I-FORM

W1600 Wireless Acoustic Monitoring Module

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Change Log:

Version	Date	Author	Description
1	2019-09-18	Yorick Groot	Initial version
2	2019-12-22	TB	Removed irrelevant parts. Updated texts.
3	2019-12-23	YG	Updated images/descriptions Updated text
4	2019-12-30	TB	Updated images
5	2020-05-07	TB	Updated I/O text
6	2020-06-08	YG	Updated to CLB128304
7	2020-10-01	TB	Updated network requirements §2.2.1.
8	2020-10-15	RL	Added Port 1 configuration for P2501
9	2020-12-17	TB	Updated product regulations and added §1.4.8 product standards

References:

Ref.	Doc. ID	Version	Document title

Abbreviations:

Abbreviation	Description
SKU	Stock Keeping Unit

Table of Contents

Product data

1.1 Product name

W1600 CLB Wireless Acoustic Monitoring Module

1.2 Product image

Image 1: W1600-PAU CLB Nurse Call (with Acoustic Monitoring) DN[1]

1.3 Product summary

W1600

The W1600 is a multifunctional wireless device.

First, nurse call functionality is provided by corresponding illuminated buttons. The illumination can be adjusted and there are seven colours available. The nurse call functionality can be used in several circumstances. To facilitate this versatile use, the W1600 module is supported by Building Blocks. A Building Block determines the behaviour of the module's buttons and LEDs.

The second functionality includes two I/O-ports that don't deliver power. The two ports can be found at the rear and can be configured as Input or Output.

The third functionality includes connecting an external Pear Push at the front left mini jack connector.

W1600

The W1600 contains audio functionalities (e.g. Acoustic Monitoring). The microphone sensitivity and volume of the speaker can be adjusted according to the CLB standards. The W1600 also contains a blue led which can be activated when a speech connection is established. This functionality can be switched off.

[1] Several button configurations possible. Image contains the W1600-PAU

Models

Various button configurations are available, as indicated in Image 2 below. The configuration is indicated by a product number extension: <front panel> <left buttons> <right buttons>, i.e. W1600-PAE (Image 1).

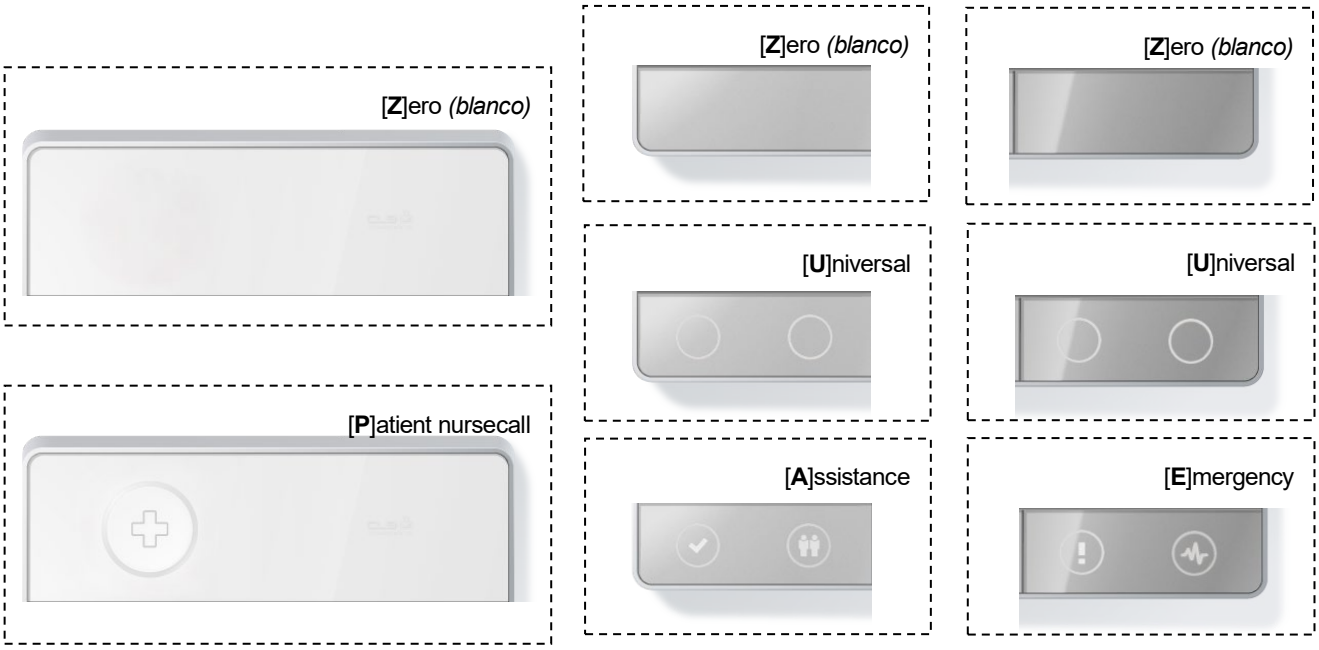


Image 2: W1600 buttons

1.4 Technical Specifications

1.4.1 Mechanical Specifications

Dimensions PCB assembly	125 x 70,25 mm
Dimensions housing surface mount	169 mm x 92,1 mm x 29,5 mm
Material	PC
Colour	Grey, white
Weight	~ 190 g incl. surface mount frame
Product type	Fixed/surface-mount
Protection class	IP40 (when mounted)

