



**PHB-RC1536 - SEIKO  
PRINTHEAD DRIVER BOARD  
HARDWARE USER GUIDE**

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Version 1.3

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# 1 Overview

PHB-RC1536 is printhead driver board for SEIKO RC1536 printhead. It connects to AEWA Print Manager Board (APMB) via optical fiber cable which makes the data transfer immune to electromagnetic interference. Alternatively it can connect to the APMB through a 20-pin parallel flat cable.

## Performance

- Optical fiber interface for long distances: 600 Mbits/sec.
- Parallel interface for short distances: 600 Mbits/sec
- Maximum Printing Speed, RC1536 printhead: 120 KHz (printhead max. speed is 37 KHz).

## Features

- Supports SEIKO RC1536 printhead (360 dpi, 1536 nozzles).
- Generates accurate printhead driving voltages which are factory programmed. Printhead voltages can be further adjusted for special ink types.
- Printhead voltage control with respect to temperature.
- Correct voltage sequencing during power ON and power OFF.
- Gray scale printing, up to 16 levels.
- Printing waveform is generated and programmed with ApmbWave software and stored in the EEPROM.
- 4 different tickle pulse generation logic during printing and not printing phases to keep nozzles always active.
- Special logic to reduce crosstalk between nozzles even when printing with very big drops.
- Printhead temperature monitor, over temperature protection.
- Firmware update over optical or parallel interface.
- Synchronisation signal for dropwatcher.
- Single 48V input voltage with reverse polarity, over current and surge current protection.
- SHA-1 Encryption for firmware copy protection.
- Small footprint, 110mm x 80mm.
- Easy software integration with APMB SDK which supports native C++ and .NET programming languages such as C# or Visual Basic.
- Compatible with APRINT RIP and print software.



## 2 Board Components

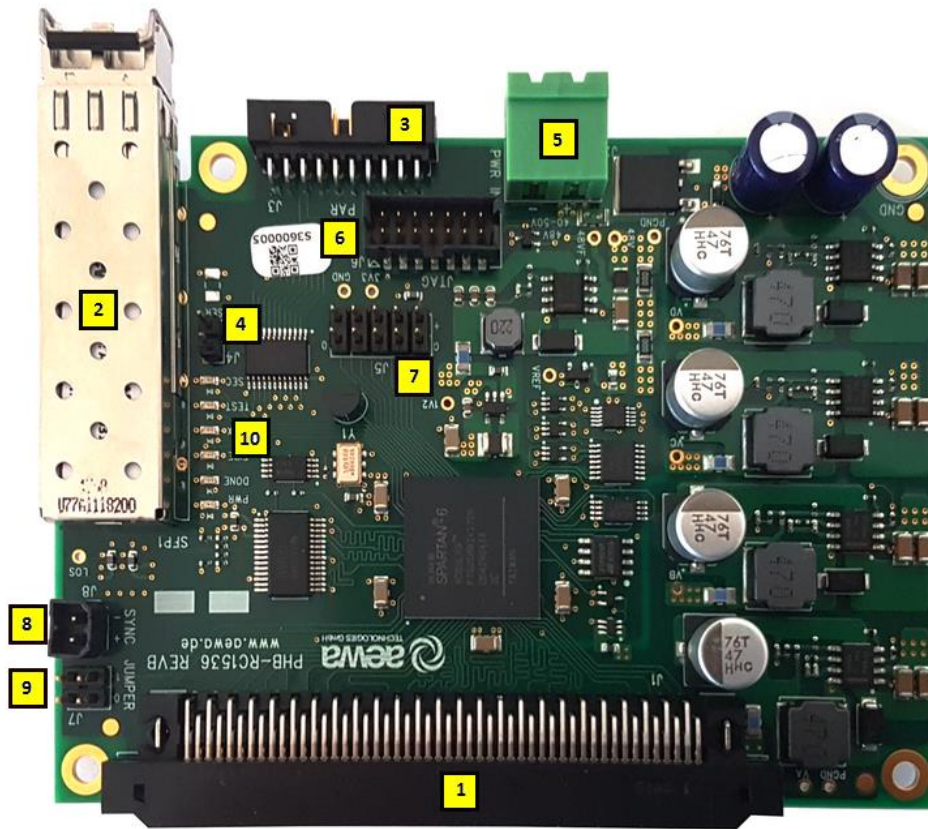


IMAGE 1 – PHB-RC1536 BOARD COMPONENTS



## 2.1 Printhead Connector (J1)

PHB-RC1536 connects to the printhead with J1 connector through a 100 pin flat cable. Maximum recommended cable length is 50 cm. Please see “Connectors and Cables” chapter for the manufacturer and part numbers of supported components.

