



VP7400 - Automotive PC Manual

Version 1.2 | English

Imprint

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1 Introduction

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1.1 About this User Manual

Conventions

In the two following charts you will find the conventions used in the user manual regarding utilized spellings and symbols.

Style	Utilization
bold	Blocks, surface elements, window- and dialog names of the software. Accentuation of warnings and advices. [OK] Push buttons in brackets File Save Notation for menus and menu entries
Source Code	File name and source code.
Hyperlink	Hyperlinks and references.
<CTRL>+<S>	Notation for shortcuts.

Symbol	Utilization
	This symbol calls your attention to warnings.
	Here you can obtain supplemental information.
	Here you can find additional information.
	Here is an example that has been prepared for you.
	Step-by-step instructions provide assistance at these points.
	Instructions on editing files are found at these points.
	This symbol warns you not to edit the specified file.

1.1.1 Warranty

Restriction of warranty

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.

1.1.2 Registered Trademarks

Registered 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 proprietors. 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 third party rights.

- ▶ Windows, Windows 7, Windows 8.1, Windows 10, Windows 11 are trademarks of the Microsoft Corporation.

1.2 Important Notes

1.2.1 Safety Instructions and Hazard Warnings

**Caution!**

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.

1.2.1.1 Proper Use and Intended Purpose

**Caution!**

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 work-shops 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.

1.2.1.2 Hazards

**Caution!**

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.

1.2.1.3 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.

1.2.1.4 Warning of Hot Surface

**Caution!**

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

1.2.1.5 Electrostatically Sensitive Components (ESD)

**Caution!**

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.

**Example**

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.

1.2.1.6 Grounding Practice

**Caution!**

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.

1.2.1.7 Additional Instructions

General information

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 12 V or 24 V DC
- ▶ Operation of the device is allowed only in circuits with safety low voltage within the admissible voltage limits (SELV standard EN60950). This applies to all connections to the unit.
- ▶ The use of a power supply outside the voltage 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 stress 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.
- ▶ Stress due to extreme environmental conditions (like intense 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 operating limits is subject to the usual fluctuations.

**Caution!**

For positioning and installation or removal of the VP system, please observe the relevant instructions given in this user manual.

The device must only be positioned and installed by maintenance personnel that is familiar with the associated risks.

The device can be operated in all positions except upside down.

In case of installation in a housing like a control cabinet: The housing must provide enough space for the VP system, air circulation and cable connections. Moreover, the housing must have sufficient, ideally active, ventilation to avoid overheating. The cooling fins and the air inlets and outlets must not be blocked or covered.

Installation and removal of additional plug-in cards must be performed by a qualified and 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 power supply.

**Note**

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.

**Note**

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

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

VP device 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.

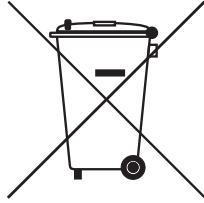
1.2.2 Disclaimer

**Caution!**

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.

1.2.3 Disposal of Vector Hardware

Please handle old devices responsibly and observe the environmental laws applicable in your country. Please dispose of the Vector hardware only at the designated places and not with the household waste.



Within the European Community, the Directive on Waste Electrical and Electronic Equipment (WEEE Directive) and the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS Directive) apply.

For Germany and other EU countries, we offer free take-back of old Vector hardware.

Please carefully check the Vector hardware to be disposed of before shipping. Please remove all items that are not part of the original scope of delivery, e.g. storage media. The Vector hardware must also be free of licenses and must no longer contain any personal data. Vector does not perform any checks in this regard. Once the hardware has been shipped, it cannot be returned to you. By shipping the hardware to us, you have relinquished your rights to the hardware.

Before shipping, please register your old device via:

<https://www.vector.com/int/en/support-downloads/return-registration-for-the-disposal-of-vector-hardware/>

2 Overview

In this chapter you find the following information:

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2.1 VP7400 Product Family

The VP7400 Product Family consists of the following components:

▶ **VP7400 Processing and Logging Platform**

The VP7400 is a high performance, compact and robust PC-based hardware platform, also called the computer core. It is available in two hardware variants. Both, the VP7440 and the VP7470 are equipped with a storage bay to hold a VP7240 Storage Cartridge. The VP7470 additionally has a PCIe add-on module to hold two PCIe cards for interface extension.

▶ **VP7240 Storage Cartridge**

The VP7240 is an exchangeable mass storage cartridge for VP7400 equipped with SSDs and a HW RAID controller. It is available in different storage sizes from 4 TByte up to 16 TByte.

▶ **VP7110 UPS**

The VP7110 is an Uninterruptible Power Supply for VP7400 holding two Li-Ion batteries.

▶ **VP7140 Docking Station for VP7240**

The VP7140 is a Thunderbolt 3 docking station to read out the VP7240 Storage Cartridges.

Detailed information about the devices of the VP7400 Product Family can be found in the following sections of this manual.

3 VP7240 Storage Cartridge

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3.1 Overview

General information The VP7240 Storage Cartridge is a mass storage device, that offers continuous write data rates of up to 1 GByte/s. It can be inserted into the storage bay of the VP7400 Processing and Logging Platform.



Note

To ensure a reliably high write performance of the Storage Cartridges in the long term, it is recommended to perform a full formatting of the storage cartridge after each logging operation or at least in regular intervals.

3.2 Interfaces, Control Elements and Indicators

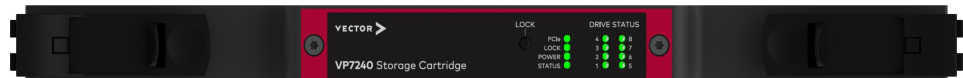


Figure 1: VP7240 Storage Cartridge

Device description

► Fastener

Fastener to lock and unlock the exchangeable VP7240 Storage Cartridge in the storage bay of the VP7400.



Note

The VP7240 Storage Cartridge is not hot plug capable. Make sure the VP7400 is shut down before you insert or remove the cartridge. Insertion or removal of the VP7240 Storage Cartridge during operation can cause data loss.

To properly shut down the VP7400, the power button must be used.

► LOCK/UNLOCK LEDs

- **PCle**
Indicates PCI Express connection established and active.
- **LOCK**
Indicates cartridge locked correctly.
- **POWER**
Indicates cartridge Power OK.
- **STATUS**
 - Green: Temperature is OK.
 - Red: Temperature too low or too high.

► DRIVE STATUS 1...8

- Green: Drive activity.
- Red: Drive failure.