1.4.2 Electrical Specifications

Supply voltage	5 Vdc;
Supply current	2400 mA
Power consumption average	1300 mW
Communication interface	5 GHz WiFi
Microphone:	
Sensitivity	5 dBV/Pa
Speaker:	
Sensitivity	-3 dBV, @ 1 W output = 78 dBspl @ 1 W, 1 m
I/O-ports (Digital)	
Inputs	ports 1 and 2
$V_{IN_{max}}$	24 Vdc
$Input_{LOW}$ $V_{IN_{max}}$	0.8 Vdc
$Input_{HIGH}$ $V_{IN_{min}}$	3.0 Vdc
Outputs	ports 1 and 2
$Output_{LOW}$ (Sink)	I_{max} = 50 mA @ 5.0 V_{max}
$Output_{HIGH}$ (Source)	I_{max} = 0.1 mA @ 3.0 V_{max}
Output PWR (Source)	Only for powering P2501 Pullcord I_{max} = 50 mA @ 5.0 V_{max}
Pear push port (Analogue)	
Inputs	port 5
Nurse call (or other) button	Potential Free, guarded contact. (guarded; connected/ removed/ short). Buttons are measure through AD-values
$V_{IN_{max}}$	24 Vdc
$Input_{LOW}$ $V_{IN_{max}}$	0.8 Vdc

$Input_{HIGH}$ $V_{IN_{min}}$	3.0 Vdc
Outputs	
Call LED (or other)	Open drain (dimmable)
Output $_{LOW}$ (Sink)	I_{max} = 50 mA @ 5.0 V_{max}
Output $_{HIGH}$ (Source)	I_{max} = 0.1 mA @ 3.0 V_{max}
Power supply output	(Left front jack)
Output voltage	5 Vdc
Max. current	50 mA

1.4.3 Connection Specifications

1.4.3.1 Front connections

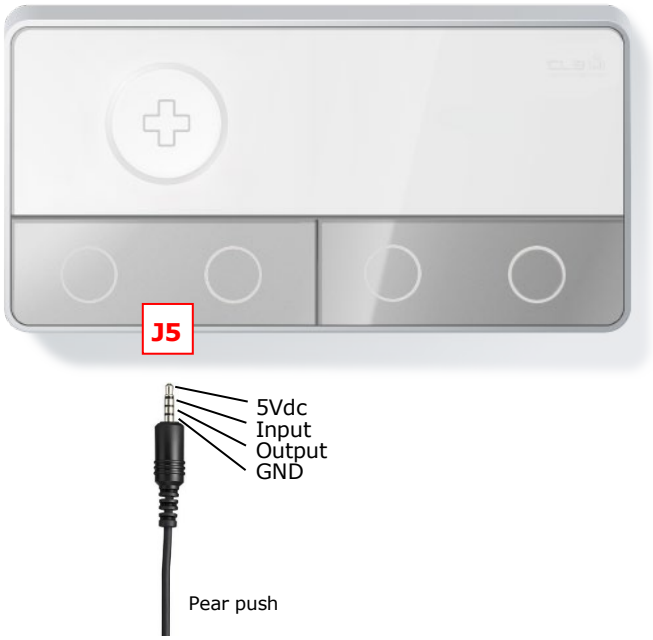


Image 3: W1600 front connection

Front connections	
J5	3.5mm 4p. mini jack
J5	Pear Push port (Analogue) 1 GND 2 Output (Open Collector) 3 Input (A/D) 4 5Vdc/50mA
J5 counterparts	3.5mm 4p mini-jack-plug
Wiring J5	Recommended: 4p, stranded wire
Maximum cable length	5m

