

**SANTINO 7.0 OF PCT**  
Arm® Cortex®-A9 Rear Mount



**Product Manual**

## Document Revision History

The information in this document is subject to change without prior notice in order to improve reliability, design and function and does not represent a commitment on the part of the manufacturer.

| Revision | Date       | Author | Description   |
|----------|------------|--------|---|
| V 1      | 10.02.2017 | CG     | Initial Release   |
| V 2      | 06.10.2017 | CG     | Mechanical modifications  |
| V 3      | 15.03.2018 | CG     | Page 18 New Picture RS485 Pin 6 to 11   |
| V 4      | 04.12.1018 | CG     | Page 17 add Text for Pin1, Page 15 add new Capitle 5.2 " connecting the HMI device" |
| V 5      | 26.08.2019 | CG     | Change address  |
| V 6      | 17.12.2021 | bmy    | SECO CI Update 2022   |

**Online support on [edge.seco.com](http://edge.seco.com)**

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## 1. Introduction

Thank you very much for purchasing a SECO Northern Europe product. Our products are dedicated to professional use and therefore we suppose extended technical knowledge and practice in working with such products.



The information in this manual is subject to technical changes, particularly as a result of continuous product upgrades. Thus this manual only reflects the technical status of the products at the time of printing. Before design-in the device into your or your customer's product, please verify that this document and the therein described specification is the latest revision and matches to the PCB version. We highly recommend contacting our technical sales team prior to any activity of that kind.

The attached documentation does not entail any guarantee on the part of SECO Northern Europe GmbH with respect to technical processes described in the manual or any product characteristics set out in the manual. We do not accept any liability for any printing errors or other inaccuracies in the manual unless it can be proven that we are aware of such errors or inaccuracies or that we are unaware of these as a result of gross negligence and SECO Northern Europe has failed to eliminate these errors or inaccuracies for this reason. SECO Northern Europe GmbH expressly informs that this manual only contains a general description of technical processes and instructions which may not be applicable in every individual case. In cases of doubt, please contact our technical sales team.

In no event, SECO Northern Europe is liable for any direct, indirect, special, incidental or consequential damages arising out of use or resulting from non-compliance of therein conditions and precautions, even if advised of the possibility of such damages.



Before using a device covered by this document, please carefully read

- ▶ **Annex „E-1 Warranty Hints“**
- ▶ **Annex „E-2 Field of Application“**



Embedded systems are complex and sensitive electronic products. Please act carefully and ensure that only qualified personnel will handle and use the device at the stage of development. In the event of damage to the device caused by failure to observe the hints in this manual and on the device (especially the safety instructions), SECO Northern Europe shall not be required to honour the warranty even during the warranty period and shall be exempted from the statutory accident liability obligation. Attempting to repair or modify the product also voids all warranty claims.

## 2. Safety Hints

Please read this section carefully and observe the instructions for your own safety and correct use of the device. Observe the warnings and instructions on the device and in the manual. SECO Northern Europe embedded systems have been built and tested by us and left the company in a perfectly safe condition. In order to maintain this condition and ensure safe operation, the user must observe the instructions and warnings contained in this manual.



### I. General Handling

- ▶ Don't drop or strike the unit: The PCB, display and/or other parts might be damaged.
- ▶ Keep away from water and other liquids, the unit is not protected against.
- ▶ Operate the unit under electrical and environmental conditions according to the technical specification.
- ▶ The electrical installations in the room must correspond to the requirements of the local (country-specific) regulations.
- ▶ Take care that there are no cables, particularly power cables, in areas where persons can trip over them.
- ▶ Do not place the device in direct sunlight, near heat sources or in a damp place.
- ▶ All plugs on the connection cables must be screwed or locked to the housing.
- ▶ Repairs may only be carried out by qualified specialist personnel authorized by SECO Northern Europe GmbH or their local distributors.
- ▶ Maintenance or repair on the open device may only be carried out by qualified personnel authorized by SECO Northern Europe GmbH which is aware of with the associated dangers.



### II. Electricity

- ▶ The embedded systems may only be opened in accordance with the description in this user's manual for
  - replacing of the (rechargeable, where applicable) lithium battery and/or
  - configuration of interfaces, where applicable
- ▶ These procedures have to be carried-out only by qualified specialist personnel.
- ▶ When accessing internal components the device must be switched off and disconnected from the power source.
- ▶ When purchased core or basic versions without protecting back cover, don't touch the PCB directly with your fingers. Especially these products need to be handled very carefully.
- ▶ Don't operate or handle the unit without typical ESD protection measures, such as ground earthing.
- ▶ Operate the unit according to the technical specification only.



### III. Damage or Permanent Malfunction

- ▶ It must be assumed that a safe operation is no longer possible, in case
  - the device has visible damage or
  - the display is dark or shows strange pattern for longer period
  - the device doesn't react after a reset
- ▶ In these cases the device must be shut down and secured against further use



### IV. LCD and touch handling

- ▶ If equipped with, the soft surface of a resistive touch screen is not suitable for use with stencils and/or other devices for touch operation. There are special plastics pens available in commercial shops. A projective capacitive touch screen might be protected by a heat strengthened glass or acrylic or polycarbonate cover lens. These are dedicated for use with finger tips. There are very special pens available which might work with a PCT touch.
- ▶ Protect the LCD/touch/cover lens against scratches and sharp edges. The warranty does not cover pixel failures resulting from non-compliant handling.
- ▶ Clean the LCD/touch/cover lens with a soft cotton cloth with alcohol. Don't use organic solvents, acid or alkali solutions.
- ▶ Water drops, finger fat or any similar fouling should be removed immediately from the LCD, cover lens and metal frame to avoid any staining.

### 3. Product Introduction

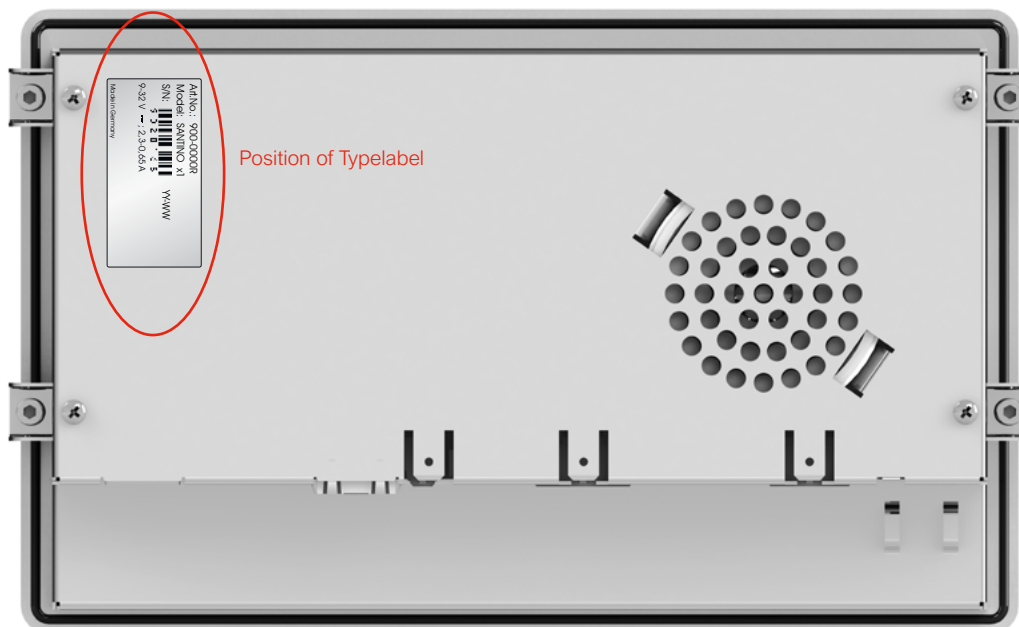
This document is applicable for hardware revisions 1.0 or later of the SANTINO series.



