BRICK CORE COM

BRICK
CORE COM

Manual
Version 2.0n

Contents

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1   General Information

1.1   Important instructions

Prior to use of the unit it is essential to comply with the following instructions. As stipulated by law, we are providing important safety information and advice how you can avoid damage to the device and other fittings.

- Connection to the power supply must be carried out with correct polarity. Polarity reversal could cause irreparable damages.

- The correct supply voltage is 12V or 24V DC

- Operation of the device is allowed only in circuits with safety low voltage within the admissible limit values (SELV standard EN60950). This applies to all connections to the unit.

- The use of a power supply outside the limits defined above could cause damage or even destruction of the device.

- It is forbidden to directly connect the unit to the 230 V mains voltage!

- Please avoid mechanical stresses when the device is installed.

- The unit has undergone a comprehensive final check to guarantee that it has left the facility in a perfect condition. Prior to initial operation, the unit has to be examined for damage caused by transport or inappropriate storage. If there is any damage to the unit it must not be taken into service.

- The unit must not be operated with defective safety equipment or with incorrectly mounted or inoperable safety/protection devices.

- Prior to initial operation, please check the suitability of the unit for the specific application. Please take special note of the admissible environmental and operating conditions specified in the data sheet.

- Any removal of identification numbers, repair work by yourself or modification of the unit is forbidden.

- Prior to initial operation carefully read this user manual containing notes and warnings in order to ensure safe operation.

- Unless specified differently, all technical data apply to an environmental temperature of 25°C. The specified values are subject to the usual fluctuations.

- Stresses due to extreme environmental conditions (e.g. heat or cold) over a longer period of time may influence reliability. Even under normal conditions of use within the admissible limits service life may be reduced by permanent operation at the limits. Tolerance of the extreme values is subject to the usual fluctuations.

1.2   Warranty and liability

We reserve the right to change the contents of the documentation and the software without notice. Vector Informatik GmbH assumes no liability for correct contents or damages which are resulted from the usage of the documentation. We are grateful for references to mistakes or for suggestions for improvement to be able to offer you even more efficient products in the future.

1.3 Trademarks

All trademarks mentioned in this documentation and if necessary third party registered are absolutely subject to the conditions of each valid label right and the rights of particular registered proprietor. All trademarks, trade names or company names are or can be trademarks or registered trademarks of their particular pro- prietors. All rights which are not expressly allowed are reserved. If an explicit label of trademarks, which are used in this documentation, fails, should not mean that a name is free of thirdparty rights.

1.4 Used symbols and their meanings

Symbol	Meaning
	Warning of general hazard. The kind of hazard is specified by the text next to the symbol.
	Warning of hazardous electrical voltage and the effects thereof.
	This symbol refers to a hot surface that should not be touched without appropriate precautions. There is danger of burning!
	Warning of damages by electrostatic discharge ESD (Electrostatically Sensitive Device) warning symbol
	This symbol refers to general information about device and user manual.
	This symbol introduces diverse details as to product configurations.
	This symbol indicates that, in the case of non-observance of the warning, the device or parts thereof could be damaged.
	This symbol refers to instructions and recommendations for the connection of external peripherals and their wiring.

2 Safety

In order to avoid personal injuries and damage to property, you have to read and understand the following safety instructions and hazard warnings prior to installation and use of this hardware. Keep this documentation (manual) always near the hardware.

Please observe the notes in chapter 1.1 in addition to this chapter.

2.1 Proper Use and Intended Purpose

The hardware may only be operated (i) according to the instructions and descriptions of this manual; (ii) with the electric power supply designed for the hardware, e.g. USB-powered power supply; and (iii) with accessories manufactured or approved by Vector.

The hardware is exclusively designed for use by skilled personnel as its operation may result in serious personal injuries and damage to property. Therefore, only those persons may operate the hardware who (i) have understood the possible effects of the actions which may be caused by the hardware; (ii) are specifically trained in the handling with the hardware, bus systems and the system intended to be influenced; and (iii) have sufficient experience in using the hardware safely.

The knowledge necessary for the operation of the hardware can be acquired in workshops and internal or external seminars offered by Vector. Additional and hardware specific information, such as „Known Issues", are available in the „Vector KnowledgeBase" on Vector´s website at www.vector.com. Please consult the „Vector KnowledgeBase" for updated information prior to the operation of the hardware.

2.2 Hazards

The hardware may control and/or otherwise influence the behavior of control systems and electronic control units. Serious hazards for life, body and property may arise, in particular, without limitation, by interventions in safety relevant systems (e.g. by deactivating or otherwise manipulating the engine management, steering, airbag and/or braking system) and/or if the hardware is operated in public areas (e.g. public traffic, airspace). Therefore, you must always ensure that the hardware is used in a safe manner. This includes, inter alia, the ability to put the system in which the hardware is used into a safe state at any time (e.g. by „emergency shutdown"), in particular, without limitation, in the event of errors or hazards.

Comply with all safety standards and public regulations which are relevant for the operation of the system. Before you operate the system in public areas, it should be tested on a site which is not accessible to the public and specifically prepared for performing test drives in order to reduce hazards.

2.3 Battery notice

CAUTION!

There is a risk of explosion if the battery is replaced incorrectly. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Please also see the battery supplementary sheet!

Valid only for devices containing a battery.

2.4 Electrostatically Sensitive Components (ESD)

A sudden electrostatic discharge could destroy sensitive components. Therefore, proper packaging and grounding prescriptions must be observed. Please always observe the following safety advices.

1. Plug-in cards always have to be transported in electrostatically safe containers or bags.

2. Please leave electrostatically sensitive components in their containers until they have reached the electrostatically safe assembly site.

3. Take care that you are correctly grounded if you touch electrostatically sensitive components.

4. Make sure that electrostatically sensitive components are stored in protective packages or on antistatic mats.

2.4.1 Grounding practices

By observing the following measures, electrostatic damage to the device can be avoided.

1. Lay out antistatic mats at the work place. Wear a grounding strap which is connected to the work place and the working tools.

2. Use antistatic foot mats, foot grounding equipment or air ionizers to provide additional safety.

3. Only touch sensitive components, plug-in cards and units on the housing or at the outer edges of the plug-in cards.

4. Avoid contact with pins, wires and conductor tracks.

5. Make sure that all voltage and signal sources are switched off before establishing or disconnecting electric connections or connecting testing devices.

6. Avoid non-conductive materials such as usual mounting accessories made of plastics or polystyrene at the work place.

7. Use conductive tools (e.g. ESD screwdrivers) when working on electrostatically sensitive units and components.

8. Always put plug-in cards and drives on the antistatic mat with the component side downwards.

2.5 Warning of hot surface

The BRICK CORE COM System can become very hot during operation and should not be touched without appropriate precautions. There is danger of burning!

2.6 Disclaimer

Claims based on defects and liability claims against Vector are excluded to the extent damages or errors are caused by improper use of the hardware or use not according to its intended purpose. The same applies to damages or errors arising from insufficient training or lack of experience of personnel using the hardware.

3 System Configuration

The BRICK CORE COM is available in various variants. This means that, for each area of application, an optimum ratio of system scope, performance and price can be obtained. Please observe the following chapters to obtain detailed information on the different options of configuration of the BRICK CORE COM and additional accessories.

A BRICK CORE COM system can comprise 3 HW feature sets:

- BRICK CORE COM computer core
- Add-on BRICK CORE COM STORAGE BAY
- Add-on BRICK CORE COM PCIe

The add-on feature sets are optional. They can be assembled on the computer core exclusively by the manufacturer or authorized partners. A subsequent extension by the customer is not provided.

3.1 BRICK CORE COM computer core

is an actively vented high-performance Computer Core based on x86 architecture with a special substructure for hardware time synchronized operation of 1GbE and 10GbE Logging ports based on integrated GPS time signal or an external IEEE 802.1as time master.
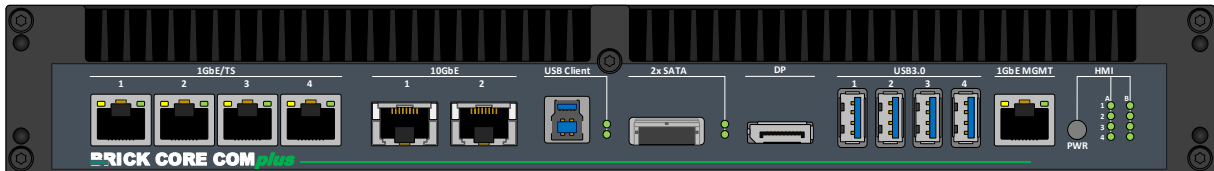
Figure 1: BRICK CORE COM*plus*

For the BRICK CORE COM computer core, the following HW equipment features are available for the respective device configuration:

Legend:
- = not available
✓ = available
opt. = optional

	Material Number	CPU/Graphic – Intel® Core i7® 5700EQ/GT2	Temp. Perfor. Class – P6 Active -25 ~ 70°C @ 2,8 GHz	RAM – 32 GByte	RAM – 16 GByte	Mass Storage OS – 128GByte Industrial SSD	OS – Win® 7 Pro	1Gb Eth. IF – 6xRJ45 1Gb Ethernet	10Gb Eth. IF – 2x RJ45 10Gb Ethernet	USB – 4x USB 3.0	eSATA SFF8088 – 2x eSATA 6G SFF8088	DP – 1x Display Port	USB Client – USB 3.0 Client	GPS – GPS	AUDIO – Headphone out	AUDIO – Microphone in	CFast – CFast Slot (no card)	SYS CTRL – K15/Ignition Function	SYS CTRL – BRICK System Com. Interface	GPIO – 4xGPI	GPIO – 4xGPO	Add-ons – STORAGE BAY Add-on	Add-ons – PCIe Add-on
BRICK CORE COM 5700EQ-16-128-ST	22510	✓	✓	opt.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
BRICK CORE COM 5700EQ-16-128-ST-P	22511	✓	✓	opt.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BRICK CORE COM 5700EQ-16-128-0-P	22512	✓	✓	opt.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓

3.2 Add-On BRICK CORE COM STORAGE BAY

If large amounts of data with a high continuous band width are to be written or read the computer core can be extended by a reception fixture for a BRICK STORAGE cartridge.
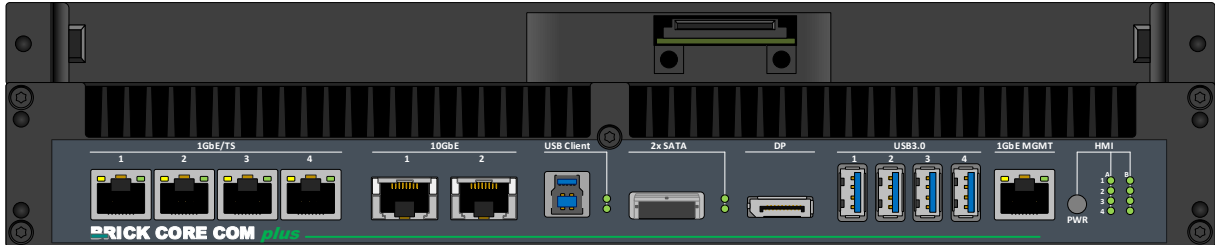
Figure 2: BRICK CORE COM*plus* including STORAGE BAY attachment frame

> ℹ️ Systems with a STORAGE BAY are always actively vented.