1.4.3.2 Rear connections

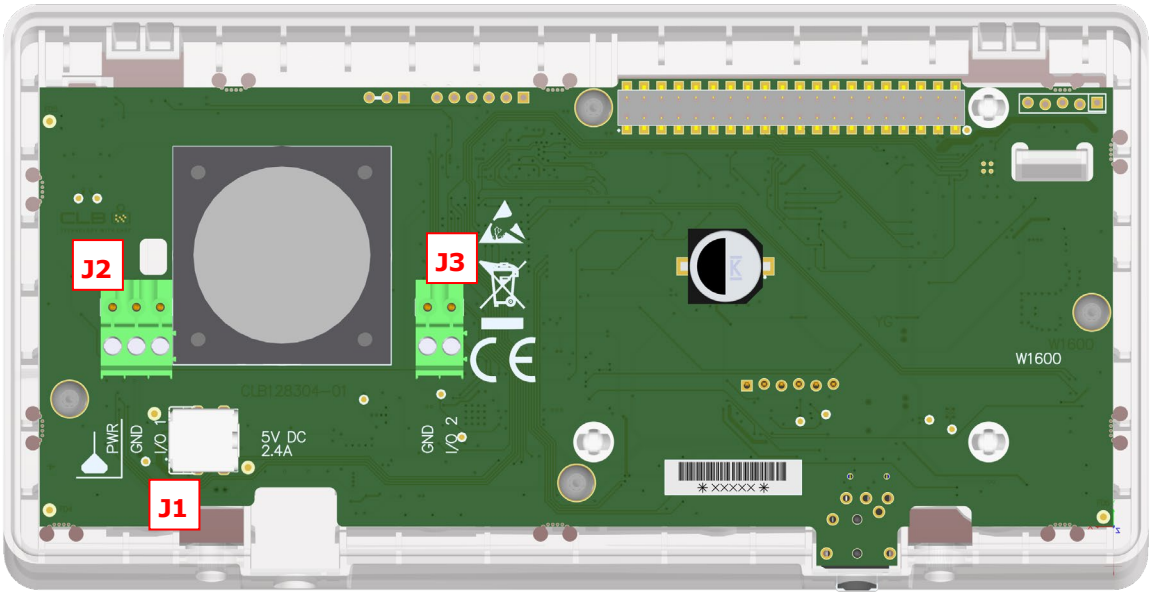


Image 4: W1600 rear connections

Rear connections	
J1	USB-C Power Connector. It is strongly advised to use the official Raspberry Pi AC Adaptor Model: **KSA-15E-051300HE(-WH)**
J2	3p pin header (I/O port) 1 PWR (Only for powering P2501 Pullcord I_{max} = 50 mA @ 5.0 V_{max}) 2 GND 3 I/O port #1
J3	2p pin header (I/O port) 1 GND 2 I/O port #2
J2 counterparts	**Option 1** 3p plug connector push-in connector *Manufacturer*: Phoenix Contact *Type no*. FK-MPT 0,5/ 3-ST-3,5 *Part no*. 1913934
	Option 2 3p plug connector screw connection Manufacturer: Phoenix Contact Type No. PT 1,5/3-PVH-3,5 Part no. 1984028 ***Important: Use of ferrules is mandatory!***
J3 counterparts	**Option 1**

Rear connections	
	2p plug connector push-in connector *Manufacturer*: Phoenix Contact *Type no*. FK-MPT 0,5/ 2-ST-3,5 *Part no*. 1913921
	Option 2 2p plug connector screw connection Manufacturer: Phoenix Contact Type No. PT 1,5/2-PVH-3,5 Part no. 1984015 ***Important: Use of ferrules is mandatory!***
Wiring J2/J3	Massive: 0.12 - 0.5 mm^2, AWG: 26 – 20 **Solid wire:** Both Phoenix connectors with Push-in or Screw connection are possible **Stranded wire**: Only 8p plug connector with screw connection is possible. Please note: Use of ferrules is mandatory!
Maximum cable length J2/J3	The maximum cable length depends on the amount of current that is drawn by the I/O device and the type of used cable. Together with the limits mentioned at § 1.4.2 the maximum cable length can be calculated[2]

[2] Calculator (under construction)

1.4.4 Indicator Specifications

1.4.4.1 Front indicators

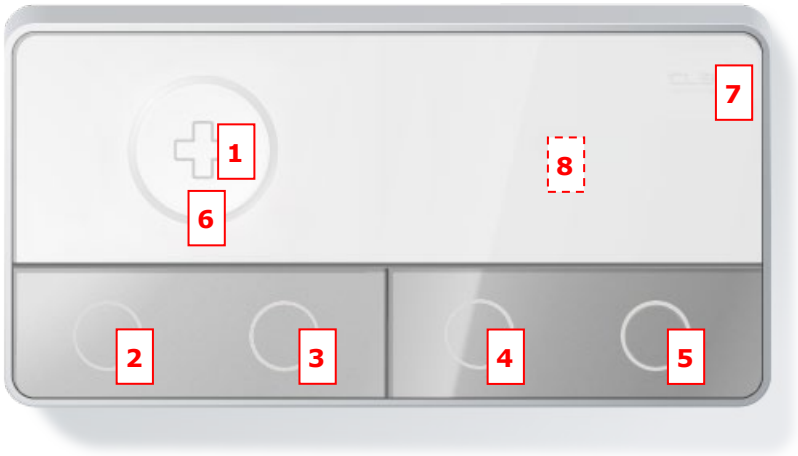


Image 5: W1600 indicators

Index	Default colour	Remark
1	RED (RGB)	Button 1 indicator (default: Nurse call)
2	GREEN (RGB)	Button 2 indicator (default: Presence)
3	RED (RGB)	Button 3 indicator (default: Assistance)
4	YELLOW (RGB)	Button 4 indicator (default: none)
5	BLUE (RGB)	Button 5 indicator (default: none)
6	RED (Fixed)	Button 1 ring indicator (default: Nurse Call)
7	BLUE (Fixed)	Speech indicator (Privacy LED)
8	Speaker	Speaker

