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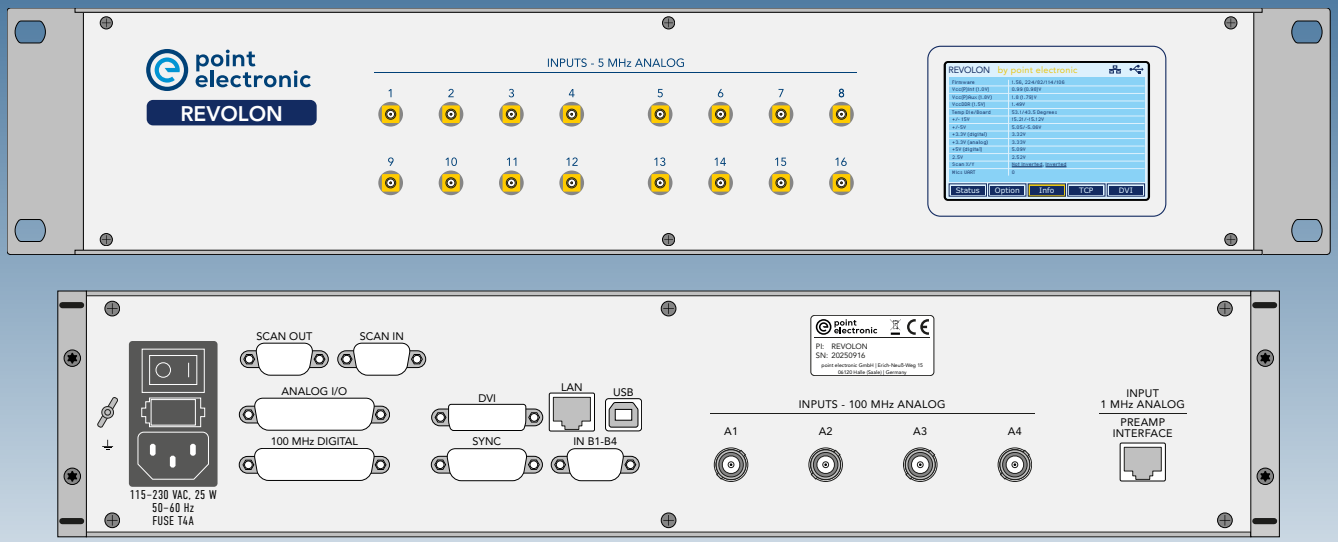

REVOLON

Integrated scan controller with scan generator and image acquisition for transmission electron microscopes (TEM)

User manual

Document version: 2.2

Date of issue: 2026-10-28

Document language: EN

Translation from German original

point electronic

Use Anybody working with/on the device has to have read and understood the relevant parts of this document.

Access The staff working with the device has to have constant access to this document to prevent handling errors and guarantee trouble-free operation.

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Up-to-datedness Every endeavor has been made to make sure that the information contained in this document is complete and correct at the printing date. This document describes all units and functions known of at the current point of time.

Brand names, company names and product names The brand names, company names and product names used in this document are the brand names, company names, or product names of the respective manufacturers and/or owners.

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Product information Product: REVOLON
Description: Integrated scan controller with scan generator and image acquisition for transmission electron microscopes (TEM)
Name: PE-REVOLON-TEM-SCAN
Manufacturer: point electronic GmbH

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1 Introduction

Chapter overview

Purpose This chapter contains information to simplify working with this document.

Contents This chapter contains the following information:

› Validity of this document 6
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Validity of this document

Validity for device variants

This document applies to the following devices in the REVOLON product series up to 2027:

Device	Part number
REVOLON scan controller (MICS-4 version, 19-inch rack-mount device, 2U)	1027 0001 0002
REVOLON scan controller (MICS-8 version, 19-inch rack-mount device, 2U)	1027 0001 0003
REVOLON scan controller (MICS-16 version, 19-inch rack-mount device, 2U)	1027 0001 0004

Validity for factory-default state

This document applies to the devices listed above in the condition in which they were placed on the market.

If the end user subsequently adds parts or makes modifications to the devices listed above, this will result in the complete invalidation of this document.

User groups of this document

Operators

"Operators" are persons with right of disposal over the device using this right for purchase or other purposes.

Technical staff

"Technical staff" are those persons that the operators entrust with tasks related to use and operation. Technical staff are trained by the operators to carry out their assigned tasks and are informed on the potential hazards that may arise due to improper handling.

Technical staff need to undergo a training by point electronic GmbH or a partner company of point electronic GmbH covering the following topics:

- Handling of the connected TEM
- Areas of application and operation of the device and the associated software
- Handling the connected peripherals
- Basic maintenance tasks and troubleshooting

Service technicians

"Service technicians" are staff members whose specialist training, knowledge and experience as well as familiarity with the relevant safety regulations mean they are able to assess the tasks they have been entrusted with and anticipate potential hazards.

Service technicians may be:

- Employees of point electronic GmbH or
- Employees of partner companies of point electronic GmbH

Structure of this document

Outline This document is structured into chapters which are organized by technical aspects.

Numbering The chapters are numbered by Arabic numerals. Chapters may be structured in sections. Sections are numbered as second numbering level (e. g. 3.1). Sections are used to structure large chapters into sub-chapters.

All pages of this document are numbered consecutively.

Overviews Each chapter and section contains an overview detailing contents and page numbers. This allows for direct access to a topic and independent use of single parts of this document.

Related information Related information within the user guide is marked by the note “Continuation next page …” resp. “... Continuation”. Please pay attention to the completeness of thus marked information when copying parts of the document.

Cross references The content of this document is structured by topics. If further information on one topic may be found elsewhere in the document, the relevant chapter and page are pointed out.

Representations in this document

Illustrations Illustrations used in this document do not always contain all details or special cases. They only represent the relevant information.

Icons The following icons are used to mark certain information visually:

Icon	Meaning
	Notice For example: The selected parameter will not be inserted in the parameter order.
	Reference to another part of this guidebook For example: see "Cross references" on page 8
	Use of a tool For example: Screwdriver TX 10

Notes Important notes are marked as follows:

NOTICE

Mind the notices in this document!

Notes explain relations that even for expert users might not be evident at first glance.

The neglect of a note is no direct security risk. However, it can lead to disturbances in the operating procedure.

Identification of the warning notices

Purpose

This document includes warning notices that may lead to serious consequences if disregarded. Warning notices are not only listed in the “Safety regulations” chapter, but especially in places where hazards for people, equipment and operation may arise.

Identification of hazards

There are four classes of hazards. These classes are indicated by specific signal words and colors. They include the following:

Signal word	Meaning
⚠ DANGER	Warning notice, which if disregarded will surely or very likely result in death or serious injury.
⚠ WARNING	Warning notice, which if disregarded will probably result in serious injury, permanent damage to health or serious property loss.
⚠ CAUTION	Warning notice, which if disregarded will probably result in injury or property loss including financial losses due to operational impairment.
ATTENTION	Warning notice, which if disregarded will probably result in property loss including financial losses due to operational impairment.

Topics relevant to service

Service contact

For detailed information and questions about topics such as installation and configuration, please contact our service department at:

service@pointelectronic.de

Further documents

Additional documents with descriptions and instructions for installation, configuration, and additional software tools are available in protected public areas.

If you require access to further documents, please contact our service department at:

service@pointelectronic.de

2 Safety regulations

Chapter overview

Purpose This chapter contains safety information relating to the protection of persons as well as safe and fault-free operation. All user groups of the hardware and software must be aware of and follow these safety provisions.

Contents This chapter contains the following information:

› Introduction 13
› Basic hazards 14
› Staff and qualifications 15
› Responsibility of the operating company 16
› Working in a safety-conscious manner 17
› Modifications and alterations 18
› Maintenance work 19
› Cleaning 21
› Environmental protection 22

Introduction

Reliable and safe operation

The reliable and safe operation of the device depends on carefully implementing the operating, setup and maintenance tasks.

Observance of the safety instructions

Always observe and follow the safety instructions and accompanying code of conduct when handling the device and the software. Always point out the instructions and code of conduct to staff working with the hardware and software.

Generally applicable safety regulations (such as accident prevention and environmental protection regulations, etc.) must also be observed.

Consequences arising from failure to observe the safety instructions

Failure to observe the safety instructions can result in death or serious injury of personnel and damage or destruction of the hardware components.

Basic hazards

Definition The device meets the current state of the art as well as the applicable safety regulations. The device has been tested at the manufacturer's site and is delivered in a state safe for operation.

Basic hazards are residual risks that may arise despite proper and safety-conscious use of the device.

⚠ DANGER

Risk of death by electrocution!

