

Operating Instructions

JETI Spectrometer

DE50 expert



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1. Introduction

DE50 expert broadband OEM spectrometer is a flat field spectrograph combined with powerful processing electronics. Its miniaturized shape makes it suitable for laboratory as well as industrial use.

DE50 expert covers the wavelength range of **200 nm** to **1000 nm**.

Acquisition and analysis of data is done by the PC software JETI VersaSpec. The connection to the PC works via USB interface (virtual COM port). It is also possible to communicate directly with the instrument via DLLs. Detailed helping information for this application is included on USB flash drive. Furthermore, the instrument can be driven by SCPI-like firmware commands. The command list is also available on the USB flash drive.

PC Requirements:

- Processor (x86/x64) with 1 GHz or faster with 2 or more cores, min. 8 GB RAM
- Graphic resolution: min. 1280 * 720, 32-bit colour depth recommended
- Windows 10/11

Scope of Delivery:

- Device with protection cap
- Operating instructions
- USB flash drive with PC software *JETI VersaSpec*, DLLs, operating instructions and firmware command list
- USB-C to USB-A cable
- Connector for external power supply Vext
- Female terminal housing 14p and pre-crimped cables for Universal Interfaces
- Fit protocol

Optionally:

- Shutter Add-On
- Slit substitution: different optical slit

2. Security recommendations

Before any operation, please read the following safety precautions to avoid any possible bodily injury and to prevent the device from damage. To avoid any contingent danger, this device has to be used only within the specified ranges.

- Avoid using liquid cleaners.
- Avoid touching the electronic circuits.
- Don't spill liquids of any kind on the device.
- If any mechanical damages on the device are detected, please contact JETI.

3. Driver installation

No manual USB driver installation is necessary. The DE50 expert works with the standard USB CDC driver, which is already integrated in Windows 10 and 11.

This driver is installed automatically when the device is connected to the PC for the first time.

3.1. How to open the device manager on Windows 10/ 11

The Windows *Device Manager* shows information about the devices installed on your computer.