**IMPORTANT: Don't connect or unconnect the printhead cable when the printhead board is powered on. This may damage the printhead and/or the printhead board.**

## 2.2 Optical Interface (SFP1)

PHB-RC1536 connects to AEWA Print Manager Board (APMB) over optical fiber cable. Fiber cable is connected to an SFP (small form factor pluggable) transceiver module and plugged into the SFP connector.

PHB-RC1536 is delivered with SFP transceiver module, but the optical cable is not included since the distance from the PHB-RC1536 to APMB differs from system to system.

Following table shows the fiber cables supported.

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

TABLE 1 - SUPPORTED OPTICAL FIBER CABLES

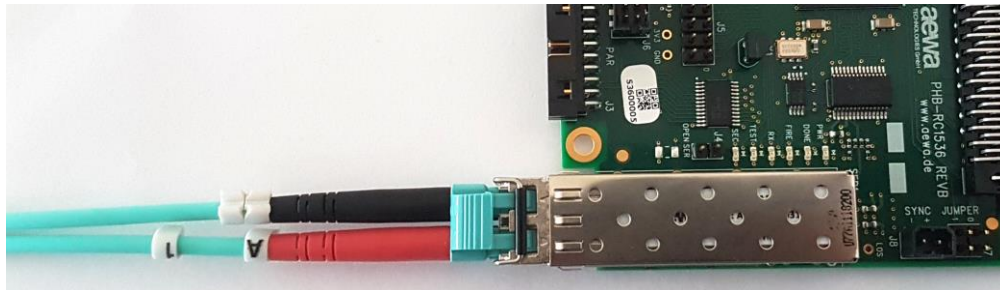


IMAGE 2 - OPTICAL FIBER CONNECTION WITH SFP MODULE

## 2.3 Parallel Interface (J3)

J3 is parallel flat cable connector to the APMB. Please see “Connectors and Cables” chapter for the manufacturer and part numbers of supported connectors and cables.

Note that not all APMB types support parallel interface.



## 2.4 Jumper (J4)

J4 single port jumper selects between serial and parallel interface. If it is open optical fiber interface is activated. If it is closed parallel interface is used to connect to the APMB.

## 2.5 Power Input Connector (J2)

J2 is a 2-port terminal block connector for power input. Switching mode or analog AC/DC power converters can be used. Converters with PFC feature is recommended. Following table can be used to estimate the total current usage.

Parameter	Value
<b>Input Voltage</b>	48V (40V - 50V)
<b>Max. current consumption, RC1536 printhead, all nozzles firing with maximum speed, printhead voltage 32V</b>	2.6A @48V
<b>Max. current consumption, RC1536 printhead, all nozzles firing with maximum speed, printhead voltage 24V</b>	2.2A @48V
<b>Max. current consumption, RC1536 printhead, 50% duty with maximum speed, printhead voltage 24V</b>	1.2A @48V
<b>Max. current consumption, not printing</b>	0.2A @48V

TABLE 2 -INPUT POWER SPECIFICATIONS

## 2.6 JTAG Connector (J6)

This connector is for internal use by AEWA for testing, debugging and updating the firmware. PHB-RC1536 firmware can also be updated over optical or parallel interface using ApmbDiag or APRINT software.

## 2.7 Test Connector (J5)

Test header. Only for AEWA internal usage.



## 2.8 Sync output (J8)

Sync output to drop-watcher for ink analyzing and waveform generation purposes. Only for SEIKO internal usage.

## 2.9 Jumper (J7)

2-port jumper. Currently not used. Leave open.

## 2.10 LEDs

There are 6 diagnostics LEDs on the PHB-RC1536 PCB.

**PWR** LED is connected to the 3.3V voltage rail. It is ON when board power is OK.

**DONE** LED is ON when FPGA firmware is loaded correctly, otherwise none of the features of PHB-RC1536 is available.

**FIRE** LED is ON when printhead nozzles are active and printing. It switches OFF when printing is stopped.

**RX** LED is ON when AEWA Print Manager Board is sending printing data to PHB-RC1536 board, otherwise it is OFF.

**SEC** LED is OFF when SHA-1 Encryption keys programmed into the device is correct. If this LED is ON, printing functions of the PHB-RC1536 board are disabled.

**TEST** LED is error indicator LED. Following table shows errors reported by 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 packages from Print Manager Board have CRC checksum errors.
Blink 2 times, than OFF for 1 second	Data packaging error. Incoming data packages from Print Manager Board have wrong number of bytes.
Blink 3 times, than OFF for 1 second	Speed error. 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 has errors.
Blink 5 times, than OFF for 1 second	No meaning. Reserved for future use.



Blink 6 times, than OFF for 1 second	Printhead voltages are switched off due to an over temperature or voltage error condition.
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**TABLE 3 –TEST LED FUNCTION**

Same errors can also be read by APMB software. More error types might be added in future with firmware updates.