Body contact with live parts may lead to death or serious injuries.

- Turn off the mains voltage before any works on the device.
- Secure the device against unintentional restart.
- Works on the device may only be executed by service technicians.
- Never operate the device when the mains cable is damaged.

⚠ WARNING

Risk of injury due to improper use!

Improper use of the device may lead to injury.

- Always protect the device from extreme heat (excessive sun exposure, close proximity to open fire or heating equipment) during operation and storage.
- Avoid hard impacts that might damage parts of the device.

Staff and qualifications

Permissions Works on/with the device may only be performed by technical staff and/or service technicians (see “User groups of this document” on page 7).

Note the legally prescribed minimum age for personnel.

Only qualified electricians or technical staff under guidance and supervision of a qualified electrician may perform works on electrical components of the device in accordance with the electrotechnical regulations.

Staff undergoing training or instructions or persons taking part in general vocational training programs may only operate the device under the continuous supervision of technical staff.

Responsibility of the operating company

Condition of the device and/or overall system

The operating company shall ensure that all safety and the protective devices are fully functional at all times. This equipment should therefore be checked periodically for functionality and completeness.

This applies to the device as single component as well as the overall system into which the device is integrated as a subcomponent.

Internal measures to avoid hazards

The operating company must be aware of the applicable industrial safety regulations and use a risk assessment to determine any additional hazards that may arise from the special working conditions at the device's site of operation. Internal instructions for avoiding the identified hazards should then be drawn up.

Throughout the entire operating period of the device, the operating company must examine and determine whether the supplied operating instructions comply with the current status of applicable regulations.

Staff

Regarding the staff authorized or trained by the operating company, the operating company carries the following responsibilities:

- The necessary training and instruction of staff must be guaranteed.
- The powers and responsibilities of staff for installation, operation, maintenance and service must be clearly defined and documented.
- This document must be kept in the immediate surroundings of the device and must be readily accessible to staff.

Working in a safety-conscious manner

Accident prevention and environmental protection

In addition to the information in this document, also note the generally applicable statutory and other binding regulations relating to accident prevention and environmental protection.

This may include, for example:

- dealing with hazardous substances
- wearing the necessary and prescribed personal protective clothing
- observance of and compliance with all national and regional industrial safety regulations
- observance of and compliance with all internal working, operating and safety regulations

Content of this document

Prior to operation, all staff members assigned to work on the device must have read and understood the relevant parts of this document, especially the chapter “Safety regulations”.

Modifications and alterations

No unauthorized modifications

Any unauthorized modifications to the device exclude any liability by the manufacturer for resulting damage and consequences.

Do not perform any modifications, additions and/or alterations to the device without written authorization from point electronic GmbH.

Spare parts and accessories

Spare parts and accessories must comply with the technical requirements specified by point electronic GmbH and its suppliers. Whenever original parts are used, compliance is given.

No modifications of the software

No modifications to the software must be made or commissioned to third parties. The software may not be deleted, decrypted or decompiled in full or in part.

If changes to the software are necessary, please contact point electronic GmbH.

Maintenance work

Implementation

High reliability as well as low maintenance costs of the device may be achieved through careful implementation of the maintenance schedule and regular monitoring over the entire operational lifetime.

Compliance with regulations

When performing maintenance work, it is essential to observe the following:

- applicable accident prevention regulations,
- applicable environmental protection regulations and
- safety instructions for maintenance work.

Only perform maintenance work if:

- you are authorized to do so and
- the device is turned off and secured against unintentional restart.

Before getting started

Before you begin maintenance work, please make sure that:

- the device is de-energized and disconnected from the power supply and
- the power supply may not be re-established unintentionally as long as the maintenance work lasts.

Works during operation

In any case, the operating company or the personnel employed by it must check based on the specific local conditions that the specified work may be performed during operation without endangering anybody.

Continuation next page …

… Continuation: Maintenance work

Electrical equipment

Regularly check the electrical equipment of the device. Immediately rectify defects (such as loose cable connections and/or faulty cables).

Damaged or faulty cables may only be replaced by cables that match the requirements stipulated by point electronic GmbH and/or its suppliers!

Check that the surfaces of all electrical equipment parts are dry and free of oil, grease, deposits and corrosion.

Only use voltage-insulated tools!

Do not place any tools or working materials on the conductive surfaces of components.

Device fuses

Faulty fuses may only be replaced by fuses that match the requirements (specifications and ratings) stipulated by point electronic GmbH!

Faulty fuses may not be repaired or bypassed, but must be replaced by fuses of the same type.

Cleaning

Requirements

Do not open the device! It contains no parts that require cleaning by the operator.

Suitable cleaning products

Only use cleaning products approved by point electronic GmbH.

All cleaning products used by the customer should be checked with point electronic GmbH or the respective supplier to ensure they are compatible with the materials and colors used.

Unsuitable cleaning agents

Do not clean the device with:

- scratchy, aggressive cleaning agents containing solvents, gasoline, or alcohol,
- pressured air, high-pressure cleaner or other kinds of cleaning machine.

Cleaning equipment

Use lint-free cleaning cloths/wipes for cleaning the device.

To remove stubborn dirt, use lint-free cleaning cloths/wipes moistened with clear water.

After cleaning

After cleaning, make sure that:

- cables, ports and fittings are free of oil and/or cleaning agents and
- cables, wires, connectors and electrical components are dry.

Environmental protection

Recyclable materials When performing maintenance work, ensure that reusable materials are recycled.

Disposal Electrical and electronic waste may constitute a hazard to health and environment when disposed off improperly. According to WEEE Directive 2012/19/EU (Waste Electrical and Electronic Equipment Directive), electrical and electronic waste may not be disposed off as general domestic waste but must be handed in at specific collection points or sent back to the manufacturer.

Check with your local environmental protection agency for the prescribed disposal options for commercially used electronic waste.

Only hire waste disposal companies that are approved by the national and regional authorities.

3 System overview

Chapter overview

Purpose This chapter describes the device. It contains information on the use, scope of delivery, equipment, structure and function.

Contents This chapter contains the following information:

› Intended use 24
› Improper use 25
› Typical use of the device 26
› Scope of delivery 27
› System environment requirements 28
› Front panel 29
› Back panel 30
› Touch display 33
› Device labeling 36

Intended use

Purpose

REVOLON is an external scan controller for Transmission Electron Microscopes (TEM). REVOLON is designed for hardware compatibility with all TEM modes, full device control via its API using Python scripts, and software that provides open access to advanced scan functions, including custom scans and triggers.

REVOLON uses the TEM's external scan interface and may be connected directly to the TEM or daisy-chained with other external scan controllers.

REVOLON is designed for installation and operation in a 19-inch rack.

Operation

The device may only be operated in a technically perfect condition and as intended, in compliance with the user manual and under consideration of safety and potential hazards. Malfunctions, in particular those that may impair safety, should be rectified immediately.

If the device shows damages or defects that compromise operational safety, this must immediately be reported to the operations center, and the device must not be put into operation.

Operation and maintenance of the device may only be performed by technical staff and service technicians (see "User groups of this document" on page 7). The valid safety and accident prevention regulations must be observed.

Compliance with regulations

All operating, maintenance, setup and service measures prescribed by the manufacturer must be complied with.

Additional information

In addition to this document, the generally applicable, legal and other binding regulations and legislation and environmental protection instructions must be adhered to.

Improper use

Any use not authorized by the manufacturer is not permissible and may lead to injury or property damage.

point electronic GmbH does not accept liability for damage arising from improper use of the device.

