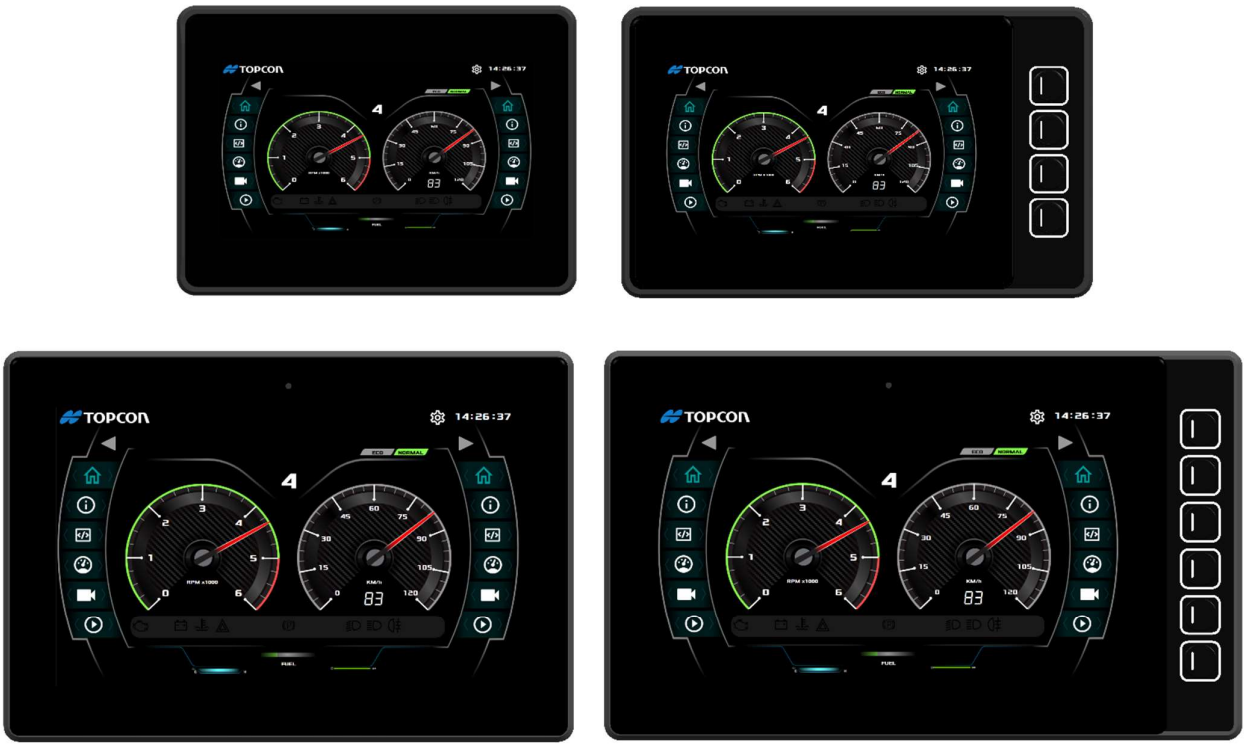
OPUS B2/B2 Plus

Operating Manual
Hardware Description



Versions

Example

OPUSB2EN1CANB000	
OPUSB2	model
E	E=ECO; S= Standard
N	N=Normal size (4,3”); P=Plus size (7”)
1	1. Generation
CAN	CAN=Projektor/C++
	CDS=CODESYS
	ISO=ISO-UT
B	B=Basic; F= Full
000	customer specific identification

Operating Manual OPUS B2/B2 Plus
Order number: OPUSBA00B2

Topcon Electronics GmbH
Industriestraße 7, 65366 Geisenheim
+49 6722 / 6722 4026 - 888

Supplements or a special operator manual may be required for customer-specific devices.

Version 22, April 2024

Table of contents

1 Preliminary Notes

This document is valid for the following OPUS B2/B2 Plus version:

- OPUSB2 Eco
- OPUSB2 Standard
- OPUSB2 Plus Eco
- OPUSB2 Plus Standard

This document is directed to the qualified personnel and contains all the important information to the correct use of the OPUS B2/B2 Plus.

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

To provide a better overview, this operating manual cannot present all details for handling the OPUS B2/B2 Plus 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 Instruction Types

This operating manual contains instructions that must be complied with for your personal safety and 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 B2/B2 Plus. Keep this operating manual where it is accessible to all users at any time. Every person who is assigned to commission or operate the OPUS B2/B2 Plus 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 to avoid damage to property. Failure to follow these safety instructions could result in fire, electric shock, or other injury or damage to OPUS B2/B2 Plus or other property.

2.2 Qualified Personnel

This operating manual is intended for technically qualified personnel, who have the appropriate skills in 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 CAN bus 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 B2/B2 Plus 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 B2/B2 Plus is designed for 12V- and 24V-Systems. The operating voltage range is 9-36 VDC, overvoltage resistance 48V for 5 minutes, inverse-polarity protection up to -48 VDC for 5 minutes.