Note

The temperature values of the VP7240 Storage Cartridge and the built-in SSDs are continuously monitored. In case of a temperature warning the STATUS LED is set to red.

3.3 Variants

3.3.1 VP7240-4 Storage Cartridge 4TB (obsolete)

Technical data

Description	Storage Cartridge with HW Raid Controller and 4 TB SSD Operating temperature: 0°C to 70°C
Part number	180144



Note

The VP7240-4 Storage Cartridge is discontinued.

3.3.2 VP7240-4e Storage Cartridge 4TB (obsolete)

Technical data

Description	Storage Cartridge with HW Raid Controller and 4 TB SSD with extended temperature range. Operating temperature: -20°C to 70°C
Part number	180148



Note

The VP7240-4e Storage Cartridge is discontinued.

3.3.3 VP7240-4r Storage Cartridge 4TB

Technical data

Description	Storage Cartridge with HW Raid Controller and 4 TB SSD with reduced temperature range. Operating temperature: 0°C to 50°C
Part number	180178

3.3.4 VP7240-8 Storage Cartridge 8TB (obsolete)

Technical data

Description	Storage Cartridge with HW Raid Controller and 8 TB SSD Operating temperature: 0°C to 70°C
Part number	180145



Note

The VP7240-8 Storage Cartridge is discontinued.

3.3.5 VP7240-8e Storage Cartridge 8TB (obsolete)

Technical data

Description	Storage Cartridge with HW Raid Controller and 8 TB SSD with extended temperature range. Operating temperature: -20°C to 70°C
Part number	180170

**Note**

The VP7240-8e Storage Cartridge is discontinued.

3.3.6 VP7240-8f Storage Cartridge 8TB

Technical data

Description	Storage Cartridge with HW Raid Controller and 16 TB SSD with reduced temperature range. Operating temperature: -20°C to 70°C
Part number	180188

3.3.7 VP7240-8r Storage Cartridge 8TB

Technical data

Description	Storage Cartridge with HW Raid Controller and 8 TB SSD with reduced temperature range. Operating temperature: 0°C to 50°C
Part number	180179

3.3.8 VP7240-16 Storage Cartridge 16TB (obsolete)

Technical data

Description	Storage Cartridge with HW Raid Controller and 16 TB SSD Operating temperature: 0°C to 70°C
Part number	180147

**Note**

The VP7240-16 Storage Cartridge is discontinued.

3.3.9 VP7240-16e Storage Cartridge 16TB (obsolete)

Technical data

Description	Storage Cartridge with HW Raid Controller and 16 TB SSD with extended temperature range. Operating temperature: -20°C to 70°C
Part number	180171

**Note**

The VP7240-16e Storage Cartridge is discontinued.

3.3.10 VP7240-16f Storage Cartridge 16TB

Technical data

Description	Storage Cartridge with HW Raid Controller and 16 TB SSD with reduced temperature range. Operating temperature: -20°C to 70°C
Part number	180189

3.3.11 VP7240-16r Storage Cartridge 16TB

Technical data

Description	Storage Cartridge with HW Raid Controller and 16 TB SSD with reduced temperature range. Operating temperature: 0°C to 50°C
Part number	180180

3.4 Technical Data

Housing dimensions	284 x 22 x 245 (L x H x W) mm
Weight	Approx. 1.3 kg
Housing material and Surface	Solid aluminum housing with black anodized surface. Please note: Due to the anodizing process minimal differences in color are possible.

Dimensions

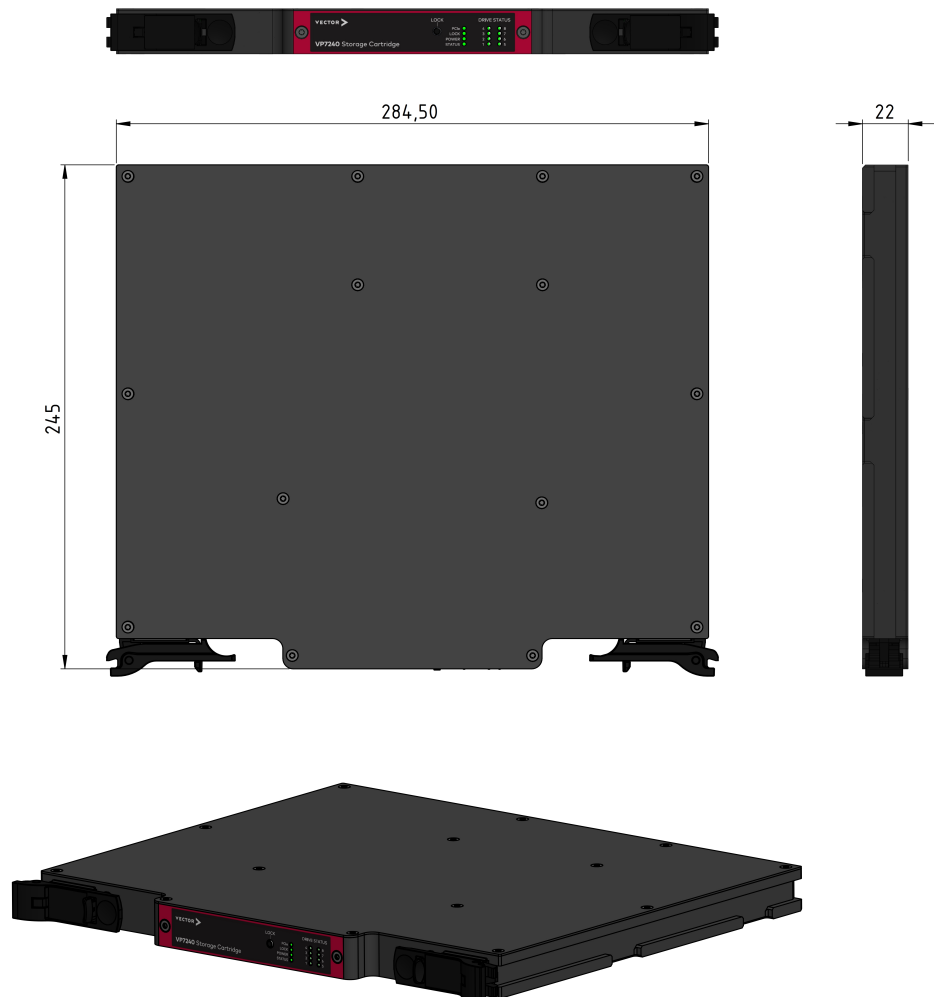


Figure 2: Mechanical drawing

4 VP7400

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4.1 Overview

The VP7400 Processing and Logging Platform is a powerful and robust hardware platform, that is especially designed for simultaneous and time-synchronous recording of automotive bus messages, video streams, radar raw data and ECU-internal measurement data.