3.3 Add-On BRICK CORE COM PCIe
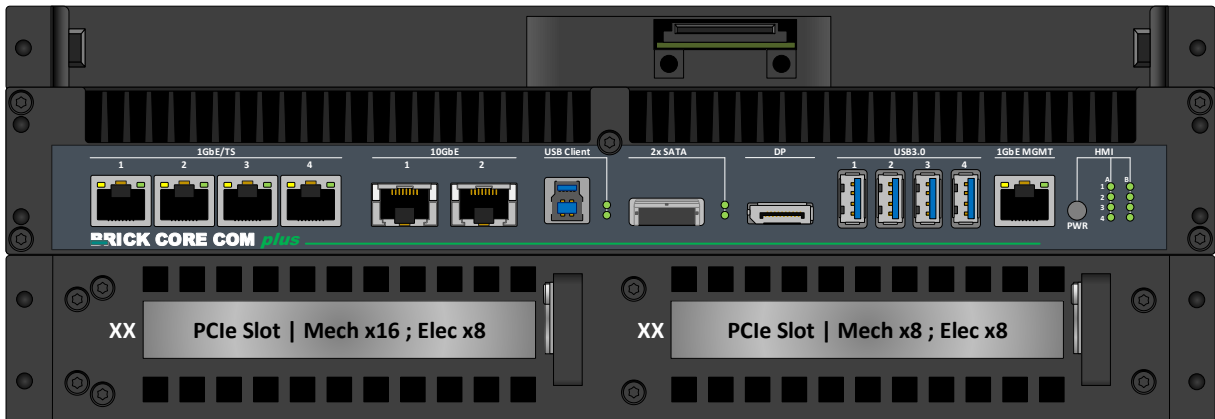
Figure 3: BRICK CORE COM*plus* including STORAGE BAY and PCIe Add-on

SPC PCIe Add On	Value	Description
Operating Temperature	-25… +70°C	Add-On PCIe cards may have different specification
PCIe Slot Power	Limited power 1x 60W or 2x 30W maximum	Power supply only via bus interface, no separate power connector, max current all slots 5A @12V, 2A @3,3V
PCIe Slot left	Mechanical x16, electrical x8	8 Lanes PCIe 3.0 extension slot
PCIe Slot right	Mechanical x8, electrical x8	8 Lanes PCIe 3.0 extension slot
PCIe Card size	max. half size cards, 106.68 mm (height) X 175.26 mm (long), 1 Slot mounting	

Insertion of non-validated PCIe cards may void certification and warranty.

4 BRICK STORAGE

If large amounts of data with a high bandwidth are to be recorded reliably the BRICK CORE COM system can be extended by a 1/2U (22mm) BRICK CORE COM STORAGE BAY. In this case, the STORAGE BAY accommodates the mass storage device in the form of a BRICK STORAGE cartridge.
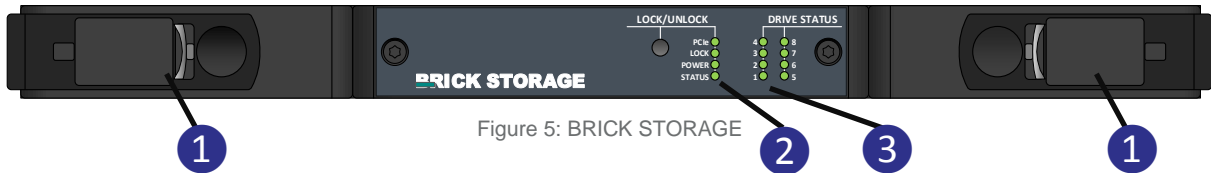
Figure 5: BRICK STORAGE

Item number	Designation	Description
1	Fastener / Lock lever	Fastener to lock and unlock to remove cartridge
2	LED PCIe	Indicates PCI Express connection established and active
	LED LOCK	Indicates cartridge locked correctly
	LED POWER	Indicates Cartridge Power OK
	LED STATUS	Green Indicates Status (Temp) OK. red indicates NOK (temp. low or high)
3	LED 1-8 Drive Status	Red indicates drive failure, green Drive activity

4.1 Lock / Unlock BRICK STORAGE cartridge
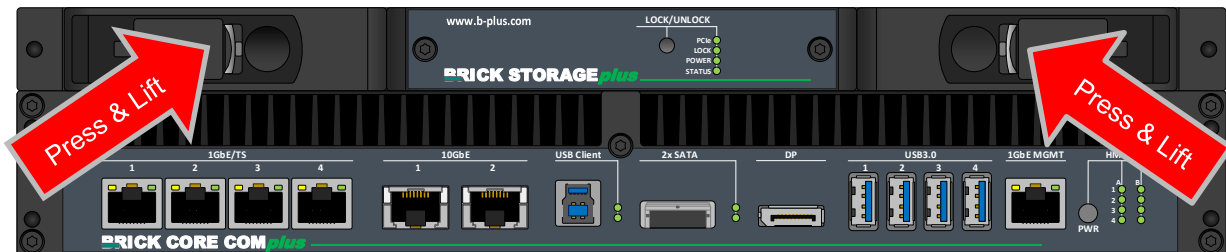
👉 The BRICK STORAGE cartridge is not hot plug capable. Make sure your system is shut down before you insert or remove the cartridge. Insertion or withdrawal of the BRICK STORAGE cartridge during operation can cause data loss.

4.2 BRICK STORAGE cartridge order Information

Material Number	Designation	Description
180120	BRICK STORAGE Cartridge 4TB	- 4 TB Storage prosumer SSD (0-60°C), up to 1GB/s - RAID Controller preconfigured as RAID 0/NTFS
180121	BRICK STORAGE Cartridge 8TB	- 8 TB Storage prosumer SSD (0-60°C), up to 1GB/s - RAID Controller preconfigured as RAID 0/NTFS
180122	BRICK STORAGE Cartridge 12TB	- 12 TB Storage prosumer SSD (0-60°C), up to 1GB/s - RAID Controller preconfigured as RAID 0/NTFS
180123	BRICK STORAGE Cartridge 16TB	- 16 TB Storage prosumer SSD (0-60°C), up to 1GB/s - RAID Controller preconfigured as RAID 0/NTFS

5 Accessories

For using BRICK CORE COM in the lab or in vehicle the following accessories are available.

Material Number	Designation	Description
22514	BRICK UPS 200	200Watt managed Li-ion UPS with 160Wh
22513	BRICK THUNDER DOCK	Highspeed Thunderbolt® Adapter to download data from a BRICK STORAGE cartridge over a Thunderbolt® interface to a PC-System
22442	BRICK Cable Guard	Cable Guard to secure connected cables to avoid loss cable and connector damages.

6 Product Identification

6.1 Scope of delivery

The scope of delivery depends on the ordered system or set configuration. Please check the scope of delivery according to the survey printed below.

	- = not available ✓ = available opt. = optional	BRICK CORE COM 5700EQ-16-128-ST	BRICK CORE COM 5700EQ-16-128-ST-P	BRICK CORE COM 5700EQ-16-128-0-P
Power Supply	Power supply line red-black, open end, 4qmm /1.5m	✓	✓	✓
	Desktop type power supply AC 110-240V 50/60Hz, 220W, 24V, 9.5A incl. Power cord EURO CEE7/7	opt.	opt.	opt.
	Power cord UK (UK Plug)	opt.	opt.	opt.
	Power cord USA/JP (NEMA 5-15, 3-pol)	opt.	opt.	opt.
	Power cord CN (China Type 1)	opt.	opt.	opt.
Accessories	GPS-Antenna	✓	✓	✓
	SYSCTRL Cable, KL15 yellow, FLRY 0.5qmm	✓	✓	✓
	GPIO Cable	✓	✓	✓
	OS Recovery Stick for Windows® / Linux	✓	✓	✓
Documentation	Manual BRICK CORE COM (on Recovery Stick)	✓	✓	✓
	Safety supplement	✓	✓	✓

6.2 Type Plate

The type plate as shown is located on the bottom of the device. The example data used here refer to the revision D01.

Figure 4: BRICK CORE COM type plate (example)

Symbol	Meaning
	Legal notice regarding the disposal of used appliances (WEEE)
	CE label

7 Technical Specification

7.1 Technical Characteristics of BRICK CORE COM:

Features	Details
	BRICK CORE COM 5700EQP6
Processor	Intel® Core 5700EQ 4x 2,6GHz (3,4GHz)
Graphic support	Intel® GT2 HD Graphics 5600, Base clock: 300 MHz; GT Turbo: up to 1000 MHz Execution Units / Pixel Pipelines: 24EU / 3, Max Graphics Memory 2048MB, GFX Memory Bandwidth (GB/s) 25.6, GFX Memory Technology DVMT, API (DirectX/OpenGL) 11.2 / 4.3 + OCL 2.0, Shader Model 5.0, Hardware accelerated Video MPEG2, VC-1, AVC, Blu-ray (+3D)
RAM	16GByte (2x 8GB SODIMM), DDR3L-1666
OS-Storage	128GByte M.2 SSD up to 512GByte M.2 SSD
Network interfaces	6x1Gbe (4x Intel® I210 Hardware Timestamp Support, 1x Intel® I210 TS 802.1AS, 1x Intel® I218LM) 2x 10Gbe (Intel X540)
USB interfaces	4xUSB3.0 Host (1000mA) 1xUSB3.0 Client (USB3380, need special software support)
Audio interfaces	Microphone input, stereo headphone output
Monitor interfaces	1xDP 1.2 (Display Port), maximum resolution: 3840x2160
External storage interfaces	CFast Slot, 2x eSATA 6G via SFF8088 plug connector
WLAN (Option)	802.11 a/b/g/n (Option)
GPS	ublox LEA-M8S
LTE	SIMCom SIM7100E 4G/LTE (project-based Option, limited certification), mini SIM slot
GPIO	4xGPI: V_ON>1.95V, V_OFF<1.75V (+-5%), Umax 32V 4xGPO: Highside (switching of the input voltage, max. 1A per channel)
On/Off control "Ignition"	1x Digital Input via SYSCTRL plug connector (Ignition), On: >4,75V / Off: <4,15V (+-5%), Umax 32V
BRICK system control interface	1x CAN, termination resistor switchable, 1x Digital Input (On/Off control)
Operating systems	Windows 7 Professional for embedded system
Housing dimensions	320 x (44 - 110) x 250 (B x H x T) mm (see details below)
Supply voltage	12V DC / 24 DC, safe in case of dropdown pulses (cranking) down to 6.5V
Cooling	Active (passive on request with different power / performance setup)
Power consumption typically	BRICK CORE COM based on Intel Core i7 5700EQ (without STORAGE and PCIe): approx. 110 Watts depending on the system utilization
Power consumption maximum	BRICK CORE COM maximum rate 200W (in full configuration)
Standby (OFF) current	< 50 µA (RTC, GPS, µC Stby.)
Weight	BRICK CORE COM (without STORAGE BAY Add-on): approx. 5kg

7.2 Environmental Characteristics and Conformity

Characteristics	Details
Operating temperature	-25°C to +70°C (for active cooled systems, without STORAGE cartridge)
Storage temperature	-40°C to +85°C
Air humidity	90% non-condensing
Vibration and shock	EN 60068-2-64:2008 (10-1000Hz – 33,8 m/s²) EN 60068-2-27:2009 (half sine, 11ms, 500 m/s²)
IP protection class	IP2X
Electromagnetic compatibility (EMC)	RED Directive 2014/53/EU
Electrical safety	LVD Directive 2014/35/EU
RoHS II directive	2011/65/EU
USA / FCC	Part 15 Subpart B / FCC ID (W-LAN Module)
CANADA	ICES 003

7.3 BRICK Temperature Management

Critical Temperature protection for the BRICK CORE COM computing unit including Add On.