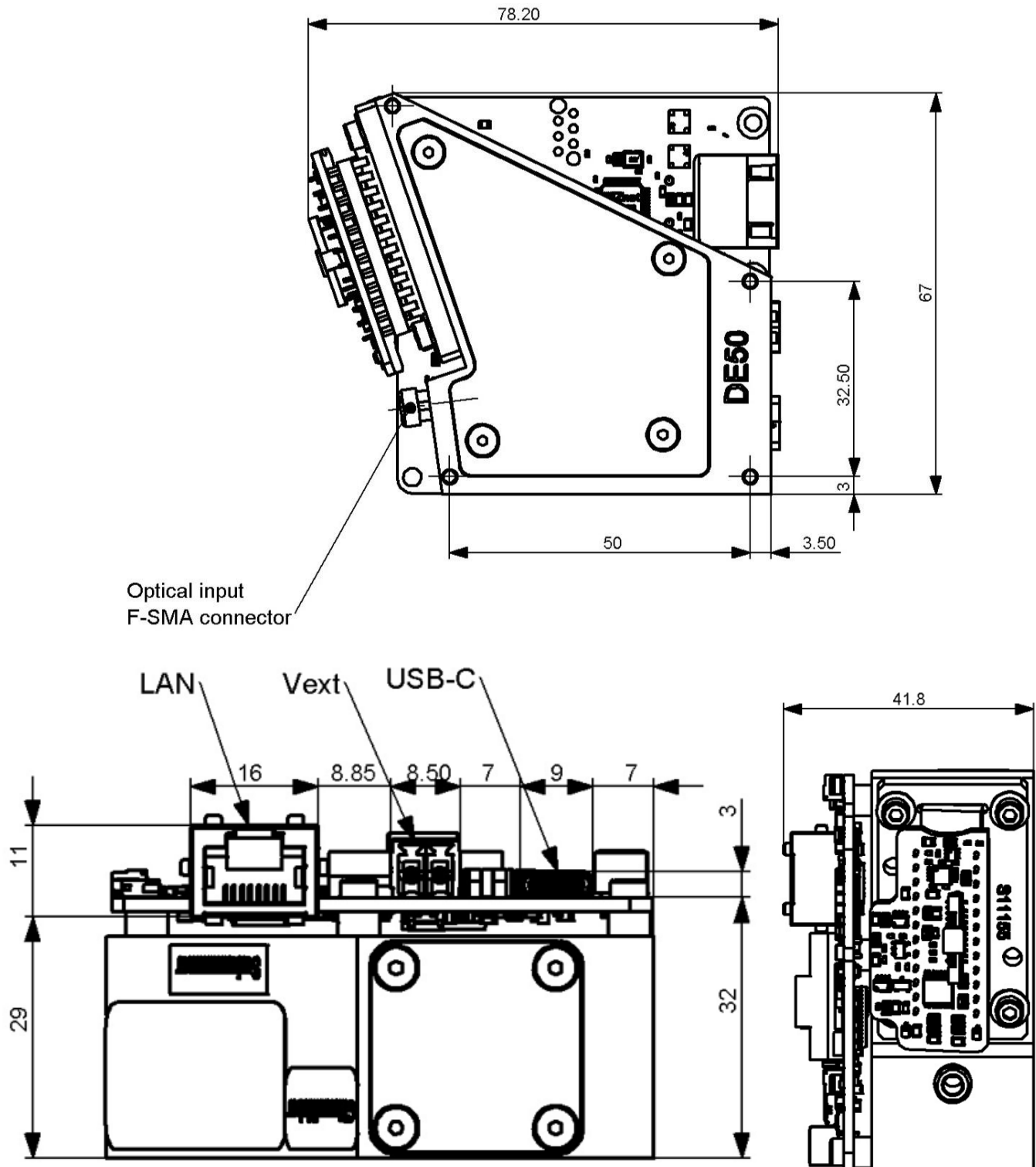
There are several ways to open the *Device Manager*, depending on the Windows version and the settings of Windows. The easiest of them is:

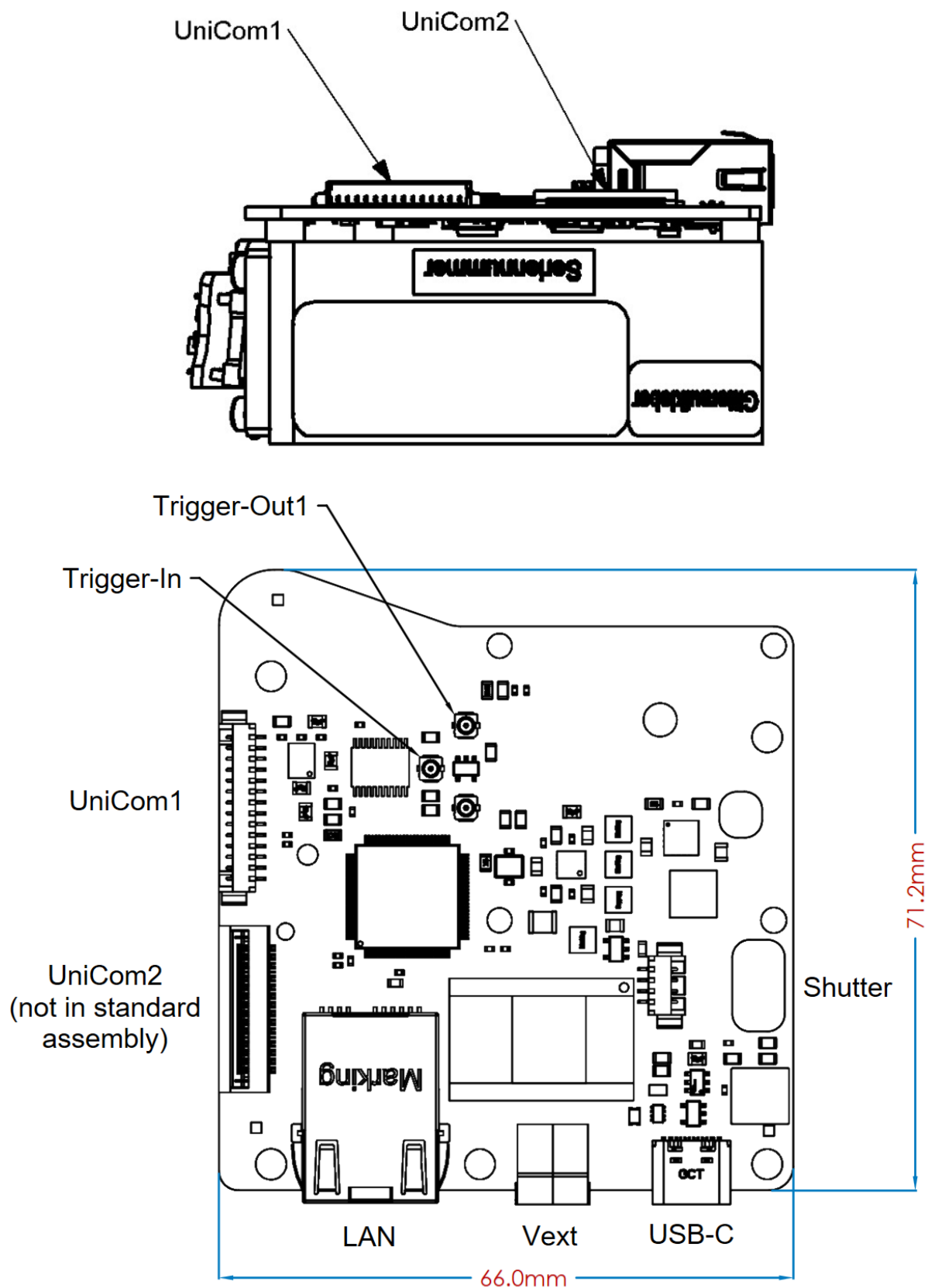
- Find the **Start** icon in the middle or left end of the taskbar and click on it with the right mouse button.
- In the window that appears, click on the **Device Manager** entry.

4. Technical data

4.1. Device dimensions

The following drawings show the position of the connectors, the position of the measuring port on the front and the general dimensions of the instrument.





Step-Files available on request.

4.2. Signals

Number	Name	Signal	Value	Min	Typ	Max	Unit	Location
1	Vext+	Power (IN)	Voltage	7	12	28	V	Uni1-1 Uni2-1 Vext-2
			Power	2.5	5	15 (for high power periphery)	W	
2	GND	GND	Voltage		0		V	Uni1-2,12 Uni2-2,16,28
3...6	GPIO0...3	GPIO*	Low	-0.3	0	0.5	V	Uni1-8...10 Uni2-3...6
			High	2.2	3.3	3.5	V	
7...14	GPIO4...11	GPIO	Low	-0.3	0	0.5	V	Uni2-7...14
			High	2.2	3.3	3.5	V	
15	A-IN0	Analog Input	Range	0		3.3	V	Uni1-11 Uni2-15
			Max	-0.3		3.5	V	
16	GND	GND	Voltage		0		V	Uni1-2,12 Uni2-2,16,28
17	SPI4-MOSI	I/O**	Low	-0.3	0	0.5	V	Uni2-17
			High	2.2	3.3	3.5	V	
18	SPI4_MISO	I/O**	Low	-0.3	0	0.5	V	Uni2-18
			High	2.2	3.3	3.5	V	
19	SPI4_CLK	I/O**	Low	-0.3	0	0.5	V	Uni2-19
			High	2.2	3.3	3.5	V	
20	SPI4_CS	I/O**	Low	-0.3	0	0.5	V	Uni2-20
			High	2.2	3.3	3.5	V	
21	MRES#	Reset Input*	Low	-0.3	0	0.5	V	Uni1-3 Uni2-21
			High	2.2	3.3	5.5	V	
22	TRIG-IN	Input*	Low	-0.3	0	0.5	V	Uni1-7 Uni2-22 TRIG-IN
			High	2.2	3.3	5.5	V	
23	TRIG-OUT1	Output	Low	-0.3	0	0.5	V	Uni1-6 Uni2-23 TRIG-OUT1
			High	2.2	3.3	3.5	V	
24	TRIG-OUT2	Output	Low	-0.3	0	0.5	V	Uni2-24 TRIG-OUT1
			High	2.2	3.3	3.5	V	
25	U1CTS#	Input*	Low	-0.3	0	0.5	V	Uni2-25
			High	2.2	3.3	5.5	V	