It supports exchangeable storage cartridges with up to 16 TBytes of SSD memory. With a very high logging rate of up to 1 GByte/s, it is suitable for ambitious ADAS projects.

Hardware variants

VP7400 is available in two hardware variants. Both, VP7440 and VP7470 consist of an actively-vented high-performance computer core based on x86 architecture. It supports time synchronization via IEEE1588 PTP on its 1 Gbit/s Ethernet and 10 Gbit/s Ethernet ports either as master or as slave, and has a built-in GNSS receiver as UTC reference clock. Also, both variants are equipped with a storage bay that accepts VP7240 Storage Cartridges.

Additionally, VP7470 comes with a PCIe extension module that can hold two PCIe Gen.3 x8 cards to allow additional interfaces like Vector CAN channels or FlexRay channels or additional ETH ports.

	VP7440	VP7470
Computer Core	x	x
Storage Bay	x	x
PCIe Extension	-	x

Software variants

VP7400 is also available in different software variants suitable for different tasks and use cases. It can be configured either as Automotive PC with optionally pre-installed Vector tools or as Smart Logger - a dedicated logging solution with CANape log or vMeasure log.

► Smart Logger

When combined with CANape log or vMeasure log, VP7400 is a high-performance stand-alone Smart Logger. To configure the Logger, a PC with CANape respectively vMeasure is used. Existing CANape projects can be downloaded to the VP7400 in a quick and easy process. During logging, the configuration PC is no longer needed. For monitoring measurements, a browser-based mobile user interface is available. Also, individual measurement signals as well as status information such as the amount of remaining storage capacity can be displayed there.

► Automotive PC

This variant offers full user interaction and allows individual usage of the high-performance VP7400 hardware with Windows 10 IoT Enterprise installed. The operating system configuration is optimized for the VP7400 hardware and comes with pre-installed Vector drivers to easily support attached Vector hardware. Optionally, the system can be ordered with pre-installed Vector tools like CANape.

4.2 Hardware Setup

VP7400 Processing and Logging platform computer core offers the following hardware feature set:

- ▶ Intel® Core i7® 6820EQ (4 cores, 2.8 GHz)
- ▶ 32 GByte RAM
- ▶ 256 GByte Industrial SSD internal mass storage
- ▶ 2 x 10 Gbit/s Ethernet (RJ45)
- ▶ 6 x 1 Gbit/s Ethernet (RJ45)
- ▶ 4 x USB 3.2 Gen 1 host ports
- ▶ GNSS receiver
- ▶ IEEE1588 (PTP), with GNSS-based master clock
- ▶ Control signals for power management
- ▶ GPIO with 4 inputs and 4 outputs
- ▶ Microphone input to record trigger comments
- ▶ Headphone out
- ▶ 1 x Monitor port
- ▶ 2 x eSATA 6G SFF8088

4.3 Interfaces, Control Elements and Indicators

4.3.1 Front Side



Figure 3: VP7470 front side

► 1G/TS 1..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. These ports support hardware time synchronization using IEEE1588 PTP and are able to provide incoming data frames with hardware timestamps.

LED	Description
LINK (left LED)	Green: 1 Gbit/s Yellow: 100 Mbit/s
ACT (right LED)	Green: Activity



► 10G 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. Both ports support hardware time synchronization.

LED	Description
LINK (left LED)	Green: 10 Gbit/s Yellow: 1 Gbit/s
ACT (right LED)	Green: Activity



► USB Client

Unused - USB Client functionality is not supported by the VP7400.

► 2x SATA

Interface to connect up to two eSATA 6G devices to the VP7400.



Note

Please note that only the Lanes 1 and 2 are supported.



Note

Matching counterpart:
Mini SAS plug (SFF-8088).

► DP

Monitor port of the VP7400.



Note

Matching counterpart:
Customary DP cables.
It is recommended to use high-quality cables, especially for longer cable lengths. The use of adapters is possible but, also in this case, high-quality components should be used.

► **USB 1..4**

The four USB 3.2 Gen 1 host ports allow to connect external USB hardware to the VP7400, for example other Vector devices to use them as additional interfaces in the tool software.



Note

The USB ports are protected against over current via a self-resetting fuse.
The maximum current is 1000 mA per port.



Note

In order to achieve the data transmission rates typical for USB 3.2 Gen 1, suitable connection cables with USB type A plugs have to be used. Furthermore, the connected peripheral devices have to support USB 3.2 Gen 1. Also a connection of USB 1.0/2.0 devices with USB type A plugs is possible.
Cable length must not exceed 3 m for proper operation.

► **1G MGMT**

This Ethernet port is not recommended for data capturing as it has no hardware time synchronization. It is intended to connect the VP7400 to a LAN or a configuration computer for setup or maintenance.

LED	Description
LINK (left LED)	Green: 1 Gbit/s Yellow: 100 Mbit/s
ACT (right LED)	Green: Activity



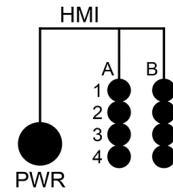
► **PWR**

Power button to start or shut down the VP7400.

► **HMI**

System and user defined LEDs for status information.

LED	Description
A1	User LED ¹
A2	User LED ¹
A3	User LED ¹
A4	User LED ¹
B1	User LED ¹
B2	User LED ² / System LED: ► red: VP7110 UPS config error
B3	User LED ² / System LED ► Red: Temperature too low. System down state.
B4	System LED ► Green: Indication of operating status. ► Red: Temperature too high. System down state.



1: programmable via SIODI application software

2: programmable via SIODI application software, system override



Note

Programming the User LEDs is not yet implemented and will be available with a future software update.



Note

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.



Note

The critical temperature values (ambient and internal storage: -25 °C...+80 °C) are continuously monitored at startup and during runtime by the µC System.

In a critical temperature condition at startup, the system will not be powered on and an error code (LED) will be shown.

In a critical temperature condition 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).