1.4.4.2 Rear indicators

N/A

1.4.5 Actuator Specifications

1.4.5.1 Front actuators

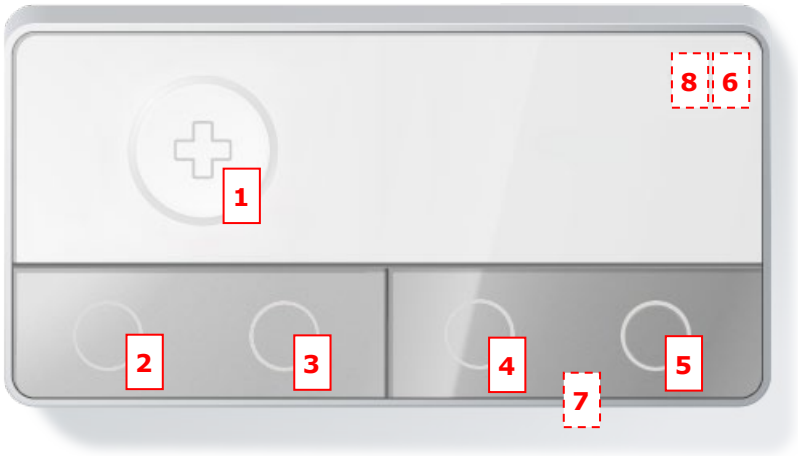


Image 6: W1600 front actuators

Index	Function	Description
1	Button 1	Switch to make a Nurse Call
2	Button 2	Default: switch for presence
3	Button 3	Default: switch to make an assistance call
4	Button 4	Default: none
5	Button 5	Default: none
6	Light sensor	Ambient light measurement for brightness adjustment
7	Microphone	Microphone for speech or AM2
8	Identify	Activated by holding a magnet at position 8 **≤2 seconds:** Network presence (Identify) notification of W1600 to the system. 1 beep can be heard when magnet is positioned correctly. **≥5 seconds:** Safe shutdown (manual): - Position magnet until 1 short beep is heard and hold at this position for ~5 sec 2 short beeps will be heard, as indication that the W1600 is shutting down. The magnet can now be removed. - **Wait** until 1 long beep will be heard (~5 sec.). The W1600 can now safely be unplugged from power.

Index	Function	Description
		Note: The W1600 can't completely shut down; the LED's will stay on, but no data can be written to the SD card and therefore it can't get corrupted when the power is suddenly unplugged.

1.4.5.2 Rear actuators

N/A

1.4.6 Environmental Specifications

Environment classification	Household/Medical
Storage temperature	0 °C..65 °C
Storage humidity (relative, non condensing)	10 %..95 %
Operating temperature	0 °C..40 °C
Operating humidity (relative, non condensing)	10 %..95 %

1.4.7 Product Regulations

Declaration of Conformity (DoC)

Directive 2014/53/EU of 16 April 2014 concerning radio equipment.

Hereby, CLB bv declares that this wireless device is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU

Note: Observe national and local regulations where the device is used. This device may be restricted for use, depending on the local network.
The operation frequency in 5150-5350 Mhz of WiFi 5G are restricted to indoor usage only.

FCC Part 15

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Federal Communications Commission (FCC) rules, Part 15 compliant
FCC ID: **2AWOF 128300**

1.4.8 Product Standards

IEC 62368-1:2014	Audio/video, information and communication technology equipment Part 1: Safety requirements

1.4.9 Radio Specifications

EIRP average (equivalent isotropically radiated power)

Type	Frequency range	Output power
Bluetooth LE	2402-2480 MHz (40 channels)	2.7 dBm
IEEE 802.11b	2412-2472 MHz (13 channels	15.6 dBm
IEEE 802.11a/n/ac (20/40/80 Mhz)	5180-5240 MHz (4/2/1 channels)	14.6 dBm
IEEE 802.11a/n/ac (20/40/80 Mhz)	5260-5320 MHz (4/2/1 channels)	14.9 dBm
IEEE 802.11a/n/ac (20/40/80 Mhz)	5500-5700 MHz (8/4/1 channels)	15.6 dBm