In particular, improper use includes:

- operation in explosive environments
- operation in an environment that does not meet the stipulated requirements
  see "Operating conditions" on page 61
- operation with opened device housing
- operation with visible damage to the device and/or peripherals (e.g. connected cables, etc.)
- modifications and/or additions that impair the performance
- exchanging components with unauthorized components

Typical use of the device

Use cases The following table provides an overview of possible use cases of the device:

Use case	Description
Direct the electron beam	The device generates X and Y scan voltages for the TEM scan amplifier, which transforms them to currents for TEM scan and de-scan coils, which then give the necessary beam tilts/phase shifts to direct the electron beam.
Generate sawtooth image scans	The standard image scans are generated on-board, including sub-pixel scans, with the necessary fly-back corrections for scan coil hysteresis.
Execute free arbitrary scans	Can also be loaded with a list of X and Y coordinates and triggers, from the software, to freely generate any scan pattern, for example serpentine or checked board.
Acquire analog signals	The device digitizes analog signals connected from TEM analog detectors, for example Bright Field (DF), Annular Dark Field (ADF), or highly-segmented STEM detectors, and supplies acquired values live as data streams.
Acquire digital signals	The device counts pulses received at the digital inputs, for example from single electron processing units, or X-Rays, and supplies acquired counts live as data streams.
Trigger fast detectors	The device generates a range of TTL triggers for acquisition of new frames with a fast camera, or give new time stamps for single particle detectors. Both master/trigger and slave/synchronization configurations are supported.
Control fast beam blankers	The device generates the TTL trigger to open/close fast beam blank during fly-back and between scans. Blanking on individual scan points is manually controlled in PixelMap arbitrary scan mode.
Control holder electronics	For Electrical Analysis with biasing holders, including communication with the embedded routing and biasing, also including digitization of preamplifier signal with digital gain and offsets
Digital lock in amplification	With a fast beam blanker or beam deflection (up to the frequency allowed by scan coils), including digital gain and offset

Scope of delivery

The following basic equipment is part the scope of delivery:

Qty.	Component	Part number
1	REVOLON scan controller (device)	depends on the type of device delivered
	Set of connecting cables for scan and video	
1	Mains power extension cable (C13, C14, 1 m)	1000 0001 0003
1	Mains power extension cable (C13, C14, 2 m)	1000 0001 0002
1	USB cable (Type-A, Type-B, 3 m)	1000 0004 0001
1	RJ-45 cable (Patch cable, S/FTP, CAT.6, 5 m)	1000 0006 0006
4	BNC cable (M/M, 5 m)	1000 0011 0008
4	BNC T-adapter (1 × M, 2 × F, F/F/M)	1000 0011 0002
1	Sync cable for TEM (15-Pin D-SUB M (SYNC), 3 × BNC M (OUT) + 3 × BNC M (IN), 5 m)	1027 0011 0001
1	USB stick with: – Documentation, – Software, libraries and licenses – USB device driver and – Sample codes for Python, C and C#	1027 0006 0002

NOTICE

The complete scope of delivery with the particular item numbers depends on the respective order.

System environment requirements

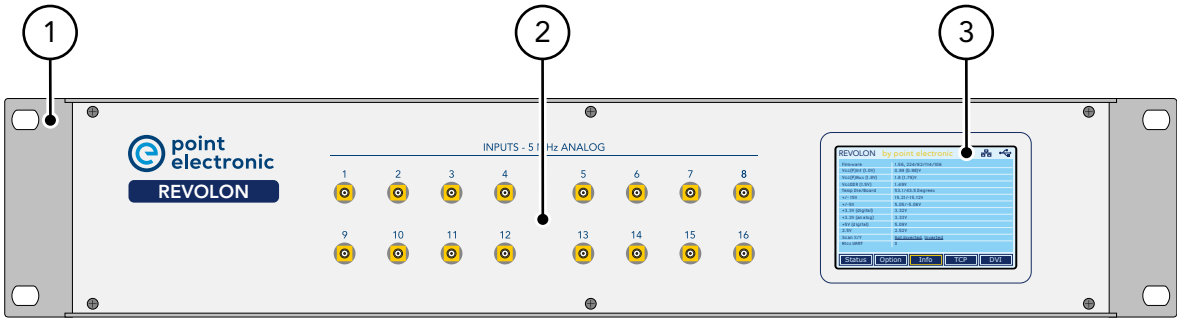
Minimum requirements

The following table contains information on the minimum requirements of the system environment:

Component	Requirement
Computer	IBM-compatible from Core i3 Recommendation: Core i5
	Resolution at least 1280×1024 pixel, true color Recommended resolution: 1920×1200 pixel
	At least one free USB 2.0 or USB 3.0 slot Optional: one free LAN slot (RJ-45) for TCP/IP connection
Power connection	At least one socket: – 115 … 230 V AC – 50 … 60 Hz – Single-phase – Same grounding as the microscope
TEM connection	– 1 × external scan interface (daisy-chain configuration supported) – At least one video signal output
Mounting	Space of 2 U in a 19 inch rack

Front panel

Structure The following figure shows the front of the device with its components:

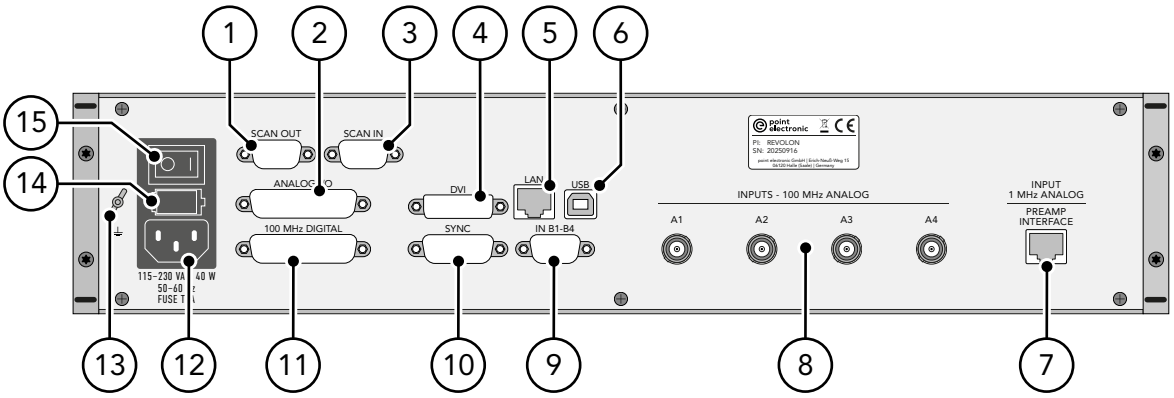


Components The following table contains information on the components on the front:

No.	Component
1	19" mounting brackets for installation in a rack
2	INPUTS - 5 MHz ANALOG – 4, 8 or 16 image signal input ports – max. ±5 V – ±0.5 V (with gain = 1x) – gain: 1 … 1800x – input offset: ±1.25 V – type: SMB, socket (female)
3	Touch display – displays status and system information for the device – enables various configurations for the device see “Touch display” on page 33

Back panel

Structure The following figure shows the back of the device with its components:



Components The following table contains information on the components of the back:

No.	Component
1	SCAN OUT – Differential scan output – Switched to REVOLON scan if a REVOLON scan is running – Type: 9 pin, D-Sub, socket (female) Pinout: page 45 Configuration: page 48
2	ANALOG I/O – Port for analog inputs and outputs – Type: 25 pin, D-Sub, plug (male) **Analog outputs** – Amplitude: max. ±12 V – Output offset: ±2 V **Analog inputs** – Max. ±5 V – ±0.5 V (with gain = 0 dB) – Gain: –22 … +26 dB – Input offset: ±1.25 V Pinout: page 39
3	SCAN IN – Differential scan input – Connected to SCAN OUT if no scan is running – Type: 9 pin, D-Sub, plug (male) Pinout: page 44
4	DVI – Port – Type: DVI-I (dual link), socket (female)

Continuation next page …

… Continuation: Back panel

No.	Component
5	LAN – Port for TCP/IP control interface – Transmission of commands and data – Type: RJ-45, socket (female)
6	USB – Port for USB control interface – Transmission of commands and data – Type: USB type B, socket (female)
7	PREAMP INTERFACE – Signal input 20 Bit – Control interface (RS-485) for additional amplifier – Type: RJ-45, socket (female) Pinout: page 46
8	INPUTS - 100 MHz ANALOG – 4 image signal input ports – ±5 V max. – ±0.5 V (with gain = 0 dB) – Gain: -22 … +26 dB – ±1.25 V input offset – Type: BNC, socket (female)
9	IN B1-4 – Port for additional analog inputs (fast) – 4 image signal inputs – Multiplexed B inputs to “100 MHz ANALOG” – Max. ±5 V – ±0.5 V (with gain = 0 dB) – Gain: –22 … +26 dB – Input offset: ±1.25 V – Type: 9 pin, D-Sub, plug (male) Pinout: page 43
10	SYNC – Trigger input and output signals – Input: 3.3/5 V TTL – Output: 5 V TTL – Type: 15 pin, D-Sub, socket (female) Pinout: page 42
11	100 MHz DIGITAL – 12 counting inputs – 3.3/5 V TTL counter – Type: 25 pin, D-Sub, socket (female) Pinout: page 41
12	Mains voltage connector – 115 … 230 V AC, 25 W, 50 … 60 Hz – Type: C14, male
13	Grounding connector

Continuation next page …

… Continuation: Back panel

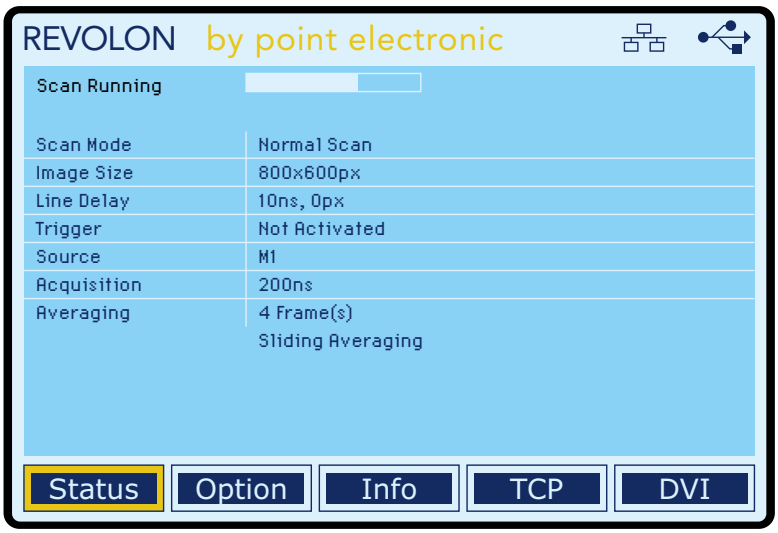
No.	Component
14	Fuses – 2 pieces – Replaceable – Type: T4A
15	On/off switch ℹ The on/off switch is not a load-breaking switch!