Please find the hardware version grid in „**Annex B: Hardware Revision Information**“:

SANTINO is an Embedded System to be used as human machine interface (HMI) in various applications. Please refer to **Annex „E-2 Field of Application“** for further information. The system is equipped with a large number of industrial interfaces. A wide variety of options is available as well.

#### 3.1 Type Plate and Device Information

For service and later identification of the device, the type plate contains important information.



|   |                                     |
|---|-------------------------------------|
| Art.No.: 900-0000R  | SECO Northern Europe article number |
| Model: SANTINO x1   | Product name and configuration      |
| S/N:  YY-WW          | Production date (week/year)         |
| 9020168   | Serial number                       |
| 9-32 V  ; 2,3-0,65 A | Power ratings                       |
| Made in Germany   |                                     |

(Exemplary Illustration. It shows the SANTINO 7.0" BX PCT.)

### 3.2 Product names and variants

Product name definition:

**SANTINO <CPU> <7.0> <OF> <PCT> <IPS> <additional description> <Vx.y.z>**

Explanation:

|                          |  |
|--------------------------|--|
| SANTINO                  | Product family name (invariable)   |
| <CPU> x1, x2L            | (number of cores inside the i.MX6 processor)                             |
| <7.0>                    | Display size in inch   |
| <OF> <SG> <BX>           | mechanical design of enclosure   |
| <PCT>                    | projected capacitive touch; if blank: 4-wire resistive                   |
| <IPS>                    | Display technology "in-plane switching", (option)                        |
| <additional description> | contains variants which are important to sales product description, i.e. |

- ▶ without or with WLAN/Bluetooth module ("W/B")
- ▶ untreated glass surface or including antiglare treatment ("AG")
- ▶ front frame made from die-cast zinc or aluminium ("Alu")
- ▶ different memory capacities for RAM and/or eMMC
- ▶ customer-specific reduced assembly
- ▶ etc.

|          |  |
|----------|--|
| <Vx.y.z> | revision of PCB layout   |
| <x>      | describes major changes in form fit and functions  |
| <y>      | describes variants that are different in PCB layout and could affect the list of critical components (UL LoCC).  |
| <z>      | describes minor changes to PCB layout due to production optimization like solder resist mask or drilling diameters.<br>Also minor changes in assembly of PCB and/or device which do NOT affect the list of critical components (UL LoCC) due to unlisted components or declared "interchangeable". |


### 3.3 Related Documents and Online Support

This document contains operating system specific information. The following additional documentations are available:

#### OPERATING SYSTEMS

|                    |  |   |
|--------------------|--|---|
| Linux Yocto Jethro | <br><a href="https://bit.ly/3DjEihg">https://bit.ly/3DjEihg</a>   | Contains information about Linux BSP with development environment<br>Linux Embedded System Yocto (Codename: Jethro, Version 3.0) includes first information about the bootloader Flash-N-Go |
| Linux Yocto Rocko  | <br><a href="https://bit.ly/3xNQKvc">https://bit.ly/3xNQKvc</a>   |   |
| Android 7.1        | <br><a href="https://bit.ly/3de2N4H">https://bit.ly/3de2N4H</a> |   |

#### UPDATE / BOOT / SYSTEM

|            |  |  |
|------------|--|--|
| Flash-N-Go | <br><a href="https://bit.ly/3pmwWo4">https://bit.ly/3pmwWo4</a> | Contains information about the usage of the G&F Flash-N-Go solution which consists of three submodules: <ul style="list-style-type: none"> <li>▶ Flash-N-Go Boot (A tiny boot loader)</li> <li>▶ Flash-N-Go System (A maintenance os)</li> <li>▶ Flash-N-Go Update (A GUI based update solution for all os)</li> </ul> |
|------------|--|--|



## 4. Technical Data

| CPU                             | x1   | x2L  |
|---------------------------------|--|--|
| CPU Type                        | i.MX6Solo  | i.MX6DualLite  |
| Core Class                      | Arm® Cortex®-A9  |  |
| Core Clock                      | 1 GHz  |  |
| Features                        | NEON for SIMD media acceleration and VFP operations; Multi-format HD 1080p video decoder and HD 720p video encoder hardware engine; L1 cache, 32 KB for instruction, 32 KB for data; 512 KB L2 cache |  |
| HW Accelerators                 | OpenGL ES 2.0, OpenVG 1.1  |  |
| RTC                             | Accuracy: +/- 30 ppm at 25°C   |  |
| <b>Memory</b>                   |  |  |
| eMMC Flash                      | 4 GB MLC eMMC  |  |
| RAM Standard                    | 512 MB 32 bit DDR3L  | 1 GB 32 bit DDR3L                                    |
| SD Card Slot                    | 4 bit MMC/SDIO/SD/SDHC   |  |
| <b>Operating Systems</b>        |  |  |
| Supported OS                    | Linux Yocto Jethro   |  |
| <b>Communication Interfaces</b> |  |  |
| Network                         | 1x 10/100 Mbit/s Ethernet (RJ-45)  |  |
| USB 2.0                         | 1x 480 Mbit/s Host (Type A)<br>1x 480 Mbit/s OTG (Type Micro-AB) <sup>1</sup>  |  |
| CAN Fieldbus/ RS-485            | 1x CAN (ISO/DIS 11898) + 1x RS-485   | 1x CAN (ISO/DIS 11898) + 1x RS-485 galvanic isolated |
| RS-232                          | 2x RS-232 (RX/TX/CTS/RTS)<br>MDB <sup>2</sup> / 1x MDB (Master / Slave optional) <sup>3</sup> instead of 2nd external RS-232   |  |
| Synchronous Serial Interfaces   | I <sup>2</sup> C, Matrix keypad up to 4 x 4  |  |
| <b>Audio</b>                    |  |  |
| Speaker output                  | 1x speaker (connector), 1.5 W RMS (8Ω)   |  |
| Audio Internal                  | 1x speaker 0.3 W RMS (8Ω) parallel to external output  |  |
| <b>Display and Touch</b>        |  |  |
| Size                            | 7.0 inch / 177.8 mm  |  |
| Resolution                      | 800 x 480 pixel  |  |
| Brightness                      | Typ. 400 cd/m <sup>2</sup>   |  |
| Backlight Lifetime              | Typ. 50.000 h  |  |
| Viewing Angle                   | 50°, 70°, 70°, 70°(UDRL)   |  |
| Color                           | 18 bit (262 K colors)  |  |
| Touch                           | projected capacitive multi touch   |  |