2.4 Interventions in the device

The OPUS B2/B2 Plus 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 can 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 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.

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

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 B2/B2 Plus

Dangerous high voltage
Never attempt to repair or modify OPUS B2/B2 Plus yourself. Disassembling OPUS B2/B2 Plus may cause damage that is not covered under the warranty and cause hazardous conditions by the high-voltage components inside of the unit.
OPUS B2/B2 Plus does not contain any user-serviceable parts. Service should only be provided by Topcon Electronics GmbH.

Hazardous situations due to device failure
Do not use the OPUS B2/B2 Plus 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 B2/B2 Plus cannot cause a hazardous situation for operating personnel.
Ensure that incorrect inputs via the OPUS B2/B2 Plus, 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 B2/B2 Plus.
Emergency-Stop devices must remain effective in all operating modes.

Unintentional operation
Operating states can be called due to unintentional operation of the OPUS B2/B2 Plus that are not appropriate for the situation.
OPUS B2/B2 Plus 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 B2/B2 Plus function.

If a further usage of the OPUS B2/B2 Plus 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

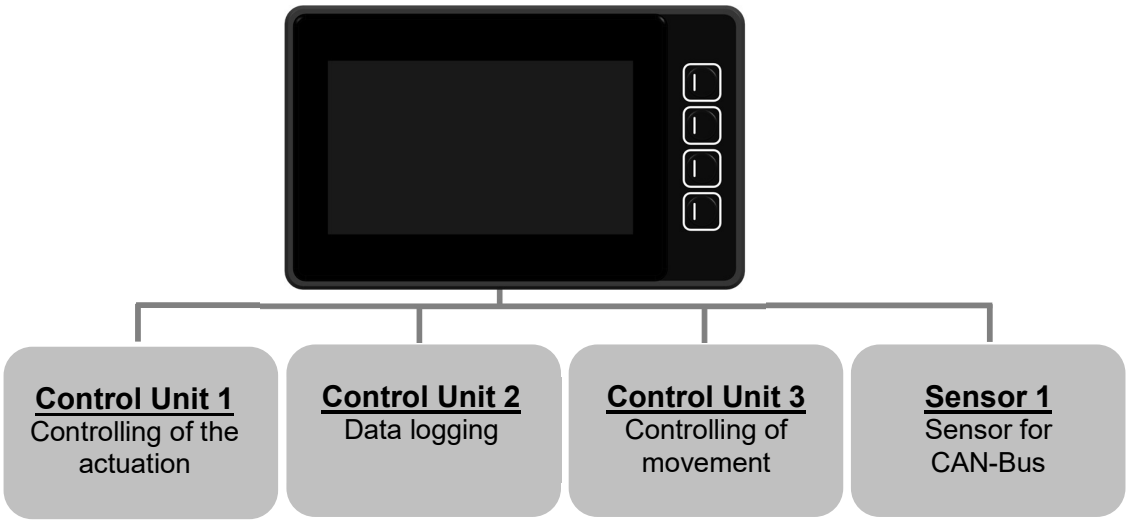
The operator panel OPUS B2/B2 Plus is a programmable graphical display used to operate and monitor vehicles and working machines.

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 II).

For service purposes additional interface like USB is available. Together with Embedded Linux operating system it forms a universal platform for the communication with other CAN devices, networks or PCs.

The operator panel OPUS B2/B2 Plus is not admitted for security-relevant duties for personal protection purposes.

3.1 Example of Use



3.2 Device Description

3.2.1 OPUS B2/B2 Plus

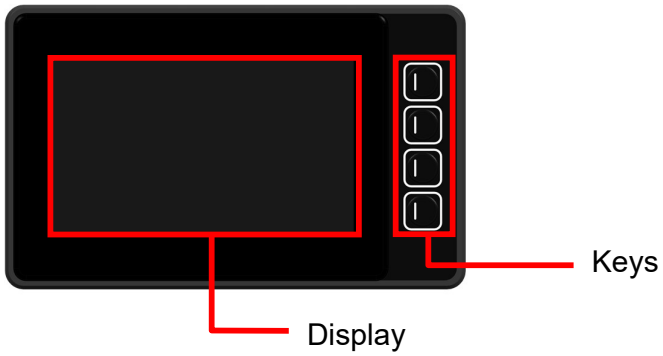


Fig. 3.1: Schematic diagram of the OPUS B2/B2 Plus

Display:
B2: 4.3” (480x272 px) TFT color graphic LCD display
B2 Plus: 7” (800 x 480 px) TFT color graphic LCD display