Touch display

Description The touch display shows status and device information on four switchable pages and allows various configurations for the device.

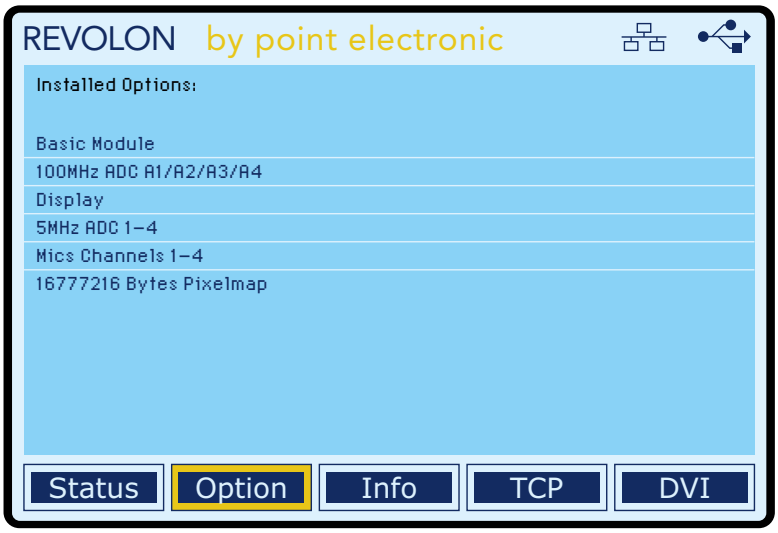
Status The Status page displays status information about the current scan.

The following figure shows the touch display with the Status page:



Option The Options page shows an overview of the installed hardware options and the size of the pixel map.

The following figure shows the touch display with the Option page:

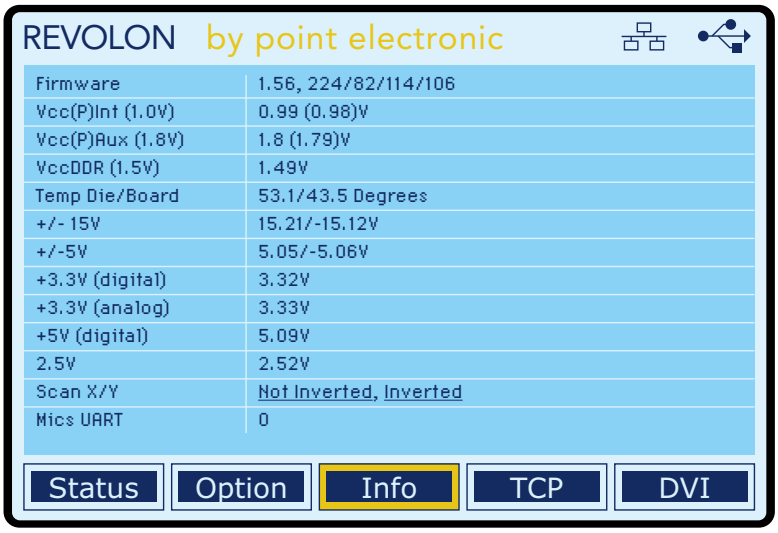


Continuation next page …

… Continuation: Touch display

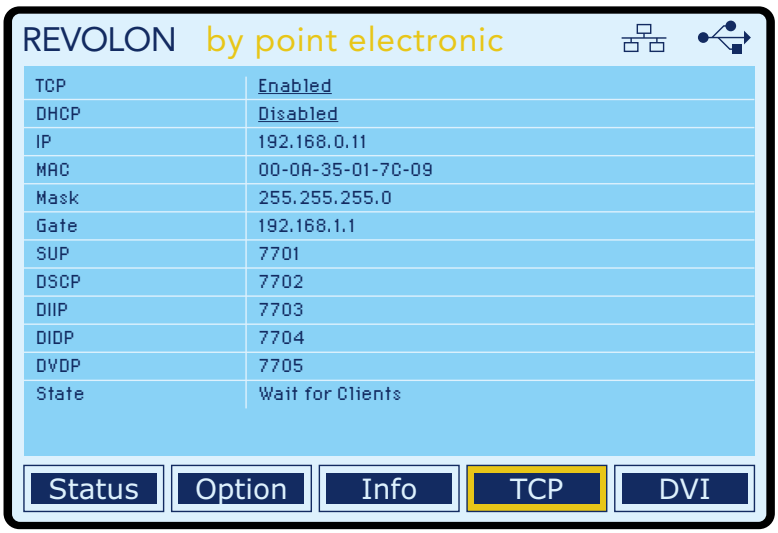
Info The Info page displays information about the installed firmware and current device parameters.

The following figure shows the touch display with the Info page:



TCP The TCP page shows an overview of the current network configuration and allows enabling/disabling of TCP and DHCP.

The following figure shows the touch display with the TCP page:

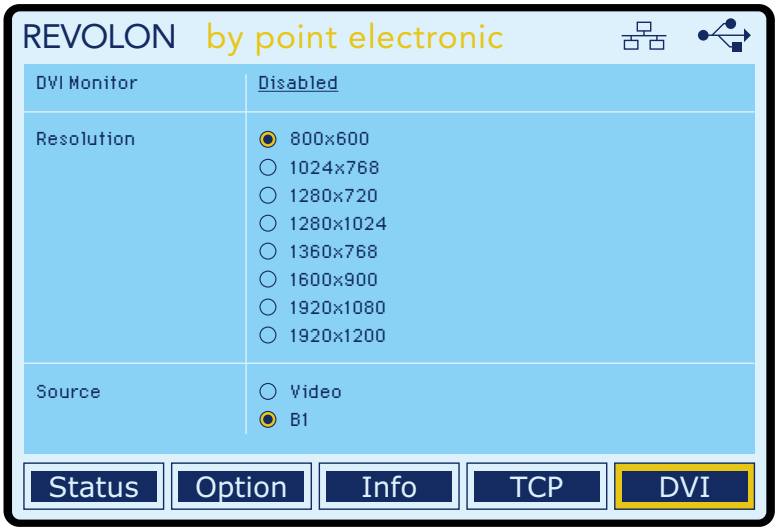


Continuation next page …

… Continuation: Touch display

DVI On the page DVI, the DVI output of the device can be configured. This is useful if a monitor is to be connected directly to the device.

The following figure shows the touch display with the DVI page:



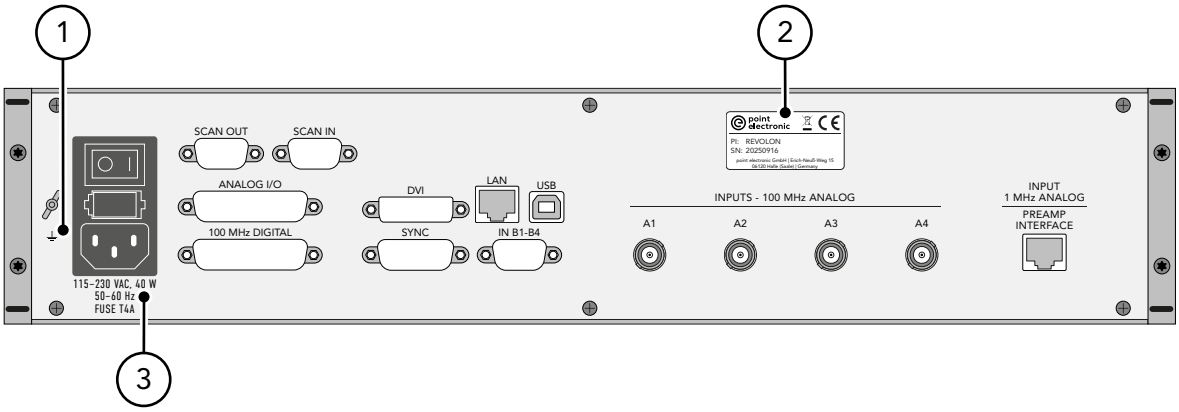
The following options are available for configuring the DVI output:

Option	Description
DVI Monitor	Enabling/disabling the DVI output.
Resolution	Setting the screen resolution.
Source	Setting the input signal source to be displayed on the screen.