#	Name	Signal	Value	Min	Typ	Max	Unit	Location
26	U1TX	Output**	Low	0	-	0.5	V	Uni1-5 Uni2-26
			High	2.2	-	3.3	V	
27	U1RX	Input*	Low	-0.3	0	0.5	V	Uni1-4 Uni2-27
			High	2.2	3.3	3.5	V	
28	GND	GND	Voltage		0		V	Uni1-2,12 Uni2-2,16,28
29	reserved							Uni2-29
30	VPower	Power (Out)	Voltage	4.5	5	5.5	V	Uni1-14 Uni2-30
			Current			100 (USB) 500 (POE) 1000 (Vext)	mA	

Denotes a low active signal *5V tolerant Input

**Add-on Board interfaces, not for user-communication.

4.3. Interfaces

4.3.1. High Speed 2.0 USB Interface

The USB communication port can be used for powering the PE65 electronics, provided it's connected to an active USB hub capable to draw up to 500 mA current at 4.4V - 5.25V.

Configuration with higher current need should be external powered.

Passive USB hubs do not provide sufficient power. In this case, the electronics must be powered externally.

USB Configuration

The USB 2.0 High Speed communication is performed by a USB CDC Class virtual serial port.

The transmission speed of 115 200 bit/s is necessary to fit the virtual serial COM-port protocol. The protocol settings are 8N1 (8-bit data, no parity, 1 stopbit) and no handshake.

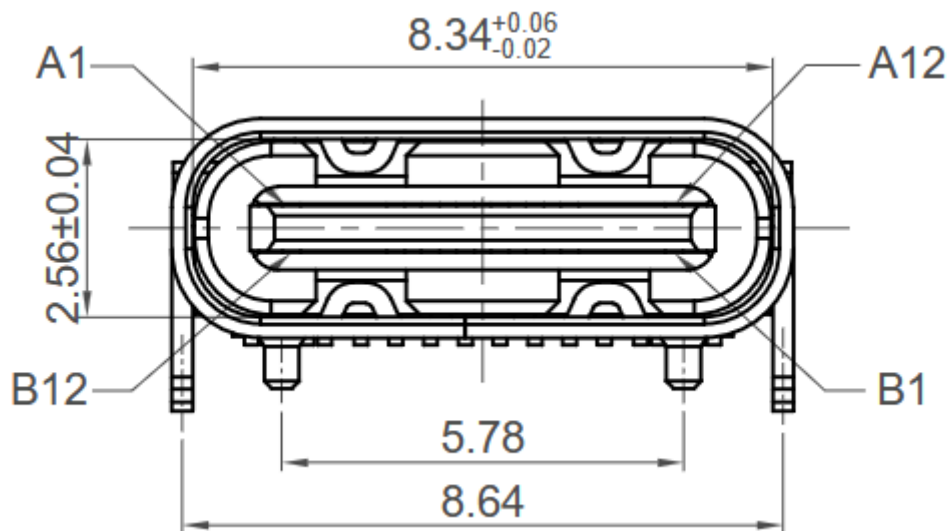
Data transfer will be done with USB high speed (480Mbit/s) independent of the virtual com port speed settings. The effective data rate can reach up to 130Mbit/s.