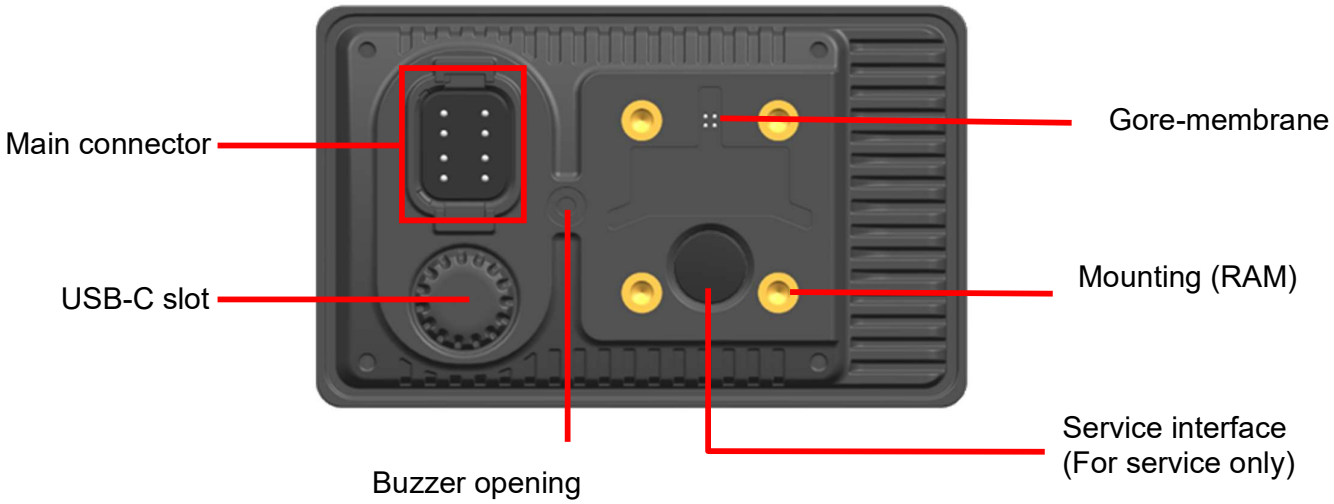


Fig. 3.4: Schematic diagram of OPUS B2/B2 Plus backside

Service interface:
On OPUS B2/B2 Plus there is a service interface available. This interface serves Topcon internal service use only.

Please do not remove the protection cap of service interface!

OPUS B2/B2 Plus may only be used with factory closed protection cap otherwise Topcon Electronics GmbH is no liable for any damage or misfunction.

Power-on/off behavior:
OPUS B2/B2 Plus can be switch on/off by the power supply directly.

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 12 V DC
On (without USB use)	B2: < 165mA @ 12V (< 2 W) B2 Plus: <370mA@12V (<5W)
Low-power	~ 40mA @ 12V (< 0,5 W)
Sleep	~ 30mA @ 12V (< 0,35 W)
Off	~ 0,08mA @ 12V (< 1 mW)

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

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

USB slot:
OPUS B2/B2 Plus offers USB 2.0 with C slot be used for software update and data transfer.

Main connector:
The following interfaces are available:

- Power supply and ignition input
- 2 x CAN-Interfaces according to ISO/DIS 11898
- Service enable

3.3 Features Overview for OPUS B2/B2 Plus

- Encapsulated plastic housing to be mounted in landscape or portrait mode, standalone or in dash
- 4.3” & 7” TFT color display for automotive with resolution 480x272 / 800 x 480 pixels
- Capacitive touch screen Buzzer (only Full option)
- Freescale NXP i.MX 6 ULL MCIMX6Y2CVM05AB
- 32bit processor with embedded Linux operating system (Linux kernel 6.x)
- Two CAN interface (ISO 11898) using CANopen® and SAE J1939 protocols. Layer II is supported
- Capacitive touch screen(only Full option)
- USB 2.0 with C slot on Backside

The OPUS B2/B2 Plus is particularly characterized by its robust construction, and it has been developed especially for harsh use conditions in mobile work machines.

3.4 Application Development

There are three possible ways to program the OPUS B2/B2 Plus and make it an integrated part of its application.

1. OPUS Projektor:
This powerful development environment provided by Topcon Electronics GmbH enables the quick and effective creation of an application for the OPUS B2/B2 Plus operator terminal. Use the Projektor to conveniently design the user interface on the computer, which can be easily displayed on the device. Additionally, this tool includes features to work with CANopen®, J1939 and CANFreestyle protocols for CAN communication.
For further information please refer to the ***OPUS Projektor Online Manual.***
With **ISO** devices, the OPUS B2/B2 Plus can be used as an ISO-VT slave in accordance with the ISO-11783 standard. The necessary configuration is also done in the OPUS Projektor.

2. CODESYS 3.x:
CODESYS is a programming tool and system developed by the German company 3S Systems GmbH according to IEC 61131-3 standard. It supports different means of programming such as FUP or Structured Text. It can be used to program the OPUS B2/B2 Plus and CODESYS compatible ECUs. CODESYS includes the functionality to configure the CANopen®, J1939 and CAN Layer 2protocol for communication over CAN bus.
For further information please refer to the ***Codesys Help File.***

3. C-Programming:
OPUS B2/B2 Plus with its embedded Linux operating 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.***

The operator panel OPUS B2/B2 Plus generation may only be handled due to the according operation manual.

Please take notice of 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 10 or 11 operational system, at least 5 GB free hard disk capacity and 8 GB RAM.