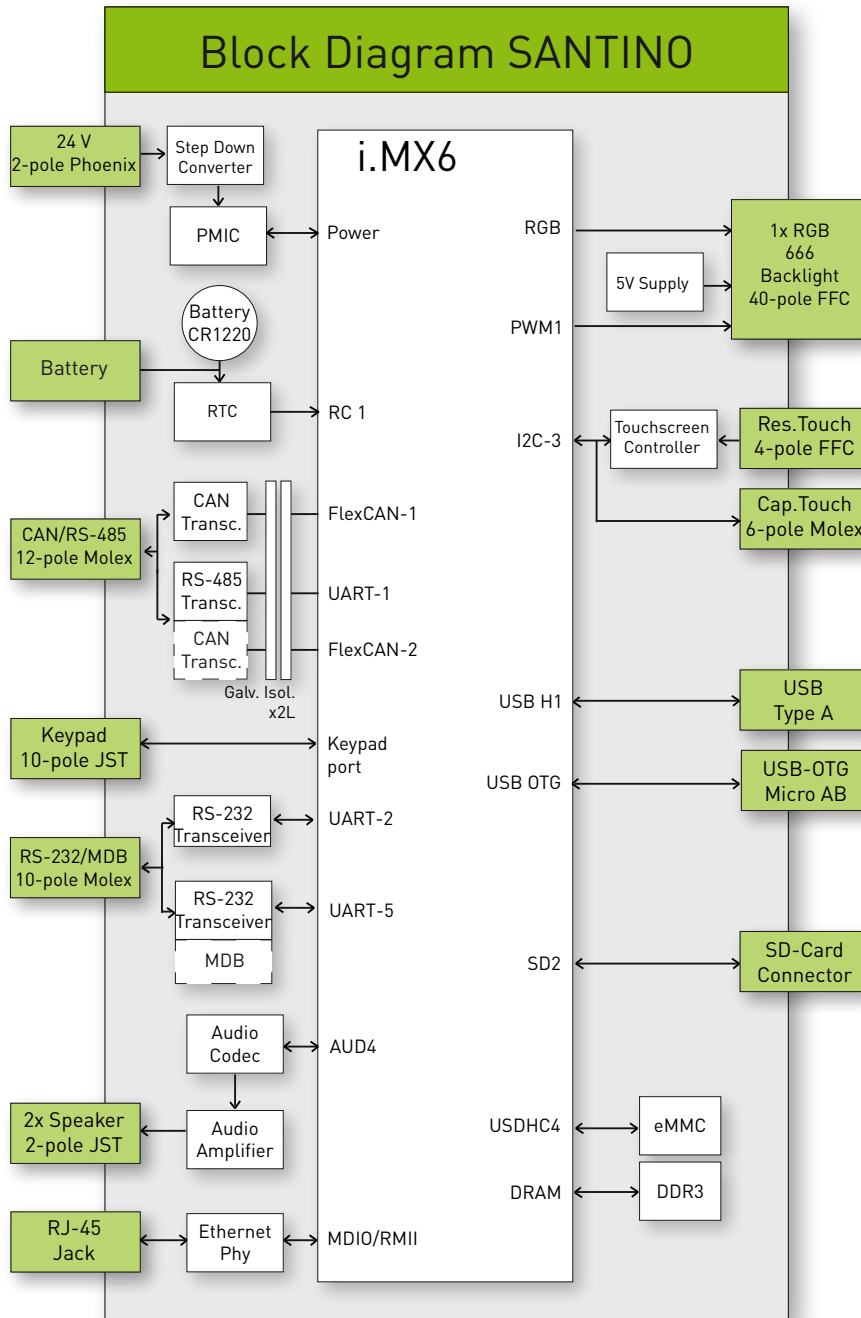
<sup>1</sup> Mechanically the Micro-USB interface has not been designed for frequent contact operations. Please use an adapter cable with a strain relief.

<sup>2</sup> Option

<sup>3</sup> The selection of a variant eliminates the other.

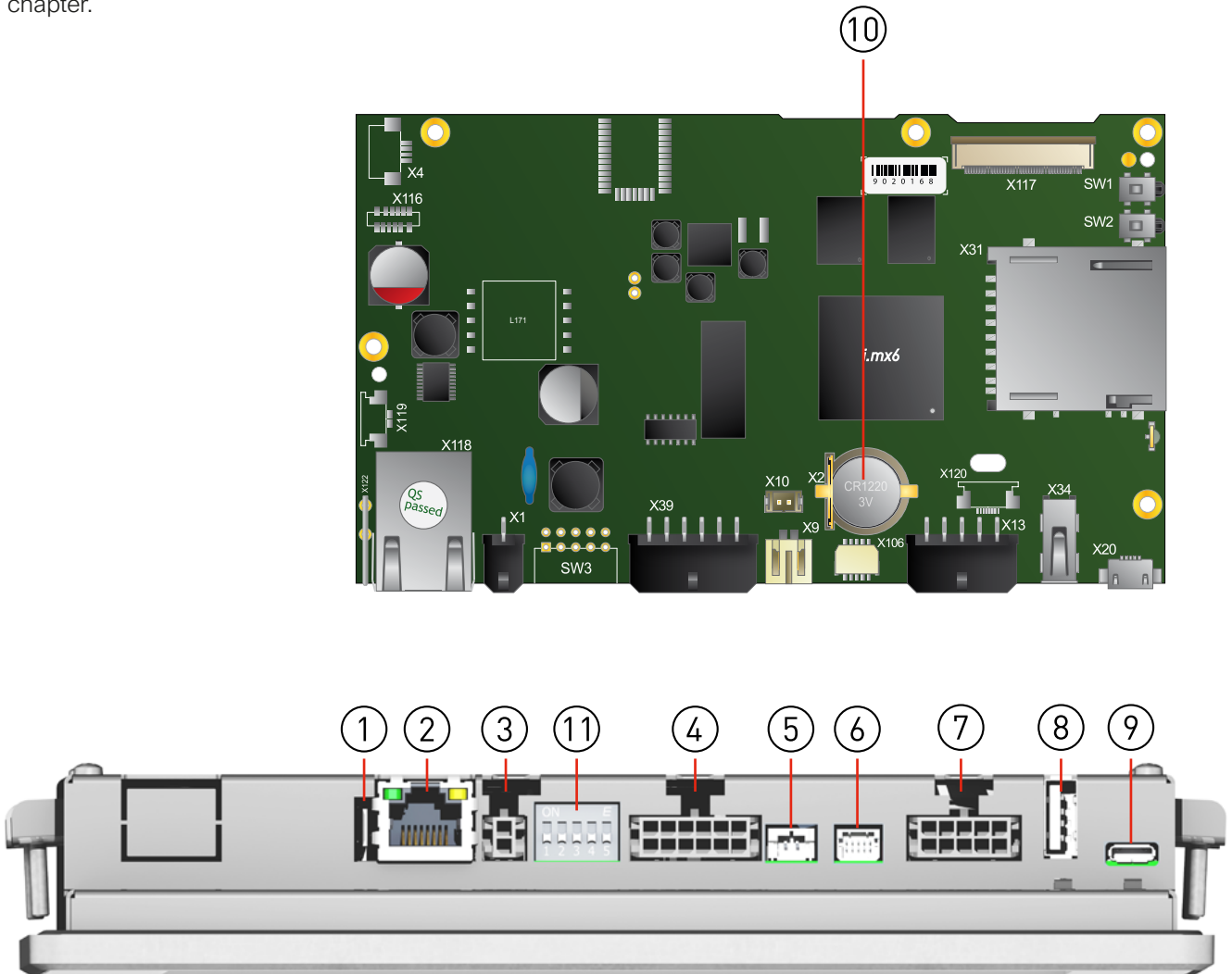
| Housing                                 | x1  | x2L |
|---|---|-----|
| Front                                   | 1.1 mm toughened glass  |     |
| Frame                                   | None  |     |
| Rear                                    | ABS-PC/1.4016 stainless steel   |     |
| Ingress Protection                      | Front IP 20/Rear IP20   |     |
| <b>Device Dimensions</b>                |   |     |
| W x H x D                               | 185.1 x 101.6 x 33.28 mm  |     |
| Weight                                  | tbd.  |     |
| <b>Power Supply</b>                     |   |     |
| Supply Voltage                          | Nom. 9 to 32 V DC   |     |
| Consumption                             | Typ. 5.3 W; max. 22.8 W   |     |
| Internal Backup Battery (RTC)           | Type: 3 V Li-Ion Type CR1220:<br>Lifetime (RTC only): Approximately 8 years, depending on application |     |
| <b>Typical Environmental Conditions</b> |   |     |
| Storage Temp.                           | -20 to +70 °C   |     |
| Operating Temp.                         | 0 to +60 °C   |     |
| Humidity                                | 5 to 90 % RH  |     |
| Max. Operating Altitude                 | 3.000 m   |     |
| Max. Storage/Transit Altitude           | 10.000 m  |     |
| Noise Level [db(A)] @ 1m                | <<40 (fanless design)   |     |
| <b>Lifetime</b>                         |   |     |
| MTBF                                    | ≥ 400.000 h (without backlight)   |     |