Users program or the OS must provide enough communication queue memory in case of huge amount of data to be transmitted at once.

USB drivers are already included in Windows 10/11 and actual Linux Distributions by default.

Drivers for Windows 7 and 8/8.1 are available from JETI.

USB Pinout



The connector used is a USB 2.0 Type C receptacle with SMT and THT components for maximum stability.

USB Signals

Pin	Signal	Mating Sequence	Pin	Signal	Mating Sequence
A1	GND	First	B12	GND	First
A4	V _{BUS}	First	B9	V _{BUS}	First
A5	CC1	Second	B8	SBU2	Second
A6	Dp1	Second	B7	Dn2	Second
A7	Dn1	Second	B6	Dp2	Second
A8	SBU1	Second	B5	CC2	Second
A9	V _{BUS}	First	B4	V _{BUS}	First
A12	GND	First	B1	GND	First
SHELL		GND	SHELL		GND

4.3.2. LV TTL UART Interface

The LV TTL UART interface provides an easy-to-use serial interface for direct communication with embedded hosts with low hardware and software requirements for other serial interfaces.

The UART Signals are available the UniCom1 and the UniCom 2 connectors

The following transmission speeds are pre-defined:

3 000 000 bit/s,

921 600 bit/s,

230 400 bit/s,

115 200 bit/s,

38 400 bit/s.

Higher speeds are possible on request.

The protocol settings are 8N1 (1 startbit, 8 bit, no parity, 1 stopbit) and no handshake.

Up to 25Mbps is possible on request.

4.3.3. General purpose Input/ Output-Pins (GPIO's)

The twelve provided GPIO Pins provide direct access to the micro-controller and are configured and controlled by firmware commands.

Accessible functions are:

- Digital Input with pull-up
- Digital Input with pull-down
- Digital Input floating
- Digital Output

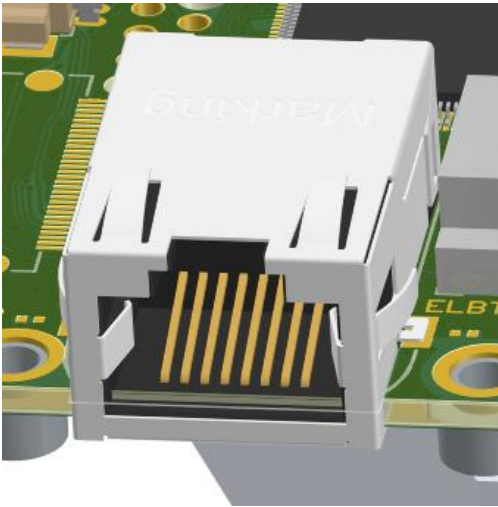
Refer to the “Specfirm Firmware Operation Instructions” for more Information.

The following GPIO pins are available:

GPIO	Hardware Pin UniCom1	Hardware Pin UniCom2
GPIO0	8	3
GPIO1	9	4
GPIO2	10	5
GPIO3		6
GPIO4		7
GPIO5		8
GPIO6		9
GPIO7		10
GPIO8		11
GPIO9		12
GPIO10		13
GPIO11		14

GPIO0...3 tolerate up to 5V GPIO 4...11 only 3.3V input voltage. The maximum output current is specified with 25mA at 3.3V.

4.3.4. Ethernet/ LAN Interface



The Ethernet/LAN-Interface is pluggable with RJ45-connectors and can reach up to 20Mbit/s real data rate.

The integrated Power over Ethernet functionality can power the complete electronics.

The Module supports:

- 10/100 Base TX
- Half/full duplex operation
- Hardware Internet protocols: TCP, IPv4, UDP, ICMP, ARP, PPPoE, IGMP
- Hardware Ethernet protocols: DLC, MAC
- IEEE 802.3/802.3u
- IEEE 802.3af PoE standard for up to 7W

4.3.5. Shutter/ Lamp Interface



The PE65 Electronics supports firmware generated Shutter/Lamp output signals for control of peripheral hardware with the following pinout. Please refer to “Operating_Instructions_Firmware_SPECFIRM.pdf” for more information’s.