4.3.2 Back Side

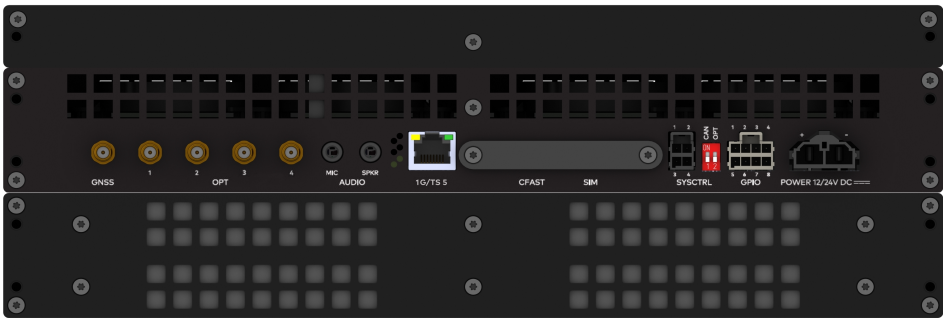


Figure 4: VP7470 back side

- ▶ **GNSS**
SMA female connector to attach a GNSS antenna.

Pin	Assignment
1	GNSS signal
2	Insulation
3	GND



- ▶ **OPT 1..4**
RP-SMA female connectors to attach project specific devices.

Pin	Assignment
1	Project specific signal
2	Insulation
3	GND



Note
OPT 3 and 4 were formerly labeled WLAN 1 and 2.

► AUDIO

These connectors can be used for connection of a microphone and a speaker or headphones.

- MIC:
Pre-amplifier with selectable 0 dB, +10 dB, +20 dB, and +30 dB gain settings.
Programmable, low-noise MIC bias level.
- SPKR:
101 dB Dynamic range (A-wtd)
89 dB THD+N
Minimum impedance 16 Ohm
Maximum output power 50 mW per channel



Note

Matching counterparts:
3.5 mm stereo jack plug (TRS plug).

► 1G/TS 5

This connector is designed as RJ45 socket with integrated LEDs and corresponds to a 1000BASE-T Ethernet interface according to IEEE 802.3 clause 40. This port supports hardware time synchronization using IEEE1588 PTP and is able to provide incoming data frames with hardware timestamps.

LED	Description
LINK (left LED)	Green: 1 Gbit/s Yellow: 100 Mbit/s
ACT (right LED)	Green: Activity



► CFAST

Slot for CFAST memory cards.

► SIM

SIM card slot.



Note

Integrated LTE module is not supported for VP7400.

► SYSCtrl

SYSCtrl connector with IGN In and CAN interface. This connector is used to attach other VP Family devices like the VP7110 UPS. Alternatively, IGN In can be used to wake respectively shutdown the VP7400.

Pin	Assignment
1	CAN High
2	IGN In, Thresholds: On: >4.75 V / Off: <4,15 V (+-5%), Umax: 32 V
3	CAN Low
4	Not connected





Note

DIP switch 1:120 R CAN bus termination (ON/OFF).
DIP switch 2:Reserved for future applications.

► **GPIO**

General purpose input and output signals.

Pin	Assignment
1	OUT 4
2	OUT 3
3	OUT 2
4	OUT 1
5	IN 4
6	IN 3
7	IN 2
8	IN 1



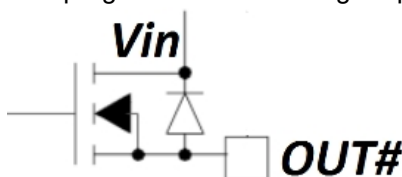
- **IN**

Switching thresholds:

- $V_{ON} > 1.95 \text{ V}$
- $V_{OFF} < 1.75 \text{ V}$ (+-5%)
- $U_{max} 32 \text{ V}$, internal pull down 10 K

- **OUT**

- Highside (switching input voltage), max. 1 A per channel.
- Max programmable switching frequency 1 Hz.



Note

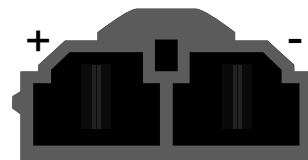
Matching counterpart:

Molex UltraFit Receptacle Housing part no.: 172258-1008

Molex Female Crimp Terminal 22 & 20 AWG part no.: 172253-3123

► **Power**

Pin	Assignment
+	VIN+ 6 V ... 32 V DC typ.: 12/24 V DC
-	VIN-



Note

Matching counterpart:

Molex MiniFit Sr. Receptacle Housing part no.: 42816-0212

Molex Female Crimp Terminal 12, 10 & 8 AWG part no.: 42815-0012

4.4 Variants

4.4.1 VP7440 Processing and Logging Platform

Description	VP7440 Processing and Logging Platform with Storage Cartridge bay for VP7240 Storage Cartridges.
Part number	22540

4.4.2 VP7470 Processing and Logging Platform

Description	VP7470 Processing and Logging Platform with Storage Cartridge bay for VP7240 Storage Cartridges and PCIe extension module.
Part number	22541

4.5 Accessories

For using VP7000 system in the lab or in vehicle the following accessories are available.

4.5.1 VP7110 UPS

Description	200 Watt managed Li-ion UPS with 160 Wh
Part number	22514

4.5.2 VP7120 Docking Station for VP7240

Description	Highspeed Thunderbolt® 3 Adapter to read out data from a VP7240 Storage Cartridge over a Thunderbolt® 3 interface to a PC-System
Part number	22513

4.5.3 Cableguard 320

Description	Cableguard to secure connected cables against damage or coming loose in harsh environments.
Part number	22442

4.6 Scope of Delivery

The scope of delivery depends on the ordered system and the configuration:

- ▶ VP7440/VP7470 in ordered variant and configuration
- ▶ VP7240 Storage Cartridge (optional)
- ▶ Power supply
 - Power Cable Molex Mini-Fit [22515]
(cable red/black, 4 mm², 1.5 m, open cable ends on one side)
 - Desktop type power supply (optional) [05116]
(AC 110...240 V 50/60 Hz, 220 W, 24 V, 9.5 A incl. power cord EURO CEE7/7)
 - Power Adapter Molex Minit-Fit (included with option AC power supply) [22556]
 - power cord UK (UK Plug) (included with option AC power supply, depending on region) [05125]
 - power cord USA/JP (NEMA 5-15, 3-pol) (included with option AC power supply, depending on region) [05115]
 - power cord CN (China Type 1) (included with option AC power supply, depending on region) [05114]
- ▶ Accessories
 - GNSS antenna
 - SYSCTRL cable, KL15 yellow, FLRY 0.5 mm²
 - GPIO cable
 - Ethernet Cable 10Gbps 2m [30016]
 - Cableguard (optional) [22442]
- ▶ PCIe cards (VP7470 only)
 - VN1530 CAN / LIN PCIe-Interface (optional) [07190]
 - VN1531 LIN / CAN PCIe - Interface (optional) [07191]
 - VN7572 FlexRay PCIe-Interface (optional) [07112]
 - USB3.0 6-Port PCI Express Card (optional) [22451]
 - ETH 4x1Gbit/s PCI Express Card (optional) [22450]
- ▶ Documentation
 - Quick Start Guide [80898]

