMAGE 3 – PHB-RCE2560 MECHANICAL DIMENSIONS



4 Connectors and Cables

PHB-RCE2560 is equipped with high-quality industrial terminal blocks and connectors for power and input/output connections. The following table provides a list of the PCB connectors along with their corresponding mating cable connectors.

Description	PCB Side	Mating Side
J2, Power input connector	PCB header, 5.08 mm raster, 2 poles, MSTBA 2,5/ 2-G-5,08 Manufacturer: Phoenix Contact Order No: 1757242	Plug, 5.08 mm raster, 2 poles, MSTB 2,5/ 2-ST-5,08 Manufacturer: Phoenix Contact Order No: 1757019 or equivalent
J1, Printhead data connector	FFC/FPC PCB Connector, 51-pin, 0.5 mm pitch Manufacturer: Hirose Electric Co Ltd Order No: FX16M2-51S-0.5SH	FFC/FPC Cable Connector, 51-pin, 0.5 mm pitch Manufacturer: Hirose Electric Co Ltd Order No: FX16M2-51P-HC
J2, Printhead power connector	PCB Header, 40-pin, 2.5mm pitch, right angle. Manufacturer: Hirose Electric Co Ltd Order No: DF1BZ-40DP-2.5DS	Cable connector, wire housing, 40-pin, 2.5mm pitch Manufacturer: Hirose Electric Co Ltd Order No: DF1B-40DS-2.5RC

TABLE 5 – CONNECTORS AND CABLES

AEWA supplies printhead data and power cables for the J1 and J2 connectors. Refer to the following section for ordering information.

5 Ordering Information

Order No	Item
PHB-RCE2560	PHB-RCE2560 board
PCL-FX16M2-51-50	Printhead data cable. 50 cm long.
PCL-DF1BZ-40-50	Printhead power cable. 50 cm lonn

TABLE 6 – ORDERING INFORMATION