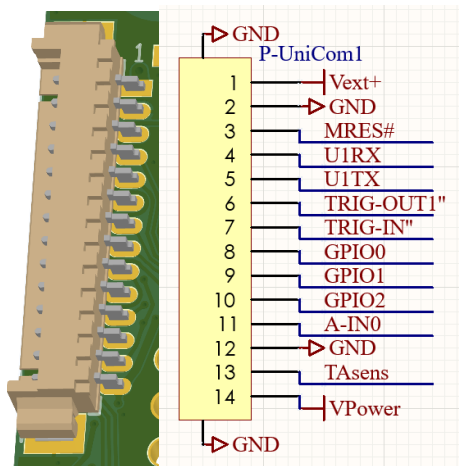
The connector is a 4pin WR-WTB 653104131822 SMD component with 1.25mm pitch from Würth Elektronik.

Pin-Nr.	Description	Signal	Level	Min	Typ	Max	Unit
1	GND	Power GND	Voltage	-	0	-	V
2	Shutter/Lamp Output	LAMP/SHUT	Low	0	-	0.4	V
			High	2.4	3.3	3.5	
3	Shutter enable Output	SHUT_EN	Low	0	-	0.4	V
			High	2.4	3.3	3.5	
4	+5V_Out	VPower (OUT)	Voltage	4.5	5	5.5	V

4.3.6. Universal Interfaces

UniCom1

The UniCom1 Connector is intended for easy accessibility to the most common hardware connections for prototyping via pre crimped wires in a terminal housing. All necessary parts are included with the prototype boards.



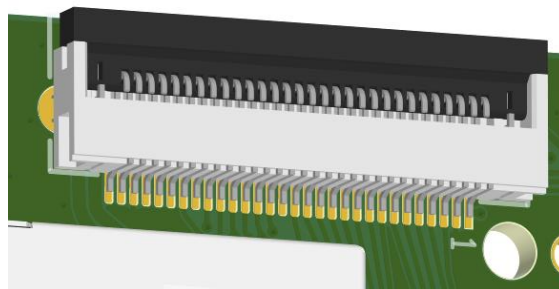
Parts from Würth Elektronik:

Female Terminal Housing	653014113322
Pre-crimped cable black	653153128130
Pre-crimped cable red	653153128130

UniCom2

The UniCom2 Connector bundles all signals mentioned in Chapter 2 and is intended for more complex hardware interfaces and later development steps or JETI add-on boards.

It is implemented on a 30-pin FPC cable connector with a 0.5 mm pitch from Würth Elektronik.
(Article#: 687130149022)



4.4. Power Supply

4.4.1. USB-powered

The USB communication port can be used for powering the PE60_2 electronics, provided it's connected to an active USB hub capable to draw up to 500 mA current at 4.4V - 5.25V.

Configuration with higher current need should be external powered.

Passive USB hubs do not provide sufficient power. In this case, the electronics must be powered externally.

The OR gated low drop out power circuitry switches automatically over to USB powering or external power, which voltage is ever higher.

4.4.2. 7-28V external supply

This Option includes a 5V fixed output voltage dc/dc step down regulator with up to 2.5A output current. The converter allows to use the electronics with supply voltages between 7V and 28V and provides a sufficient low output voltage ripple (typ. 10mV) and a peak efficiency up to 95%.

	Voltage Range	Power	Ripple
recommended	7V - 28V	≥15W	≤100mV

4.4.3. Power over Ethernet

The included signature and control circuit provides the IEEE802.3af compliant PoE compatibility signature required by the Power Sourcing Equipment (PSE) before applying up to 7W power to the electronics and provides a Class 0 signature.

The DC/DC converter operates over 36V to 57V input voltage range and provides a regulated output. The DC/DC converter also has built-in short-circuit and over temperature output protection.