Device labeling

Markings on the device

The following figure shows the markings on the back of the device:



The following table contains information on the markings on the back of the device:

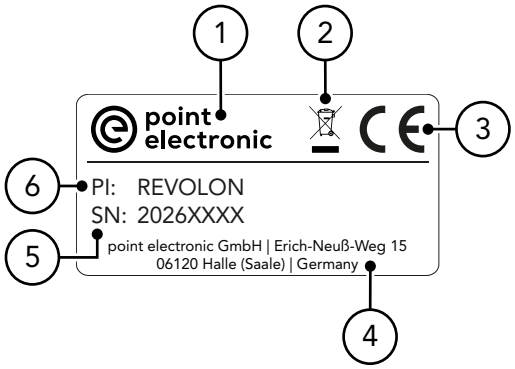
No.	Component
1	Grounding marking
2	Identification plate
3	Information on power supply, power consumption and fuses

Continuation next page …

… Continuation: Device labeling

Identification plate

The following figure shows the identification plate with its components:



The following table contains information on the components of the identification plate:

No.	Component
1	Manufacturer identification
2	Disposal symbol in accordance with the WEEE directive
3	CE marking
4	Manufacturer address
5	Serial number
6	Device designation

4 Pinouts of the inputs and outputs

Chapter overview

Purpose This chapter describes the pinouts of the particular inputs and outputs.

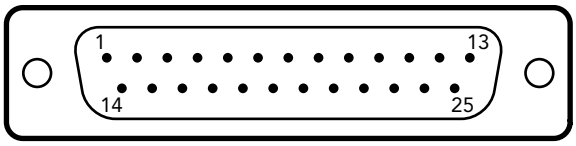
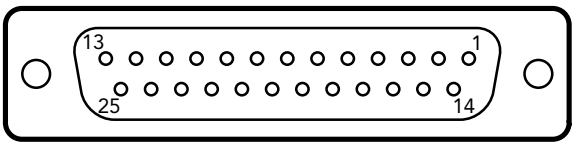
Contents This chapter contains the following information:

› Analog I/O 39
› 100 MHz digital 41
› Sync 42
› IN B1-B4 43
› Scan in 44
› Scan out 45
› Preamp Interface 46

Analog I/O

Type 25 pin, D-Sub, plug (male)

Numbering The following table contains information on the numbering of the connections for the respective shape:

Shape	Numbering (view from outside)
Plug	
Socket	

Assignment The following table contains information on the assignment of the connection numbers:

No.	Assignment
1	Scan Y out
2	Scan X out
3	Ext. scan out
4	Ext. blank out
5	Image signal A1+
6	Image signal A1–
7	Image signal A2+
8	Image signal A2–
9	Image signal A3+
10	Image signal A3–
11	Image signal A4+
12	Image signal A4–
13	Not connected
14	Scan Y in
15	Scan X in
16	Ext. scan in
17	Ext. blank in

Continuation next page …

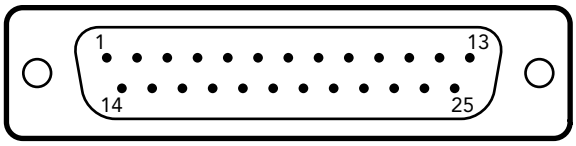
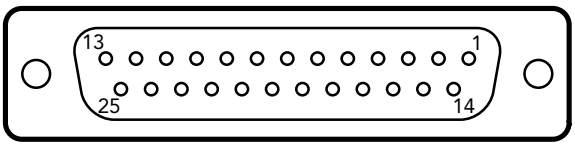
… Continuation: Analog I/O

No.	Assignment
18…24	GND
25	Not connected
Housing	Shield

100 MHz digital

Type 25 pin, D-Sub, socket (female)

Numbering The following table contains information on the numbering of the connections for the respective shape:

Shape	Numbering (view from outside)
Plug	
Socket	

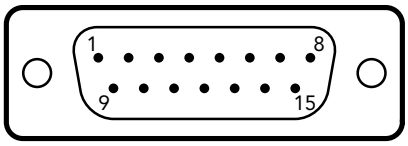
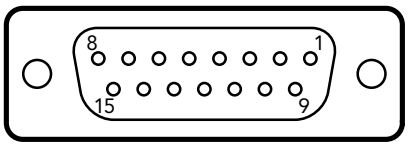
Assignment The following table contains information on the assignment of the connection numbers:

No.	Assignment
1	X 1
2	X 2
3	X 3
4	X 4
5	X 5
6	X 6
7	X 7
8	X 8
9	X 9
10	X 10
11	X 11
12	X 12
13	Not connected
14…25	GND
Housing	Shield

Sync

Type 15 pin, D-Sub, socket (female)

Numbering The following table contains information on the numbering of the connections for the respective shape:

Shape	Numbering (view from outside)
Plug	
Socket	

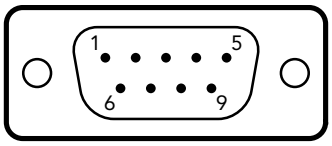
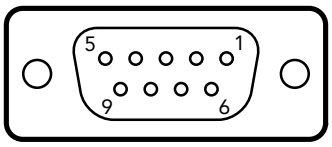
Assignment The following table contains information on the assignment of the connection numbers:

No.	Assignment	Type
1	PixelClock	output: 5 V TTL
2	LineClock	output: 5 V TTL
3	FrameClock	output: 5 V TTL
4	HoldClock	output: 5 V TTL
5	Ext. scan	output: 5 V TTL
6	Ext. blank	output: 5 V TTL
7	BeamBlanker	
8	Lock-In ref out	
9	GND	
10	GND	
11	Pixel sync	input: 3.3/5 V TTL
12	Line sync	input: 3.3/5 V TTL
13	Frame sync	input: 3.3/5 V TTL
14	Hold sync	input: 3.3/5 V TTL
15	Spare I/O	
Housing	Shield	

IN B1-B4

Type 9 pin, D-Sub, plug (male)

Numbering The following table contains information on the numbering of the connections for the respective shape:

Shape	Numbering (view from outside)
Plug	
Socket	

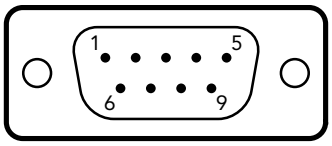
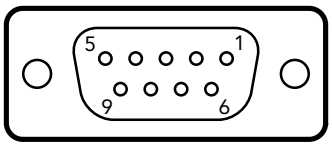
Assignment The following table contains information on the assignment of the connection numbers:

No.	Assignment
1	Image signal B1+
2	Image signal B2+
3	Image signal B3+
4	Image signal B4+
5	GND
6	Image signal B1–
7	Image signal B2–
8	Image signal B3–
9	Image signal B4–
Housing	Shield

Scan in

Type 9 pin, D-Sub, plug (male)

Numbering The following table contains information on the numbering of the connections for the respective shape:

Shape	Numbering (view from outside)
Plug	
Socket	

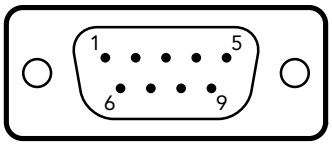
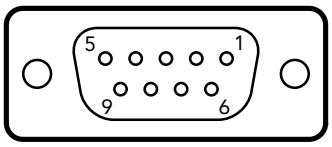
Assignment The following table contains information on the assignment of the connection numbers:

No.	Assignment
1	Scan Y–
2	Not connected
3	Not connected
4	Not connected
5	Scan X–
6	Scan Y+
7	Not connected
8	Not connected
9	Scan X+
Housing	Shield

Scan out

Type 9 pin, D-Sub, socket (female)

Numbering The following table contains information on the numbering of the connections for the respective shape:

Shape	Numbering (view from outside)
Plug	
Socket	

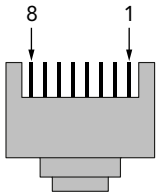
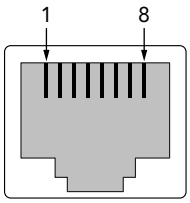
Assignment The following table contains information on the assignment of the connection numbers:

No.	Assignment
1	Scan Y–
2	Not connected
3	Not connected
4	Not connected
5	Scan X–
6	Scan Y+
7	Not connected
8	Not connected
9	Scan X+
Housing	Shield

Preamp Interface

Type RJ-45, socket (female)

Numbering The following table contains information on the numbering of the connections for the respective shape:

Shape	Numbering (view from outside)
Plug	
Socket	

Assignment The following table contains information on the assignment of the connection numbers:

No.	Assignment	Type
1	Signal input +	20 Bit ADC
2	Signal input –	20 Bit ADC
3	RS-485+	Interface
4	–15 V	Power supply
5	+15 V	Power supply
6	RS-485–	Interface
7	+3.3 V	Internal control signal
8	GND	
Housing	Shield	

5 Installation and configuration

Chapter overview

Purpose This chapter contains descriptions and instructions on installation and configuration of the device.