4.7 Technical Data

Processor	Intel® Core i7-6820EQ 4x 2.8 GHz
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	32 GByte, DDR4
OS-Storage	256 GByte M.2 SSD
Network interfaces	6x 1 Gbit/s Ethernet (5x Intel® I210 with Hardware Timestamp Support, 1x Intel® I218LM) 2x 10Gbit/s Ethernet (Intel X540)
USB interfaces	4x USB 3.2 Gen 1 host (1000mA)
Audio interfaces	Microphone input, stereo headphone output
Monitor interfaces	1xDP 1.2, maximum resolution: 3840x2160
External storage interfaces	CFast Slot, 2x eSATA 6G via SFF8088 plug connector
GNSS	ublox LEA-M8S
GPIO	4x General Purpose Input: V _{ON} >1.95 V, V _{OFF} <1.75 V (+5 %), U _{max} 32 V 4x General Purpose Output: Highside (switching of the input voltage, max. 1 A per channel)
On/Off control "Ignition"	1x Digital Input via SYSCTRL plug connector (Ignition), On: >4.75 V / Off: <4.15V (+5 %), U _{max} 32 V
System control interface	1x CAN, termination resistor switchable, 1x Digital Input (On/Off control)
Operating system	Windows 10 IoT (64 bit)
Housing dimensions	VP7440: 320 x 66 x 250 (W x H x T) mm VP7470: 320 x 110 x 250 (W x H x T) mm
Supply voltage	12 V DC / 24 DC, safe in case of dropdown pulses (cranking) down to 6.5 V
Cooling	Active
Power consumption typically	approx. 110 W depending on the system configuration and utilization
Power consumption maximum	200 W (in full configuration)
Standby (OFF) current	< 50 µA (RTC, GNSS, µC Stby.)
Weight	approx. 5.5 kg (without VP7240 Storage Cartridge)
Operating temperature	-20 °C to +70 °C (without VP7240 Storage Cartridge)
Storage temperature	-40 °C to +85 °C
Air humidity	90 % non-condensing
Vibration and shock	EN 60068-2-64:2008 (10-1000Hz – 33,8m/s ²) EN 60068-2-27:2009 (half sine, 11 ms, 500m/s ²)
IP protection class	IP2X

VP7470 only

Electromagnetic compatibility (EMC)	RED Directive 2014/53/EU
Electrical safety	LVD Directive 2014/35/EU
RoHS II directive	2011/65/EU
PCIe operating temperature	-20 °C...+70 °C (PCIe cards may have different specification)
PCIe power	Limited power 1x 60 W or 2x 30 W maximum. Power supply only via bus interface, no separate power connector, max current all slots 5 A @12 V, 2 A @3.3 V
PCIe slots	- Left: mechanical x16, electrical x8 8 lanes PCIe 3.0 extension slot - Right: mechanical x8, electrical x8 8 lanes PCIe 3.0 extension slot
Size	Max. half size cards, 106.68 mm (height) x 175.26 mm (long), 1 slot mounting