## 4.1 Block Diagram SBC



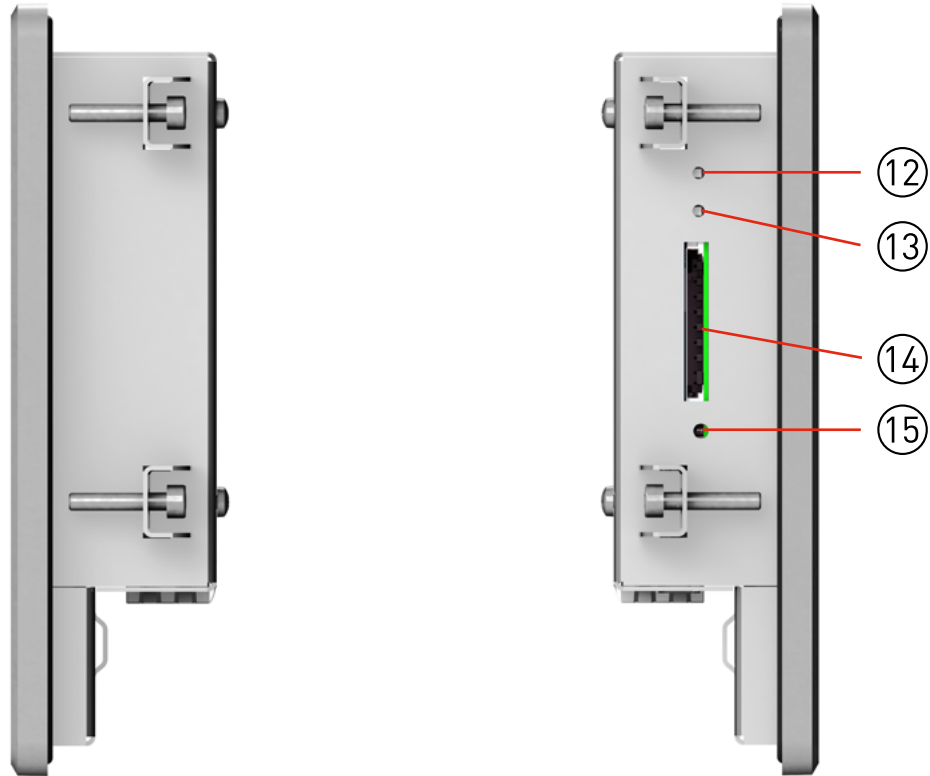
## 4.2 Connectors

As this manual describes an open frame version, only the external interfaces will be mentioned in the following chapter.



(Exemplary Illustration. It shows the fully equipped SANTINO Dualcore light 7.0" BX PCT.)

| Pos. | Description  |
|------|--|
| 1    | GND Shield connector (X122)                                    |
| 2    | Ethernet (X118)  |
| 3    | Power (X1)   |
| 4    | CAN/RS-485 Interface (X39)<br>optional with galvanic isolation |
| 5    | Speaker (X9)   |
| 6    | Keypad/Capacitive Touch (X106)                                 |
| 7    | RS-232/MDB (X13)   |
| 8    | USB Host (X34)   |
| 9    | USB OTG (X20)  |
| 10   | Battery (X2/X112)  |
| 11   | Dip Switch for RS485/CAN (SW3)                                 |



(Exemplary Illustration both sides)

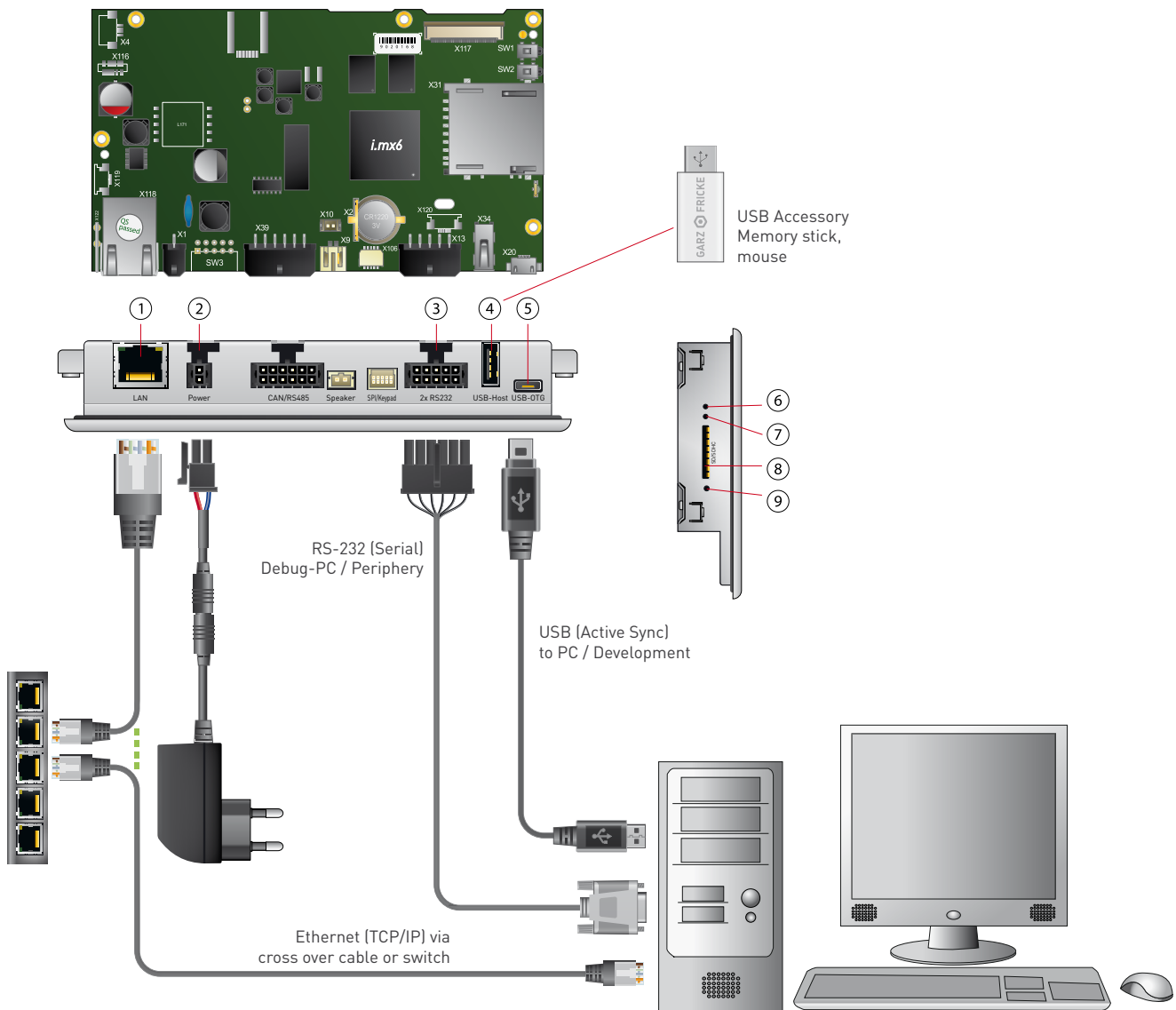
| Pos. | Description                          |
|------|--------------------------------------|
| 12   | Reset Switch (SW1)                   |
| 13   | Bootselect Switch (SW2) <sup>1</sup> |
| 14   | SD card reader (X31)                 |
| 15   | Power LED (D30)                      |

<sup>1</sup> For the function of this switch please refer in the future to the Flash N Go User Manual.