1.5 Block diagram

N/A

1.6 Connection diagram

N/A

1.7 Hardware overview

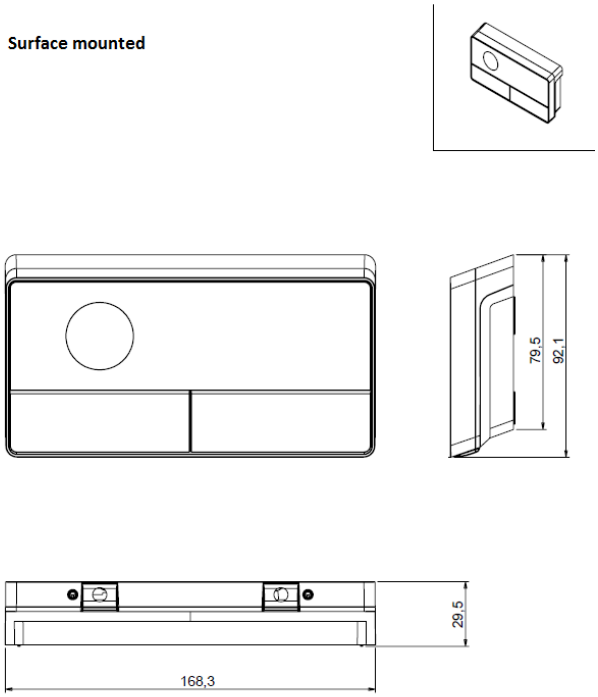


Image 7: W1600 surface mount assembled unit - Dimensions: mm

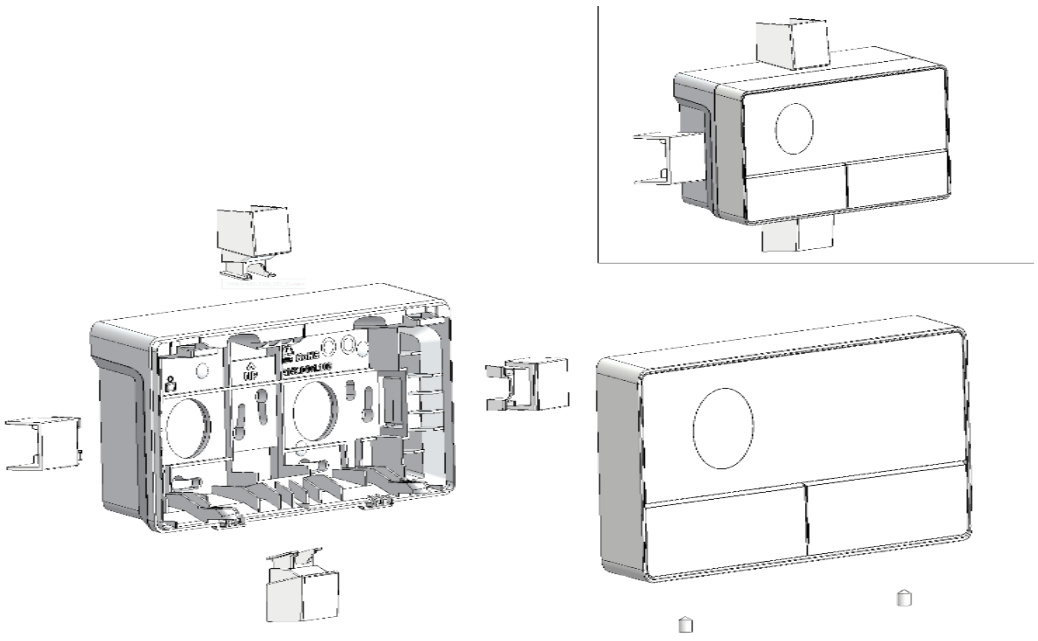
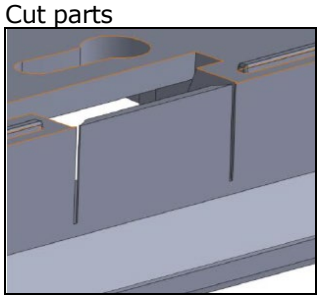
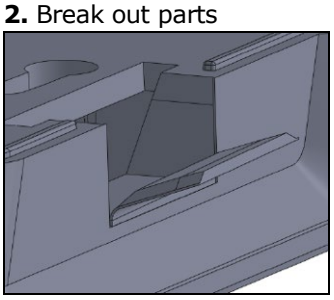