Contents This chapter contains the following information:

› Configuring the inputs and outputs 48
› Mounting in a 19-inch rack 51
› Connecting to the power supply 53

Configuring the inputs and outputs

Description On the carrier board of the device, the inputs and outputs of the device are adjusted to the requirements of the connected TEM.

> **⚠ DANGER**
>
> **Risk of death by electrocution!**
>
> Body contact with live parts may lead to death or serious injuries as well as the destruction or damaging of components.
>
> – Prior to the configuration of inputs and outputs, please make sure that the device is de-energized and secured against unintentional starting (restart).

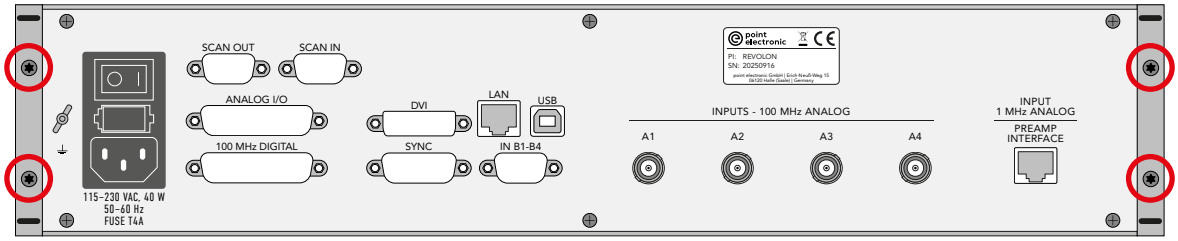
Before getting started Complete the following steps before configuring the inputs and outputs of the device:

1. Switch off the device.
2. Remove the mains cable.
3. Remove all connected cables from the device.

Steps Complete the following steps to configure the inputs and outputs of the device:

1. Remove the 4 screws (TORX TX 10) on the back of the device.

   screwdriver TX 10



2. Push back the upper casing cover.

Continuation next page …

… Continuation: Configuring the inputs and outputs

3. Configure the inputs and outputs.

   see “Connector strips and assignment” on page 49

   see “Configurations for K13 and K14” on page 50

4. Configure the differential scan outputs.

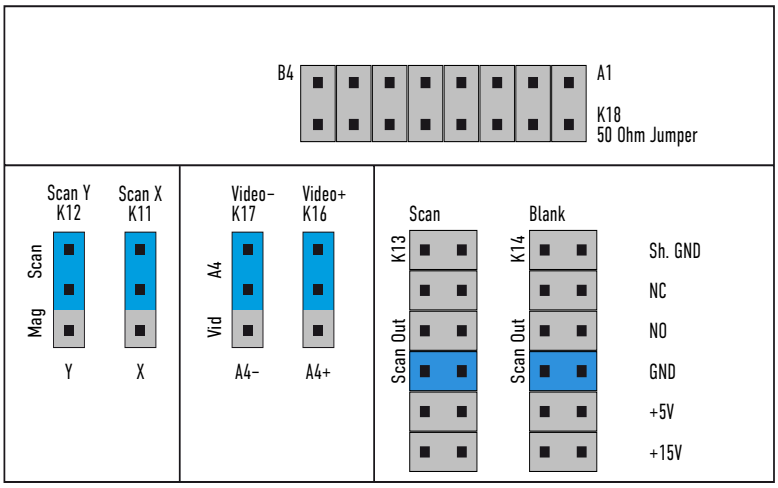
   see “Configuration of the differential scan outputs” on page 50

5. Close the casing cover.
6. Attach the 4 screws (TORX TX 10) on the back of the REVOLON.

   screwdriver TX 10

Connector strips and assignment

The following figure shows the distribution of the connector strips and their standard assignment:



The following table contains information on function and assignment of the connector strips:

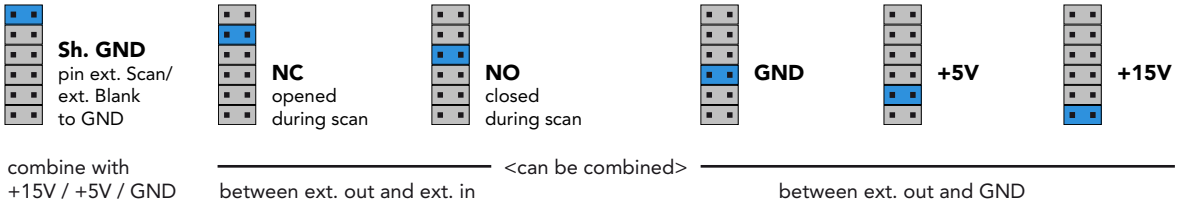
Connector strip	Function	Assignment
K18	Terminating resistor for signal inputs A1 … A4 and B1 … B4	Jumper closed = terminated with 50 Ω
K11, K12	Type of scan output	– Scan (standard) = fixed configured signal level – Mag = signal level adjustable with DAC
K16, K17	Type of signal input A4	– A4 (standard) = analog signal – Vid: configuration for composite video (PAL)
K13, K14	Configuration of outputs “ext. Scan” and “ext. Blank”	– K13 = signal for ext. Scan – K14 = signal for ext. Blank

Continuation next page …

Configurations for K13 and K14

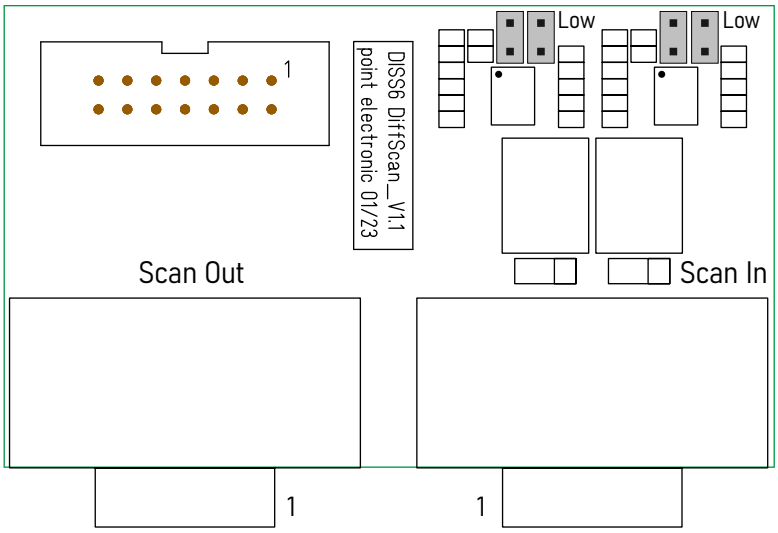
The digital outputs “ext. Scan” and “ext. Blank” are potential-free relay outputs destined for switching the TEM to external beam control. They must be adapted to the requirements of the TEM using the K13 and K14 connector strips.

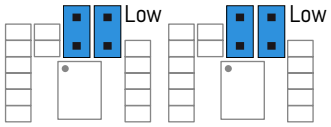
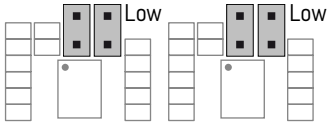
The following figure shows the possible configurations of the “ext. Scan” and “ext. Blank” outputs on the connector strips K13 and K14:



Configuration of the differential scan outputs

The voltage range of the differential scan outputs must be adapted to the requirements of the TEM as follows:



Voltage range	Configuration
Jumper set: ±0,65 … ±2,2 V	
Jumper not set: ±2,2 … ±7,5 V	

Mounting in a 19-inch rack

Installation site Ensure that the installation site adheres to the stipulated operating conditions.

see “Operating conditions” on page 61

19-inch rack Ensure that the 19-inch rack is equipped with horizontal mounting rails for each built-in device.