### 3 Mechanical Dimensions

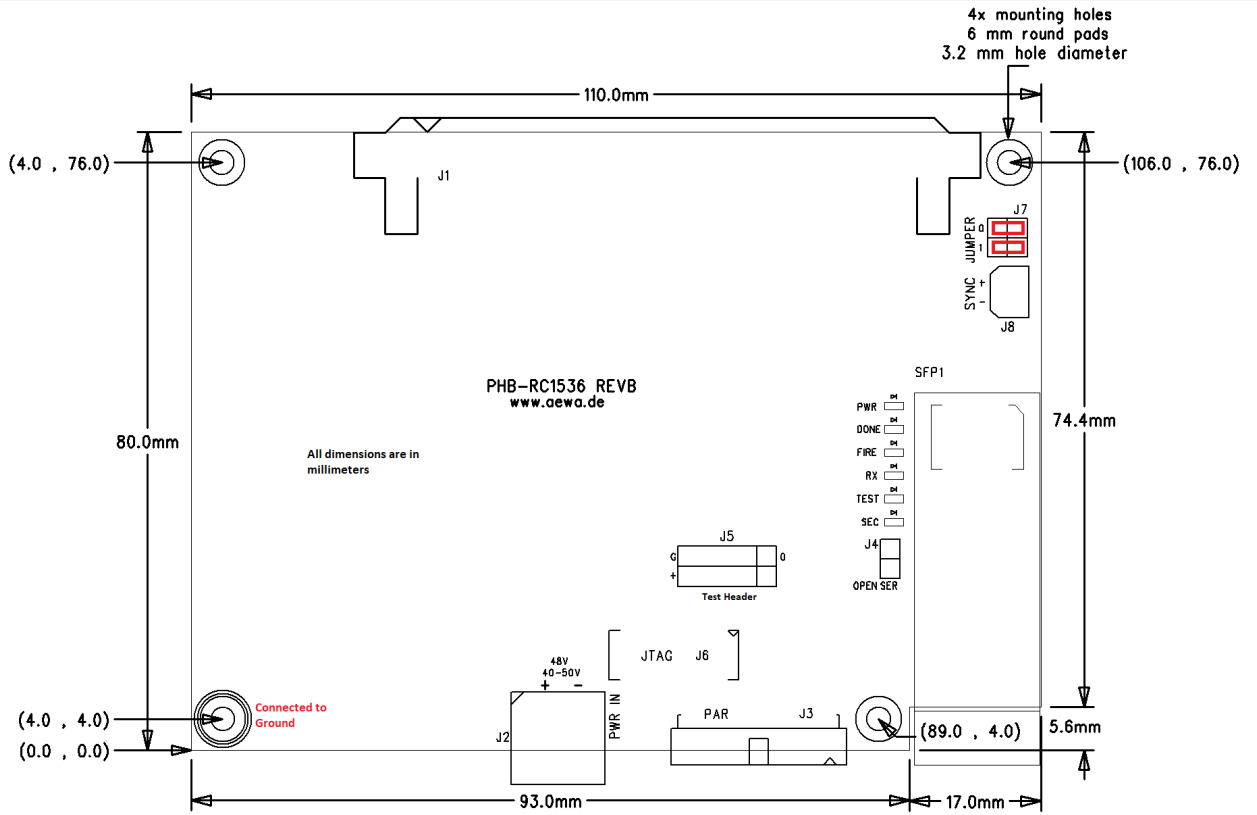


IMAGE 3 – PHB-RC1536 MECHANICAL DIMENSIONS



## 4 Connectors and Cables

PHB-RC1536 is assembled with very high quality industrial terminal blocks and connectors for power and input/output. Following table lists the PCB connectors and their mating cable connectors.

Description	PCB Side	Mating Side
J1, printhead connector	100-pin PCB connector Manufacturer: HIROSE Part Number: FX2B-100PA-1.27DSL	100-pin flat cable connector Manufacturer: HIROSE Part Number: FX2B-100SA-1.27R or equivalent
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
J3, Parallel interface connector	PCB header, 2mm raster, 20 poles Manufacturer: Molex Order No: 87833-2020	Plug, 2mm raster, 20 poles Manufacturer: Molex Order No: 87568-2093 or equivalent
Cable for J3		Flat ribbon cable, 20 conductors Manufacturer: 3M Order No: 82-28-3020 or equivalent Maximum 30cm
J8, Sync output	PCB header, 2.5mm raster, 2 poles Manufacturer: Phoenix Contact Order No: 1778557	Plug, 2.5mm raster, 2 poles Manufacturer: Phoenix Contact Order No: 1778832 or equivalent

TABLE 4 – CONNECTORS AND CABLES



## 5 Ordering Information

Order No	Item
PHB-RC1536	For RC1536 printhead.
PHB-RC1536-CC	PHB-RC1536 PCB with conformal coating for harsh environments.
RCK1536-XX	Assembled cable for RC1536 printhead. XX is the length of the cable in centimeters between 5 and 50.

**TABLE 5 – ORDERING INFORMATION**