- Programming with C/C++, Linux operational system is prerequisite.

3.5 Development Kit

For programming the graphical user interface of the OPUS B2/B2 Plus some different development kits are provided.

Topcon Toolchain with Projektor Tool
Order number: OPEPB2CAN

Description	Order Number	Qty
Main connecting cable	OPKAB2CAN15	1
Service-Adapter OPUS B2	OPUSB2XZSA000	1
USB coupler, cable 0.15m, type A female	OPKAB2USBA015	1
SUB-D9 female/male connector, with CAN terminating resistor		1
LogiLink UA0025C USB 2.0 (male) to Fast Ethernet Adapter (RJ45 female)		1
D-SUB9-male to USB A-male, 1m, Conrad 1360254 - VQ		1
WE Toolchain download: - **Projektor Tool** - **PClient** - **Documentation**		1
Basic Projektor-Tool training at a Topcon facility		1
Projektor Tool license		2
12 months technical support		1

CODESYS 3.x
Order number: OPEPB2CDS

Description	Order Number	Qty
Main connecting cable	OPKAB2CAN15	1
Service-Adapter OPUS B2	OPUSB2XZSA000	1
USB coupler, cable 0.15m, type A female	OPKAB2USBA015	1
SUB-D9 female/male connector, with CAN terminating resistor		1
LogiLink UA0025C USB 2.0 (male) to Fast Ethernet Adapter (RJ45 female)		1
D-SUB9-male to USB A-male, 1m, Conrad 1360254 - VQ		1
CODESYS Software download: - **Development Tool** - **Application** - **Target files** - **Documentation**		1
Basic CODESYS training at a Topcon facility		1
12 months technical support		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 (opus-support@topcon.com).

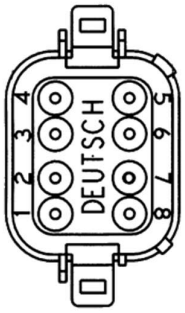
5 Electrical installation OPUS B2/B2 Plus

Below you find the pin out diagram of the OPUS B2/B2 Plus. The connectors (see fig. 3.3) 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 B2/B2 Plus 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.

Main Connector
(Deutsch DT06-08SA)



Main connector pinout (in full option)

pin no.	assignment	description
1	SERV_EN	Service Enable
2	KL15	ignition input; terminal 15
3	KL31	supply voltage -; terminal 31
4	KL30	supply voltage +; terminal 30
5	CAN 2 L	CAN 2 low
6	CAN 2 H	CAN 2 high
7	CAN 1 L	CAN 1 low
8	CAN 1 H	CAN 1 high

Please observe the following guidelines for set-up:

- Power supply lines should only be passed in 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 passed 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 in parallel to the extent possible, and they should be routed with clearance.

The OPUS B2/B2 Plus 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.

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

Wrong connection may cause damage of the unit.

5.1 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.

5.2 First steps

Plug in the main connector into the OPUS B2/B2 Plus. Then connect the clamps 15 and 30 for the plus voltage, as well as clamps for GND 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 8 seconds and will then call the application according to the start scripts on the unit (start scripts for Projektor Tool or CODESYS application already installed by delivery).