Mounting Complete the following steps to mount the device in a 19-inch rack:

WARNING

Risk of injury when lifting, holding and carrying the device!

The weight of the device can lead to injuries and damage to health when lifting, holding and carrying it.

- Always assemble/disassemble the appliance in pairs.
- Wear the prescribed protective work clothing (e.g. safety shoes).

NOTICE

Always ensure accessibility!

When positioning the device, please ensure that on-off switch and all connectors are accessible without obstructions.

Continuation next page …

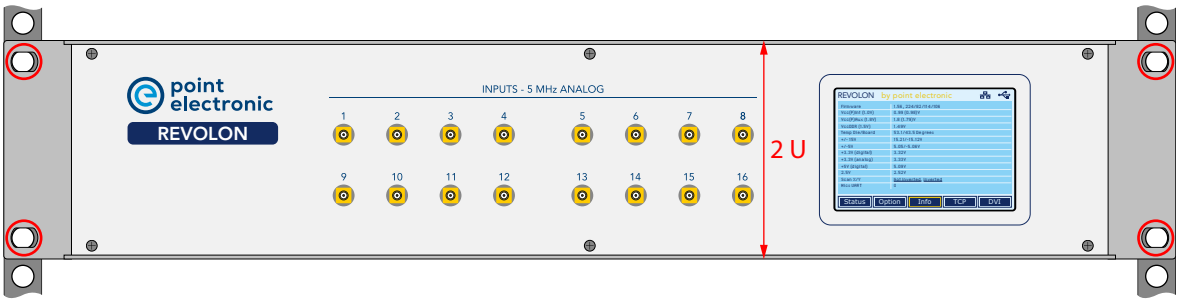
… Continuation: Mounting in a 19-inch rack

1. Place the device in a 19-inch rack.

   Mind the installation height of two rack units (U).

   Ensure that the device rests on the horizontal mounting rails in the rack.

2. Fix the device to the frame with four screws.



3. Tighten the four screws hand-tight.

Connecting to the power supply

Steps Complete the following steps to connect the device to the power supply:

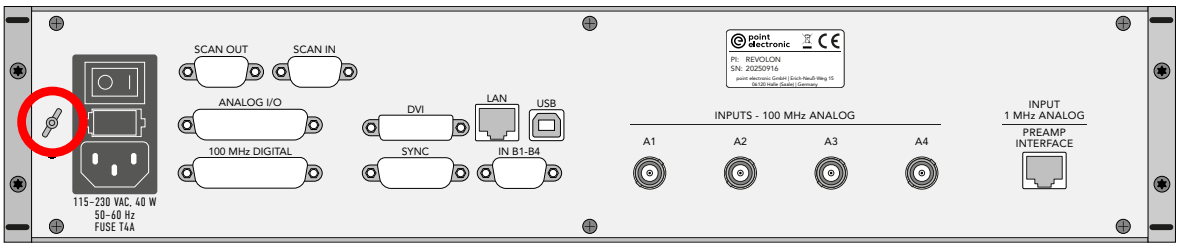
NOTICE

Mind the device connectors!

When connecting the device, please refer to the description of the unit's backside.

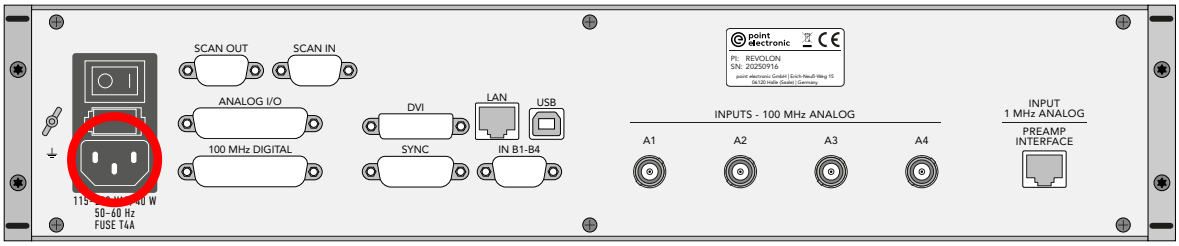
see "Back panel" on page 30

1. Connect the grounding to the device.



The device and the microscope must be connected to the same grounding!

2. Connect the AC power cable to the device.



Use the AC power cable included in the scope of delivery or an AC power cable that meets the same requirements!

3. Connect the AC power cable to a power supply.

The power supply must comply with the specified requirements!

see "Device specifications" on page 62

6 Maintenance

Chapter overview

Purpose This chapter contains instructions on the maintenance of the device.

Contents This chapter contains the following information:

› Disconnecting from the power supply 55
› Replacing the fuses 56

Disconnecting from the power supply

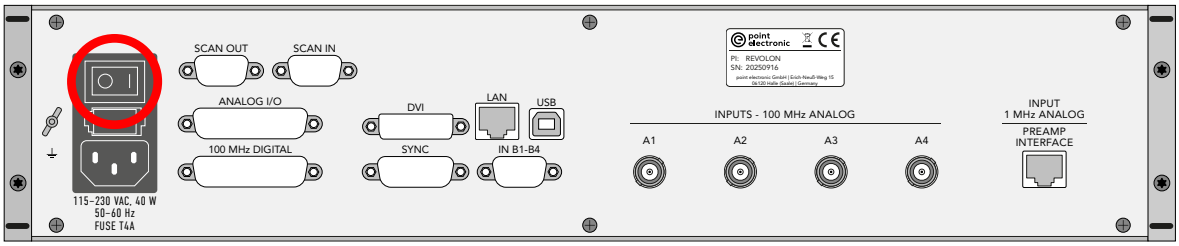
Steps Complete the following steps to disconnect the device from the power supply:

NOTICE

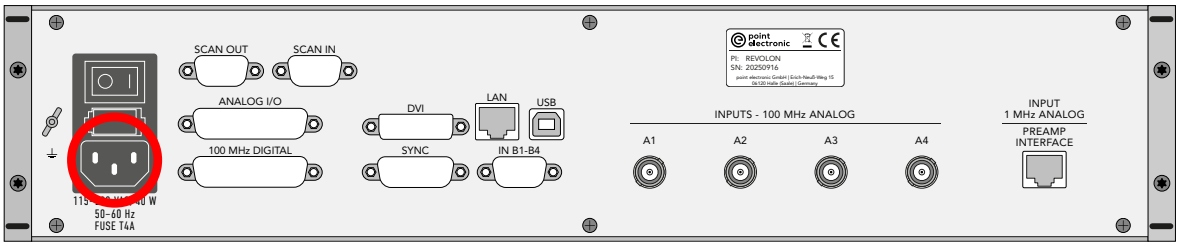
The device's on/off switch is not a load-breaking switch!

Before performing any maintenance, disconnect the power cable from the device.

1. Turn off the device using the on/off switch.



2. Unplug the device's power cable from the power outlet.
3. Unplug the power cable from the device.



Replacing the fuses

Position of the fuses

The fuses are located at the back of the device.

see “Back panel” on page 30

DANGER

Risk of death by electrocution!

Body contact with live parts may lead to death or serious injuries as well as the destruction or damaging of components.

– Prior to the replacement of the fuses, please make sure that the device is de-energized and secured against unintentional starting (restart).

Before getting started

Complete the following steps before replacing the fuses of the device:

1. Disconnect the device from the power supply.

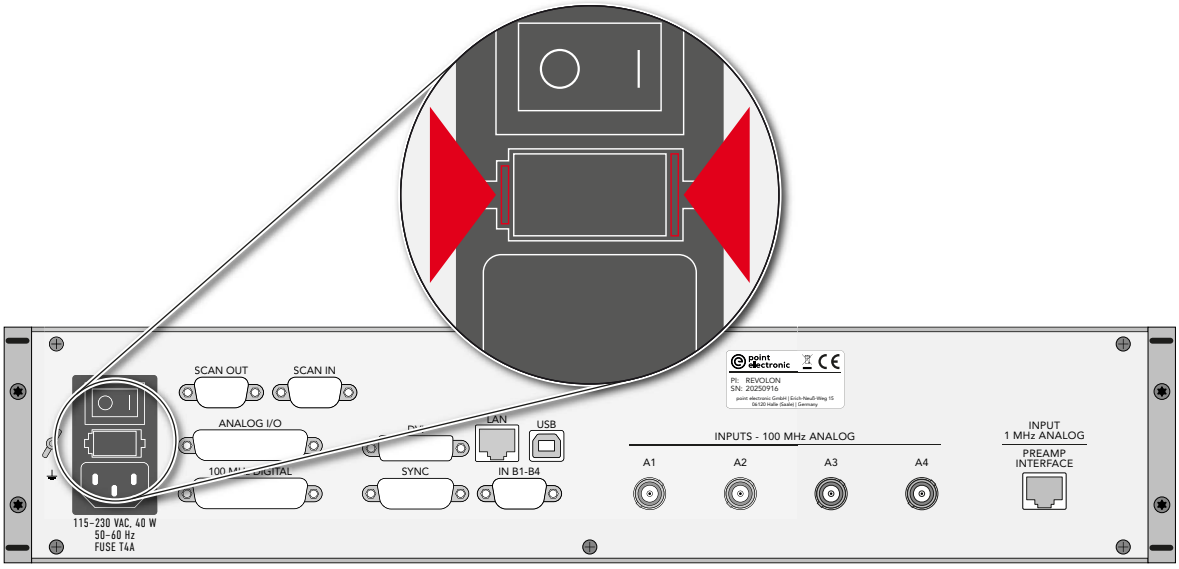
   see “Disconnecting from the power supply” on page 55