7.3.1 BRICK System Critical Temperature warnings (absolute maximum rates)
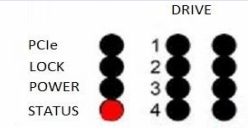
BRICK System Critical Temperature values

Sensors	Temperature Settings BRICK	
	max	min
Ambient BRICK Temp. located at backside (reference)	80	-25
Storage internal (reference)	80	-25
The critical Temperature values are continuously polled at startup and during runtime by the BRICK µC System	HMI Indication	
In a critical temp case at startup the System will not be powered on and an Error Code (LED) will be shown.	too high 	too low
In a critical temp case during operation the system will be set to LimpHome state (power down but µC active) and an Error Code (LED) will be shown. The System can only be re-powered by pressing power button (Note: 3°C threshold)		

7.3.2 BRICK STORAGE cartridge temperature warnings

Critical temperature protection for BRICK CORE COM systems with BRICK STORAGE cartridge.

BRICK STORAGE cartridge temperature warnings

	BSC Temperature Warning Settings	
	max	min
Cartridge Temperature HDD (internal)	60	>0
Cartridge Temperature SSD PRO (internal)	70	-20
Cartridge Temperature SSD industrial (internal)	tbd	-25
Storage Temperature warnings (see table), are continuously polled by an independently µC System	HMI Indication	
In a warning case (temp. out of range) at startup the Cartridge will not be powered and a Warning LED is set, to activate the Cartridge a restart under good conditions is necessary		
In a warning case (temp. out of range) during runtime the Warning LED is set but the Storage keep running (to avoid data lost) up to critical temp		

7.4 Mechanical Details:

7.4.1 BRICK CORE COM

Features	Details
Computer Core Unit	Base computing Unit with DC/DC power
Housing dimensions	320 x 44 x 250 (B x H x T) mm
Weight	approx. 5,0kg
Housing material and Surface	Solid aluminum housing with black anodized surface, please note, due to this chemical process minimal differences in color are possible

All dimensions are given in millimeters [mm].
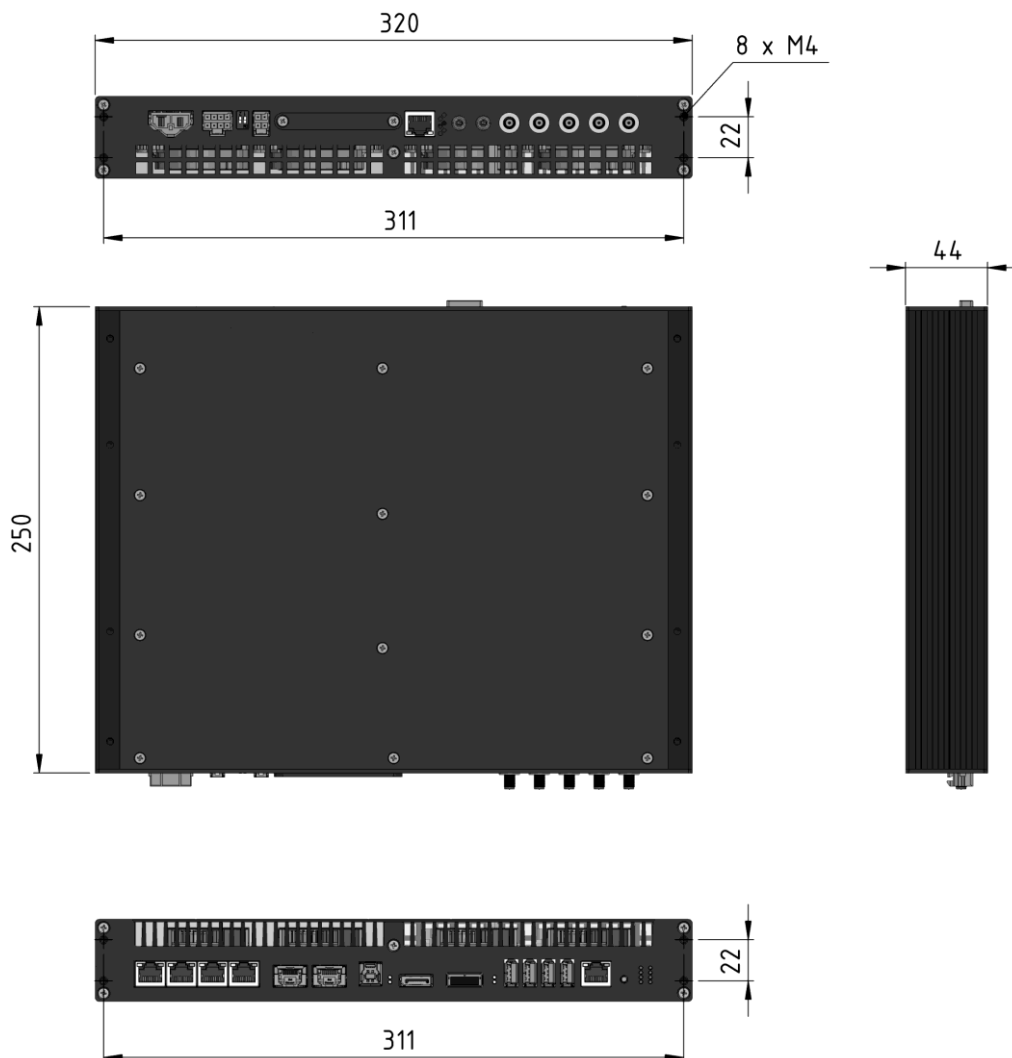
Figure 5: BRICK CORE COM mechanical drawing

7.4.2 BRICK CORE COM with STORAGE BAY Add-on

Features	Details
Further external storage interfaces	Base computing Unit with DC/DC power and PCIe 3.0-based STORAGE BAY Add-on.
Housing dimensions	320 x 66 x 250 (B x H x T) mm
Weight	approx. 5,5kg
Housing material and Surface	Solid aluminum housing with black anodized surface, please note, due to this chemical process minimal differences in color are possible

All dimensions are given in millimeters [mm].
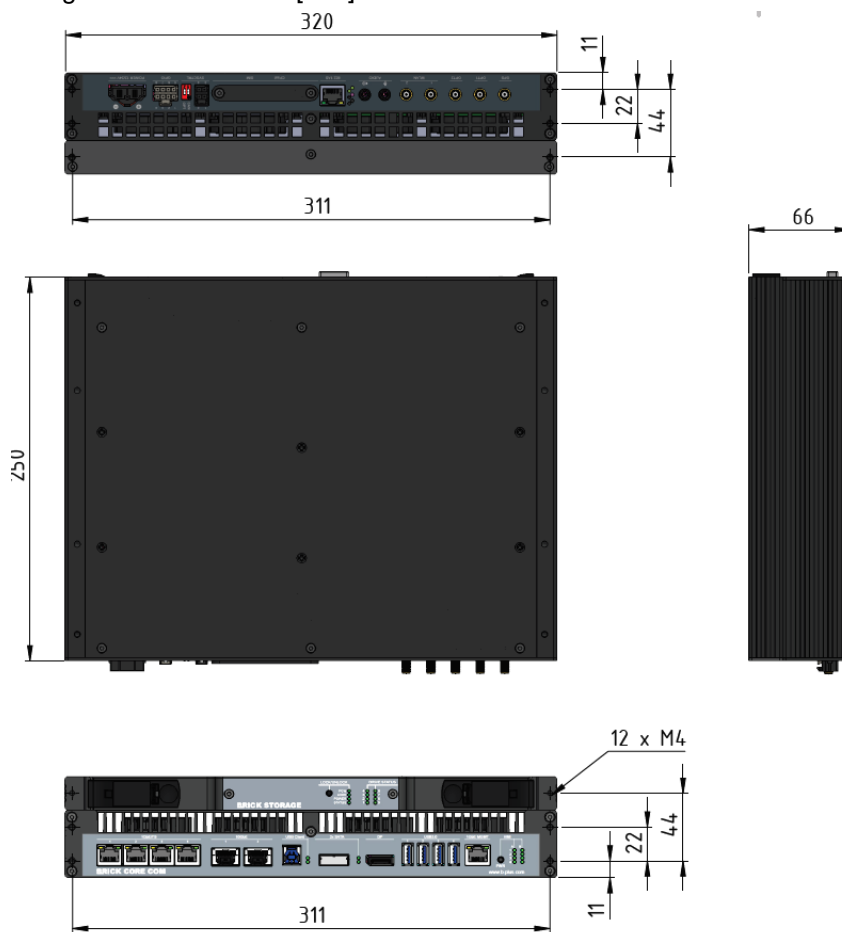
Figure 6: BRICK CORE COM with STORAGE BAY mechanical drawing

7.4.3 BRICK CORE COM with STORAGE BAY and PCIe Add-ons

Features	Details
Further external storage interfaces	Base computing Unit with DC/DC power PCIe 3.0-based STORAGE BAY Add-on and PCIe Ad- on
Housing dimensions	320 x 110 x 250 (B x H x T) mm
Weight	approx. 7kg
Housing material and Surface	Solid aluminum housing with black anodized surface, please note, due to this chemical process minimal differences in color are possible

All dimensions are given in millimeters [mm].
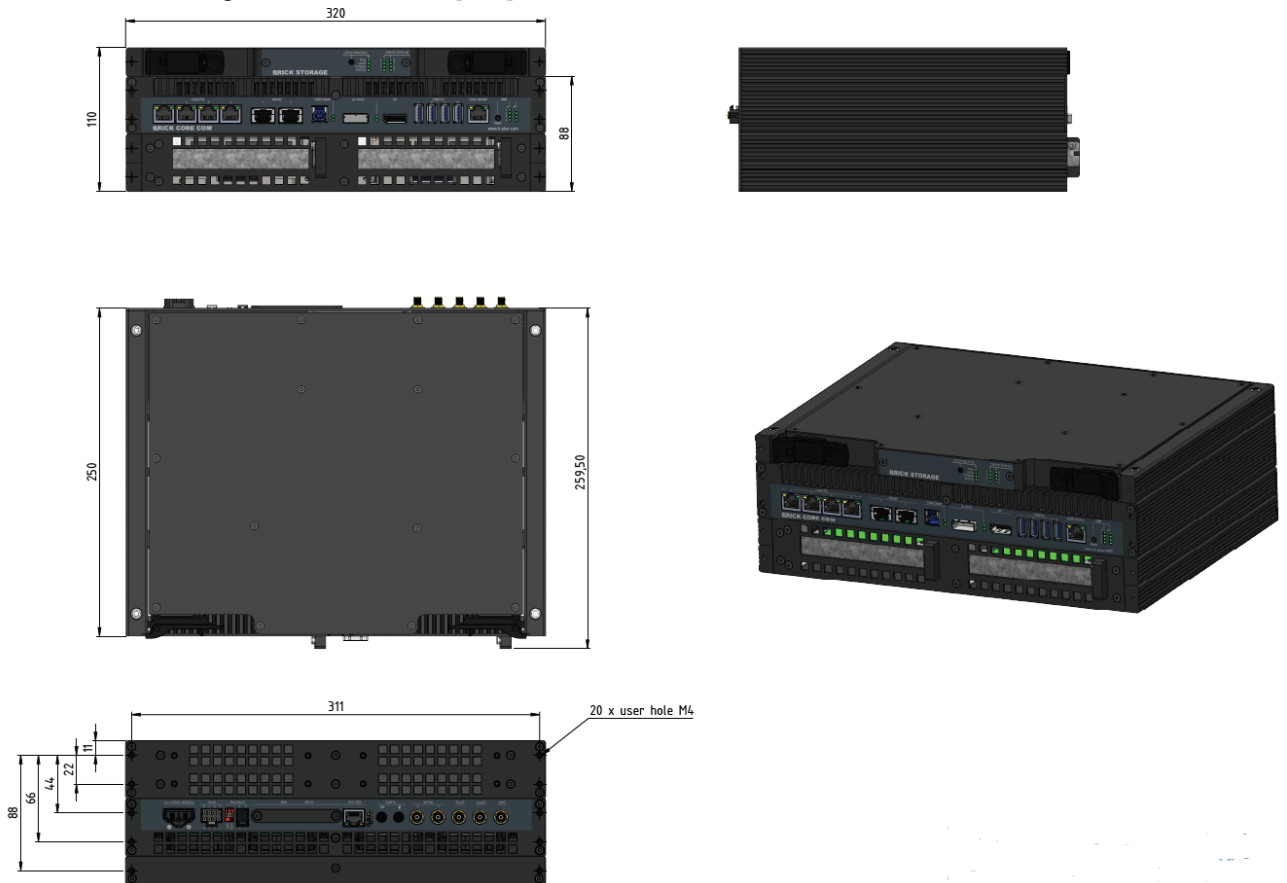
Figure 7: BRICK CORE COM with STORAGE BAY and PCIe mechanical drawing

