TOPCON

OPUS A3

Operating Manual
Hardware Description

Versions

Example

OPUSA3EL1CANB000

OPUSA3	model
E	E=ECO; S= Standard
L	L= Landscape; P= Portrait; N= Neutral
1	1. Generation
CAN	CAN=Projektor; CDS=CODESYS©; ISO=ISO-UT
B	B=Basic F= Full
000	customer specific identification

Operating Manual OPUS A3
Order number: OPUSBA00A3

Topcon Electronics GmbH & Co KG
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Supplements or a special operator manual may be required for customer-specific devices.

Version 5.0, September 2019

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1 Preliminary Notes

This document is valid for the following OPUS A3 version:

- OPUSA3E “ECO”
- OPUSA3S “Standard”

This document is directed to the qualified personnel and contains all the important information to the correct use of the OPUS A3.

Please read this document before the first use and keep it during the operation.

In order to provide a better overview, this operating manual cannot present all details for handling the OPUS A3 in all conceivable application cases. Neither can all conceivable methods of setting up the device, operating the device, and servicing the device be discussed in this manual. In case more information or support is required please contact manufacturer technical support department.

1.1 Used Instructions Types

This operating manual contains instructions that must be complied with for your personal safety and in order to avoid damage to property.

The instructions are presented as follows listed by degree of hazard:

Hazard!

Very Important information
Malfunction or Failure possible if non-compliance

Caution!

Severe bodily injury or property damage can occur if the respective precautionary measures are not taken

Note

Additional information about the product, the handling of the product or the respective part of the operating manual to which particular attention should be paid.

2 Safety instructions, guarantee and liability

2.1 Common

Read this operating manual before commissioning the OPUS A3. Keep this operating manual where it is accessible to all users at anytime. Every person who is assigned to commission or operate the OPUS A3 must have read and understood the operating manual and the safety instructions in particular!

This operating manual contains instructions that must be complied with for your personal safety and in order to avoid damage to property. Failure to follow these safety instructions could result in fire, electric shock, or other injury or damage to OPUS A3 or other property.

2.2 Qualified Personnel

This operating manual is intended for technically qualified personnel, who have the appropriate skills in the area of measurement, control, and regulating technology.

Precise knowledge of all safety instructions and warnings contained in this operating manual, as well as problem-free technical implementation of these instructions and warnings are the prerequisites for hazard-free installation, commissioning, safe operation, and maintenance, of the operator panel. Consequently, it is strictly required that all measures be performed by qualified personnel.

Qualified personnel, in accordance with the safety and warning instructions contained in this operating manual are personnel, who

- are familiar with CANbus systems, related protocols and network designs that fulfill all legal requirements of the intended application, so that they are able to program the OPUS operator panel accordingly
- have gained knowledge of the programming related concepts by education or trainings. Using the Projektor Tool a Projektor Tool training by Topcon needs to be attended. Using CODESYS© a CODESYS© training needs to be attended, either held by Topcon or 3S.
- are familiar with the safety concepts of automation technology, either as project design personnel
- or operating personnel who have been instructed in how to handle the automation technology, and who are familiar with the section of this manual which deals with operation.
- or who, as commissioning, and service personnel have been trained to repair this type of automation technology, or who are authorized to commission, ground, and label electrical circuits and devices, or systems, in accordance with technical safety standards.

All persons who are involved in project planning, installation and operating the OPUS A3 must be familiar with automation technology safety concepts, and they must be qualified in accordance with the guidelines listed above.

Serious bodily injury and property damage can occur in the event of unqualified

interventions in the device, or the system, or failure to heed the warning instructions specified in this operating manual.

Consequently, only personnel who are appropriately qualified may undertake interventions on this device, or on the associated system.

2.3 Power Supply

OPUS A3 is designed for 12 V and for 24 Volt battery systems. The operating voltage range is 9-36 VDC, overvoltage resistance 48V for 2 minutes, inverse-polarity protection up to -48 VDC.

CarGND (pin no. 4 on main connector) has to be connected to the chassis by a conductor as short as possible. Even if there is no conductive chassis available (eg. in E-vehicles) the pin has to be connected to the negative pole of the battery. Otherwise there will be no protection against over voltage, short cut or ESD.

2.4 Interventions in the device

The OPUS A3 has been developed, manufactured, and tested in compliance with applicable standards. When the handling guidelines and safety-related instructions described here are complied with for project design, mounting, intended use, and maintenance, normally the product poses no hazards relative to property damage or to personal health. Nevertheless, the device can cause residual hazards if it is used or operated improperly by personnel who have not been trained.

In case of malfunctions or lacks please get in contact with the manufacturer. Any interventions in the device are able to cause serious interferences of the security for people and machines. They are not allowed and lead to disclaimer of liability and guarantee exclusion.

TOPCON is not liable for damage that occurs due to improper misuse of the delivered components, or through failure to heed the instructions in the operating manual, including the safety instructions.

TOPCON is not liable for damage that occurs due to unintended or intended changes of the TOPCON board support package or any other parts of the operating system.

TOPCON is not liable for injuries to third party licenses for the content used on OPUS panel by the end customer.

TOPCON is not liable for damage that occurs due to improper programming and/or testing of the created application that runs on the OPUS operator panels.

TOPCON is not liable for damage or malfunctions occurs using pirated or illegal software on the OPUS operator panel.

Moreover, we expressly declare that all obligations on the part of Topcon are exclusively derived from the respective purchase contract, in which the guarantee is conclusively stipulated.

2.5 Safety Instructions for the OPUS A3

Dangerous high-voltage
Never attempt to repair or modify OPUS A3 yourself. Disassembling OPUS A3 may cause damage that is not covered under the warranty and cause hazardous conditions by the high-voltage components inside of the unit.
OPUS A3 does not contain any user-serviceable parts. Service should only be provided by a Topcon Eektronics GmbH & Co KG.

Hazardous situations due to device failure
Do not use the OPUS A3 as the sole means of preventing hazardous conditions on vehicles, machines and equipment. Vehicles, machines and equipment must be constructed in such a manner that defective conditions associated with the OPUS A3 cannot cause a hazardous situation for operating personnel.
Ensure that incorrect inputs via the OPUS A3, its malfunction, or its failure cannot lead to major property damage, or to a hazard for operating personnel.

Missing safety devices if used improperly
Precautions for the safety of a system should not be rendered inoperable through the use of the OPUS A3.
Emergency-Stop devices must remain effective in all operating modes.

Unintentional operation
Operating states can be called due to unintentional operation of the OPUS A3 that are not appropriate for the situation.
OPUS A3 devices should be installed in such a manner that the possibility of unintentional operation is adequately excluded.

Undefined operating states
Undefined operating states can cause personal injury or property damage.
To prevent supply line and signal line interruptions from causing undefined or hazardous operating conditions, appropriate hardware and software safety precautions must be maintained.

Supply lines and signal lines must be installed in such a manner that noise (such as inductive or capacitive interference) cannot impair OPUS A3 function.

If a further usage of the OPUS A3 will cause danger, the device and if necessary the system needs to be switched off and be secured against unintented activation. This particularly applies:

- **If the device shows visible signs of damage**
- **If the device is no longer functional**
- **If parts of the device are disconnected or loose**
- **if the connection lines show visible damage**

Using Connectors and Ports:
Never force a connector into a port. Check for mechanical obstructions on the port. If the connector and port don't join with reasonable ease, they probably do not match. Make sure that the connector matches the port and that you have positioned the connector correctly in relation to the port.

3 Intended Use

The operator panel OPUS A3 is a programmable graphical display used to operate and monitor vehicles and working machines.

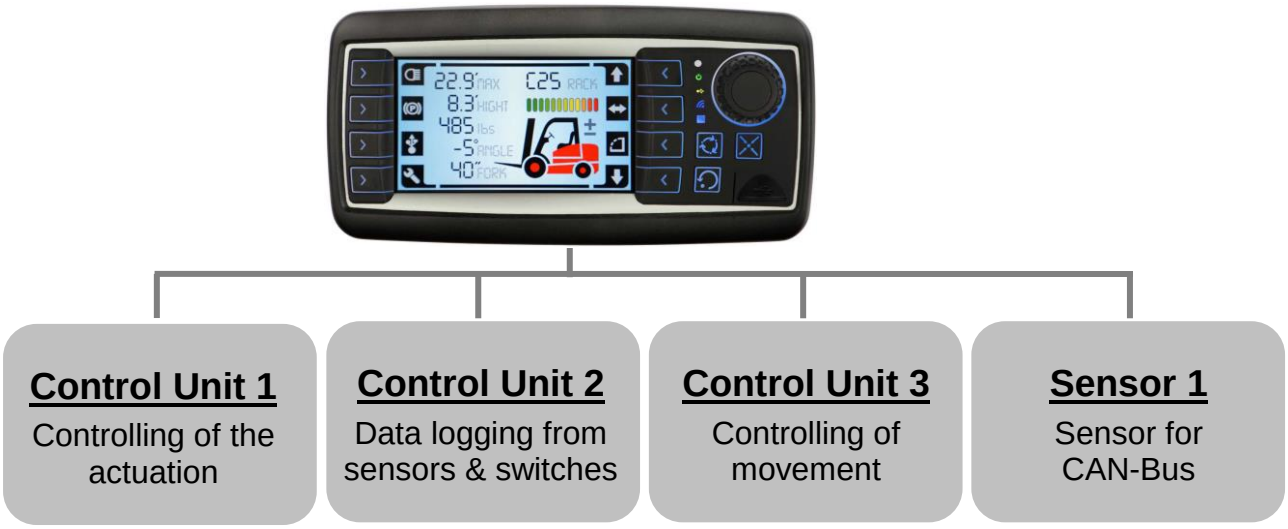
The communication with other system components, as for example decentralised I/O module, occurs over the CAN interfaces with the supported protocols: CANopen, J1939 and CANfreestyle (layer 2).