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

5.3 Cleaning / service / maintenance

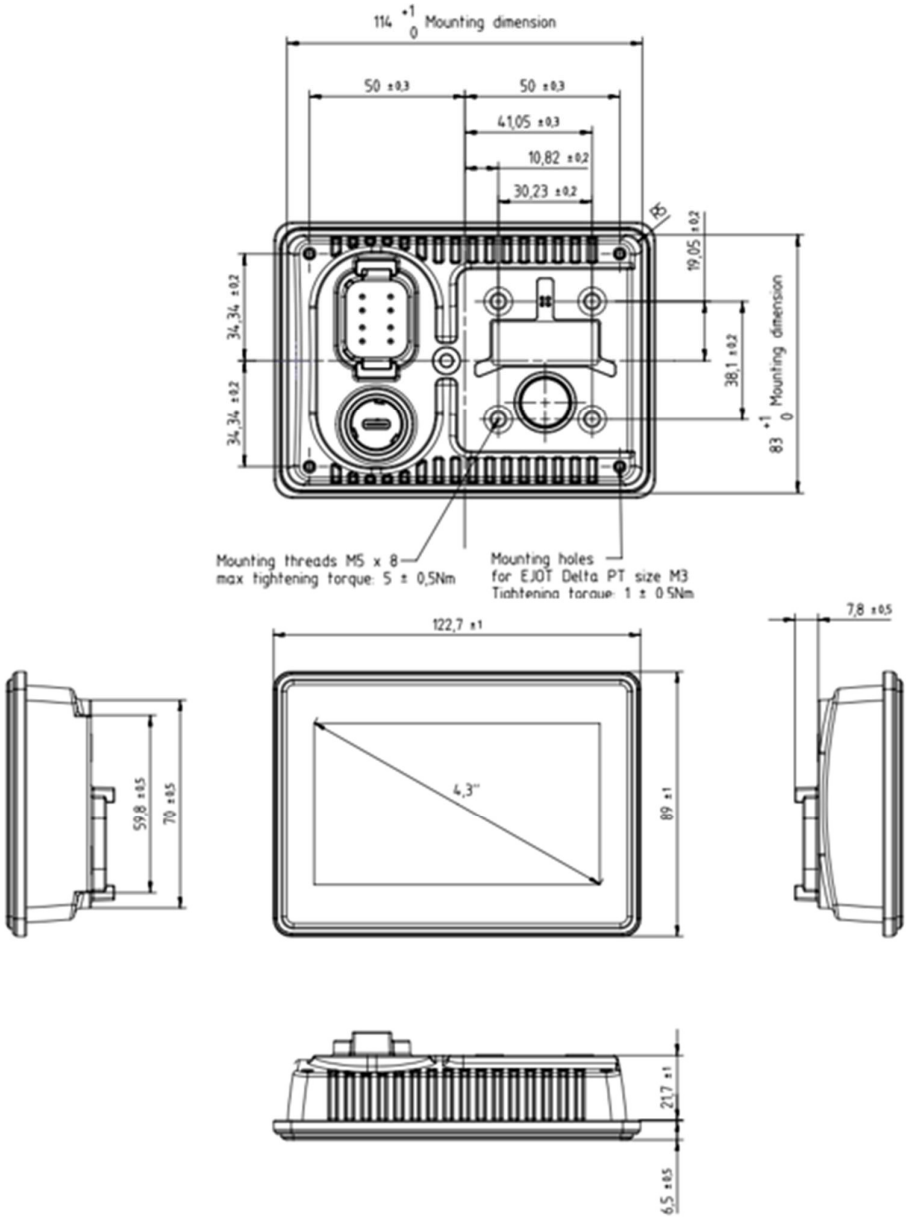
Cleaning agents which have an abrasive or dissolving effect on the glass pane touch screen or the housing should not be used to clean OPUS B2/B2 Plus operator panels. Only use soft clothes with a little soap and water or mild dish washing liquid.

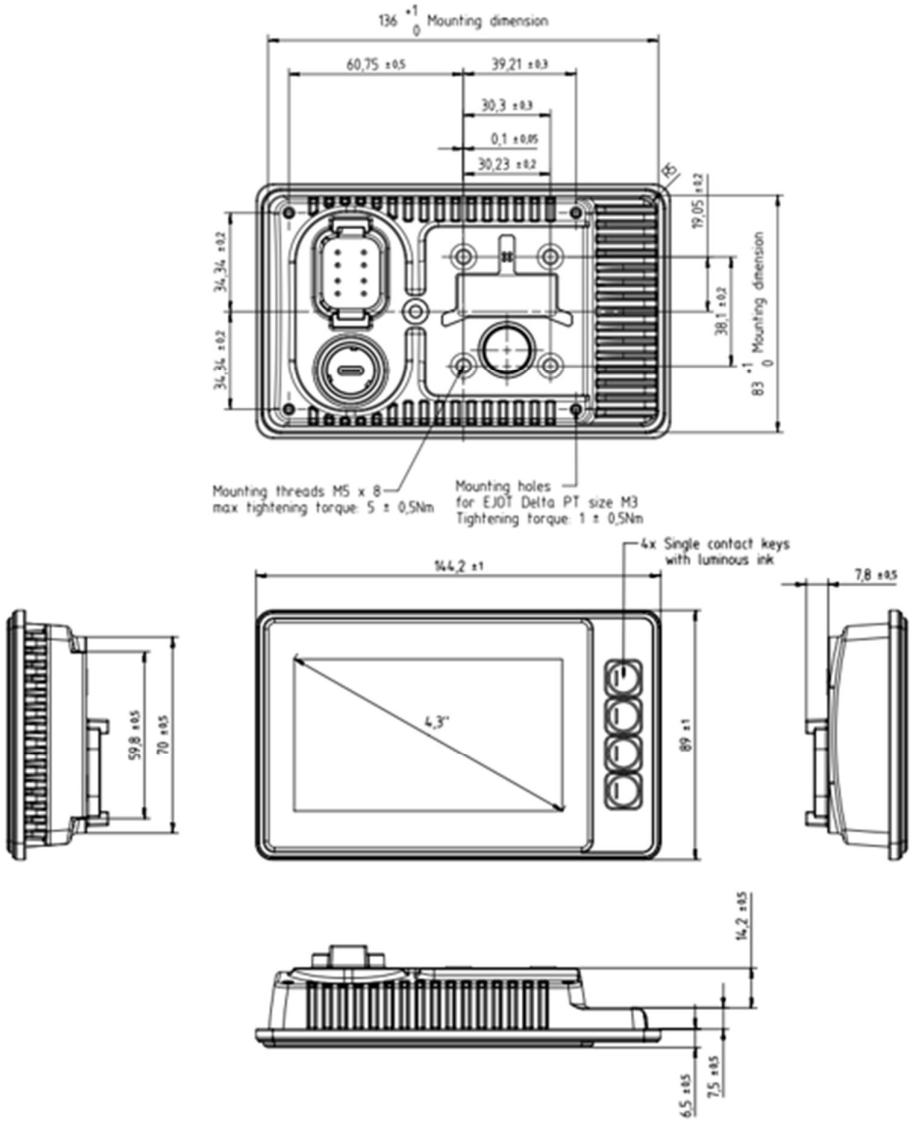
The OPUS B2/B2 Plus does not have any parts that require service by the user. Repairs can only be performed by Topcon Electronics GmbH.