8 Product Description

8.1 BRICK CORE COM Computer Core

8.1.1 Front side BRICK CORE COM Computer core
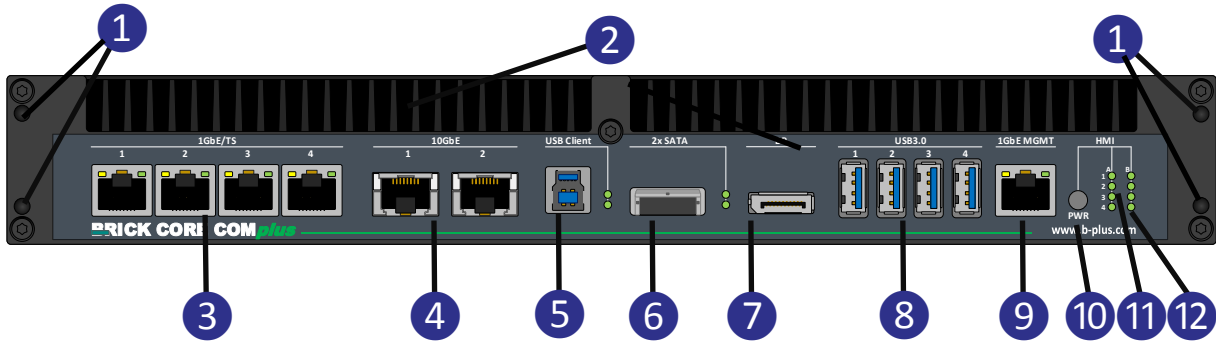
Figure 8: BRICK CORE COM*plus* front view connectors

Pos.	Designation	Description
1		Mounting holes with inner thread M4 (depth approx. 11.5mm)
2		Air outlets left and right for actively vented BRICK CORE COM systems
3	1GbE/TS 1,2,3,4	1Gb Ethernet Port (dedicated I210 per Port, TS-capable)
4	10GbE, 1,2	10Gb Ethernet Port (TR-capable need XTSS TR license)
5	USB Client	USB 3.0 Client Port (need project-based software support)
6	DP	Display Port
7	2xSATA	2xSATA 6G via SFF8088 [i] (only Lanes 1 and 2 are supported)
8	USB3.0 1,2,3,4	USB3.0 Port
9	1GbE MGMT	1Gb Ethernet Port (adapted for System Management via Remote Desktop)
10	HMI PWR	On/Off button
11	HMI LED A1-4, B1-3	User LED (controlled via application software SIODI), see details in chapter 9.9
12	HMI LED B4	Operating status indication (Power LED), see details in chapter 9.9

8.1.2 Rear side BRICK CORE COM Computer core
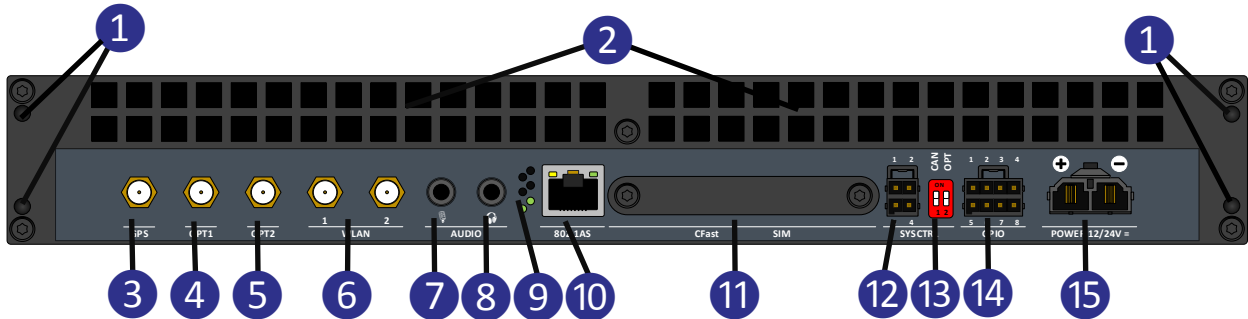
Figure 9: BRICK CORE COM*plus* rear view connectors

Pos.	Designation	Description
1	-	Mounting holes with inner thread M4 (depth approx. 11.5mm)
2	-	Air intake opening left and right for actively vented BRICK CORE COM systems
3	GPS	GPS Antenna connection
4	OPT1	HF SMA connector for option (i.e. LTE)
5	OPT2	HF SMA connector project specific option
6	WLAN 1,2	WLAN Antenna connection (Prim, Aux)
7	MIC Symbol	Audio input, stereo microphone
8	SPK Symbol	Audio output, stereo headphones
9	Temp	Opening for temperature sensors for system temperature management
10	802.1AS	1Gb Ethernet Port (optional: with specific time synchronization function)
11	Cover plate for CFast and miniSIM socket	CFast Slot (CFast not included in the scope of delivery) miniSIM socket (need option LTE)
12	SYSCTRL	BRICK System control connector
13	SYSCTRL SW	DIP-Switch for CAN termination for the system control connector
14	GPIO	4 GPI and 4 GPO
15	POWER	Power supply connector

8.2 BRICK CORE COM with STORAGE BAY

Depending on the configuration, a BRICK CORE COM system may be equipped with a STORAGE BAY.

8.2.1 Front side BRICK CORE COM with STORAGE BAY
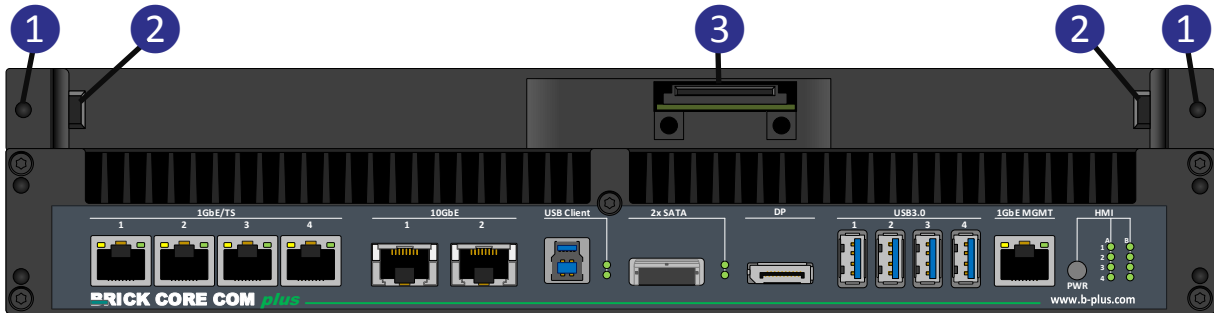
Figure 10: BRICK CORE COM*plus* front view STORAGE BAY connectors

Pos.	Designation	Description
1		Mounting holes with inner thread M4 (depth approx. 11.5mm)
2		Guide rollers
3		Connection terminal for the STORAGE CARTRIDGE

Into the STORAGE BAY, A STORAGE CARTRIDGE can be inserted from the front.
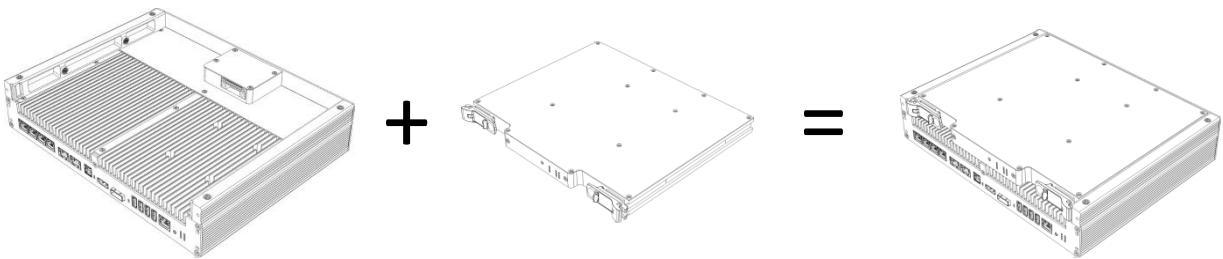
Figure 11: BRICK CORE COM STORAGE insert

Inserting or withdrawal of the BRICK STORAGE cartridge during operation can cause data loss.
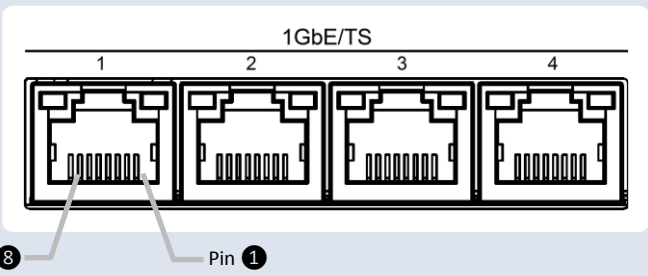
More information about the BRICK STORAGE cartridge can be found in the chapter referring to accessories.

9 Interfaces, Control Elements and Indicators

9.1 1GbE/TS 1/2/3/4

These connectors are designed as RJ45 sockets with integrated LEDs and correspond to a 1000BASE-T Ethernet interface according to IEEE 802.3 clause 40.

With activated Platform Timesync Service PTSS (part of BRICK XTSS) these ports are hardware time synchronized with the defined time master and are able do a timestamp capturing of incoming data frames.

Pin	Signal	RJ45 Network socket 1-4
1	GBEx_MDI0+	
2	GBEx_MDI0-	
3	GBEx_MDI1+	
4	GBEx_MDI2+	
5	GBEx_MDI2-	
6	GBEx_MDI1-	
7	GBEx_MDI3+	
8	GBEx_MDI3-	
	LED on the right	ACT = green
	LED on the left	LINK100 = yellow LINK1000 = green

Figure 12: Pin assignment 1GbE/TS

9.2 **10GbE 1/2**

These connectors are designed as RJ45 sockets with integrated LEDs and correspond to a 10GBASE-T Ethernet interface according to IEEE 802.3an.