4.5. Firmware Update Feature

The firmware implemented bootloader allows infield updates of the firmware using the serial interfaces. For proper operation, it is recommended to use only the USB-Interface.

For the necessary tool "SFProg" or if you have any questions concerning technical problems please contact the JETI-support: support@jeti.com

5. Declarations

5.1. CE – Declaration of conformity

We:

JETI Technische Instrumente GmbH
Göschwitzer Straße 48
D-07745 Jena

declare that the product series

Spectrometer DE50 expert

to which this declaration relates is in conformity with the requirements of following documents:

- EU Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- EU Low Voltage Devices (LVD) Directive 2014/35/EU

EU Harmonised standards:

- EN 61326-1 (2018-09)
- EN 55011 (2017-03) class B
- EN 61000-4-2 (2009-12); EN 61000-4-3 (2011-04)
- EN 61000-4-4 (2013-04); EN 61000-4-6 (2014-08)
- EN 61010-1 (2020-03)
- EN 50581 (2013-02)

The **CE** sign confirms the conformity of the product with the standards and directives mentioned above.


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Jena, February 11, 2025

5.2. Declaration of UKCA conformity

We:

JETI Technische Instrumente GmbH
Göschwitzer Straße 48
D-07745 Jena

declare that the product series

Spectrometer

DE50 expert

placed on the market by the Company and its subsidiaries are compliant with Electromagnetic Compatibility Regulations 2016 (S:I: 2016/1091) and following documents.

EU Harmonised standards:

- EN 61326-1 (2018-09)
- EN 55011 (2017-03)
- EN 61000-4-2 (2009-12); EN 61000-4-3 (2011-04)
- EN 61000-4-4 (2013-04); EN 61000-4-6 (2014-08)
- EN 61010-1 (2020-03)

The ^{UK}CA sign confirms the conformity of the product with the standards and directives mentioned above.


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Fax: +49 (0)3641 232 92 01



Jena, February 11, 2025

5.3. Certificate of warranty

Certificate of warranty for

Model: Spectrometer

Type: DE50 expert

JETI Technische Instrumente GmbH (referred to as JETI) hereby warrants this equipment as follows:

If any part of this unit (except as described below) fails due to poor workmanship or material (determined by JETI) within TWO (2) years from date of delivery, that part will be exchanged at no charge.

This warranty is valid only when the unit is installed and adjusted according to factory specifications and serviced by competent authorized personnel.

JETI does not assume responsibility for any of the following, all of which are excluded from the coverage of this warranty:

- Damage due to ordinary wear and tear, abusive use, or lack of proper maintenance
- Damage due to harsh mechanical shock, e.g. falling to the floor
- Loss or damage due to adverse environmental conditions or acts of God
- Loss of wages or income due to repair, replacement, malfunction or damage

Warranty becomes void if serial number is removed or defaced, or the instrument was opened by the customer.

If a defect appears which the customer feels is covered by this warranty, a written notice describing the defect must be sent to JETI's office at the current address of record.

Upon receipt of customer's written report of a defect, if the defective items are covered by this warranty, JETI will repair or replace it at no charge to the customer, within 30 days after receipt of the returned unit (provided there are no labor problems or materials shortages to cause delays). The choice between repair and replacement shall be determined by JETI based on actual conditions or circumstances. JETI reserves the right to substitute new and improved equipment or parts at any time. The obligation to replace defective parts does not require replacement of the complete unit.

NO OTHER WARRANTY EXPRESSED OR IMPLIED IS APPLICABLE TO THIS UNIT.

This warranty shall be in effect for a period of 24 months, beginning one week after the date of delivery.

5.4. License Agreement

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JETI hereby grants to you a non-exclusive license to use one copy of the delivered JETI software program (the 'software') on a single computer according to the following items:

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JETI's sole liability for a breach of this warranty is to be in JETI's sole discretion:

- to replace your defective media; or
- to advise you how to achieve substantially the same functionality with the software as described in the documentation through a procedure different from that set forth in the documentation; or
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6. Service

Please contact in case of any question or technical problem:

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