Dimensions
VP7440

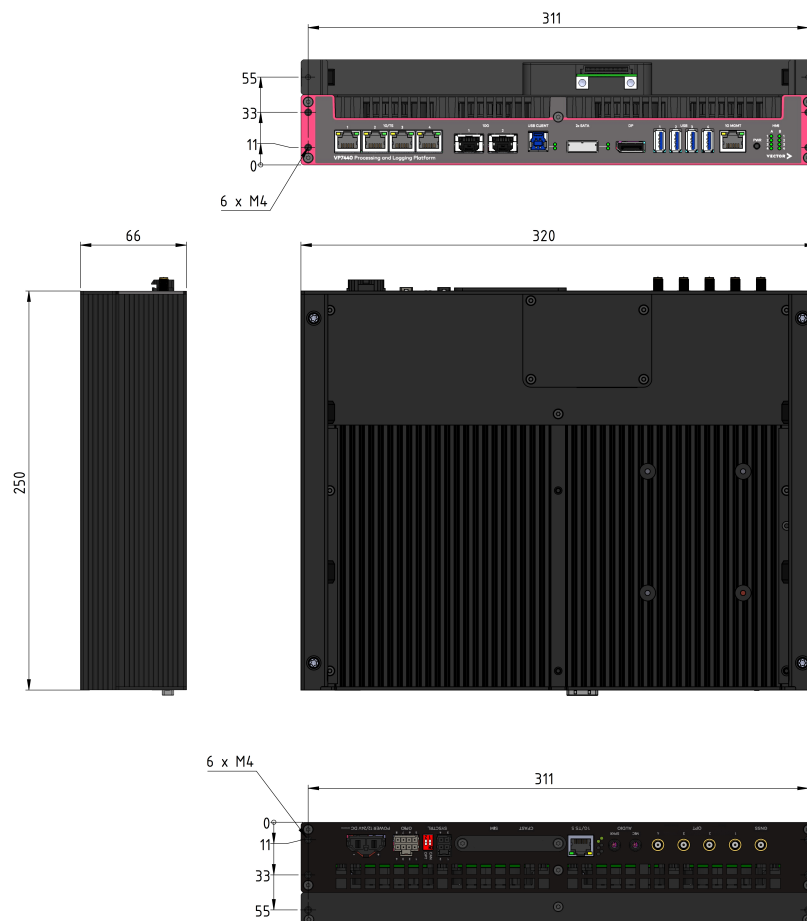


Figure 5: Mechanical drawing VP7440

Dimensions
VP7470

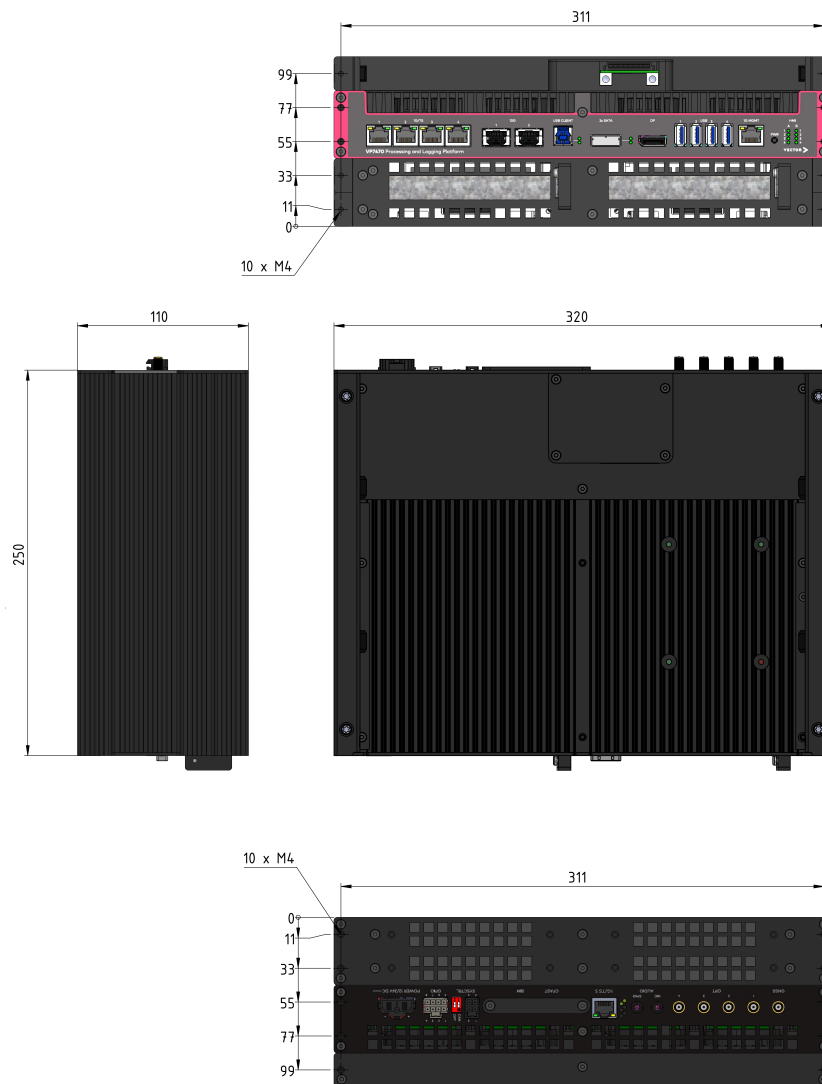


Figure 6: Mechanical drawing VP7470

5 VP7110 UPS

In this chapter you find the following information:

5.1 Overview	38
5.2 Interfaces, Control Elements and Indicators	39
5.2.1 Front Side	39
5.2.2 Back Side	40
5.3 Technical Data	42

5.1 Overview

The VP7110 UPS is designed to bridge gaps in any kind of automotive supply systems. It uses two Li-Ion smart batteries to provide the needed energy during voltage drops or even breakouts on board supply. There is the opportunity to control the switching between operation from the board net and the batteries with an additional signal called "LOAD". This feature can be used to reduce the board nets load. Furthermore, the VP7110 provides secondary functions like a management interface, two CAN interfaces and several GPIOs.

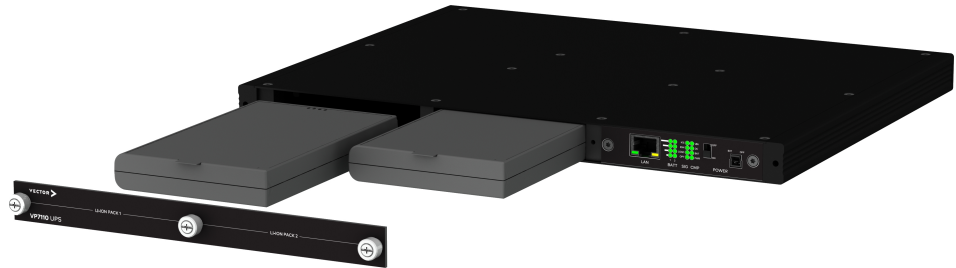


Figure 7: VP7110 with two batteries

5.2 Interfaces, Control Elements and Indicators

5.2.1 Front Side



Figure 8: VP7110 front side

► LAN (RJ45)

This connector is designed as RJ45 socket with integrated LEDs and corresponds to a 100BASE-T Ethernet interface.

Collision (green LED)	Description
On	Collision
Off	No collision

Link (yellow LED)	Description
On	Good link
Flashing	Activity
Off	No link

► Batt

LEDs indicating the charge status of the batteries.

Symbol	Battery 1/2
	Charge status: ≥75 %
	Charge status: ≥50 %
	Charge status: ≥25 %
	Charge status: <25 %



Note

Please note that flashing LEDs indicate the batteries are being charged. Fast flashing of the lowest LEDs indicate a very low charge status <9 %.

► System Status Sig/Cmp

LEDs indicating the system status.

Sig LEDs	Description
K15	IGN_IN on CARCTRL is high.
IGN	IGN_OUT on SYSCTRL is on.
LOAD	LOAD_IN on CARCTRL is high
OPT	Reserved for internal use.

Cmp LEDs	Description
VIN	Input voltage on POWER_IN is present.
DC	POWER_OUT is powered from POWER_IN connector.
BAT	POWER_OUT is powered by batteries.
PWR	System is active.

► Power Switch

Turns the device on/off.

5.2.2 Back Side



Figure 9: VP7110 back side

► CARCTRL

Car system control connector. This connector is used for power control.

Pin	Description
1	CAR_CAN_High (do not use). CAN interface with general purpose.
2	IGN_IN. Ignition input. This signal is logically connected to IGN_OUT.
3	CAR_CAN_Low (do not use).
4	LOAD_IN. "High" level allows the VP7110 to supply the load from the input voltage. "Low" level forces to supply from the batteries.



Note

Signal description: If LOAD_IN is high, the UPS is allowed to power a connected sink from the supply on the power in connector, else it is powered from the batteries. The IGN_IN state is mapped to the IGN_OUT pin of the SYCTRL connector.

► Dip Switch

DIP switch for CAN termination for the SYCTRL and CARCTRL connectors.

Switch	Description
1	CAN termination (120 Ω) for CAN_CAR on CARCTRL connector.
2	- „On“(on startup) The VP7110 starts with the default network configuration (see chapter base specification). - „Off“(on startup) The VP7110 starts with the last saved network configuration.
3	CAN termination (120Ω) for CAN_SYS on SYCTRL connector.