For service purposes additional interfaces like Ethernet, RS232, USB and analog/digital inputs/outputs (optional) are available. Together with Embedded Linux operating system they form a universal platform for the communication with other CAN devices, networks or PCs.

The operator panel OPUS A3 is not admitted for security-relevant duties for personal protection purposes.

Vehicles, machines, and equipment surrounding the OPUS A3 must be combined in such a manner that the OPUS A3 will be warmed up equally from all sides.
Increased warming of the OPUS from the back side may cause temporary fogging of the front glass or touch screen.

3.1 Example of Use



3.2 Device Description

3.2.1 OPUS A3 ECO

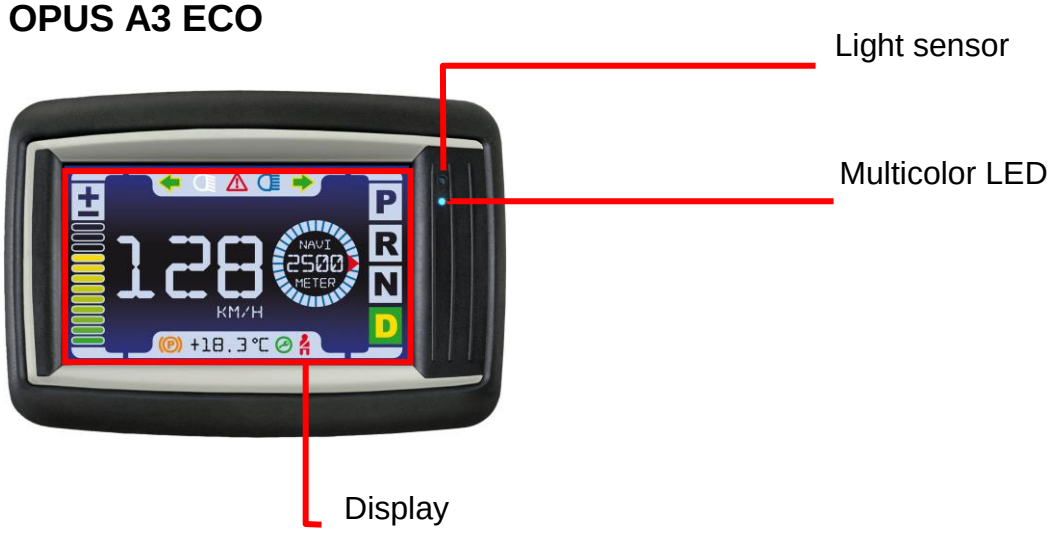


Fig. 3.1: Schematic diagram of the OPUS A3 ECO

Display:
4.3” (480 x 272 px) TFT colour graphic LCD display with (optional) analogue resistive touch.

Light sensor (option):
Light sensor embedded in keypad for automatic adoption of display-backlight and key-backlight to ambient light intensity.

Multicolour LED (option):
Multicolour-LED is embedded in keypad and can be free programmable. This LED is able to show PWM-controlled RGB colours, 16 bit each.

3.2.2 OPUS A3 STANDARD

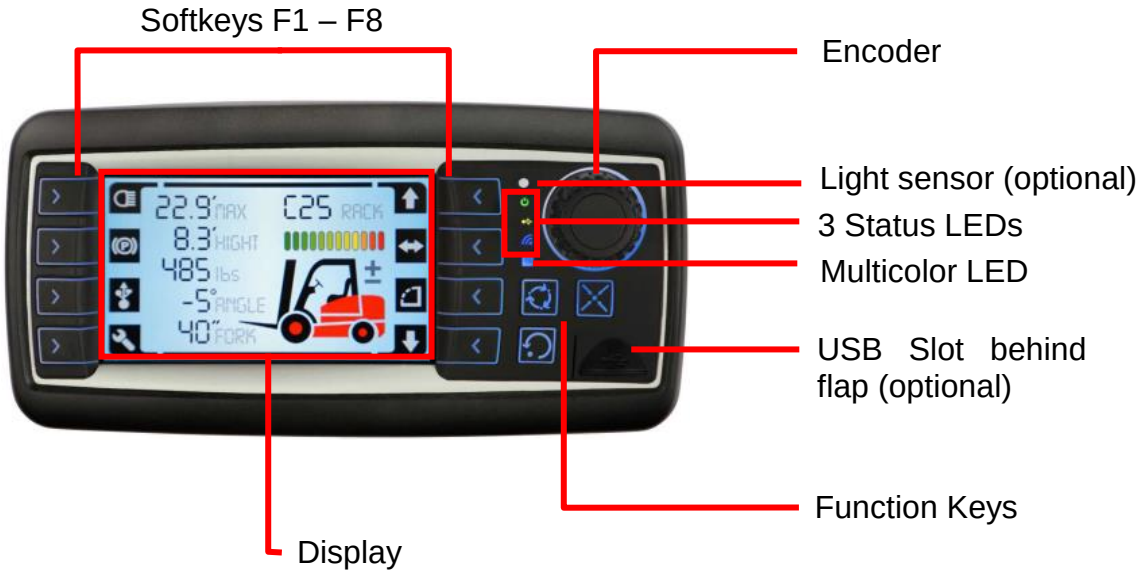


Fig. 3.2: Schematic diagram of the OPUS A3 STANDARD Landscape

Fig. 3.3: Schematic diagram of the OPUS A3 STANDARD Portrait

For display, light sensor and multicolor LED please see the description for the OPUS A3 ECO.

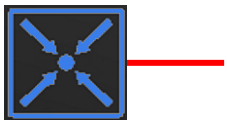
Softkeys F1 to F8:
All softkeys can be assigned to the function defined in the customer specific application. Please see the ***Operational Manual*** of the application tools for more information.

The Function Keys:
The function keys serve as global keys and do not change the function with a screen change.

Using CODESYS© these keys are free programmable.

Using Projektor Tool the functions for these keys are fixed:

ESC is used to deselect the selected value, to cancel the entered value or to acknowledge the raised alarm

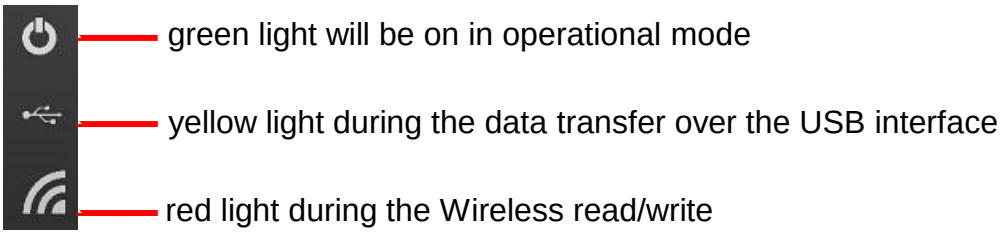


HOME is used to change the display page to the start page of the application

SET key is reserved for window management

The Encoder:
Encoder is used for the navigation between the objects in customer specific application. It is possible to select graphical objects on the screen and change there value rotating the encoder. An entry function can be generated directly on rotating or by pressing the encoder.

LEDs:
There are 3 different status LEDs available on the unit:



Multicolor LED (option) is embedded in keypad and can be free programmable. This LED is able to show PWM-controlled RGB colours, 16 bit each.

Light Sensor:
The light sensor offers the possibility for an automatic adaption of display-backlight and key-backlight to the ambient light intensity.

USB slot on the front (option):
The high speed USB interface can be used for updating and data exchange.

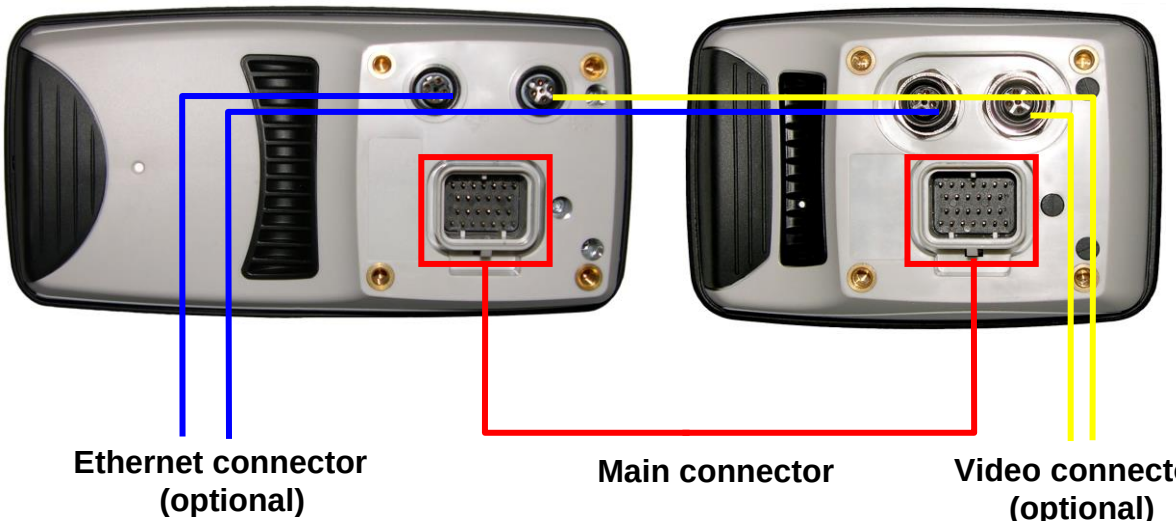


Fig. 3.4: Schematic diagram of both OPUS A3 types backside

Main connector:
There are following interfaces available of the main connector:

- Power supply and ignition input
- 2 x CAN-Interfaces according to ISO/DIS 11898
- RS232-Interface
- USB
- 4 analogue/digital inputs (optional)
- 3 digital outputs (optional)

Video (optional):
This interface is used for the analog Video-Input included protected camera power supply.