6 Technical Documentation

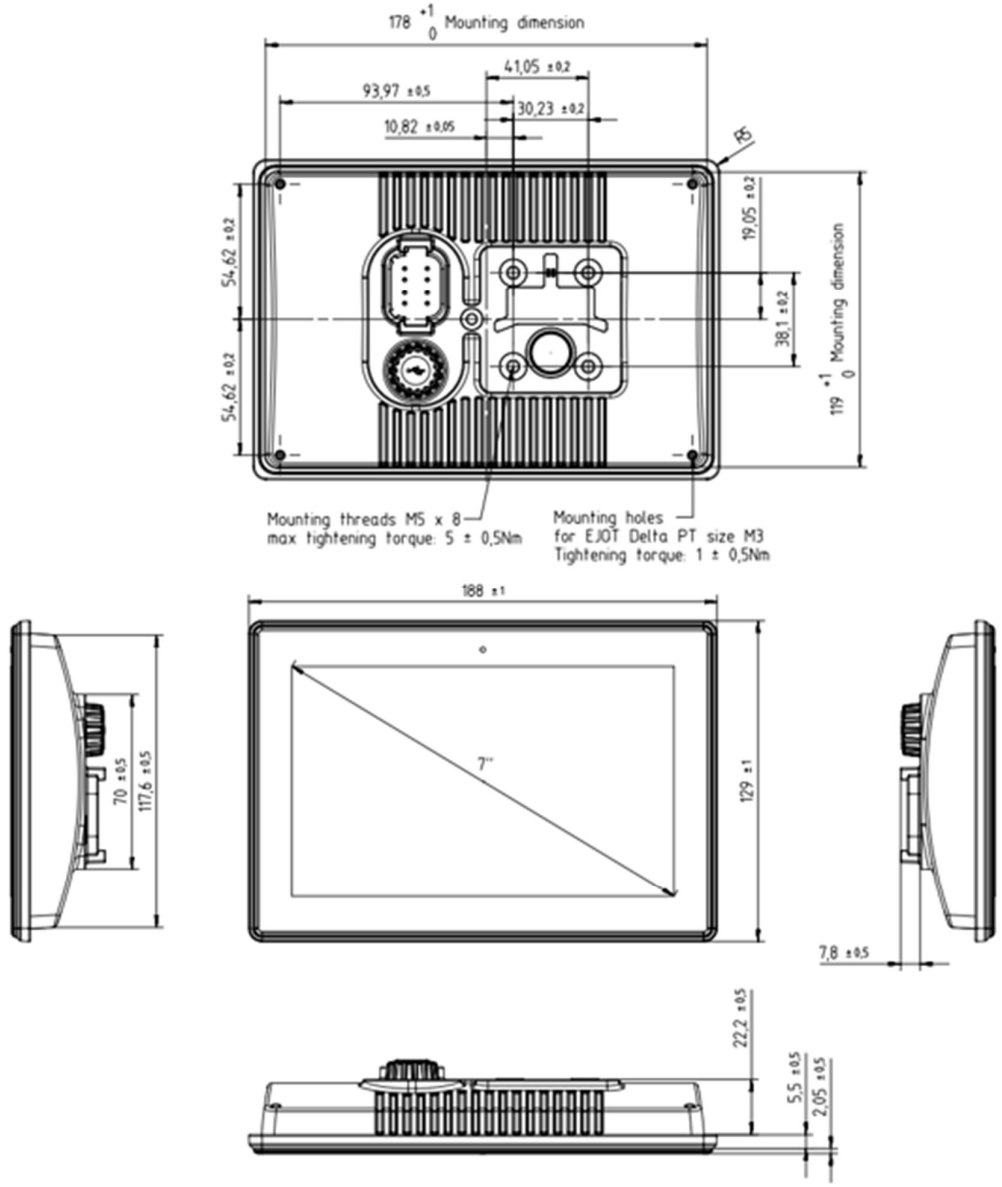
6.1 Dimension Drawings – OPUS B2/B2 Plus