► SYCTRL

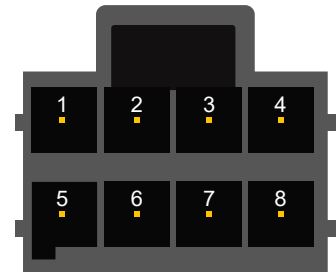
The SYCTRL connector can be connected to a VP7400 or a BRICK CORE COM for system control functionality.

Pin	Description
1	SYS_CAN_High. CAN interface for in-system communication.
2	SYS_CAN_Low. CAN interface for in-system communication.
3	IGN_OUT. Ignition output, this signal is logically connected to IGN_IN.

► **GPIO**

General purpose input and output signals.

Pin	Assignment
1	Digital output 1
2	Digital output 2
3	Digital output 3
4	Digital output 4
5	Digital input 1
6	Digital input 2
7	Digital input 3
8	Digital input 4



► **UPS Out**

Power output supply connector. This connector needs to be connected to a VP7400 or a BRICK CORE COM for power supply.

► **UPS In**

Power input supply connector. This connector needs to be connected to vehicle power.

5.3 Technical Data

Supply voltage	Typ. 12 V DC / 24 DC, wide range 10 V to 32 V
Max. power consumption	250 W including battery charge current
Switch to UPS mode	Vin < 10 V
Energy storage	2x Li-Ion smart batteries
Output voltage	Ext. supply mode: 14.8 V ±5 % UPS mode: depending on used battery packs
Delivery power	Max. 200 W
Network interfaces	1x 100 Mbe (management interface)
Default network configuration	IP address: 2.168.10.3 Subnet mask: 5.255.255.0 Gateway: 0 DHCP: off
GPIO	4x GPI 4x GPO, highside switching Input max: 32 V Input resistance: 12 kOhm Low: 4.2 V to 4.4 V High: 4.5 V to 4.7 V
On/off control	Power switch
CAR system control interface	1x CAN, termination resistor switchable, 1x digital Input
System control interface	1x CAN, termination resistor switchable, 1x digital Output
Dimensions (LxWxH)	320 x 250 x 22 mm
Cooling	Passive
Weight	Approx. 3 kg
Max.Battery Charge Current	4 A
Temperature range	Operation: -25 °C to +70 °C Storage: -40°C to +75°C Storage temperature incl. battery: -20 °C to 60 °C, 80 % RH Operating temperature battery discharge: SB200NI: 0 °C to +60 °C (limited current <0 °C) SB200NI2: -20°C to +60°C Operating temperature battery charge, controlled by battery: SB200NI: 0 °C to +50 °C SB200NI2: 0 °C to +50° C
Air humidity device	90% non-condensing
Vibration and shock	EN 60068-2-64:2008 (10-1000 Hz – 33.8 m/s²) EN 60068-2-27:2009 (half sine, 11 ms, 500 m/s²)
IP protection class	IP20
Electromagnetic compatibility (EMC)	EMV Directive 2014/30/EU
Electrical safety	Low-voltage directive (LVD) 2014/35/EU

RoHS II directive	2011/65/EU
European Union	EN 55032 (Class B) and EN 55024 EN 62368-1 Safety
Output voltage when supplied from board net	14.1 V to 15.5 V
Output voltage when supplied from batteries	Nominal voltage depending on used battery pack
Output current when supplied from board net	15 ¹⁾
Output current when supplied from batteries	Nominal voltage depending on used battery pack
LOAD Input Low voltage	4.2 V to 4.4 V
LOAD Input High voltage	4.5 V to 4.7 V
LOAD input voltage max	Max. 32 V
LOAD input resistance	12 kOhm
IGN_IN Input Low voltage	4.2 V to 4.4 V
IGN_IN Input High voltage	4.5 V to 4.7 V
IGN_IN input voltage max	Max. 32 V
IGN_IN input resistance	12 kOhm
GPO output voltage when supplied from board net	14.1 V to 15.5 V
GPO output voltage when supplied from batteries	Nominal voltage depending on used battery pack
GPO output current when supplied from board net	6 ¹⁾
GPO output current when supplied from batteries	Max. 6
IGN_OUT output voltage when supplied from board net	14.1 V to 15.5 V
IGN_OUT output voltage when supplied from batteries	Nominal voltage depending on used battery pack
IGN_OUT output current when supplied from board net	1 ¹⁾
GN_OUT output current when supplied from batteries	Max. 1

1) Overall current is not allowed to exceed 15 A
 $(I_{OUT} + I_{GPO1} + I_{GPO2} + I_{GPO3} + I_{GPO4} + I_{IGN_OUT} \leq 15A)$