Ethernet (optional):
There is an Ethernet interface (10/100 Mbit/s Base) available on the unit. This interface may only used for the data transfer.

Power-on/off Behavior:
The OPUS A3 does not have a separate on/off key. As soon as the device is supplied with the necessary voltage via terminal 30 (battery plus), terminal 31 (battery GND) and terminal 15 (ignition), it will start to boot. In order to decrease boot time the device supports power modes with which you can put the device in a sleep mode before it powers down.

When ignition voltage is removed, the device will switch to low-power-mode (see ***C/C++ Developer Guide***). After a time frame that can be configured (default time is 60 sec) the device will move one more step down to sleep-mode. After another 60 seconds (default time) the unit will fully switch off. As soon as terminal 15 is switched on again the unit will go back to on-mode in full operation.

Power Mode	current at 13.5 V DC	current at 27 V
On	430 mA	240 mA
Low-power	160 mA	90 mA
Sleep	90 mA	55 mA
Off	< 3 mA	< 3 mA

Do not unplug terminal 30 from power supply on running unit. Power supply interruption on terminal 30 may cause data corruption and loss.

For more information please refer to the ***C/C++ Developer Guide***.

3.2 Features Overview for OPUS A3

- Encapsulated plastic housing to be mounted in landscape or portrait mode standalone or in dash
- 4.3” TFT color display for automotive with resolution 480 x 272 pixel
- Touch (optional)
- Programmable keys with backlight on STANDARD variant
- 32bit processor with embedded linux operating system
- Two CAN interface (ISO 11898) using CANopen® and SAE J1939 protocols. Layer II is also supported
- Four analog / digital inputs (selectable via software) and three digital outputs (optional)
- Beeper and Light sensor
- RS232 interface for serial console and Full-Speed USB on main connector

- High speed USB on the front (optional)

The OPUS A3 is particularly characterized by its robust construction, and it has been developed especially for harsh use conditions in mobile work machines.

3.3 Application Development

There are three possible ways to program the OPUS A3 and make it an integrated part of its application.

1. Projektor-Tool:
This powerful development environment provided by Topcon Electronic GmbH & Co KG enables the quick and effective creation of an application for the OPUS A3 operator terminal. Use the Projektor to conveniently design the user interface on the computer, which can be easily displayed on the device. In addition, this tool includes features to work with CANopen®, J1939 and CANfreestyle protocols for CAN communication. For further information please refers to the ***Operator Manual Projektor Tool III.***

2. CODESYS© 3.x:
CODESYS© is a programming tool and system developed by the German company 3S. It supports different means of programming such as FUB or Structured Text. It can be used to program the OPUS A3 and CODESYS© compatible ECUs. CODESYS© includes the functionality to configure the CANopen® protocol for communication over CAN bus. For further information please refer to the ***BAOPUSA3CDS.***

3. C-Programming:
OPUS A3 with its embedded Linux as operational system can be fully programmed using C or C++ as programming language. For further information and function-call list please refer to the ***C/C++ Developer Guide.***

4. ISO-UT:
OPUS A3 can be used as a ISO-UT slave. According to the ISO-11783 standard and DLG conformity.

5. Topcon Board Support Package (BSP):
Based on the operationally system Topcon Boards Support Package provides all the necessary interfaces to control the internal functionality of the unit (e.g. activation of the backlight display, processing key activation, etc.).
This software is ready installed on all OPUS A3 delivered together with the operation system. For further information please refer to the ***C/C++ Developer Guide.***

6. Universal Downloader:
To download software from the PC to the terminal the Universal Downloader 4 is provided. It supports a download via USB stick and Ethernet. The Universal Downloader 4 also stores the software, installs it and restarts the application on the terminal. It is part of the Topcon Toolchain and documented in the ***Operator Manual Projektor Tool III.***

The operator panel OPUS A3 may only be handled due to the according operation manual.

Please notice the following recommendation and prerequisites for the computer used to the application design and /or programming:

- Using Projektor Tool and CODESYS© for the development it is recommended to use the PC with Windows XP operational system (for CODESYS© it may by younger), at least 2 GB free hard disk capacity and 2 GB RAM. Serial port is recommended.
- Programming with C/C++ Linux operational system is prerequisite.

3.4 Development Kit

To be support programming the graphical user interface for the OPUS A3 terminal the different development kits referred to the using tools are provided.

Topcon Toolchain with Projektor Tool
Order number: OPEP00A3CAN

Description	Order Number	Qty
Main connecting cable	OPKAA3CAN15	1
Ethernet cable		1
CD with WE Toolchain: - **Projektor Tool** - **PClient** - **Documentation**		1
Basic Projektor-Tool training at a Topcon facility		1
Projektor Tool license		2
12 month technical support		1

CODESYS© 3.x
Order number: OPEP00A3CDS

Description	Order Number	Qty
Main connecting cable	OPKAA3CAN15	1
Ethernet cable		1
CD with CODESYS© Software: - **Development Tool** - **Application** - **Target files** - **Documentation**		1
Basic CODESYS© training at a Topcon facility		1

12 month technical support		1

ISO-UT with Projektor Tool
Order number: OPEP00A3ISO

Description	Order Number	Qty
Main connecting cable	OPKAA3CAN15	1
Ethernet cable		1
CD with ISO-UT: - **Projektor Tool** - **PClient** - **ISO-UT** - **Documentation**		1
Basic Projektor-Tool training at a Topcon facility		1
Projektor Tool license		2
12 month technical support		1

Accessories not part of the Developer's kit:

Description	Order Number	Qty
Video Cable OPUS A3	OPKAA3VID010	1
Etherner-to-USB adapter		1

4 Getting Started

4.1 Check the delivered parts

Please check whether all parts described in the scope of delivery have been delivered correctly. For question or reclamation please contact the support team of Topcon Electronics GmbH & Co KG (opus-support@topcon.com).

4.2 Mounting

The unit is delivered without mounting accessories.

Depending on mounting type the following mounting accessories are available.

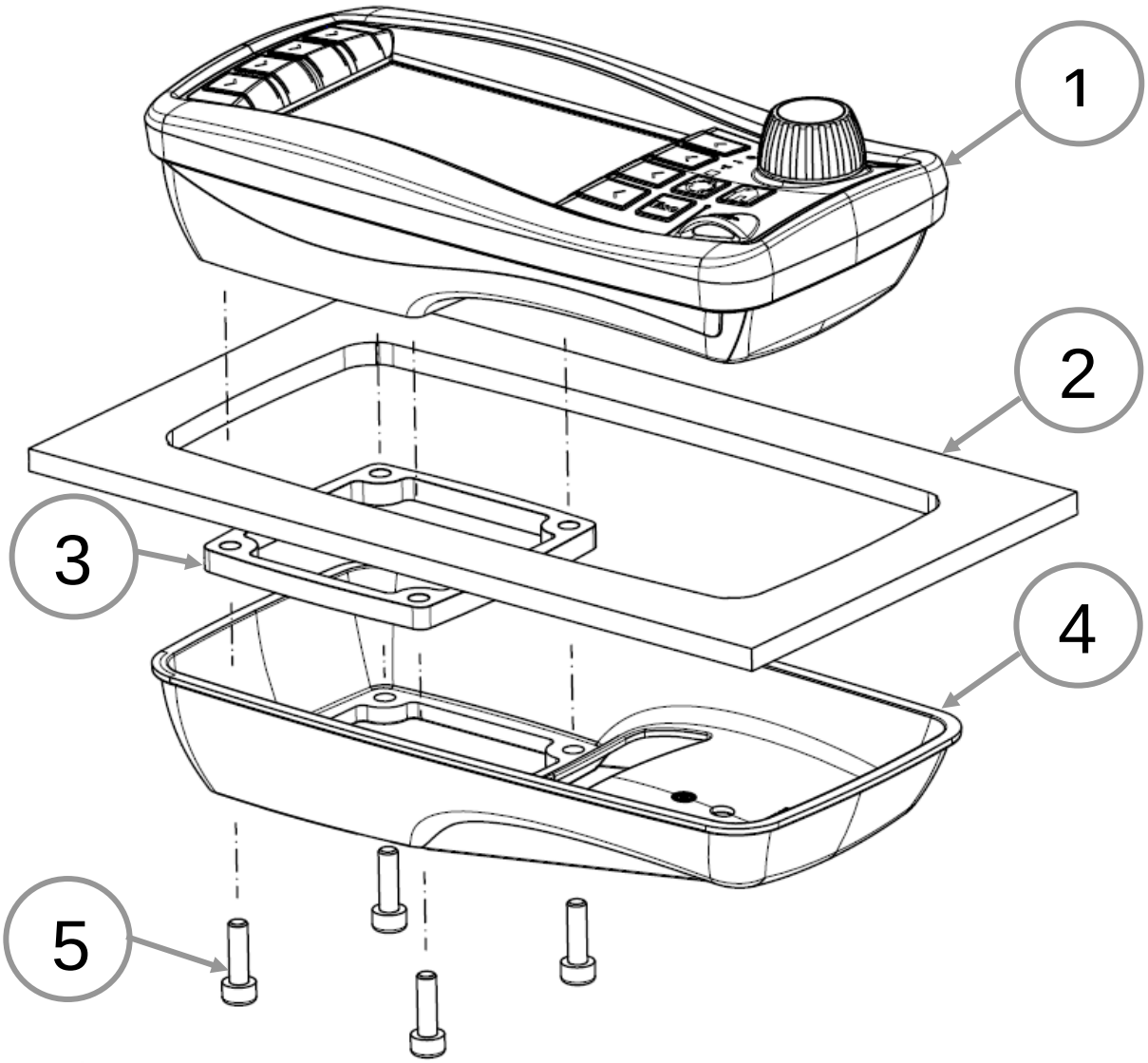
Description	Order Number
In dash mounting cover OPUS A3 STANDARD	OPUSA3ZBEB001
In dash mounting cover OPUS A3 ECO	OPUSA3ZBEB002
Stand alone RAM-adapter OPUS A3 (both)	OPUSA3ZBAH001

The back side of the unit is ready prepared for both in dash and standalone mounting.