## 5. Installation and Start Up

The content of this document is limited to explain the device connectors and how to access SANTINO via FTP over your local area network (LAN) within a few seconds. For advanced hardware specifications and software support, please refer to chapter „**3.3 Related Documents and Online Support**“

### 5.1 Connection Scheme



Exemplary Illustration

| Pos. | Description    |
|------|----------------|
| 1    | Ethernet       |
| 2    | DC in          |
| 3    | RS-232         |
| 4    | USB-Device     |
| 5    | USB Host (OTG) |

| Pos. | Description   |
|------|---------------|
| 6    | Reset sw      |
| 7    | Bootselect sw |
| 8    | SD card slot  |
| 9    | Power LED     |



<http://support.garz-fricke.com/projects/Santino/>

## 5.2 Connecting the HMI device

### Notice

An incorrectly dimensioned power supply can destroy the HMI device.  
 Use a DC power supply with adequate amperage; see Chapter 4. Technical Data

### Notice

Safe electrical isolation  
 For the DC supply, use only power supply units with safe electrical isolation in accordance with IEC 60364-4-41 or HD 384.04.41 (VDE 0100, Part 410), e.g. conforming to the SELV/PELV standard.  
 The supply voltage must be within the specified voltage range. Otherwise, malfunctions at the HMI device cannot be ruled out.  
 Applies to non-isolated system configurations:  
 Connect the GND connection from the DC power supply output to equipotential bonding for uniform reference potential. You should always select a central point of termination.

### Notice

We recommend using cables with the following specifications

| Function  | Cable specification   |
|-----------|---|
| DC supply | No special requirements   |
| Audio     | No special requirements; length < 3m                                    |
| Ethernet  | Shielded, type CAT5e SFTP   |
| RS485     | Shielded data cable   |
| RS232     | Shielded data cable, length <30m  |
| CAN       | Shielded data cable   |
| USB       | Shielded USB cable; labeled as "Certified HI-SPEED USB 2.0"; length <3m |

## 6. Internal and External Interfaces

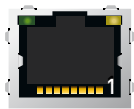
### 6.1 GND Shield Connector (X122)



| Pin | Name | Description   | Information |
|-----|------|---------------|-------------|
| 1   | GND  | Ground shield |             |

6.3 mm spade terminal

### 6.2 Ethernet (X118)



| Pin | Name    | Description | Information   |
|-----|---------|-------------|---|
| 1   | Tx+     |             | Rx/Tx might be swapped (Auto-MDIX)<br>+/- might be swapped (Autom. polarity correction) |
| 2   | TX-     |             |   |
| 3   | RX+     |             |   |
| 4   | SPARE 1 |             |   |
| 5   |         |             |   |
| 6   | RX-     |             |   |
| 7   | SPARE 2 |             |   |
| 8   |         |             |   |

Header: RJ45

Green LED (link) is default off and turns on when link is detected.

Yellow LED (act) flashes during sending/receiving packets.



### 6.3 Power (X1)

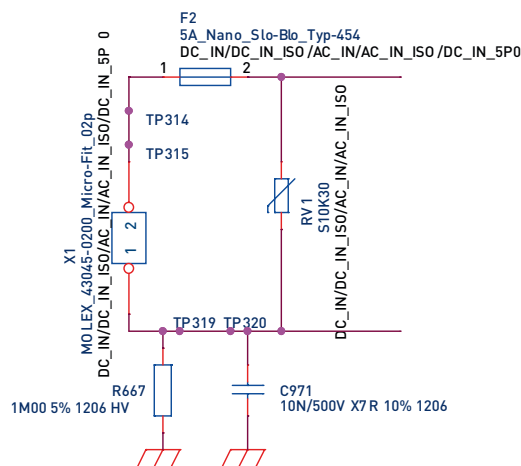


| Pin | Name   | Description      | Level             |
|-----|--------|------------------|-------------------|
| 1   | GND    | DC Ground        | 0 V               |
| 2   | Vcc_In | DC Input voltage | Nom. 9 to 32 V DC |

Header: Molex 43045-0200 Micro-Fit 2p  
 Plug: Molex 43025-0200 Micro-Fit 2p,  
 crimp contact Molex 43030-0007  
 Shielding with 6,3 mm male spade terminal connector.  
 Pin 1 (GND) is connected to frame/housing. GND/Vcc\_In is not galvanic isolated from System-GND



Caution:  
 Power supplies connected to this device must be compliant to the requirements of  
 “limited power sources” (LPS) to prevent the end-user from danger in case of a fault.

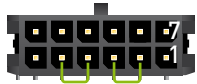
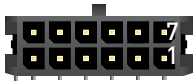


### 6.4 DIP Switch (SW3)

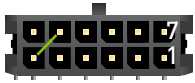


| Switch | Function          | Description               |
|--------|-------------------|---------------------------|
| 1/2    | RS485 Half Duplex | Switch on for Half Duplex |
| 3      | RS485 Termination | Switch on for termination |
| 4/5    | CAN Termination   | Switch on for termination |

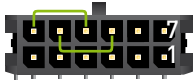
## 6.5 CAN/RS-485 Interface (X39)



CAN1 Termination



RS485 Termination



RS485 Half-Duplex

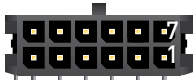
| Pin | Name          | Description                                      | Level |       |
|-----|---------------|--|-------|-------|
| 1   | GND_CAN_RS485 | Ground Shield                                    |       |       |
| 2   | CAN1_TERM     | To enable CAN1-Termination, bridge with CAN1_H   |       |       |
| 3   | CAN1_H        | CAN bus 1 high                                   | -24   | +24 V |
| 4   | CAN1_L        | CAN bus 1 low                                    | -24   | +24 V |
| 5   | CAN1_TERM     | To enable CAN1-Termination, bridge with CAN1_L   |       |       |
| 6   | RS485_TERM    | To enable RS485-Termination: bridge with RS485_A |       |       |
| 7   | GND_CAN_RS485 | Ground for CAN and RS485 group                   |       |       |
| 8   | n.a.          |  |       |       |
| 9   | RS485_Y       | TX+  | -7    | +12 V |
| 10  | RS485_Z       | TX-  | -7    | +12 V |
| 11  | RS485_A       | RX+, to enable Half-Duplex: bridge with RS485_Y  |       |       |
| 12  | RS485_B       | RX-, to enable Half-Duplex: bridge with RS485_Z  |       |       |

Header: Molex 43045-1200 Micro-Fit 12p

Plug: Molex 43025-1200 Micro-Fit 12p, crimp contact Molex 43030-0007

Shielding with 6,3 mm male spade terminal connector

## CAN1 / CAN2 \*



CAN1 Termination



CAN2 Termination

| Pin | Name          | Description                                    | Level |       |
|-----|---------------|--|-------|-------|
| 1-5 |               | Identical to standard                          |       |       |
| 6   | n.a.          |  |       |       |
| 7   | GND_CAN_RS485 | Ground for CAN group                           |       |       |
| 8   | CAN2_TERM     | To enable CAN2-Termination, bridge with CAN2_H |       |       |
| 9   | CAN2_H        | CAN bus 2 high                                 | -24   | +24 V |
| 10  | CAN2_L        | CAN bus 2 low                                  | -24   | +24 V |
| 11  | CAN2_TERM     | To enable CAN2-Termination, bridge with CAN2_L |       |       |
| 12  | n.a.          |  |       |       |

\* alternative assembly upon request

## 6.6 Speaker (X9)



| Pin | Name      | Description     | Level          |
|-----|-----------|-----------------|----------------|
| 1   | Speaker + | Parallel to X10 | 1.5W RMS 8 Ohm |
| 2   | Speaker - |                 |                |