With activated Platform Timesync Service PTSS (part of BRICK XTSS) these ports are hardware time synchronized with the defined time master. With activated XTSS-TR (time-relay) this ports can synchronize connected IEEE 802.1AS devices like MDILink.
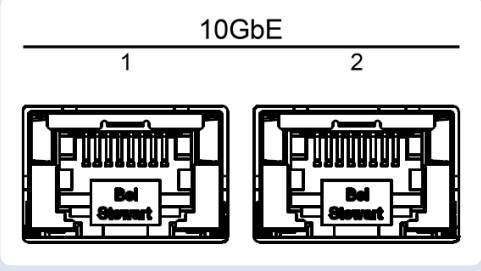
Pin	Signal	RJ45 Network socket 1-2
1	GBEx_MDI0+	
2	GBEx_MDI0-	
3	GBEx_MDI1+	
4	GBEx_MDI2+	
5	GBEx_MDI2-	
6	GBEx_MDI1-	
7	GBEx_MDI3+	
8	GBEx_MDI3-	

Figure 13: Pin assignment 10GbE/TS

9.3 **USB Client**
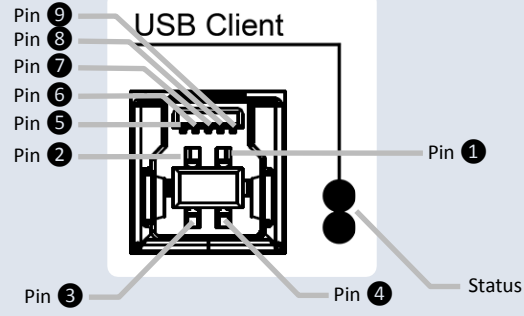
Pin	Signal	USB 3.0 Type B socket
1	VBUS	
2	D-	
3	D+	
4	GND	
5	SSTX-	
6	SSTX+	
7	GND	
8	SSRX-	
9	SSRX+	

Figure 14: Pin assignment USB Client

Matching counterpart: USB 3.0 Type B plug and USB 1.0/2.0 Type B plug

This Port need project-based software adaption, this is not included in standard OS package

9.4 DP (DisplayPort)
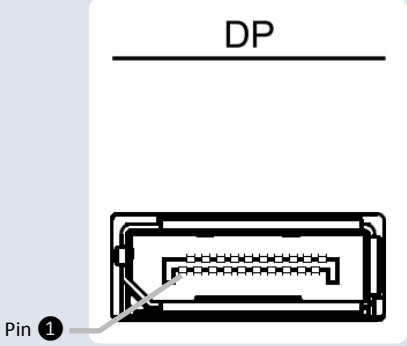
Pin	Signal	DisplayPort socket 20-pole
1	LANE0+	
2	GND	
3	LANE0-	
4	LANE1+	
5	GND	
6	LANE1-	
7	LANE2+	
8	GND	
9	LANE2-	
10	LANE3+	
11	GND	
12	LANE3-	
13	CONFIG1	
14	CONFIG2	
15	AUX+	
16	GND	
17	AUX-	
18	HPD	
19	RTN_PWR	
20	PWR	
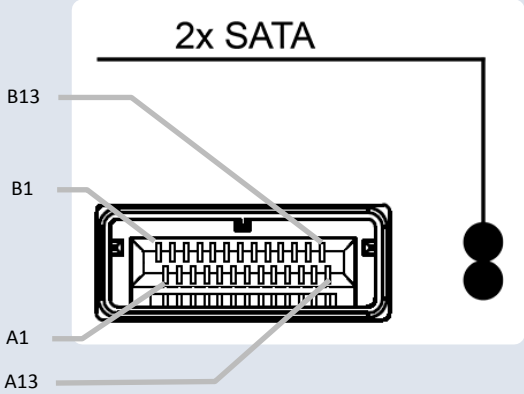
Figure 15: Pin assignment DisplayPort

Matching counterpart: Customary DisplayPort cables.

It is recommended to use high-quality DisplayPort cables, especially for longer cable lengths. The use of DisplayPort to HDMI and DisplayPort to DVI adapters is possible but, also in this case, high-quality components should be used.

9.5 2x Serial ATA (SATA) Port

Pin	Signal	Mini SAS x4 socket / SFF-8088 socket
A1	GND	
A2	SFF_SATA1_RXP	
A3	SFF_SATA1_RXN	
A4	GND	
A5	SFF_SATA0_RXP	
A6	SFF_SATA0_RXN	
A7	GND	
A8	Not connected	
A9	Not connected	
A10	GND	
A11	Not connected	
A12	Not connected	
A13	GND	
B1	GND	
B2	SFF_SATA1_TXP	
B3	SFF_SATA1_TXN	
B4	GND	
B5	SFF_SATA0_TXP	
B6	SFF_SATA0_TXN	
B7	GND	
B8	Not connected	
B9	Not connected	
B10	GND	
B11	Not connected	
B12	Not connected	
B13	GND	

Figure 16: Pin assignment mini SAS x4

Matching counterpart: Mini SAS plug (SFF-8088)

Please note that only the Lanes 1 and 2 are supported by BRICK CORE COM

9.6 USB3.0 Port 1/2/3/4

In the basic configuration, the system is provided with four USB 3.0 interfaces. To the USB interfaces, various USB devices can be connected. Both ports are equipped with a current limit at 1000mA.

Pin	Signal	USB3.0 Type A sockets
1	VBUS *1	
2	D-	
3	D+	
4	GND	
5	RX-	
6	RX+	
7	GND	
8	TX-	
9	TX+	

Figure 17: Pin assignment USB3.0 1/2/3/4
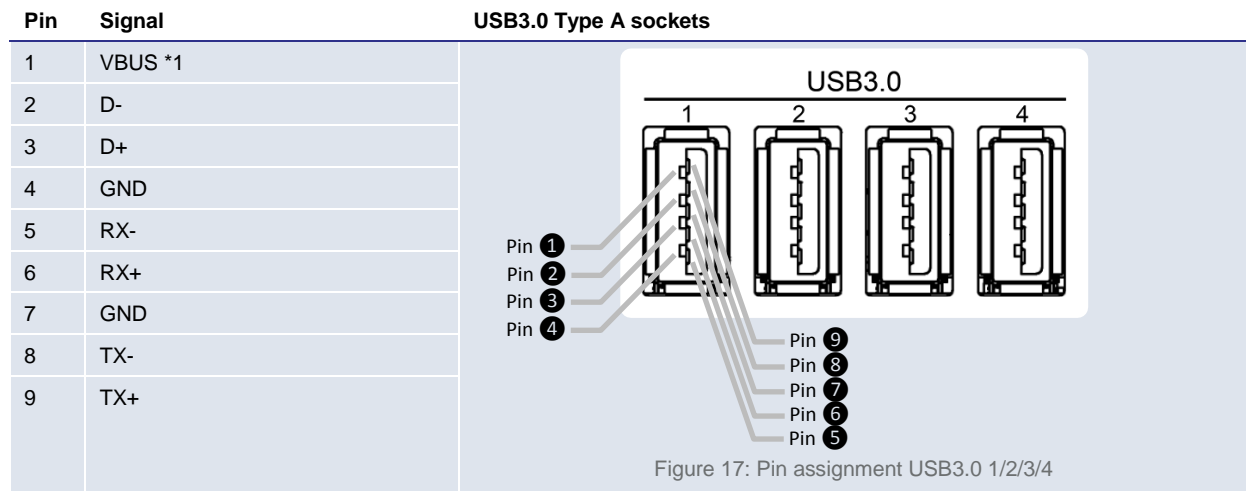
*1   Overcurrent protection by self-resetting fuse (maximally 1000mA)

Matching counterpart: In order to achieve the data transmission rates typical for USB3.0 connecting cables with USB3.0 type A plugs have to be used. Besides, the connected peripheral devices have to support USB3.0.

Also a connection of devices with USB1.0/2.0 type A plugs is possible.

9.7 1GbE MGMT Port

Pin	Signal	RJ45 Network socket
1	GBEx_MDI0+	
2	GBEx_MDI0-	
3	GBEx_MDI1+	
4	GBEx_MDI2+	
5	GBEx_MDI2-	
6	GBEx_MDI1-	
7	GBEx_MDI3+	
8	GBEx_MDI3-	

Figure 18: Pin assignment 1GbE MGMT
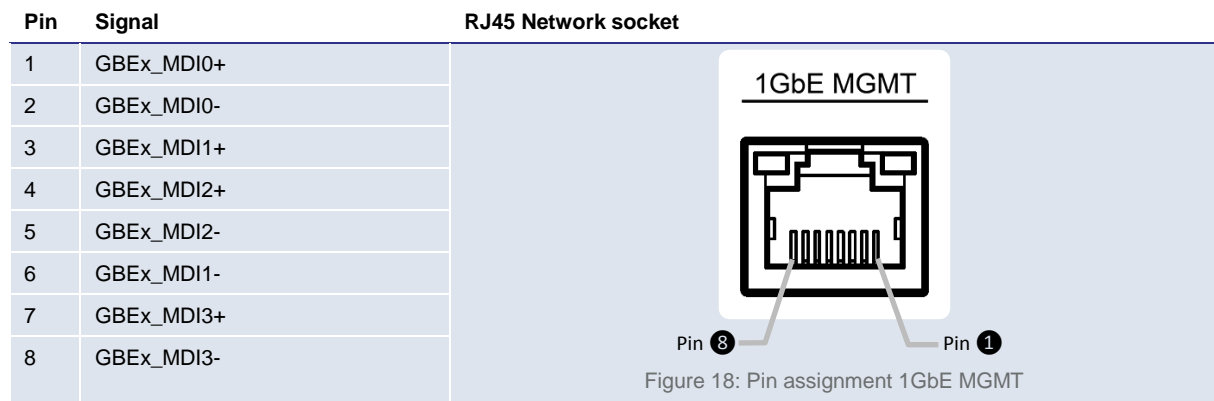
This Ethernet port is not recommended for data capturing (No TS), it can be used for connecting the BRICK to a LAN for setup or maintenance.

9.8 HMI Power

Pin	Signal
1	VIN+ typ. 12/24V (6V – 32V)
2	VIN-
3	VIN+ typ. 12/24V (6V – 32V)
4	VIN-
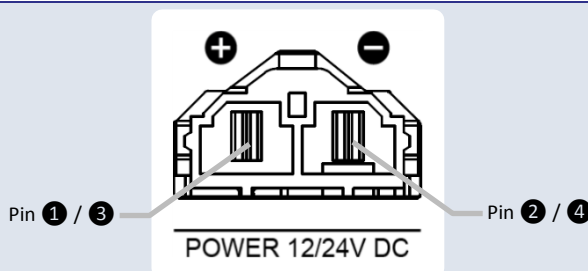
Figure 19: Pin assignment HMI PWR

Matching counterpart:

Molex MiniFit Sr. Receptible Housing Art.-Nr.: 42816-0212

Molex Female Crimp Terminal 12, 10 & 8 AWG Art.-Nr.: 42815-0012

9.9 HMI Power button and LEDs

LED	Signal	
PWR	On/Off button	
A1		Programmable by SIODI application software
A2	User LED	
A3		
A4		
B1	User LED	Programmable by SIODI application software
B2	User/System	Programmable by SIODI application software System override: red BRICK UPS config error
B3	User/System	Programmable by SIODI application software System override: red: System down state low temp
B4	System Status	Green: Indication of operating status (Power LED) System override: System down state high temp
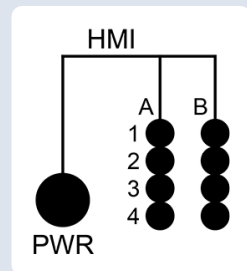
Figure 20: HMI Power button and LEDs

System Override: the microcontroller-based system management controller may override the user programmed LED state in case of the described system warning or system shut down to limp home state.