Both portrait and landscape positions are supported for mounting.

For mounting please follow the instruction provided in the following dimension drawing.

4.2.1 Dashboard Mounting Instruction for OPUS A3 STANDARD



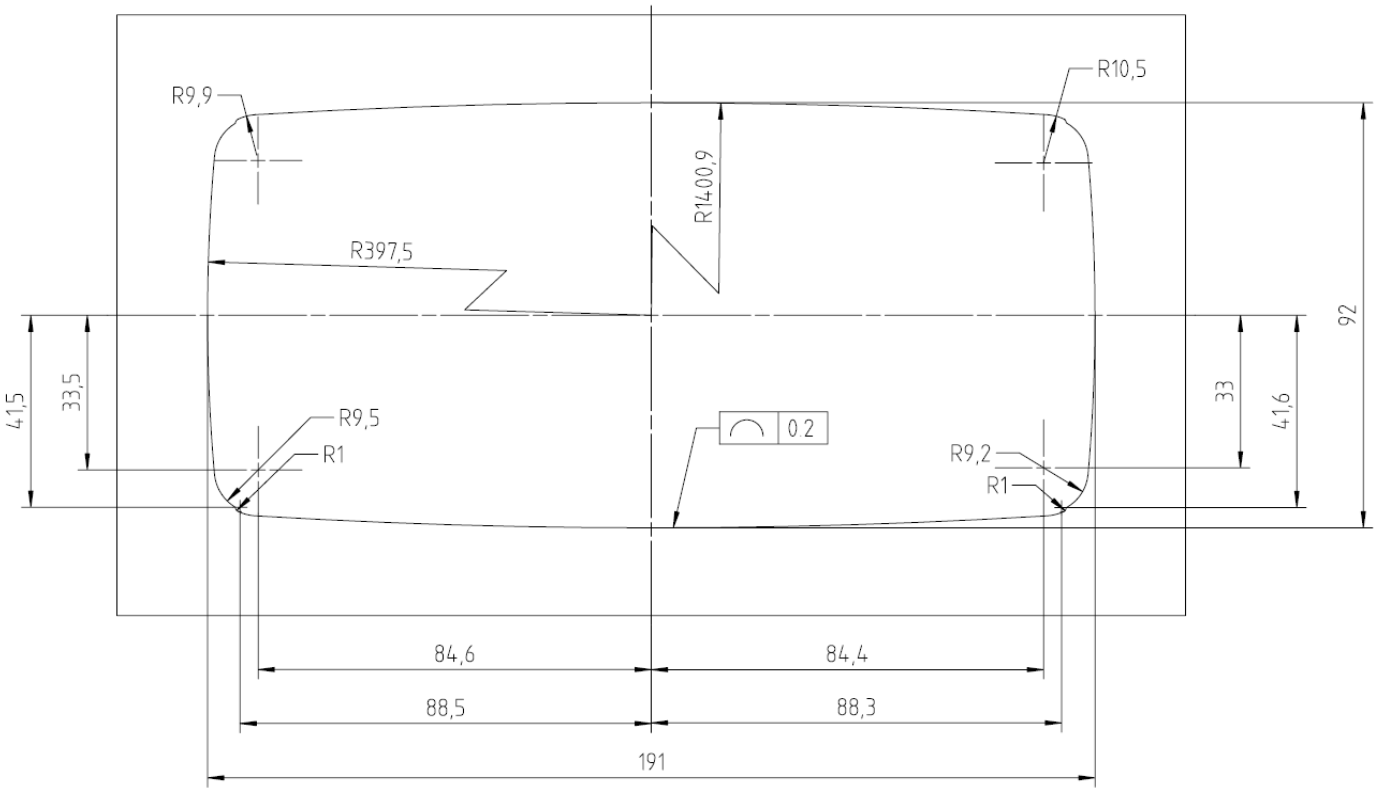
Parts List			
Pos.	Description	Order number	Supplier
1	OPUS A3 Standard	OPUSA3SXXXXX	Topcon Electronics
2	Dashboard	-	Customer
3	Spacer or washer	-	Customer
4	Mounting Cover	OPUSA3ZBEB001	Topcon Electronics
5	M5 Screw* (DIN EN ISO 4762)	-	Customer

*Assignment of the screw length depends on dashboard thickness (thickness/length):
1mm – 3mm / M5 x 12
4mm – 6mm / M5 x 16
7mm – 10mm / M5 x 20

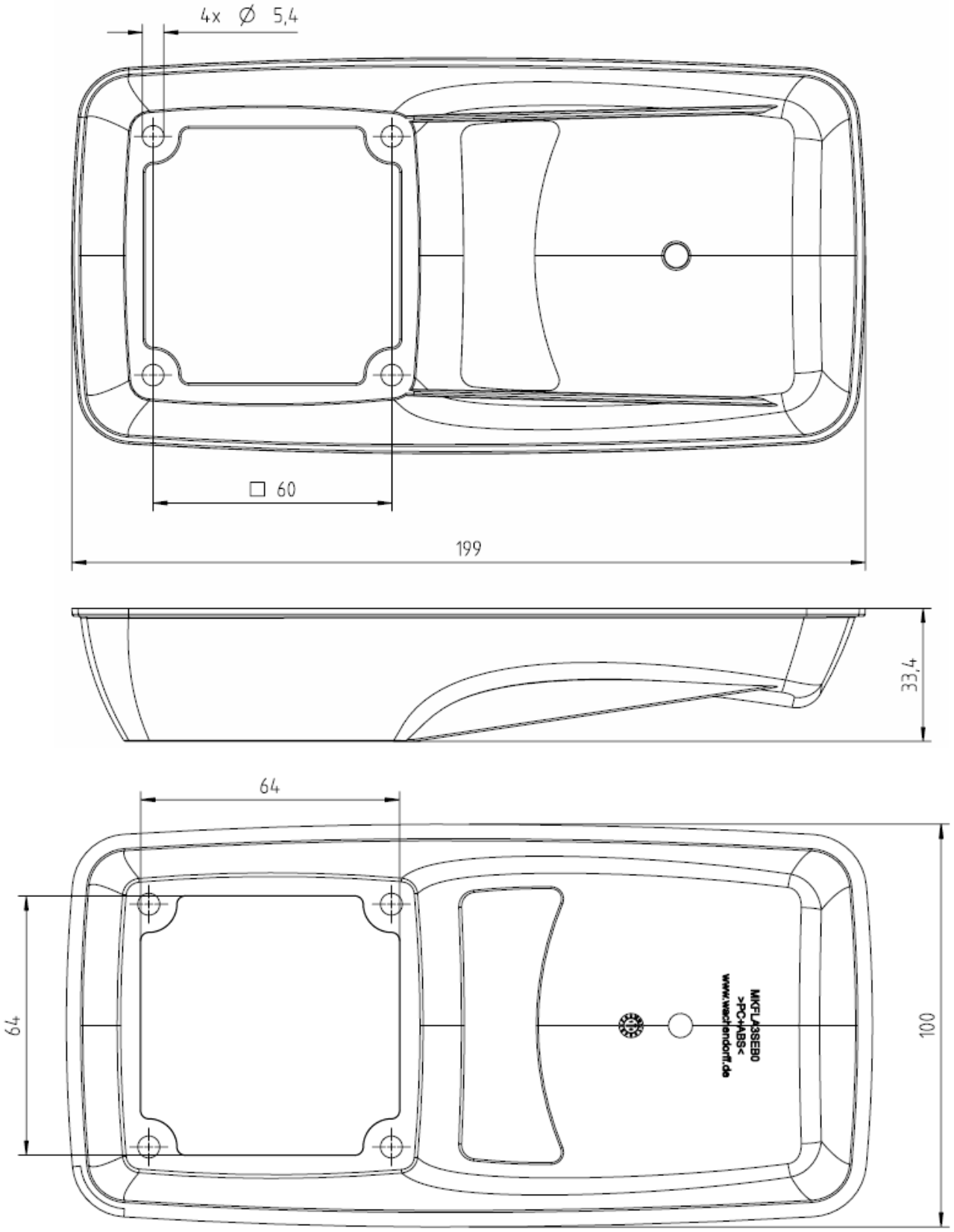
Attention!
Using too long screws can damage the unit!
Accepted mounting torque with mounting cover is 2,5 ± 0,2 Nm.
Please secure the screws with the thread locker medium strength (e.g. Loctite 243).