Header: JST S2B-PH-SM3-TB

Plug: ST PHR-2 with crimp contacts SPH-002GW-P0.5L-ND

## 6.7 Keypad/SPI (X106)

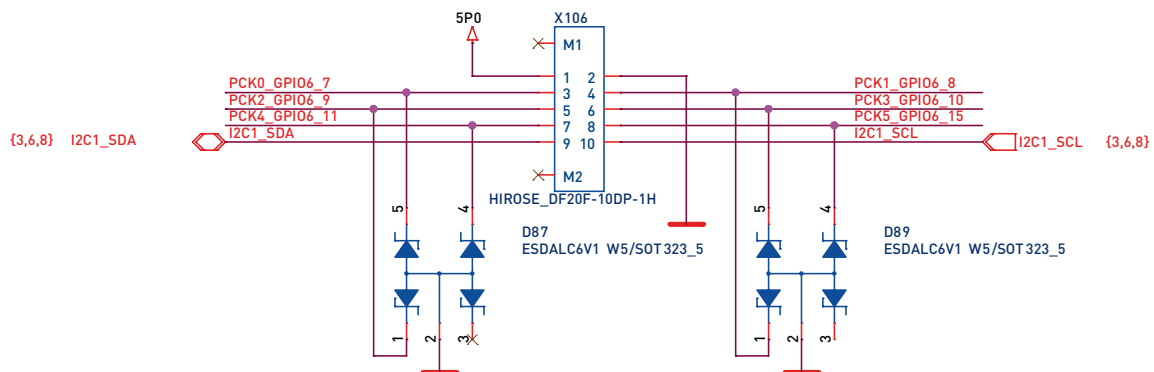
### Keypad/SPI/I<sup>2</sup>C, multiplexed



| Pin | Name          | Description<br>Default Mode | Level  |
|-----|---------------|-----------------------------|--------|
| 1   | Power Supply  |                             | 100 mA |
| 2   | GND           | Ground                      |        |
| 3   | PCK0_GPIO6_7  | Keypad row 0                | 3.3 V  |
| 4   | PCK1_GPIO6_8  | Keypad column 0             |        |
| 5   | PCK2_GPIO6_9  | Keypad row 1                |        |
| 6   | PCK3_GPIO6_10 | Keypad column 1             |        |
| 7   | PCK4_GPIO6_11 | Keypad row 2                |        |
| 8   | PCK5_GPIO6_15 | Keypad column 2             |        |
| 9   | I2C1_SDA      | I <sup>2</sup> C data       |        |
| 10  | I2C1_SCL      | I <sup>2</sup> C clock      |        |

Header: JST DF20F-10DP, side entry, RM = 1.00

Plug: JST DF20-10DS-1C, crimp contact: DF20 F2830 SCF A

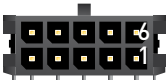


#### Digital output Specification (3.3 V):

V<sub>OH</sub>: min OVDD-0.15; V<sub>OL</sub> max: 0.15V

| Drive Strength<br>(Software defined) | I <sub>OL</sub> (mA) | I <sub>OH</sub> (mA) |
|--------------------------------------|----------------------|----------------------|
| Low                                  | 5.1                  | -5.1                 |
| Medium                               | 10.2                 | -10,2                |
| High                                 | 15.3                 | -15,3                |

## 6.8 RS-232/RS-232 (X13)



| Pin | Name       | Description                      | Level |
|-----|------------|----------------------------------|-------|
| 1   | GND        | Ground Shield                    |       |
| 2   | RS232_TXD1 | Port#1: Transmit data (Output)   |       |
| 3   | RS232_RXD1 | Port#1: Receive data (Input)     |       |
| 4   | RS232_RTS1 | Port#1: Request-to-send (Output) |       |
| 5   | RS232_CTS1 | Port#1: Clear-to-send (Input)    |       |
| 6   | GND        | Ground Signal                    |       |
| 7   | RS232_TXD2 | Port#2: Transmit data (Output)   |       |
| 8   | RS232_RXD2 | Port#2: Receive data (Input)     |       |
| 9   | RS232_RTS2 | Port#2: Request-to-send (Output) |       |
| 10  | RS232_CTS2 | Port#2: Clear-to-send (Input)    |       |

Header: Molex 43045-1000 Micro-Fit 10p  
 Plug: Molex 43025-1000 Micro-Fit 10p,  
 crimp contact Molex 43030-0007  
 Shielding with 6,3 mm male spade terminal connector

## RS-232/MDB \*



| Pin | Name       | Description                 | Level |
|-----|------------|-----------------------------|-------|
| 1-6 |            | Identical to standard       |       |
| 7   | MDB_TXD    | MDB: Transmit data (Output) |       |
| 8   | MDB_RXD2   | MDB: Receive data (Input)   |       |
| 9   | MDB_WakeUp | MDB: WakeUp Signal (Output) |       |
| 10  |            | MDB: WakeUp PullUp VCC      | 0.5 V |

\* alternative assembly upon request

## 6.9 USB Host (X34)



| Pin | Name        | Description     | Level              |
|-----|-------------|-----------------|--------------------|
| 1   | USB_H1_VBUS | Power supply    | +5 V DC max 500 mA |
| 2   | USB_H1_DN   | Data minus (D-) |                    |
| 3   | USB_H1_DP   | Data plus (D+)  |                    |
| 4   | GND         | Ground          |                    |

Header: USB Type A

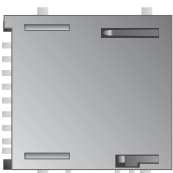
## 6.10 USB OTG (X20)



| Pin | Name         | Description     | Level              |
|-----|--------------|-----------------|--------------------|
| 1   | USB_OTG_VBUS | Power supply    | +5 V DC max 100 mA |
| 2   | USB_OTG_DN   | Data minus (D-) |                    |
| 3   | USB_OTG_DP   | Data plus (D+)  |                    |
| 4   | USB_OTG_ID   | Device ID       |                    |
| 5   | GND          | Ground          |                    |

Header: Micro-USB Type AB

## 6.11 SD Card Reader (X31)



| Pin | Name | Description | Level |
|-----|------|-------------|-------|
| 1   | DAT3 |             |       |
| 2   | CMD  | Pullup      | 3.3 V |
| 3   | GND  |             |       |
| 4   | VDD  |             | 80 mA |
| 5   | CLK  |             |       |
| 6   | GND  |             |       |
| 7   | DAT0 |             |       |
| 8   | DAT1 |             |       |
| 9   | DAT2 |             |       |

## **6.12 Reset Switch (SW1)**

Push for a power on reset.

## **6.13 Bootselect Switch (SW2)**

Push during a power on sequence to boot into the Flash-N-Go.

## **6.14 Power LED (D30)**

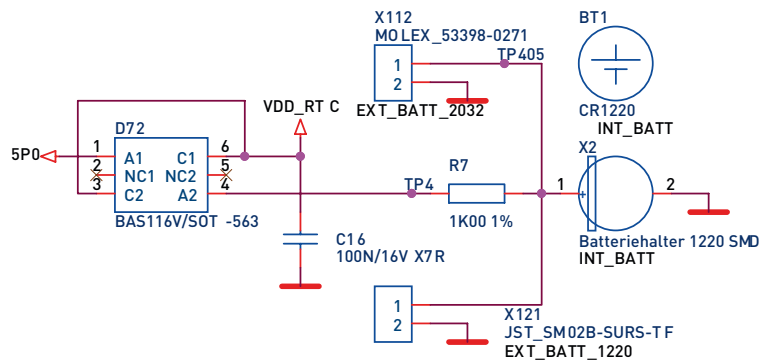
Should be green when the device is powered up.

## 6.15 Battery-Holder (X2)

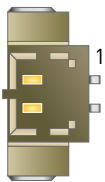


| Pin | Name | Description | Level |
|-----|------|-------------|-------|
| 1   | VCC  | Supply      | 3 V   |
| 2   | GND  | Ground      |       |

Header: Keystone 1056  
Battery: CR1220



## Battery Connector (X112) \*



| Pin | Name | Description | Level |
|-----|------|-------------|-------|
| 1   | VCC  | Supply      | 3 V   |
| 2   | GND  | Ground      |       |

Header: Molex 53398\_0271  
Plug: Molex 51021\_0200

\* alternative assembly upon request

Connector X112 / Optional: external battery instead of battery holder



## 7. Battery

### 7.1 Battery Specifications

The internal baseboard is equipped with a Primary Lithium battery (type CR1220), which has a typical lifetime of 8 years.

| Type                | SECO Northern Europe Article Number |
|---------------------|-------------------------------------|
| Battery type CR1220 | 010-0059R                           |

| Manufacturer               | Model      |
|----------------------------|------------|
| Camelion                   | CR1220     |
| Renata                     | CR1220 MFR |
| Alpha 3 Manufacturing Ltd. | YOBCR1220  |
| Keystone                   | 1220       |
| Maxell                     | CR1220     |

One of these brands must be installed.