OPUS B2 Eco

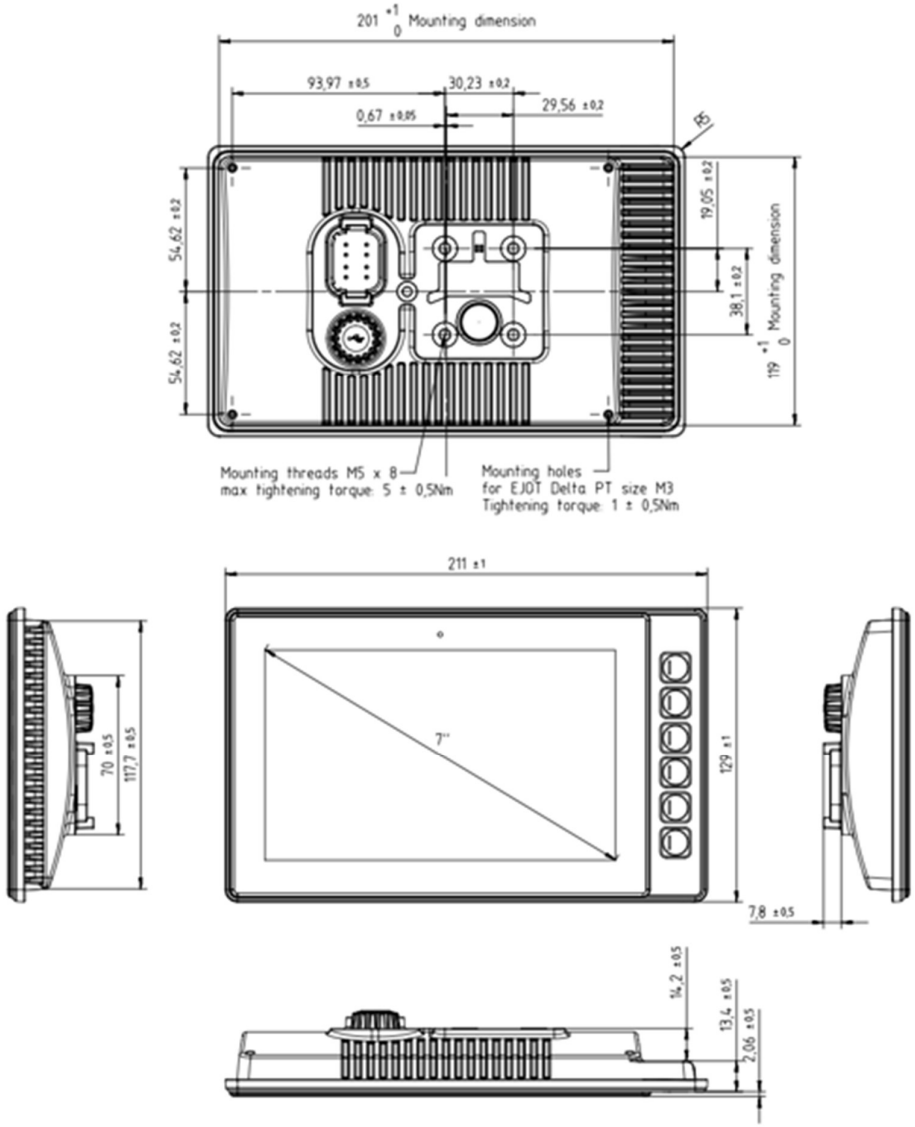



136 +1 0 Mounting dimension
60,75 ±0,5
39,21 ±0,3
30,3 ±0,3
0,1 ±0,05
30,23 ±0,2
19,05 ±0,2
38,1 ±0,2
83 +1 0 Mounting dimension
34,34 ±0,2
34,34 ±0,2
Mounting threads M5 x 8
max tightening torque: 5 ± 0,5Nm
Mounting holes
for EJOT Delta PT size M3
Tightening torque: 1 ± 0,5Nm
4x Single contact keys
with luminous ink
144,2 ±1
7,8 ±0,5
4,3"
59,8 ±0,5
70 ±0,5
89 ±1
14,2 ±0,5
6,5 ±0,5
7,5 ±0,5

OPUS B2 Plus Eco



OPUS B2 Plus Standard



6.2 Specification OPUS B2

	OPUS B2 ECO		OPUS B2 Standard	
	Basic	**Full**	**Basic**	**Full**
Dashboard Mount	X	X	X	X
Dimensions approx. (mm)	123x89x35mm	123x89x35mm	144x89x35 mm	144x89x35 mm
Display size	480 x 272 pixels	480 x 272 pixels	480 x 272 pixels	480 x 272 pixels
Touchscreen		X		X
Buzzer		X		X
Processor Speed	528MHz	528MHz	528MHz	528MHz
RAM	256 MB DDR3	256 MB DDR3	256 MB DDR3	256 MB DDR3
Mass Storage	2 GB	2 GB	2 GB	2 GB
EEPROM	64Kbit	64Kbit	64Kbit	64Kbit
CAN bus	2	2	2	2
USB-C	1	1	1	1