4.2.2 Cut-out Dashboard

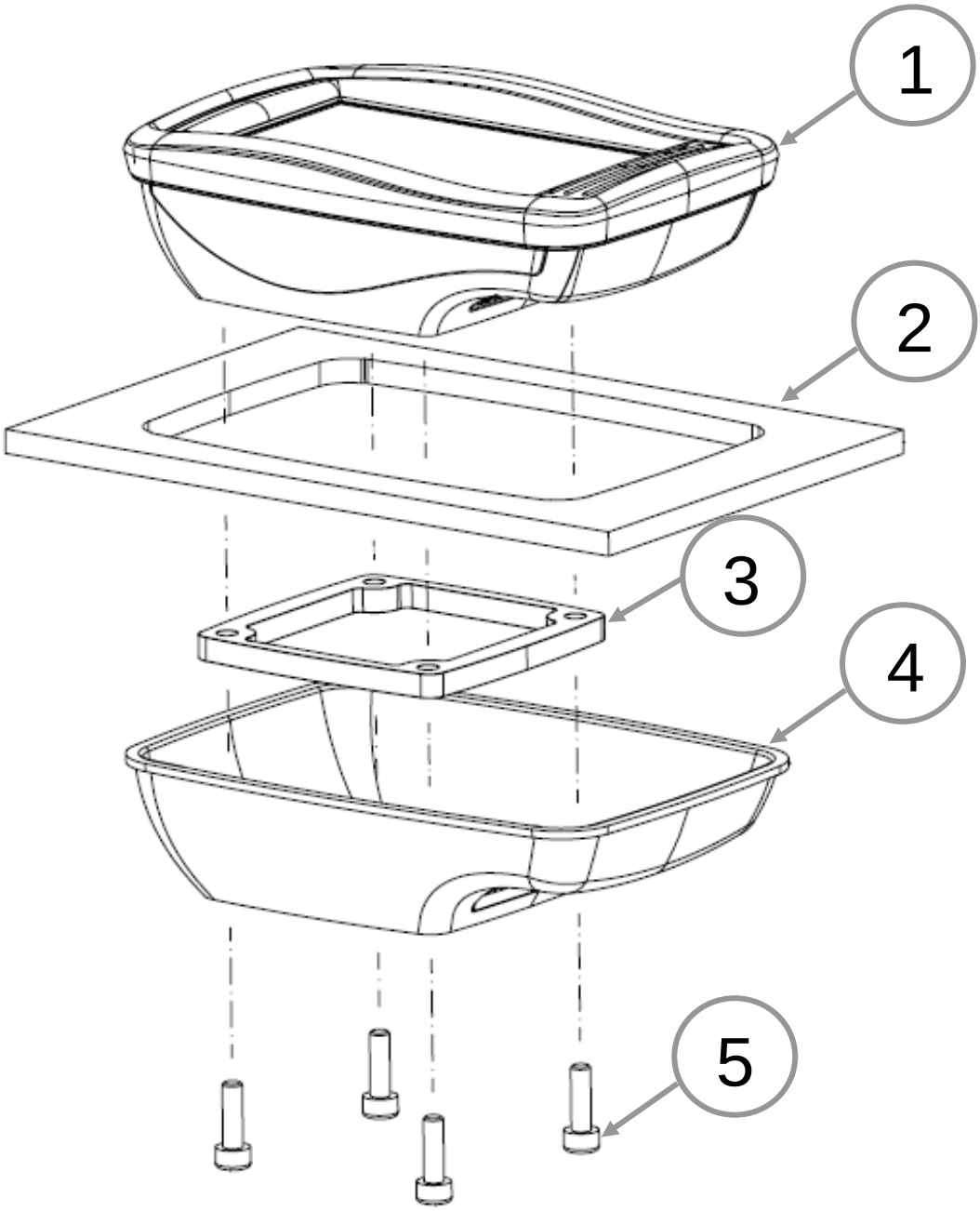
Maximum thickness for mounting OPUS A3 STANDARD is 10mm



4.2.3 Mounting Cover for OPUS A3 STANDARD



4.2.4 Dashboard Mounting Instruction - OPUS A3 ECO



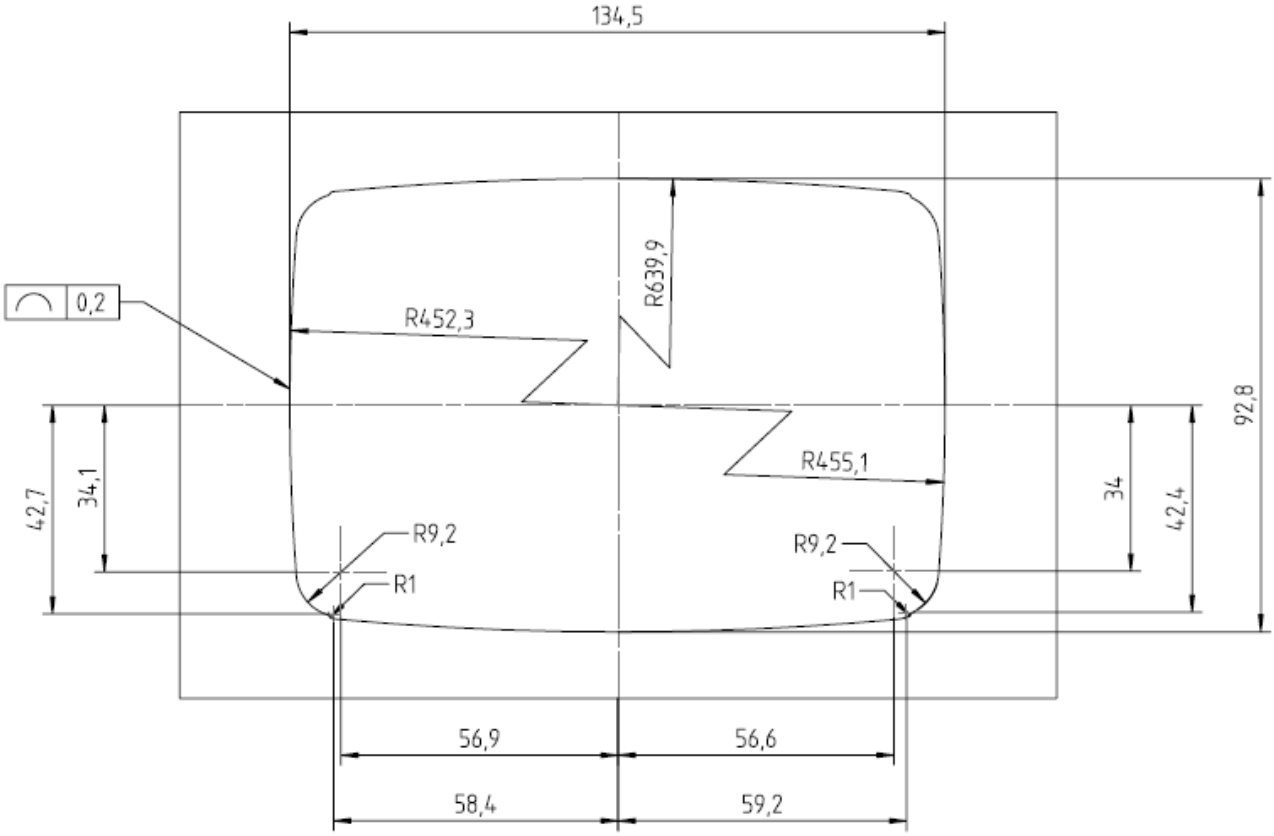
Parts List			
Pos.	Description	Order number	Supplier
1	OPUS A3 Eco	OPUSA3EXXXXX	Topcon Electronics
2	Dashboard	-	Customer
3	Spacer or washer	-	Customer
4	Mounting Cover	OPUSA3ZBEB002	Topcon Electronics
5	M5 Screw* (DIN EN ISO 4762)	-	Customer

*Assignment of the screw length depends on dashboard thickness (thickness/length):
1mm – 3mm / M5 x 12
4mm – 6mm / M5 x 16
7mm – 10mm / M5 x 20