Danger of explosion when replaced with wrong type of battery.  
 Replace the battery only with a Lithium battery that has the same or equivalent type recommended by SECO Northern Europe GmbH.



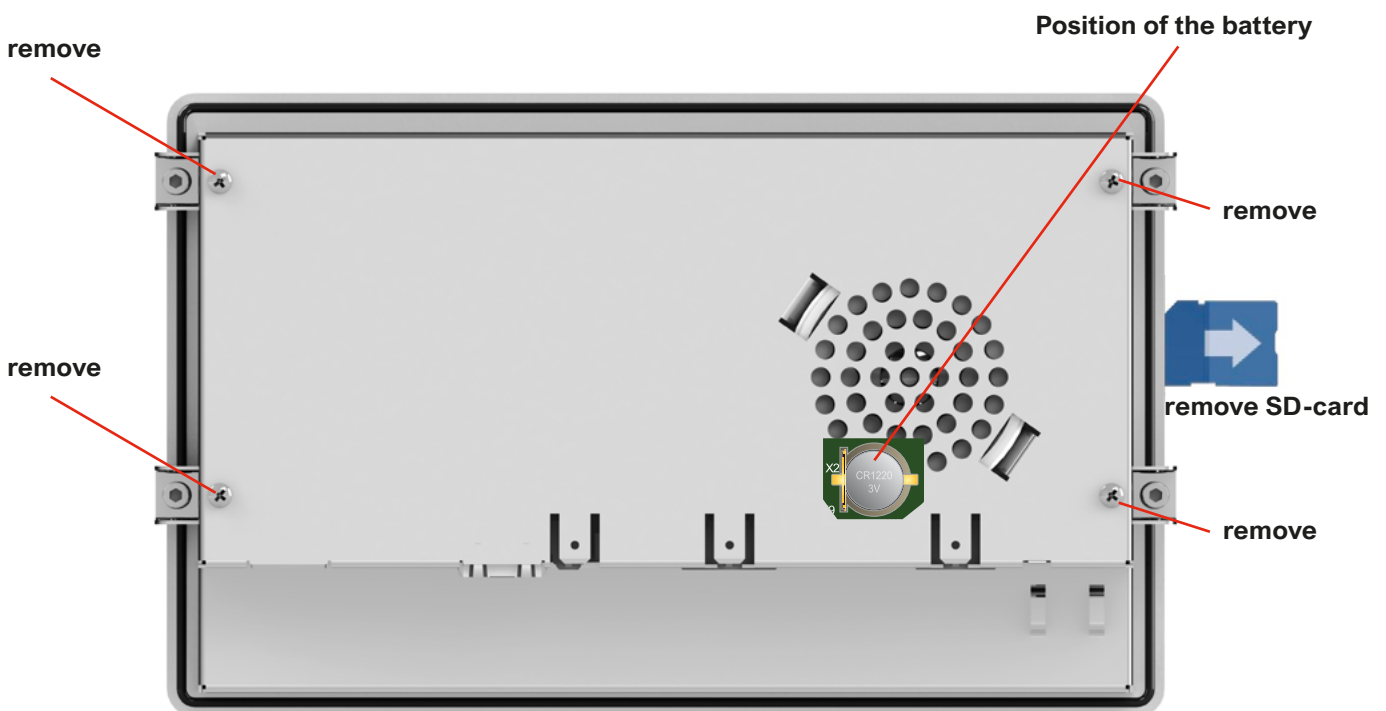
Do not dispose of used CMOS batteries in domestic waste.  
 Dispose of the battery according to the local regulations dealing with the disposal of these special materials (e. g. to the collecting points for disposal of batteries).

## 7.2 Replacement of the Internal Battery

The internal battery is placed as per figure below.  
For replacement, the SD-card and the back cover have to be removed.  
The device shall be opened by authorized and skilled personnel only.



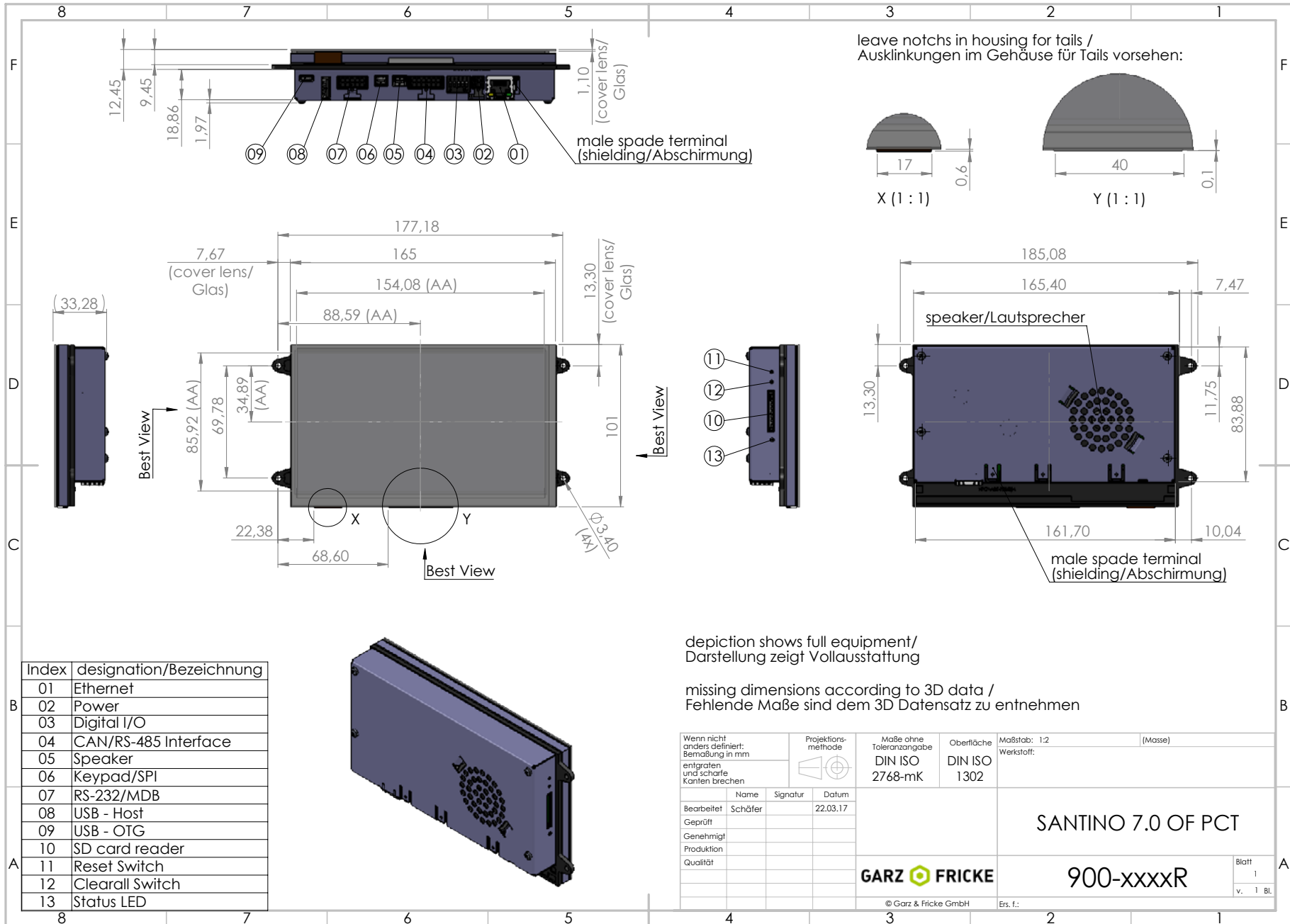
Danger of electric hazard! First before opening, please make sure that the unit is completely disconnected from any power supply, direct or indirect. In order to remove the back cover all other connectors must be removed as well. Please make sure that the SD-card has been removed as it blocks the cover. Furthermore take care about the socket and connectors. Especially the micro USB connector might be damaged easily.