9.10 GPS SMA/F

SMA socket, for using GPS antennas with SMA/M plug.

Pin	Signal	SMA socket
1	SMA GPS	
2	Insulation	
3	GND	

Figure 21: Pin assignment GPS

9.11 SMA Port OPT1/2

SMA-RP (reverse polarity) socket, e.g. for connecting customary antennas with SMA-RP plug.
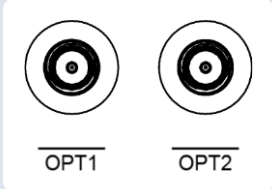
Pin	Signal	SMA-RP socket
1	Option 1 SMA (preferred for LTE) Option 2 SMA-RP project specific	
2	Insulation	
3	GND	

Figure 22: Pin assignment OPT1/2

ℹ️ If used for LTE antenna 4G/LTE/GPS with SMA/M connector a gender changer is needed.

9.12 SMA-RP WLAN 1/2

SMA-RP (reverse polarity) socket, e.g. for connecting customary WLAN antennas with SMA-RP plug.
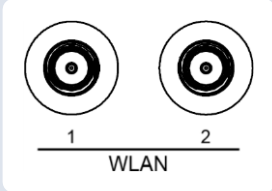
Pin	Signal	SMA-RP socket
1	SMA WLAN (1 prim, 2 aux)	
2	Insulation	
3	GND	

Figure 23: Pin assignment WLAN 1/2
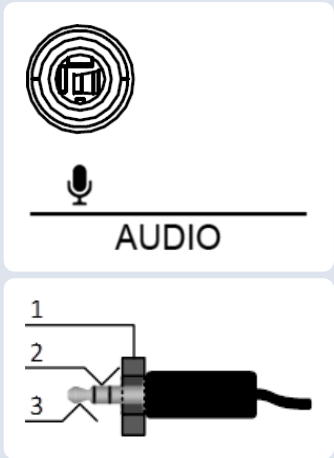
Matching counterpart: SMA-RP plug

9.13 Microphone Input

This connector can be used for connection of a microphone.
- Pre-amplifier with selectable 0 dB, +10 dB, +20 dB, and +30 dB gain settings
- Programmable, low-noise MIC bias level

Pin	Signal	Description	3.5mm jack socket
1	Sleeve	Ground	
2	Ring	Right channel with stereo plugs, negative phase with symmetrical connections	
3	Tip	Left channel with stereo plugs, positive phase with symmetrical connections, signal („hot") with mono connectors	

Figure 24: Pin assignment microphone
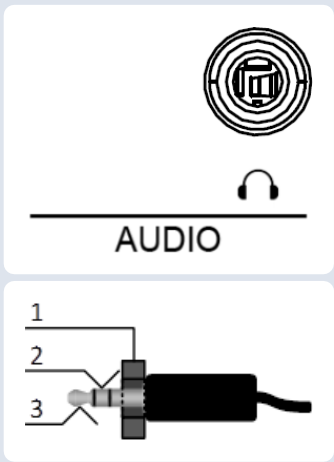
Matching counterpart: 3.5mm stereo jack plug (TRS plug)

9.14 Headphones Output

This connector is suitable for connecting wired headphones and earphones to the BRICK CORE COM. A connection of actively intensified audio devices to this connector is not recommended as this may cause an overregulation of the audio signal.

- 101 dB Dynamic range (A-wtd)
- -89 dB THD+N
- Minimum impedance 16 Ohm
- Maximum output power 50mW per channel

Pin	Signal	Description	3.5mm jack socket
1	Sleeve	Ground	
2	Ring	Right channel with stereo plugs, negative phase with symmetrical connections	
3	Tip	Left channel with stereo plugs, positive phase with symmetrical connections, signal („hot") with mono connectors	

Figure 25: Pin assignment headphones

Matching counterpart: 3.5mm stereo jack plug (TRS plug)

9.15 **1GbE/802.1AS**

This connector is designed as a RJ45 sockets with integrated LEDs and corresponds to a network interface according to IEEE 802.1AS that can be used for timing and synchronization of time-critical applications.

With activated Platform Timesync Service PTSS and Cluster Timesync (BRICK XTSS) this port can be the time master alternatively to the internal GPS for PTSS and CTSS.

It is also able do a timestamp capturing of incoming data frames.
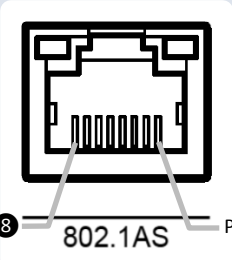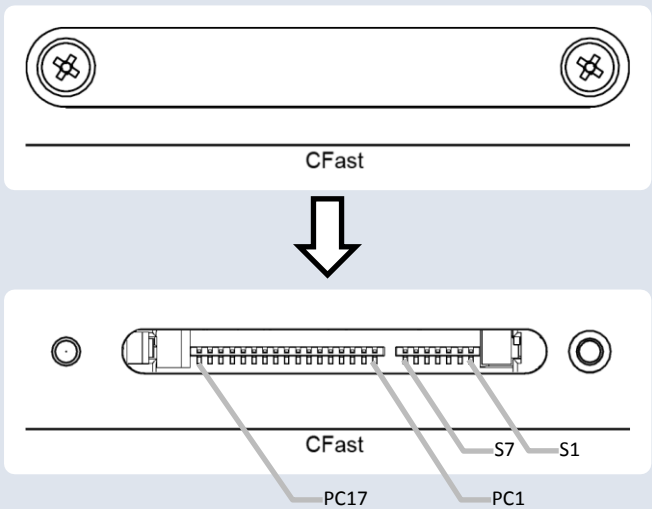
Pin	Signal	RJ45 Network socket
1	GBEx_MDI0+	
2	GBEx_MDI0-	
3	GBEx_MDI1+	
4	GBEx_MDI2+	
5	GBEx_MDI2-	
6	GBEx_MDI1-	
7	GBEx_MDI3+	
8	GBEx_MDI3-	

Figure 26: Pin assignment 1GbE 802.1AS

9.16 CFast Slot
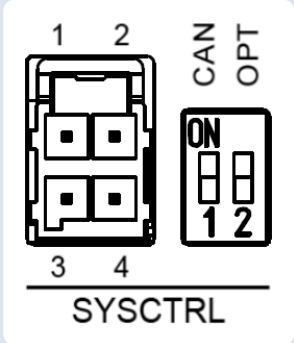
	Pin	Signal
SATA Segment	S1	GND
	S2	TX+
	S3	TX-
	S4	GND
	S5	RX-
	S6	RX+
	S7	GND
	Key	
Power Segment	PC1	CDI (Card Detect In)
	PC2	GND
	PC3	Not connected
	PC4	Not connected
	PC5	Not connected
	PC6	Not connected
	PC7	GND
	PC8	Not connected
	PC9	Not connected
	PC10	Not connected
	PC11	Not connected
	PC12	Not connected
	PC13	3.3V
	PC14	3.3V
	PC15	GND
	PC16	GND
	PC17	Not connected

Figure 27: Pin assignment CFast

9.17 SYSCTRL (internal System Control)

Pin	Signal
1	CAN_HIGH
2	IGN_IN, Thresholds: On: >4,75V / Off: <4,15V (+-5%), Umax 32V
3	CAN_LOW
4	n.c.

DIP switch 1 defines the CAN bus termination

DIP switch 2 is reserved for future applications

Configuration	1	2
CAN Termination (120R)	ON	OFF

This CAN Interface is for BRICK System internal use to connect System components like BRICK UPS

3.50mm Pitch connector and DIP switch

Figure 28: Pin assignment SYSCTRL
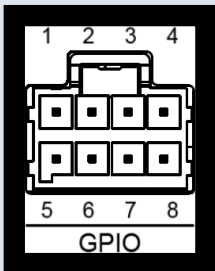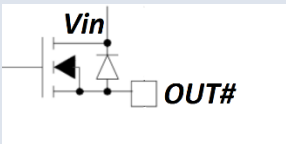
Matching counterpart:

Molex UltraFit Receptiple Housing Art.-Nr.: 172258-1004

Molex Female Crimp Terminal 22 & 20 AWG Art.-Nr.: 172253-3123

9.18 GPIO General Purpose I/Os

Pin	Signal	
1	OUT4	
2	OUT3	
3	OUT2	
4	OUT1	
5	IN4	
6	IN3	
7	IN2	
8	IN1	Figure 29: Pin assignment GPIOs
IN	Input	Switching thresholds: V_ON >1.95V, V_OFF<1.75V (+-5%), Umax 32V, internal pull down 10K
OUT	Output Voltage	Highside (switching input voltage), max. 1A per channel. Max programmable switching frequency 1Hz

Matching counterpart:

Molex UltraFit Receptible Housing Art.-Nr.: 172258-1008

Molex Female Crimp Terminal 22 & 20 AWG Art.-Nr.: 172253-3123

9.18.1 Electrical characteristics Input/Output

Symbol	Description	Value			Unit
		Min	Typ	Max	
V_{IN}	Input voltage continuous full load	10	12	32	V
$V_{IN\,min}$	Input voltage (short-term crank safe)	6,5			V
$V_{GPI,LOW}$	GPI Low voltage			1,75	V
$V_{GPI,HIGH}$	GPI High voltage	1,95			V
$V_{GPI\,max}$	GPI input voltage max			32	V
$R_{IN,GPI}$	GPI input resistance		10		kΩ
$V_{IGN\_IN,LOW}$	IGN_IN Input Low voltage			4,15	V
$V_{IGN\_IN,HIGH}$	IGN_IN Input High voltage	4,75			V
$V_{IGN\_IN\,max}$	IGN_IN input voltage max			32	V
R_{IN,IGN_IN}	IGN_IN input resistance		12		kΩ
V_{GPO}	GPO output voltage		V_{IN}	32	V
$I_{GPO\,max}$	GPO output current max			1	A
$f_{GPO\,min}$	GPO output frequency	1			Hz