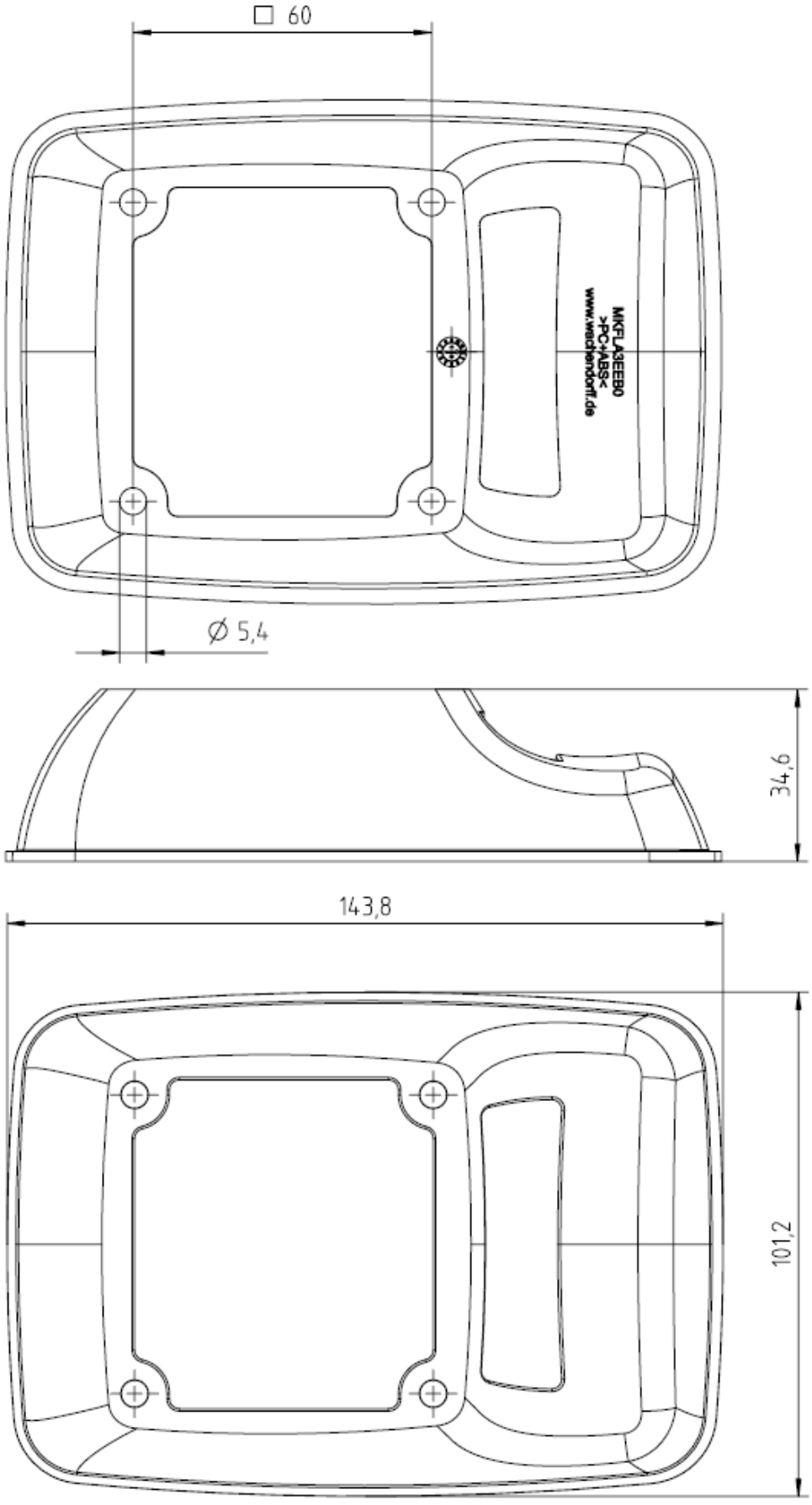
Attention!
Using too long screws can damage the unit!
Accepted mounting torque with mounting cover is 2,5 ± 0,2 Nm.
Please secure the screws with the thread locker medium strength (e.g. Loctite 243)

4.2.5 Cut-out Dashboard

Maximum thickness for mounting OPUS A3 Eco: 10mm



4.2.6 Mounting Cover

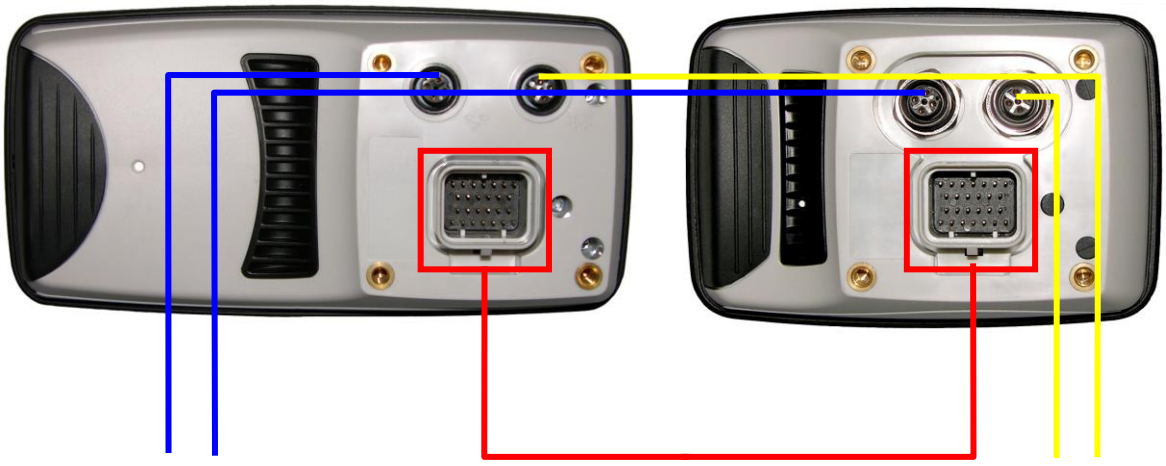


4.3 Electrical installation OPUS A3

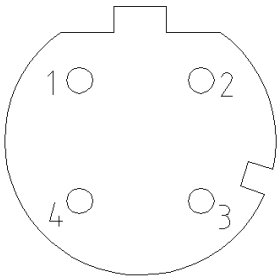
Below you find the pin out diagram of the OPUS A3. The connectors are drawn as seen from the back side of the unit.

Please be aware that the existing pins and connectors depend on the hardware option you ordered.

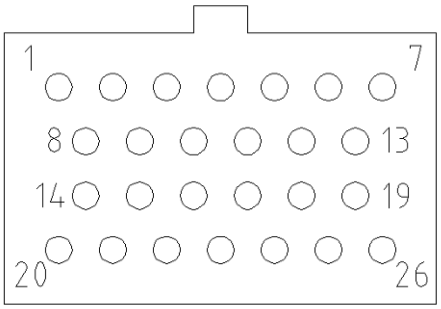
Please note that the OPUS A3 only represents one part of the entire CAN network. Set-up and dimensioning of the network must be executed by specialized personnel, and the information in this regard cannot be a component of this operating manual.



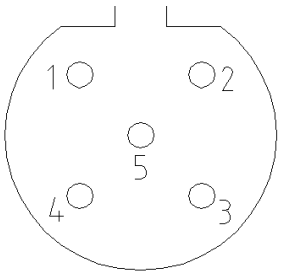
Ethernet Connector, M12, female, 4 pins, d-coded



Main Connector



Video- Connector, M12, female, 5 pins, b-coded



Ethernet connector pinout

Ethernet	Round Connector, 4 pins, M12, acc. To IEC 61076-2-101
1	TD+
2	RD+
3	TD-
4	RD-

Video connector pinout

Video	Round Connector, 5 pins, M12
1	VidSig+
2	Mirror
3	Camera+
4	Camera -
5	VidSig GND

Main connector pinout (in full option)

Pin no.	Assignment	Description
1	VCC	supply voltage +; terminal 30
2	Ignition Input	ignition input; terminal 15
3	GND	supply voltage - ;terminal 31
4	CarGND	car ground; has to be connected, otherwise there will be no protection against overvoltage, shortcut or ESD
5	n. c.	not connected
6	n. c.	not connected
7	n. c.	not connected
8	CAN1H	CAN bus 1 high signal
9	CAN1L	CAN bus 1 low signal
10	CAN2H	CAN bus 2 high signal
11	CAN2L	CAN bus 2 low signal
12	USB_VCC	full speed USB, + 5 V DC
13	USB_GND	full speed USB, 0 V
14	USB_D-	full speed USB, data line (-)
15	USB_ D+	full speed USB, data line (+)
16	RS232: RxD	RS232: RxD
17	RS232: TxD	RS232: TxD
18	RS232: GND	RS232: GND
19	A/DI3	analog/digital input 3
20	A/DI1	analog/digital input 1
21	A/DI2	analog/digital input 2
22	A/DI4	analog/digital input 4
23	SERV_EN	service enable; to be connected while power-on for updating
24	DO3	digital output 3
25	DO1	digital output 1
26	DO2	digital output 2

Please observe the following guidelines for set-up:

- Power supply lines should only be laid as pairs, as close together as possible.
- Sensitive signal lines should be shielded to achieve highest possible damping, and under this shielding they should be still be laid out twisted.
- Metal plug connections should be used for shielded lines.
- Cable bundles should be distributed in accordance with their purpose (e.g. HF, LG, and power supply); the groups thus formed should not be routed parallel to the extent possible, and they should be routed with clearance.

The OPUS A3 relies on a connection to an ECU that controls the functions and features of the target vehicle/machine.

The ECU must be the component in charge of all safety related functions.

Wrong connection may cause damage of the unit.

Please keep all the connectors separated. All connection should be done on the shortest distance to the unit.

4.3.1 Unused plugs

Penetrating humidity by unused and unprotected plugs may cause damage of the unit. Please protect unused plugs with the special blind inserts that have been supplied with the units.

4.3.2 Power Supply

The unit may be used with the 12 V and for 24 Volt battery systems, operating voltage range of 8-36 VDC. The overvoltage resistance is about 48V for 2 minutes. Inverse-polarity protection is up to -48 V DC.

Car ground (pin no. 4 on main connector) has to be connected to the chassis by a conductor as short as possible. Even if there is no conductive chassis available (eg. in E-vehicles) the pin has to be connected to the negative pole of the battery. Otherwise there will be no protection against over voltage, shot cut or ESD.

4.4 First steps

Plug the main connector into the OPUS A3. Then connect the pins 15 and 30 for the plus voltage, as well as pins for GND and CarGND for the ground. Switch on the Power supply.

On start the boot-logo image will be displayed on the screen. This may be exchanged with the customer specific image (please refer to **C/C++ Developer Guide** for more information).

The boot up takes about 3 minutes and will call the application according to the start scripts on the unit (start scripts for Projektor Tool and CODESYS© application already installed by delivery).

The application displays the information to the version of the application software required. CODESYS© application also contains a simple function test. Each new downloaded application will replace the old one automatically.

4.5 Cleaning/ service / maintenance

Cleaning agents which have an abrasive or dissolving effect on the coated glass pane, the foil of the touch screen or the plastic of the encoder or the housing should not be used to clean OPUS A3 operator panels. Only use soft clothes with a little soap and water or mild dish washing liquid.

The OPUS A3 does not have any parts that require service by the user.

Repairs can only be performed by Topcon Electronics GmbH & Co KG.