2. Remove all connected cables from the device.

Continuation next page …

Steps Complete the following steps to replace the fuses of the device:

1. Pinch the locking tongues of the fuse holder and pull the fuse holder from the slot.



2. Replace the fuse or the fuses.

   ⚠ **Only use type T4A fuses!**

3. Push the fuse holder into the slot until the locking tongues snap in.

7 Disposal

Chapter overview

Purpose This chapter contains information on the disposal of the device.

Contents This chapter contains the following information:

› Recycling and taking back of used equipment 59

Recycling and taking back of used equipment

Disposal in accordance with regulations

Electrical and electronic devices may pose a risk to health and the environment if disposed of incorrectly. They cannot therefore be disposed of as domestic waste according to WEEE Directive 2012/19/EU (Waste Electrical and Electronic Equipment Directive). Instead they must be taken to designated collecting points or returned to the manufacturer.

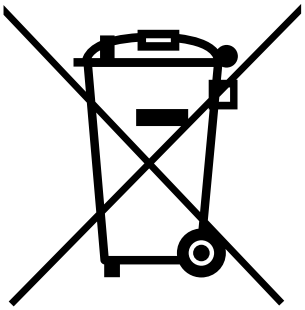
Electrical and electronic devices must undergo specified recycling processes (e.g. with respect to circuit boards) which enable safe, environmentally compatible re-use or separate disposal of different device elements.

The return of used devices is regulated differently in different places. Find out from your local council about the return conditions for commercially used electronic devices.

The device contains no toxic substances requiring separate identification for disposal such as mercury (Hg), cadmium (Cd), lead (Pb) or chrome 6 (e.g. in circuit boards).

Labeling

The following symbol indicates the legal duty to dispose of electronic devices as stipulated:



8 Specifications

Chapter overview

Purpose This chapter lists the specifications of the device.

Contents This chapter contains the following information:

› Operating conditions 61
› Device specifications 62

Operating conditions

The following table contains information on the operating conditions of the device:

Site of operation	– indoor – permanently installed device (mounted in a 19-inch rack) – controlled electromagnetic environment
Ambient air	– average air pressure (approx. 1 bar) – dry – free of dust
Ambient temperature	5 … 40 °C
Humidity	max. 80 % (at 31 °C, non-condensing)
Altitude	max. 2,000 m

Device specifications

Electrical safety

The following table contains information on electrical safety:

Protection class	I
Protection type	IP20
Overvoltage category	II
Contamination level	1

Power supply

The following table contains information on the specifications of the power supply:

Supply voltage	115 … 230 V AC
Frequency	50 … 60 Hz
Power consumption	max. 25 W
Fluctuation of the supply voltage	max. ±10%

Fuses

The following table contains information on the fuses:

Number	2 pc. (replaceable)
Type	T4A
Rating	4 A slow blowing

Dimensions and weight

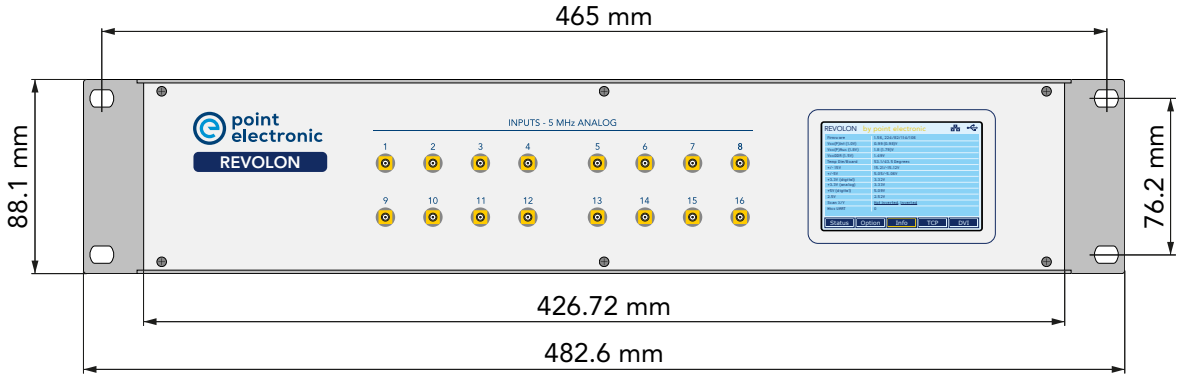
The following table contains information on the dimensions and weights:

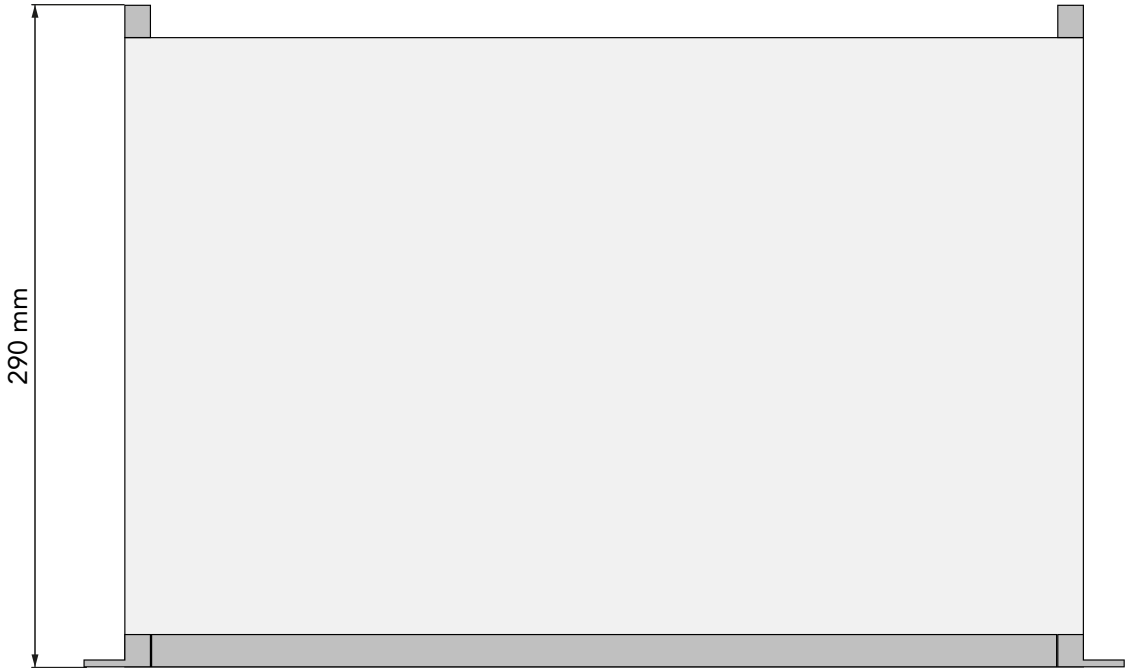
Height	88.1 mm (2 U)
Width	482.6 mm (incl. 19-inch mounting brackets)
Depth	290 mm
Weight	approx. 4.7 kg

Continuation next page …

… Continuation: Device specifications

Dimensional drawing The following figure shows the dimensions of the device:





Continuation next page …

… Continuation: Device specifications

Device housing The following table contains information on the components of the device housing:

Cover plate and base plate	Material: Aluminum Surface: powder-coated RAL 7035 (light gray)
Front panel and rear panel	Material: Aluminum Surface: powder-coated RAL 7035 (light gray)
Frame and profiles	Material: Aluminum Surface: powder-coated RAL 7001 (silver gray)
19-inch mounting brackets	Material: Die-cast aluminum Surface: powder-coated RAL 7001 (silver gray), contact points bare