Image 8: W1600 surface mount exploded view

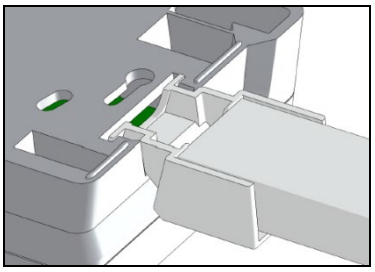
1. Cut parts



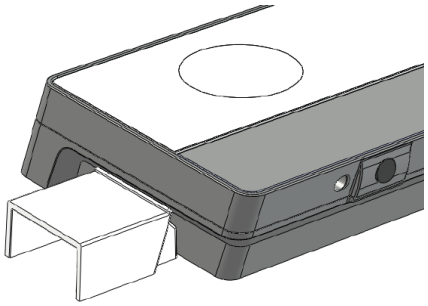
2. Break out parts



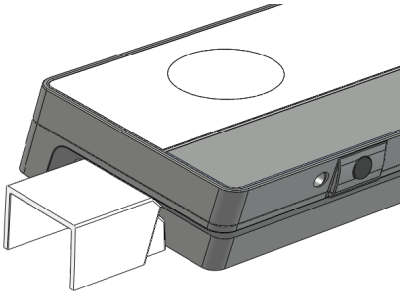
3. Place conduit reducer



K25-NL (25 x 13 mm)



K25-UK (25 x 16 mm)



K10-UK (16 x 10 mm)

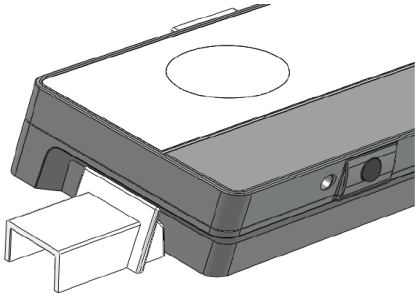


Image 9: Connecting conduit reducers

2 Installation

2.1 Content

Item	Model / variant / note
Hardware	1x W1600 PCB assembly
Front	1x Front (assembled to the PCB assembly)
Mounting bracket	1x Surface mounting bracket
Mounting screws	4x mounting screws DM000365-00 Parker 2,5x6 Torx T8 Remform (for mounting the PCB assembly to the front) 2x mounting screws DM000366-00 Socket M3x6 Torx T7 setscrews with conepoint, steel class 45H. (for mounting the front to the back shell).
Adaptors (optional)	2x Conduit reducers (Surface mount only) for connecting conduits types: K25-NL: 25 x 13 mm K25-UK: 25 x 16 mm K10-UK: 16 x 10 mm
Printed documents	Installation manual

2.2 Installation Requirements

2.2.1 Extra requirements

Item	Model / variant / note
Installation equipment (not provided by CLB)	Screw driver (for fixing the mounting bracket) Hex screw driver (for locking the assembled unit)
Network	WiFi 5GHz

2.2.2 Compatibility

The table below contains compatible pear push & handset models.

	Model / variant / note	Connector
P2110	CLB Pear Push for Cx60x	3,5mm 4 pin mini jack connector
P2680-2b	CLB Handset 2 button for Cx60x	3,5mm 4 pin mini jack connector
P2680-5b	CLB Handset 5 buttons for Cx60x	3,5mm 4 pin mini jack connector
P2680-7b	CLB Handset 7 buttons for Cx60x	3,5mm 4 pin mini jack connector

NOTE: The P2100 (RJ45 connector) is NOT compatible with the W1600.

2.2.3 Network requirements

The following network requirements should be met in order to ensure proper functioning of the system.

1. Availability of a DHCP server is required
    - The DHCP scope shall have sufficient IP addresses available
    - The DHCP lease time shall be set at 24 hours at least.

2. The WAMM shall connect over a dedicated network
    - Sharing network with other business applications is allowed provided a separate VLAN with a sufficient DHCP scope to be used by the WAMM population only.
    - No Bring-Your-Own-Devices shall be allowed on the same network.

3. For best audio experience it is strongly recommended to use 5Ghz network only.
    - RSSI at W160x spots shall be at least -64dBm
    - The 5 GHz network shall have a unique SSID

4. As a power supply for the WAMM it is strongly recommended to only use an official Raspberry Pi USB-C 3A Power supply (Raspberry Pi 4 Model B)
    - USB power cables shall not be extended to prevent loss of sufficient power during start-up.

2.2.4 Precautions

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

2.3 Instructions

2.3.1 Visual anchors

Please refer to sections 1.4, 1.6 and 1.7 for images that can be used as visual anchors.

2.3.2 Installation Instructions

- Do not install/place this module in a location where it is subjected to direct sun light.
- Do not install/place this module near a heat source.
- Do not install/place this module in a location where it may be exposed to liquids / high humidity.
- Install this module on a wall at a height of 1000..2000 mm.
- Do not install this module near an acoustic source.
- Do not apply any labels with a width larger than 10mm to the cables in the junction boxes in order to prevent cable kinks.

Typical Input, Potential-free Contact

Port must be configured as input.