4.6 Disposal

Dispose of the device in accordance with the national environmental regulations

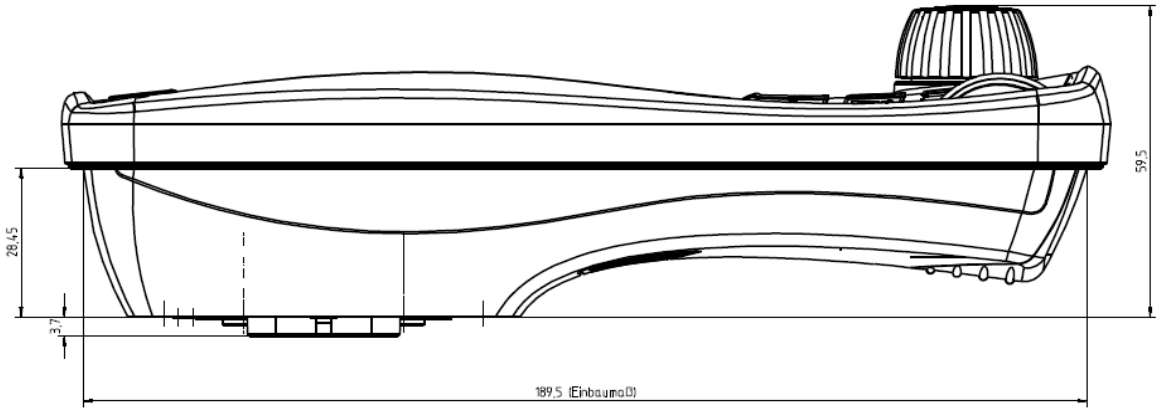
5 Technical Documentation

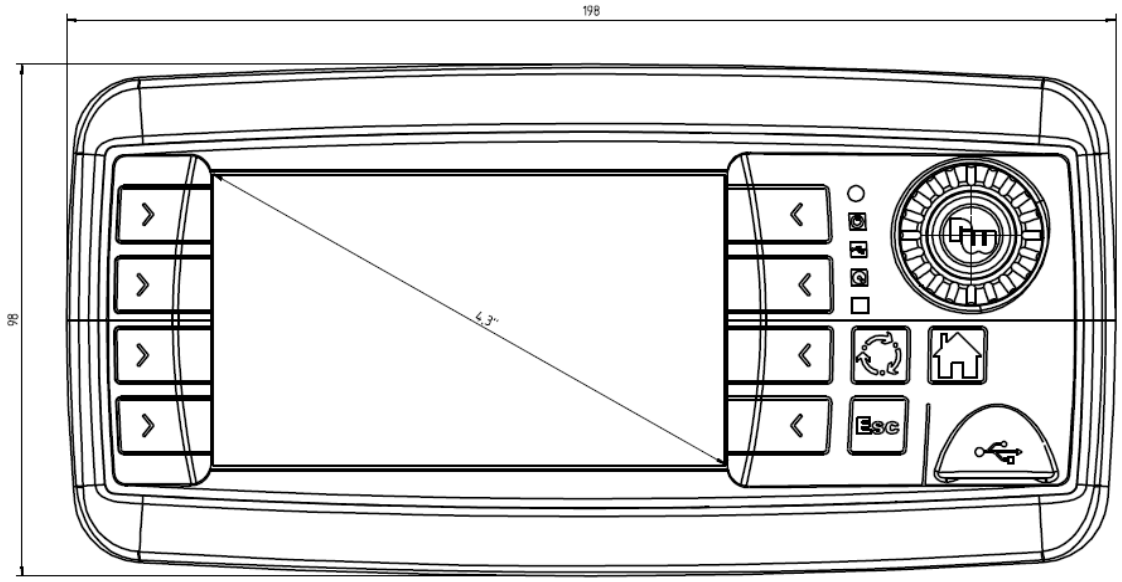
The OPUS A3 is currently available in two variants:

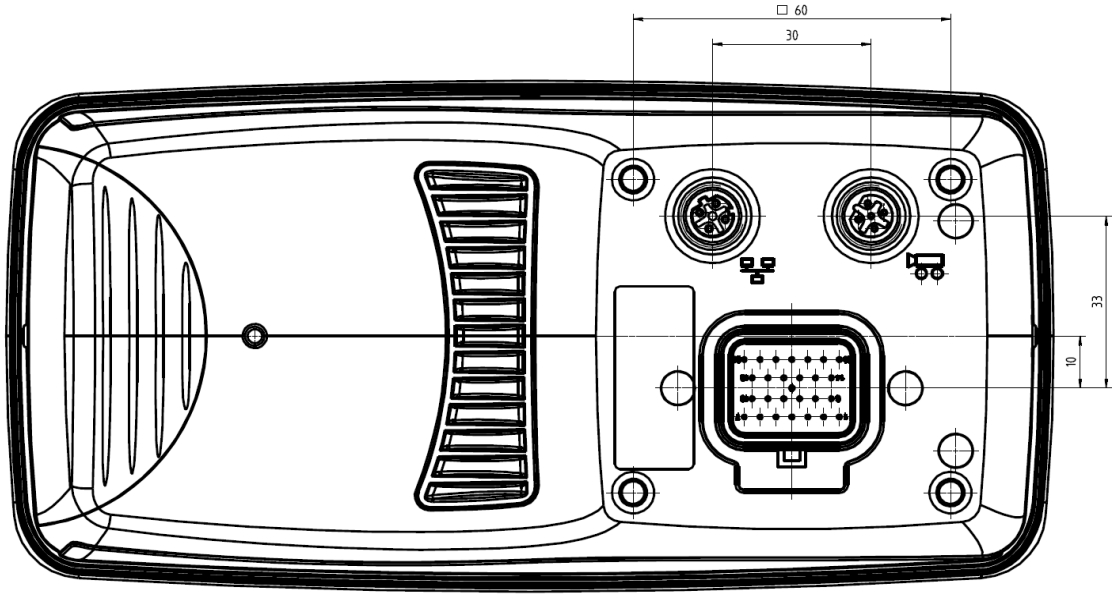
OPUS A3 STANDARD:

OPUS A3 ECO:

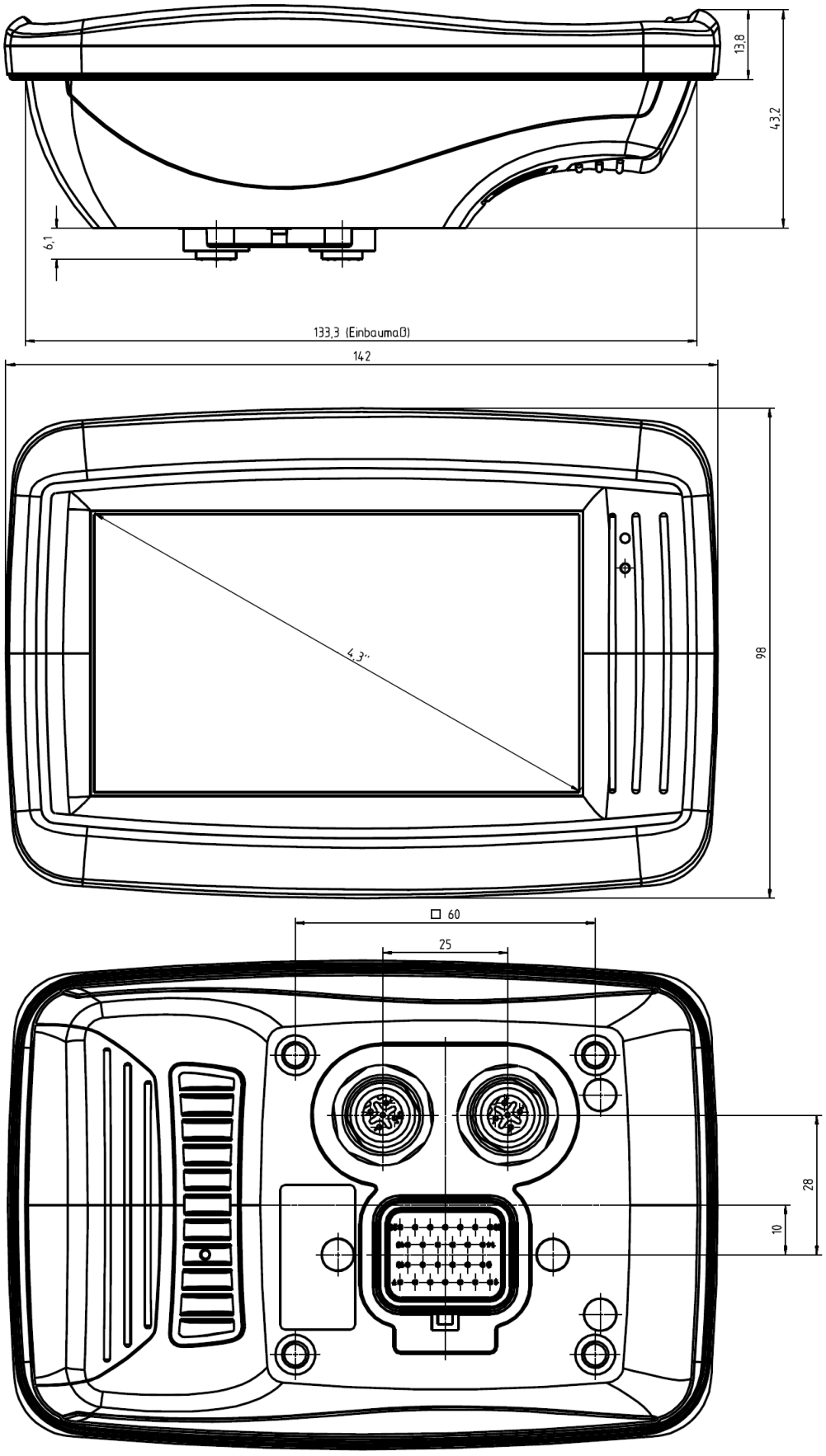
5.1 Dimension Drawings - OPUS A3 STANDARD