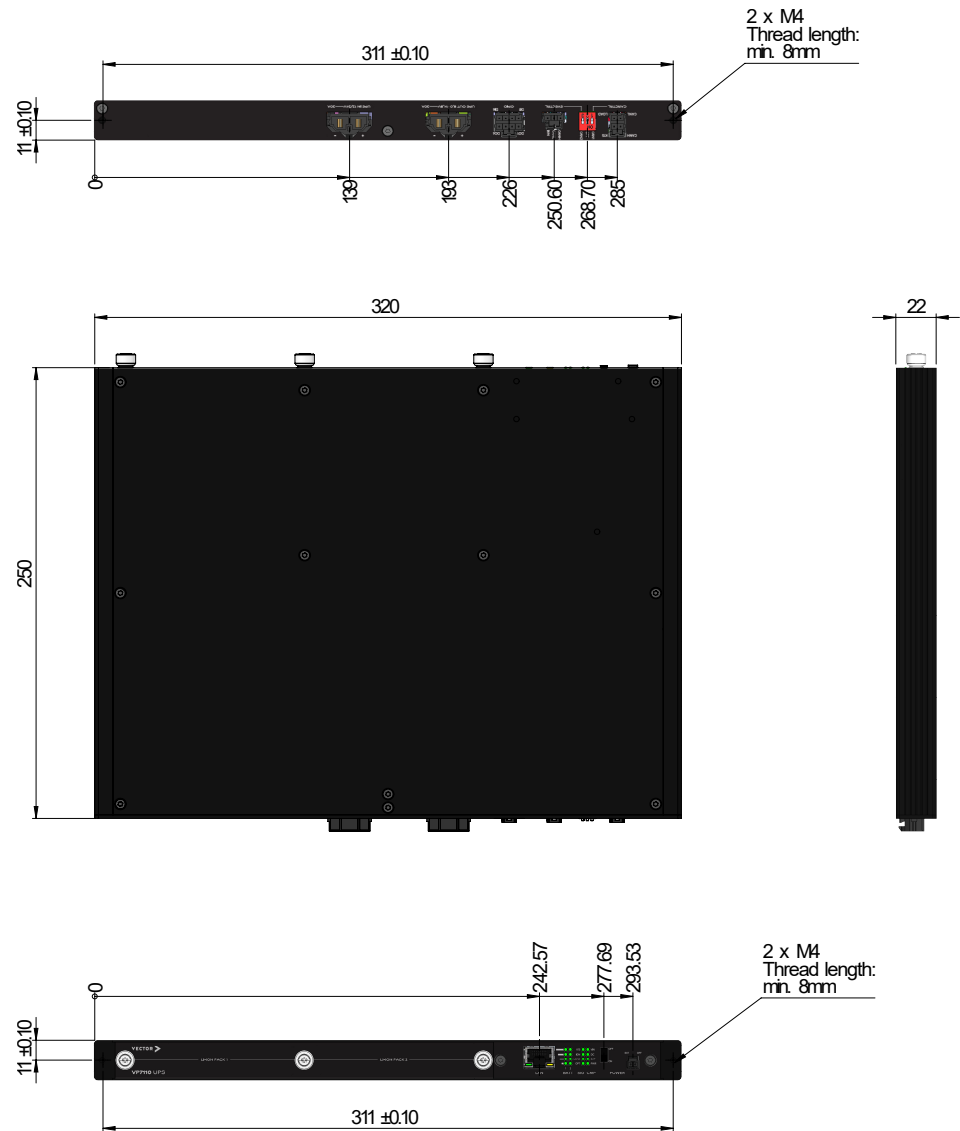


Figure 10: Mechanical drawing VP7110

6 VP7140 Docking Station

In this chapter you find the following information:

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6.2 Interfaces, Control Elements and Indicators	46
6.2.1 Front Side	46
6.2.2 Back Side	46
6.3 Technical Data	47
6.4 Getting Started	48

6.1 Overview

The VP7140 Docking Station is designed to connect a VP7240 Storage Cartridge or a Brick Storage Cartridge over a Thunderbolt® interface to a PC-System for accessing the memory of the storage cartridge.



Figure 11: VP7140 Docking Station

6.2 Interfaces, Control Elements and Indicators

6.2.1 Front Side

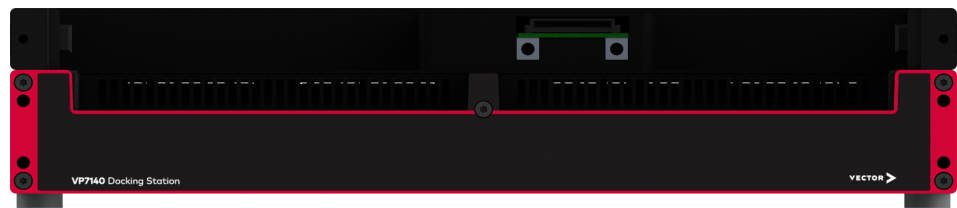


Figure 12: VP7140 front side

► Storage bay

The storage bay of the VP7140 is compatible with all VP7240 Storage Cartridges as well as all Brick Storage Cartridges.



Note

For instructions regarding the handling of the VP7240 Storage Cartridge, please refer to the corresponding chapter in this manual.

6.2.2 Back Side

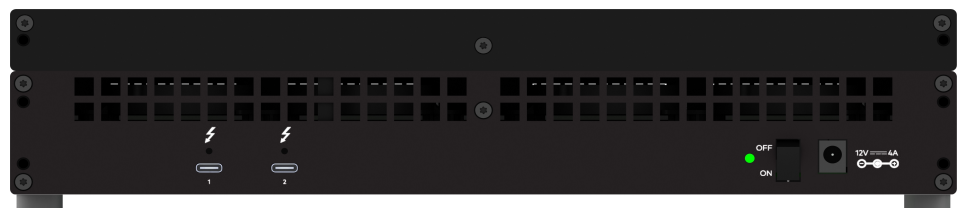


Figure 13: VP7140 back side

► 2x Thunderbolt® 3

This connector provides the Thunderbolt® 3 interface (redundant ports) to connect the VP7140 to a PC.

- ▶ **Power LED**
LED indicating the power status of the device.
- ▶ **Power Switch**
Turns the device on/off.
- ▶ **DC Connector (2.1 x 5.5 mm)**
Power input supply connector.
Only use the specified power supply.

6.3 Technical Data

Supply voltage	12 V DC; 5 A
Storage interface	compatible to VP7240 Storage Cartridge / Brick Storage Cartridge
PC interface	Thunderbolt® 3
Dimensions (LxWxH)	320 x 250 x 44 mm
Cooling	Active
Weight	Approx. 3 kg
Temperature range (ambient temp. of the device)	Operation: 0 °C to + 40 °C Storage: -40 °C to +75 °C
Air humidity	90% non-condensing
IP protection class	IP20
Electromagnetic compatibility (EMC)	EMV Directive 2014/30/EU
Safety	LVD Directive 2014/35/EU (power supply 230 V)
RoHS II directive	2011/65/EU
Certifications	FCC Industrial Class A

6.4 Getting Started

General information The accessories of the VP7140 Docking Station include an appropriate power supply, a Thunderbolt® cable and Windows® OS drivers.

Prerequisites:

- ▶ This Docking Station only works with Thunderbolt® aware Personal Computers.
- ▶ Be sure the VP7140 Docking Station is switched off.



Step by Step Procedure

1. Insert a compatible storage cartridge (is not part of the scope of delivery) into the VP7140 Docking Station.
2. Connect the power supply line to the power supply unit and to the power connector on the back side of the VP7140.
3. Connect the Thunderbolt® cable to the PC and to one of the two Thunderbolt® connectors on the back side of the VP7140. The second connector can be used for cascading VP7140 (not specified).
4. If the PC is not powered, switch on the PC.
5. Switch on the VP7140 and check, if the green power LED turns on.
6. In Windows, a message dialog appears that a new Thunderbolt® device has been found. Click **[OK]**.
7. In the next dialog, set to **Always Connect** and click **[OK]**.
8. Please accept the Thunderbolt® Device in the next message box by clicking the **[Yes]** button.
9. Now the Thunderbolt® Bridge is installed and the RAID Controller within in the storage cartridge is detected by the system.



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