6.3 Specification OPUS B2 Plus

	OPUS B2 ECO		OPUS B2 Standard	
	Basic	**Full**	**Basic**	**Full**
Dashboard Mount	X	X	X	X
Dimensions approx.(mm)	188x129x37,5 mm	188x129x37,5 mm	211x129x37,5 mm	211x129x37,5 mm
Display size	800 x 480 pixels	800 x 480 pixels	800 x 480 pixels	800 x 480 pixels
Touchscreen		X		X
Buzzer		X		X
Processor Speed	528MHz	528MHz	528MHz	528MHz
RAM	256 MB DDR3	256 MB DDR3	256 MB DDR3	256 MB DDR3
Mass Storage	2 GB	2 GB	2 GB	2 GB
EEPROM	64Kbit	64Kbit	64Kbit	64Kbit
CAN bus	2	2	2	2
USB-C	1	1	1	1

6.4 Declaration of Conformity

6.4.1 Declaration of Conformity for OPUS B2

EU–Konformitätserklärung
EU Declaration of Conformity

für die Produktfamilie: **OPUS B2**
for the product family:

bestehend aus folgenden Modellen:
consisting of the following models:

OPUSB2EN1CANB000, OPUSB2EN1CDSB000
OPUSB2EN1CANF000, OPUSB2EN1CDSF000
OPUSB2SN1CANB000, OPUSB2SN1CDSB000
OPUSB2SN1CANF000, OPUSB2SN1CDSF000

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 harmonisation 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 + A1 2019**	EMV Flürförderfahrzeuge
EN ISO 13766-1	**2018**	EMV Baumaschinen
EN ISO 14982	**2009**	EMV Land- u Forstwirtschaftliche Masch.
EN 50498	**2011**	Aftermarket electronic equip. in vehicles
EN 61000-6-2	**2019**	EMV Industriebereiche u Fachgrundnorm
EN 61000-6-4	**2019**	EMV Industriebereiche u Fachgrundnorm

- **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
- **2015/863/EU (RoHS-Richtlinie Änderung)**
  DELEGIERTE RICHTLINIE (EU) 2015/863 DER KOMMISSION zur Änderung von Anhang II der Richtlinie 2011/65/EU des Europäischen Parlaments und des Rates hinsichtlich der Liste der Stoffe, die Beschränkungen unterliegen
  COMMISSION DELEGATED DIRECTIVE (EU) 2015/863 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances
- **2017/2102/EU (RoHS-Richtlinie Änderung)**
  RICHTLINIE (EU) 2017/2102 DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 15. November 2017 zur Änderung der Richtlinie 2011/65/EU zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten
  DIRECTIVE (EU) 2017/2102 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 November 2017 amending Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Dipl.-Ing (FH), Dirk Ziesen, Development Team Manager — **17.04.2024**
Titel, Name, Position, Unterschrift / *Name, Title, Position, Signature* — Datum / *Date*

Dipl.-Wirtsch.-Ing (FH), Thilo Nagel, General Manager — **19.04.2024**
Titel, Name, Position, Unterschrift / *Name, Title, Position, Signature* — Datum / *Date*

6.4.2 Declaration of Conformity for OPUS B2 Plus

EU–Konformitätserklärung
EU Declaration of Conformity

für die Produktfamilie: **OPUS B2 Plus**
for the product family:

bestehend aus folgenden Modellen:
consisting of the following models:

OPUSB2EP1CANB000, OPUSB2EP1CDSB000
OPUSB2EP1CANF000, OPUSB2EP1CDSF000
OPUSB2EP1ISOF000

OPUSB2SP1CANB000, OPUSB2SP1CDSB000
OPUSB2SP1CANF000, OPUSB2SP1CDSF000
OPUSB2SP1ISOF000

OPUSB2EP1CANBC87

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 harmonisation 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 + A1 2019**	EMV Flürförderfahrzeuge
EN ISO 13766-1	**2018**	EMV Baumaschinen
EN ISO 14982	**2009**	EMV Land- u Forstwirtschaftliche Masch.
EN 50498	**2011**	Aftermarket electronic equip. in vehicles
EN 61000-6-2	**2019**	EMV Industriebereiche u Fachgrundnorm
EN 61000-6-4	**2019**	EMV Industriebereiche u Fachgrundnorm

- **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
- **2015/863/EU (RoHS-Richtlinie Änderung)**

DELEGIERTE RICHTLINIE (EU) 2015/863 DER KOMMISSION zur Änderung von Anhang II der Richtlinie 2011/65/EU des Europäischen Parlaments und des Rates hinsichtlich der Liste der Stoffe, die Beschränkungen unterliegen
COMMISSION DELEGATED DIRECTIVE (EU) 2015/863 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances

- **2017/2102/EU (RoHS-Richtlinie Änderung)**
  RICHTLINIE (EU) 2017/2102 DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 15. November 2017 zur Änderung der Richtlinie 2011/65/EU zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten
  DIRECTIVE (EU) 2017/2102 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 November 2017 amending Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Dipl.-Ing (FH), Dirk Ziesen, Development Team Manager — **17.04.2024**
Titel, Name, Position, Unterschrift / *Name, Title, Position, Signature* — Datum / *Date*

Dipl.-Wirtsch.-Ing (FH), Thilo Nagel, General Manager — **19.04.2024**
Titel, Name, Position, Unterschrift / *Name, Title, Position, Signature* — Datum / *Date*