5.2 Dimension Drawings - OPUS A3 ECO



5.3 Specification

	OPUS A3 ECO		OPUS A3 STANDARD	
	Basic	**Full option**	**Basic**	**Full option**
Dashboard Mount	■	■	■	■
Dimensions (mm)	B130xH97xT56	B130xH97xT56	B198xH97xT56	B198xH97xT56
Display size	480x272 pixels	480x272 pixels	480x272 pixels	480x272 pixels
Touchscreen		■		■
Keys Soft / Hard			8 / 3	8 / 3
Keys with backlight			■	■
Encoder with Click			■	■
Optical Signal	1	1	4	4
Beeper		■		■
Processor Size	32KByte	32KByte	32KByte	32KByte
Processor Speed	532 MHz I.MX35	532 MHz, I.MX35	532 MHz I.MX35	532 MHz, I.MX35
RAM	128 MB DDR2	256 MB DDR2	128 MB DDR2	256 MB DDR2
Mass Storage	512 MB	1 GB	512 MB	1 GB
EEPROM	32 kB serial	32 kB serial	32 kB serial	32 kB serial
CAN bus	2	2	2	2
RS232	1	1	1	1
USB 2.0 full speed	1	1	1	1
USB 2.0 high speed		■		■
Ethernet		■		■
Video in		■		■
Analog/digital input		4		4
Digital Output		3		3
Real time clock	■	■	■	■
Light Sensor		■		■

5.4 Environmental compatibility

5.4.1 CE-Compliance

EU Directive 2014/30/EU (EMC) according to

- EN 12895: Industrial Trucks – Electromagnetic compatibility
- EN 13309: Construction machinery – Electromagnetic compatibility of machines with internal electrical power supply
- EN ISO 14982: Agricultural and forestry machinery - Electromagnetic compatibility - Test methods and acceptance criteria

5.4.2 e1 - Type approval

EU Directive 72/245/EWG including changes up to 2009/19/EG

5.4.3 Protection Level (IP Code)

IP 6k5 and 6k7 according to ISO 20653: Road Vehicles – Degrees of protection (IP-Code) – Protection of electrical equipment against foreign objects, water and access

5.4.4 Electrical Capability

12 and 24V-Systems according to:

- ISO 16750-2: Road Vehicles – Environmental conditions and testing for electrical and electronic equipment – Electrical loads
- ISO 15003: Agricultural Engineering – Electrical and electronic equipment – Testing resistance to environmental conditions

5.4.5 Mechanical Capability

According to ISO 16750-3: Road Vehicles – Environmental conditions and testing for electrical and electronic equipment – Mechanical loads, Code L

ISO 15003: Agricultural Engineering – Electrical and electronic equipment – Testing resistance to environmental conditions

- Mechanical Shock: Level 2
- Random Vibration: Level 2
- Sinusoidal Vibration: Level 2

5.4.6 Climate Capability

- According to ISO 16750-4: Road Vehicles – Environmental conditions and testing for electrical and electronic equipment – Climatic Loads
  - Operating Temperature Range: Code E: -30 … +65°C
  - Storage Temperature Range: -40 … +85°C
  - Climatic Loads: Code C
- ISO 15003: Agricultural Engineering – Electrical and electronic equipment – Testing resistance to environmental conditions

5.4.7 Chemical Capability

- According to ISO 16750-5: Road Vehicles – Environmental conditions and testing for electrical and electronic equipment – Chemical Loads
  Mounting Location: B
- ISO 15003: Agricultural Engineering – Electrical and electronic equipment – Testing resistance to environmental conditions

5.5 Declaration of Conformity

5.5.1 Declaration of Conformity for OPUS A3 ECO

TOPCON

EU–Konformitätserklärung
EU Declaration of Conformity

für die Produktfamilie: **OPUS A3 Eco**
for the product family:

bestehend aus folgenden Modellen:
consisting of the following models:
OPA3EL1CANBC62, OPUSA3EL1CANBK09, OPUSA3EL1CANB000, OPUSA3EN1CANB000, OPUSA3EL1CANBC07, OPUSA3EL1CANF000, OPUSA3EN1CANF000, OPUSA3EL1CANFC07, OPUSA3EL1CANT000, OPUSA3EN1CANT000, OPUSA3EL1CDSB000, OPUSA3EN1CDSB000, OPUSA3EL1CDSBC25, OPUSA3EL1CDSF000, OPUSA3EN1CDSF000, OPUSA3EL1CDSFC25, OPUSA3EL1CDST000, OPUSA3EN1CDST000, OPUSA3EL1CDSBB92, OPUSA3EL1CDSFB94, OPUSA3EL1CDSFC65, OPUSA3EL1CDSFC28, OPUSA3EL1CDSTC25, OPUSA3EN1ISOF000, OPUSA3EL1ISOT000, OPUSA3EN1ISOT000, OPX14EL1CANTC23, OPUSA3EN1CANBC43, OPUSA3EN1CANFC43, OPUSA3EN1CANTC63, OPUSA3EN1CANTC64, OPUSA3EL1ISOTK02, OPUSA3EL1ISOTK03, OPUSA3EN1CWVF000

Für die oben bezeichnete Produktfamilie wird hiermit erklärt, dass diese den wesentlichen Schutzanforderungen entspricht, die in den nachfolgend bezeichneten Richtlinien festgelegt sind:
The indicated product family is in conformance with the regulations of the following European Directives:

- **2014/30/EU (EMV-Richtlinie)**
  RICHTLINIE 2014/30/EU DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit
  DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility
  - **Die Konformität wird in Bezug auf folgende angewandte harmonisierte Europäische Normen erklärt:**
    Conformity is declared with reference to the following harmonized European standards:
    - **EN 12895 2015**
    - **EN ISO 13766-1 2019**
    - **EN ISO 14982 2009**
- **2011/65/EU (RoHS-Richtlinie)**
  RICHTLINIE 2011/65/EU DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten
  DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Dipl.-Ing. Sebastian Nolte, Director of Quality & Service — **18.03.2019**
Titel, Name, Position, Unterschrift / *Name, Title, Position, Signature* — Datum / *Date*

Dipl.-Wirtsch.-Ing. (FH) Thilo Nagel, General Manager — **18.03.2019**
Titel, Name, Position, Unterschrift / *Name, Title, Position, Signature* — Datum / *Date*

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5.5.2 Declaration of Conformity for OPUS A3 STANDARD

EU–Konformitätserklärung
EU Declaration of Conformity

für die Produktfamilie: **OPUS A3 Standard**
for the product family:

bestehend aus folgenden Modellen:
consisting of the following models:
OPUSA3SL1CANB000, OPUSA3SL1CANBK04, OPUSA3SL1CANBC07, OPUSA3SL1CANBC21, OPUSA3SL1CANBC27, OPUSA3SL1CANF000, OPUSA3SL1CANFC07, OPUSA3SL1CDSB000, OPUSA3SL1CDSBC29, OPUSA3SL1CDSBC30, OPUSA3SL1CDSBC48, OPUSA3SL1CDSF000, OPUSA3SL1CDSFB92, OPUSA3SL1CANFB92, OPUSA3SL1CANFK18, OPUSA3SL1ISOB000, OPUSA3SL1ISOF000, OPUSA3SN1CANB000, OPUSA3SN1CANBC20, OPUSA3SN1CANBC70, OPUSA3SN1CANF000, OPUSA3SN1CDSB000, OPUSA3SN1CDSBC25, OPUSA3SN1CDSF000, OPUSA3SN1CDSFC25, OPUSA3SN1CDSFK17, OPUSA3SN1ISOB000, OPUSA3SN1ISOF000, OPUSA3SN1CANBC36, OPUSA3SN1ISOBC37, OPUSA3SN1ISOBC38, OPUSA3SN1CANBC43, OPUSA3SN1CANFC43, OPUSA3SN1CDSBC49, OPUSA3SL1CDSBC49, OPUSA3SN1CANBK06, OPUSA3SL1CDSBK11, OPUSA3SN1CWVF000

Für die oben bezeichnete Produktfamilie wird hiermit erklärt, dass diese den wesentlichen Schutzanforderungen entspricht, die in den nachfolgend bezeichneten Richtlinien festgelegt sind:
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  DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility
  - **Die Konformität wird in Bezug auf folgende angewandte harmonisierte Europäische Normen erklärt:**
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    - **EN 12895 2015**
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    - **EN ISO 14982 2009**
- **2011/65/EU (RoHS-Richtlinie)**
  RICHTLINIE 2011/65/EU DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten
  DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Dipl.-Ing. Sebastian Nolte, Director of Quality & Service — **18.03.2019**
Titel, Name, Position, Unterschrift / *Name, Title, Position, Signature* — Datum / *Date*

Dipl.-Wirtsch.-Ing. (FH) Thilo Nagel, General Manager — **18.03.2019**
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Komplementär: Topcon WE GmbH · Geschäftsführer: Albert Zahalka
Rheingauer Volksbank · Geisenheim · IBAN: DE 96 51091500 00000 66699 · BIC: GENO DE 51 RGG
Rheinland-Pfalz Bank (LBBW-Gruppe) · Mainz · IBAN: DE 19 60050101 0002987217 · BIC: SOLA DEST
Deutsche Bank · Wiesbaden · IBAN: DE 45 51070021 02009 00900 · BIC: DEUT DE FF 510
General Terms and conditions (AGB) are available here: www.topcon-electronics.com