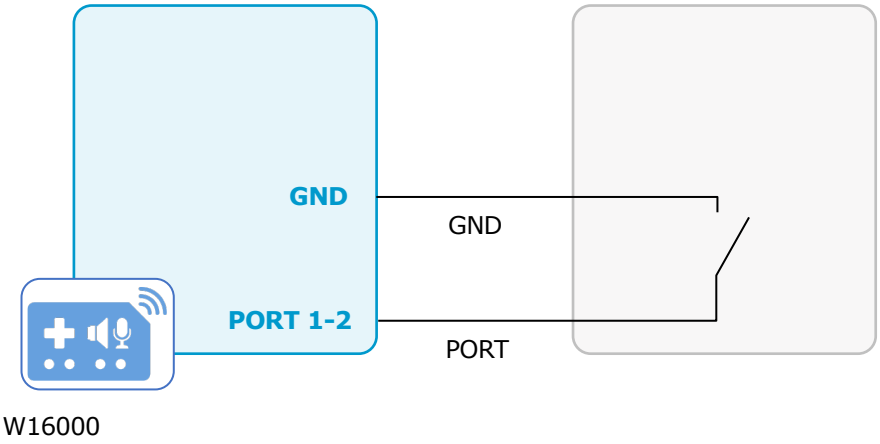


Image 10: Typical Input, Potential-free contact

Typical Input, Contact Potential

Port must be configured as input, for external controlling of internal logic ports.

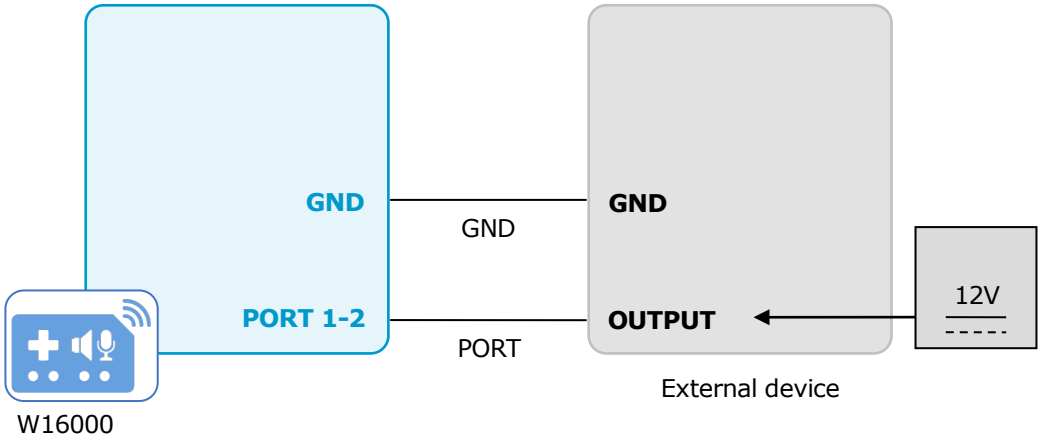


Image 11: Typical input, contact potential

External device can have an output voltage up to 24Vdc.

Typical Output, Sink

Port must be configured as output.

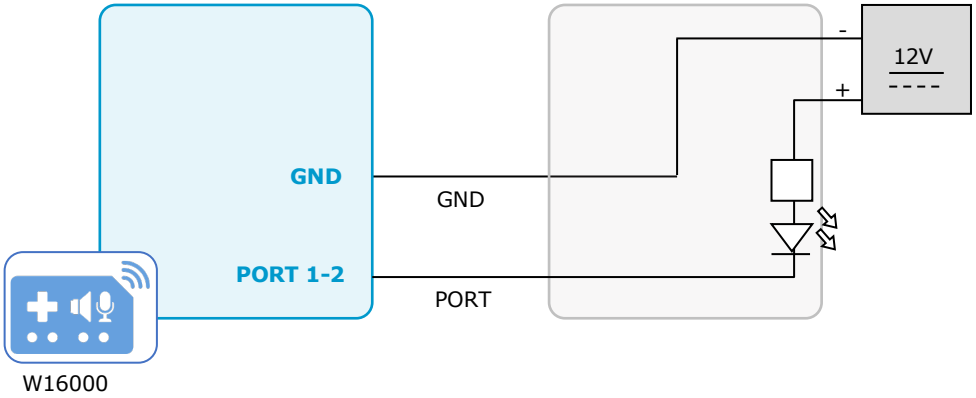


Image 12: Typical output, sink

External device can have an output voltage up to 24Vdc.

Typical Output, Source

Port must be configured as output, for controlling external logic ports.
(Ports are not driven by current!)