10 Typical Installation

10.1 Vehicle Power Wiring Diagram BRICK CORE COM and UPS (for reference only)
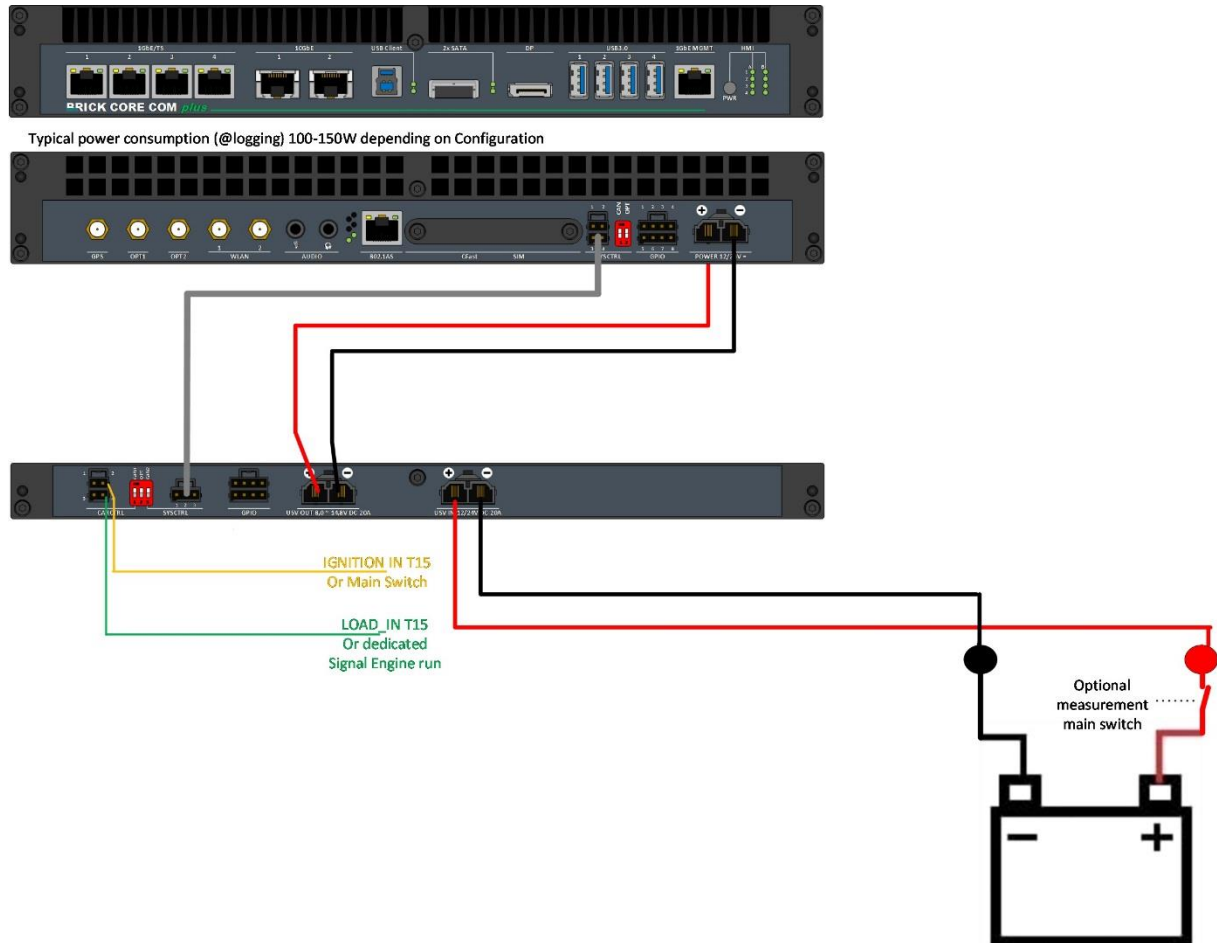
Figure 30: Power Wiring Diagram BRICK CORE COM and BRICK UPS

VECTOR

11

11 BIOS/UEFI BRICK CORE COM 5700EQP616G

11.1 Determination of the BIOS version

To determine the current BIOS version please check the system information tab within the BIOS.

11.2 Operation

In the BIOS setup, the system behavior can be adapted to individual requirements. The BIOS setup offers a series of menus to make changes to the system and to switch features on or off.

The Setup Utility changes system behavior by modifying the Firmware configuration. The setup program uses a number of menus to make changes and turn features on or off.

Function keys during POST:

[F2]	Enter BIOS Setup
[F5]	Boot Menu
[ESC] + [2]	Enter BIOS Setup via Remote Keyboard in Console Redirection Mode

Function keys in the setup:

[F1]	Help
[F9]	Load default settings
[F10]	Save and Exit

⚠️ This chapter describes important settings to be used for operation of the BRICK CORE COM. All necessary settings are BIOS default (F9). Special Add-On configuration (SPC) may need different settings.

Please consult your manufacturer before adjusting parameters in BIOS to avoid functional restrictions of your BRICK CORE COM.

11.2.1 Advanced → HDD Configuration

```
                 Phoenix SecureCore Technology Setup
        Advanced
┌─────────────────────────────────────────────────┬─────────────────────────┐
│            HDD Configuration                     │   Item Specific Help    │
│                                                  │                         │
│   SATA Device            [Enabled]          ▲    │                         │
│   SATA Speed Limit       [Auto]                  │                         │
│   Interface Combination  [AHCI]                  │                         │
│   Aggressive Link Power  [Enabled]               │                         │
│ ► Software Feature Mask Configuration            │                         │
│                                                  │                         │
│   ComExpress SATA 0    Not Installed or the port │                         │
│     Port Enable          [Enabled]               │                         │
│     Hot Plug             [Enabled]               │                         │
│     SATA Device Type     [Hard Disk Drive]       │                         │
│   ComExpress SATA 1    Not Installed or the port │                         │
│     Port Enable          [Enabled]               │                         │
│     Hot Plug             [Enabled]               │                         │
│     SATA Device Type     [Hard Disk Drive]       │                         │
│   ComExpress SATA 2    M.2 (S80) 3MG2 - 124.0 GB │                         │
│     Port Enable          [Enabled]               │                         │
│     Hot Plug             [Disabled]              │                         │
│     SATA Device Type     [Solid State Drive]     │                         │
│   ComExpress SATA 3    Not Installed or the port │                         │
│     Port Enable          [Enabled]               │                         │
│     Hot Plug             [Enabled]               │                         │
│     SATA Device Type     [Solid State Drive] ▼   │                         │
├─────────────────────────────────────────────────┴─────────────────────────┤
│  Esc  Exit  ⟷  Select Menu  Enter  Select ► Sub-Menu  F10  Save and Exits  │
└────────────────────────────────────────────────────────────────────────────┘
```

Parameters	Options	Description
SATA Device	**Enabled** Disabled	General activation of the SATA function
SATA Speed Limit	**Auto** Gen 2 Gen 1	Fastest SATA speed
Interface Combination	IDE **AHCI** RAID	Defines the interface type of the mass storage
Aggressive Link Power	Disabled **Enabled**	Aggressive Link Power Management for HDD Ports
ComExpress SATA0	Port Enable -> Disable, *Enable* Hot Plug -> Disable, *Enable* SATA Device Type -> *Hard Disk Drive*, Solid State Drive	eSATA-Lane 1
ComExpress SATA1	Port Enable -> Disable, *Enable* Hot Plug -> Disable, *Enable* SATA Device Type -> *Hard Disk Drive*, Solid State Drive	eSATA-Lane 2
ComExpress SATA2	Port Enable -> Disable, *Enable* Hot Plug -> *Disable,* Enable SATA Device Type -> Hard Disk Drive, *Solid State Drive*	M.2-based internal SSD

ComExpress SATA3	Port Enable -> Disable, **Enable** Hot Plug -> Disable, **Enable** SATA Device Type -> Hard Disk Drive, **Solid State Drive**	CFast-Slot

i Please note that, upon misadjustment of these parameters, the system does not boot any more or data on the corresponding data media are even destroyed. Besides, misadjustment may cause that data media are no longer recognized.

11.2.2 Advanced → South Bridge Configuration

```
                    Phoenix SecureCore Technology Setup
            Advanced

            South Bridge Configuration                  Item Specific Help


     SMBUS Device           [Enabled]
     State After G3         [State S5]
   ▶ SB PCI Express Config
   ▶ SB USB Config
   ▶ SB Azalia Config













  Esc  Exit  ←→  Select Menu  Enter  Select ▶ Sub-Menu  F10  Save and Exits
```
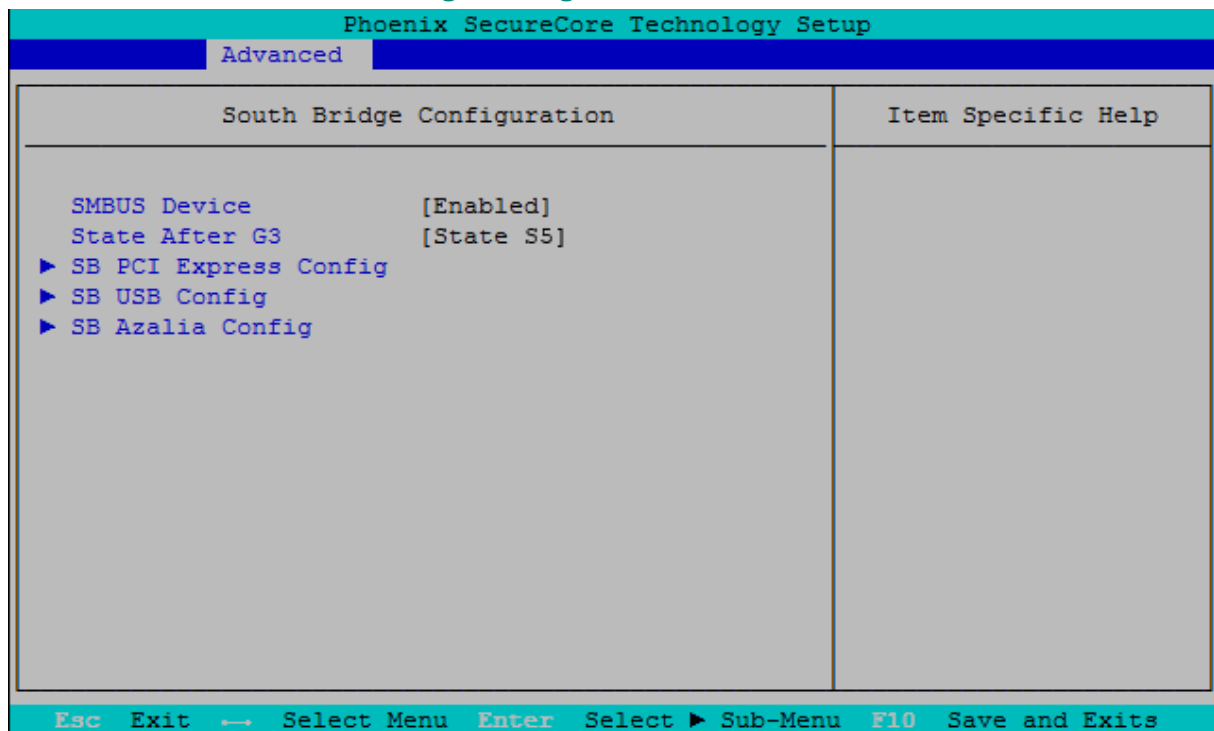
Parameters	Options	Description
SMBUS Device	Disabled **Enabled**	Activates/Deactivates SMBUS Device
State After G3	**State S5** State S0 Last State	S5 → System works in the ATX mode

11.2.3 Advanced → Onboard UART & CPLD Configuration

```
                 Phoenix SecureCore Technology Setup
        Advanced
┌──────────────────────────────────────────┬─────────────────────────┐
│      Onboard UART & CPLD configuration    │   Item Specific Help    │
│                                           │                         │
│   Serial Port 0  [Disabled]               │   Enable/Disable Serial │
│                                           │   Port.                 │
│   Serial Port 1  [Disabled]               │                         │
│                                           │                         │
│   GPIO IRQ       [Disabled]               │                         │
│   I2C IRQ        [Disabled]               │                         │
│                                           │                         │
│                                           │                         │
│                                           │                         │
│                                           │                         │
│                                           │                         │
│                                           │                         │
│                                           │                         │
│                                           │                         │
│                                           │                         │
└──────────────────────────────────────────┴─────────────────────────┘
  Esc  Exit  ←→   Select Menu  Enter  Select ▶ Sub-Menu  F10  Save and Exits
```

Parameters	Options	Description
Serial Port 0	**Disabled** Enabled	COM UART SER0 is not available!
Serial Port 1	**Disabled** Enabled	COM UART SER1 is not available!
GPIO IRQ	**Disabled** 14 15	Configuration IRQ for GPIO pins
I2C IRQ	**Disabled** 14 15	Configuration IRQ of the I2C controller

12 Commissioning and Maintenance

In order to avoid injuries and damage caused by direct or indirect contact with hot surfaces the following instructions must be observed:

BRICK CORE COM must be positioned and installed in a maintenance area or in an operating facility of limited access.