# Annex A: Technical Drawing

Weitergabe sowie Vervielfältigung dieses Dokuments, Verwertung und  
 Mitteilung seines Inhalts sind verboten, soweit nicht ausdrücklich gestattet.  
 Zuwiderhandlungen verpflichten zu Schadenersatz. Alle Rechte für den Fall  
 der Patent-, Gebrauchsmuster- oder Geschmackschutzverletzung vorbehalten.

Schutzvermerk gemäß ISO 16016



## Annex B: Hardware Revision Information

This document is applicable for all products listed below. Please note that customized variants might possibly not support all features listed herein. Additional features are documented in specific attachments.

| Platform               | Article Number | Marking on PCB    |
|------------------------|----------------|-------------------|
| SANTINO x1 7.0 OF PCT  | 900-3537R      | 0597 SANTINO V1.0 |
| SANTINO x2I 7.0 OF PCT | 900-3547R      | 0597 SANTINO V1.0 |

| Hardware Revision | Changes         | Marking on PCB    |
|-------------------|-----------------|-------------------|
| V1.0              | initial release | 0597 SANTINO V1.0 |

## Annex C: Assembly Options

### C-1 Wi-Fi / Bluetooth

Some appliances require a wireless network connection. To be more flexible with regard to future Wi-Fi standards and regulations, we decided not to assemble this functionality directly onto the single-board-computer. We recommend an external USB or miniPCIe solution. Drivers for both versions will be included in the related operating systems. Please contact the support for information about supported modules.



## Annex D: Guidelines and Standards

### D-1 RoHS Declaration

Devices comply with the requirements of Directive 2011/65/EU of the European Parliament and of the Council of 8th June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

### D-2 Supplier Declaration – Directive EG 1907/2006 REACH

SECO Northern Europe is manufacturer of electronic products, thus - in the sense of REACH - we are so called „downstream users“. The products we supply to you are solely non-chemical products (goods). Moreover and under normal and reasonably foreseeable circumstances of application, the goods supplied to you shall not release any substance. For that, SECO Northern Europe is neither obligatory for registration nor for the creation of material safety data sheet (MSDS).

From state of knowledge today our products contain no substances of very high concern from the current SVHC candidate list of the European Chemicals Agency in percentage >0,1.

We will immediately inform you in correspondence to REACH-Article 33 if any substance of content >0,1 percentage in our goods will be classified alarming by the ECHA. Based on the current status, however, we do not expect such an incidence.

### D-3 UL Certification

Customers of SECO Northern Europe are attending on different markets. These markets are subjected to different UL certifications. Therefore SECO Northern Europe have no UL certification for their products.

To obtain UL certifications the product is designed to respect the following constraints:

- ▶ All electronic printed circuit boards are conform to UL standard
- ▶ Battery schematics meets the requirements of UL standard (please refer to chapter **„6.15 Battery-Holder (X2)“**)
- ▶ All wirings are designed with UL components
- ▶ The selected components on the markets are UL (List of UL relevant components is available at SECO Northern Europe (on request))

**SECO Northern Europe do not guarantee to obtain UL certifications.**

## **D-4 SECO Northern Europe Conformity Statement**

SECO Northern Europe GmbH develops and distributes reliable, Arm®-based embedded solutions. We offer various solutions from computer-on-modules (COM) to single-board computers (SBC) and fully-assembled human machine interface (HMI) with pre-installed operating system, display and housing.

These solutions are offered exclusively as OEM products. They do not include any application software that is intended for the end user. Therefore, we do not make any EU declarations of conformity in the name of SECO Northern Europe GmbH and do not provide the products with the CE mark.

Our customers provide the products with application software and build them into an end-user device as part of an industrial production process. They identify themselves as a manufacturer by affixing a license plate with their company or brand name.

We are happy to assist our customers when they compile the necessary technical documentation for the EU Declaration of Conformity of the complete device. We provide e.g. Supplier declarations or RoHS certifications, issue EMC testing results and carry out safety / radio / SAR tests, etc.

## Annex E: Common Documentation

### E-1 Warranty Hints



SECO Northern Europe embedded systems are subject to manufacturer's warranty as long as the products are handled with adequate care and caution and in accordance to this manual.

The period of guarantee starts from the date of shipment

The products are warranted against defects in material, quality and functionality within the warranty period.

During this period, the repair of the products is free of charge.

SECO Northern Europe will decide for repair or replacement at their own discretion.

If the product has been returned with or without prior notice and no failure or malfunction can be detected or the failure or malfunction is caused by inappropriate handling or the device has been returned after expiry of warranty period, SECO Northern Europe reserve the right to charge the user for repair or replacement.



The warranty does not cover defects caused by improper or inadequate installation, maintenance or handling by the user, unauthorized modification or misuse, operation outside the specification or non-compliance of this manual. In case of doubt, please contact the technical sales team prior to intended activity.

The warranty does also not cover any defects or damages of other equipment connected to the SECO Northern Europe product, faulty or not.

For warranty or repair service, please contact the technical sales team.

**[support.north@seco.com](mailto:support.north@seco.com)**  
**[rma.north@seco.com](mailto:rma.north@seco.com)**



## **E-2 Field of Application**

The products covered by this document are designed and manufactured for the following applications (I). If you intend to use these products in applications as quoted in (II) we highly recommend a personal contact with our consultants and/or technical sales team.

### **(I) Recommended application areas for SECO Northern Europe embedded systems**

Even for these applications, we recommend to get in contact with our technical sales team. We offer a wide range of support, even at an early stage of evaluation and/or design-in phase.

- ▶ Vending machines and gastronomy devices
- ▶ Industrial controllers and HMI systems
- ▶ Home automation and facility management
- ▶ Audiovisual equipment
- ▶ Instrumentation and measuring equipment

### **(II) Restricted application areas, prior consultation is mandatory to identify and meet the individual regulatory requirements**

- ▶ Gas leak detectors
- ▶ Rescue and security equipment
- ▶ Safety devices
- ▶ Control and safety devices for airplanes, trains, automobiles and other transportation equipment
- ▶ Traffic control systems
- ▶ Control equipment for nuclear power industry
- ▶ Medical equipment related to life support etc.
- ▶ Gasoline stations and oil raffineries

## **Annex F: Technical Support**

Before contacting the SECO Northern Europe support team, please try to help yourself by the means of this manual or any other documentation provided by SECO Northern Europe or the related websites.

If this does not help at all, please feel free to contact us.

Our technicians and engineers will be glad to support you. Please note that beyond the support hours included the Starter Kit, various support packages are available. To keep the pure product cost at a reasonable level, we have to charge support and consulting services per effort.

### **Shipping Address:**

SECO Northern Europe GmbH  
Schlachthofstrasse 20  
21079 Hamburg  
Germany

### **Support Contact:**

Phone: +49 (0) 40 / 791 899-200  
Fax: +49 (0) 40 / 791 899-39  
E-Mail: [support.north@seco.com](mailto:support.north@seco.com)  
URL: [north.seco.com](http://north.seco.com)

## **Annex G: General Information**

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All drawings, which are shown in this manual are schematic drawings.

For exact technical drawings please refer to our sales team or product manager

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