The users having permission to enter the maintenance area or the operating facility must have received adequate instructions regarding the risks.

Important instructions!

For positioning and installation or removal of the BRICK CORE COM System, please observe the relevant instructions given in this user manual.

The device must only be positioned and installed by maintenance personnel responsible in this area (that is familiar with the associated risks).

The device can be operated in all positions except with the upper side downwards.

In order to avoid overheating of the platform, keep a distance of at least 100 mm to the upper cooling fins of the chassis (passively cooled variant).

In case of installation in a housing (e.g. a control cabinet): The housing (control cabinet) must have enough space for the BRICK CORE COM System and the corresponding spaces for air circulation and cable connections. Moreover, the housing must have sufficient, possibly active, ventilation to avoid overheating.

The cooling fins and the inlet and discharge openings of the housing must not be blocked (covered).
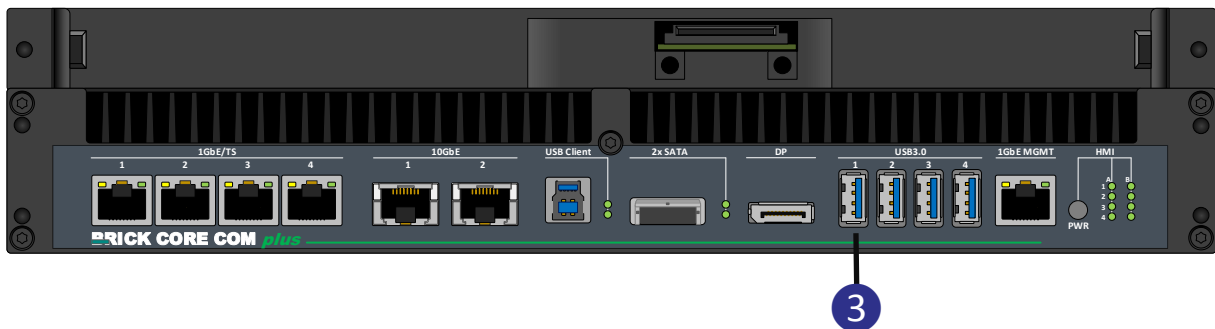
12.1 Initial commissioning

1. Connect the DC supply cable of the power supply unit to the rear side (1) of the BRICK CORE COM system.
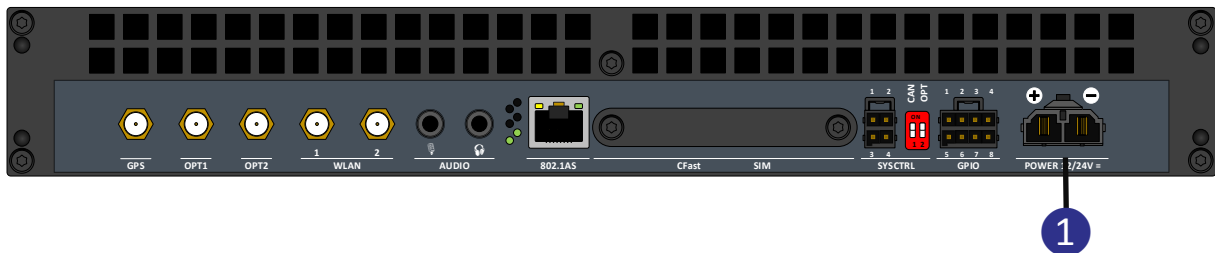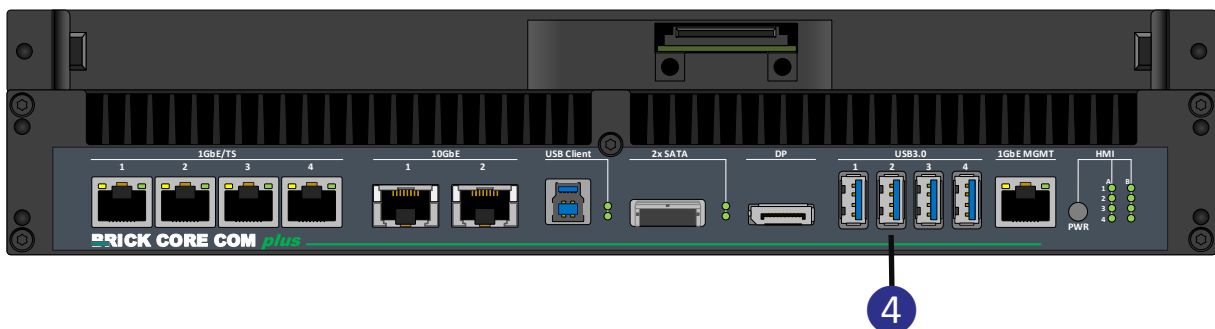

2. Connect a suitable monitor which is able to display a resolution of at least X x Y to the display port (2) at the front side. (Later the resolution can be reduced)
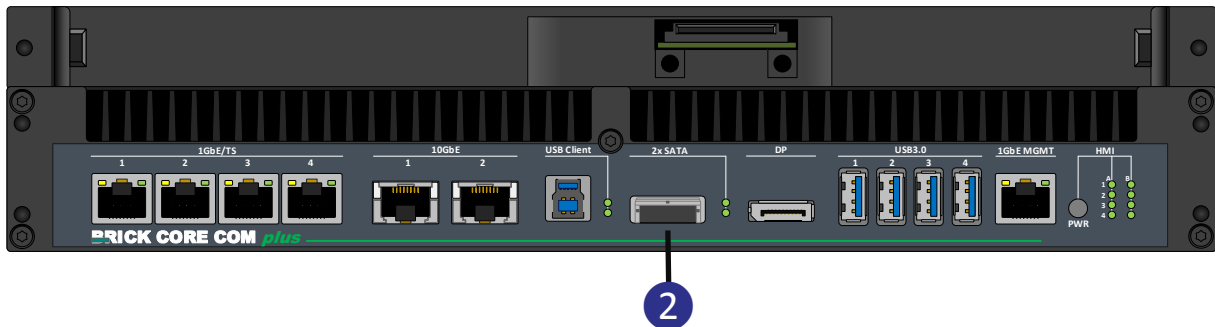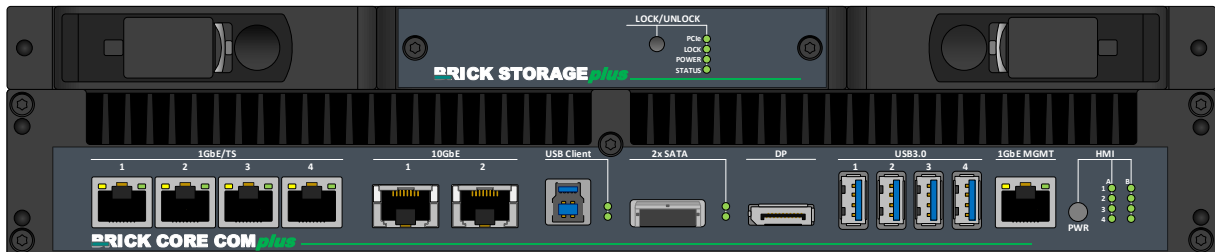

3. Connect a compatible mouse to the USB port (e.g. 3).

4. Connect a compatible keyboard to the USB port.

5. Connect the table power pack to the mains supply by using the country-specific network supply line

**6.** For BRICK CORE COM with STORAGE BAY Add-on please insert Cartridge

7. Please start the BRICK CORE COM system via the power button (5). Hold the button down until the LED B4 (6) turns green.

> **i** For vehicle installation you can use IGNITION IN (SYS Controll) for boot and shut down the system.
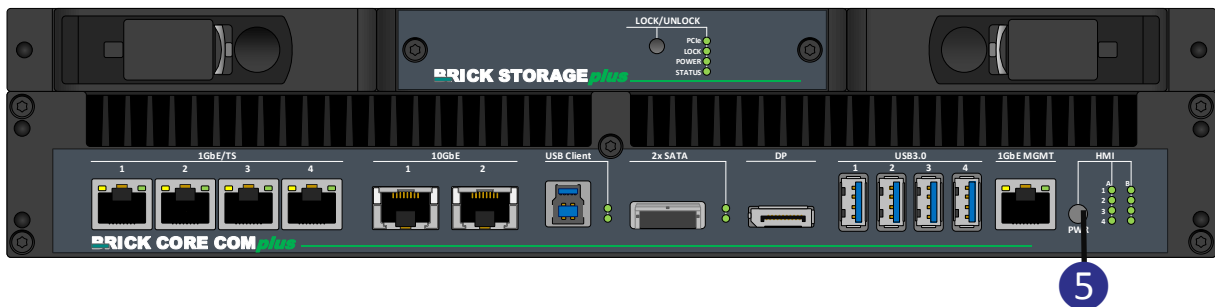
8. The system will now boot the operating system defined in the scope of delivery. The LED B4 (6) will first shine red before turning green.

VECTOR >
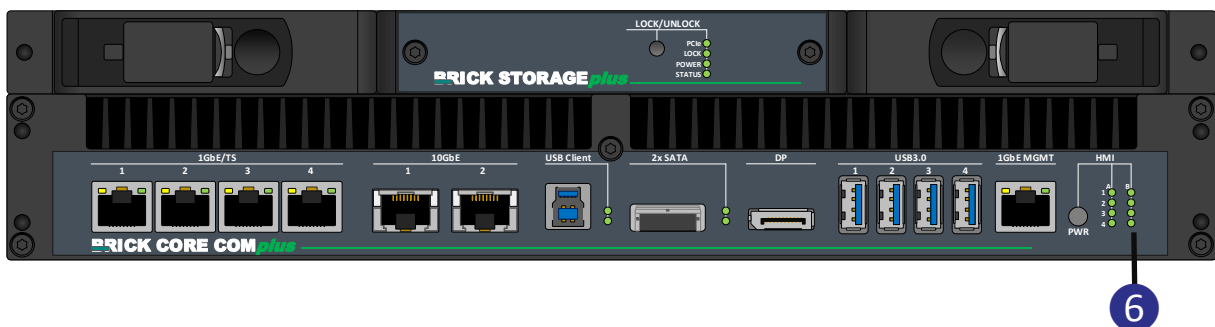
12.1.1 BRICK Core COM 5700EQP6 Operating system

Your system will be delivered, depending on the configuration, with an operating system installed.

If you have ordered your BRICK CORE COM with a preinstalled operating system all drivers are installed in accordance with the ordered system configuration. When switched on the first time, the system will be fully operational. Please observe the following instruction.

> **Important information when using pre-installed "WINDOWS 7 PROFESSIONAL FOR EMBEDDED SYSTEMS" operating systems:**
> The terms and conditions for using the pre-installed operating systems are defined in the document "Microsoft Software License Terms".

12.2 Handling of internal components

This section contains important information about the safe handling of internal components. Please follow the instructions when handling all internal components of the BRICK CORE COM systems.

When installing or removing additional plug-in cards, please follow the following instructions:

Please observe the "general safety instructions for IT equipment" and installation instructions.

The installation and removal of additional plug-in cards may only be made by a qualified trained employee in accordance with the instructions of this manual.

Before removing the device cover please make sure that your system is switched off and disconnected from the voltage supply.

Please observe the safety instructions regarding electrostatically sensitive components (ESC). Failure to observe this warning may cause damage to the device or components of the device.

The BRICK CORE COM system might get hot during operation and should not be touched without adequate precautions. There is danger of burning.