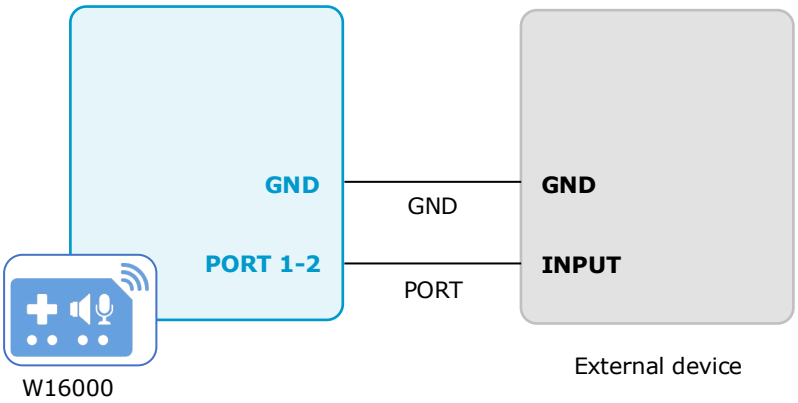


Image 13: Typical output, source

Typical Combined Input/Output (*5V power supply **only** for powering P2501 Pullcord)*
Port must be configured as combined Input & Output.

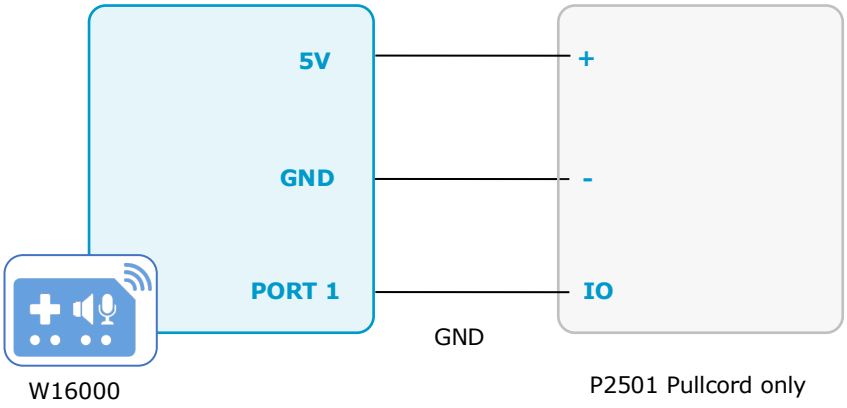


Image 14: Typical combined input/output, (internal power supply)

2.3.3 Maintenance Instructions

- Clean the surface of this module with a moist cloth.
- The surface of this module can be disinfected with 70% isopropyl alcohol (IPA 70)
- Do not use aggressive cleaning agents.
- Only authorized personnel are allowed to open this module for maintenance.

2.4 Unit connectors

2.4.1 Included connectors

N/A

2.4.2 Not included connectors

Only prescribed Phoenix parts are allowed!

pin	Product
3p connector (J2) For use see §1.4.3.2	**Option 1** *Description*: 2p plug with push-in spring connection *Manufacturer*: Phoenix Contact *Type no*. FK-MPT 0,5/ 3-ST-3,5 *Part no*. 1913934
	Option 2 *Description*: 2p plug with screw connection *Manufacturer*: Phoenix Contact *Type No*.: PT 1,5/ 3-PVH-3,5 *Part no*.: 1984028
2p connector (J3) For use see §1.4.3.2	**Option 1** *Description*: 2p plug with push-in spring connection *Manufacturer*: Phoenix Contact *Type no*. FK-MPT 0,5/ 2-ST-3,5 *Part no*. 1913921
	Option 2 *Description*: 2p plug with screw connection *Manufacturer*: Phoenix Contact *Type No*.: PT 1,5/ 2-PVH-3,5 *Part no*.: 1984015

2.5 Settings

2.5.1 Hardware

2.5.1.1 Settings

N/A

2.5.1.2 Indicators

Name	Description	Default state	Colour
1	Button 1 indicator (default: Nurse call)	Dimmed	RED (Default; RGB)
2	Button 2 indicator (default: Presence)	Dimmed	GREEN (Default; RGB)
3	Button 3 indicator (default: Assistance)	OFF	RED (Default; RGB)

Name	Description	Default state	Colour
4	Button 4 indicator (default: none)	OFF	YELLOW (Default; RGB)
5	Button 5 indicator (default: none)	OFF	BLUE (Default; RGB)
6	Button 1 ring indicator (default: Nurse Call)	OFF	RED (fixed)
7	Speech indicator (Privacy LED)	OFF	BLUE (fixed)
8	Speaker	OFF	-

Every state (ON/OFF/BLINK/DIMMED), is driven by the programmed state. Within the programming, the Speech indicator LED can be switched OFF when speech connection is opened, check local legislation!

2.5.2 Software

2.5.2.1 Network settings

The network settings of the W1600 needs to be configured in order to connect to the required WiFi network. These settings can be configured via the CLB DDC, of CLB Configurator. To access the W1600, it is preconfigured to connect to the wireless network with SSID 'CLB-Config'. Once the network settings have been changed, the W1600 will always try to connect to the configured network first on startup.

The W1600 connects by default to a predefined configuration SSID:

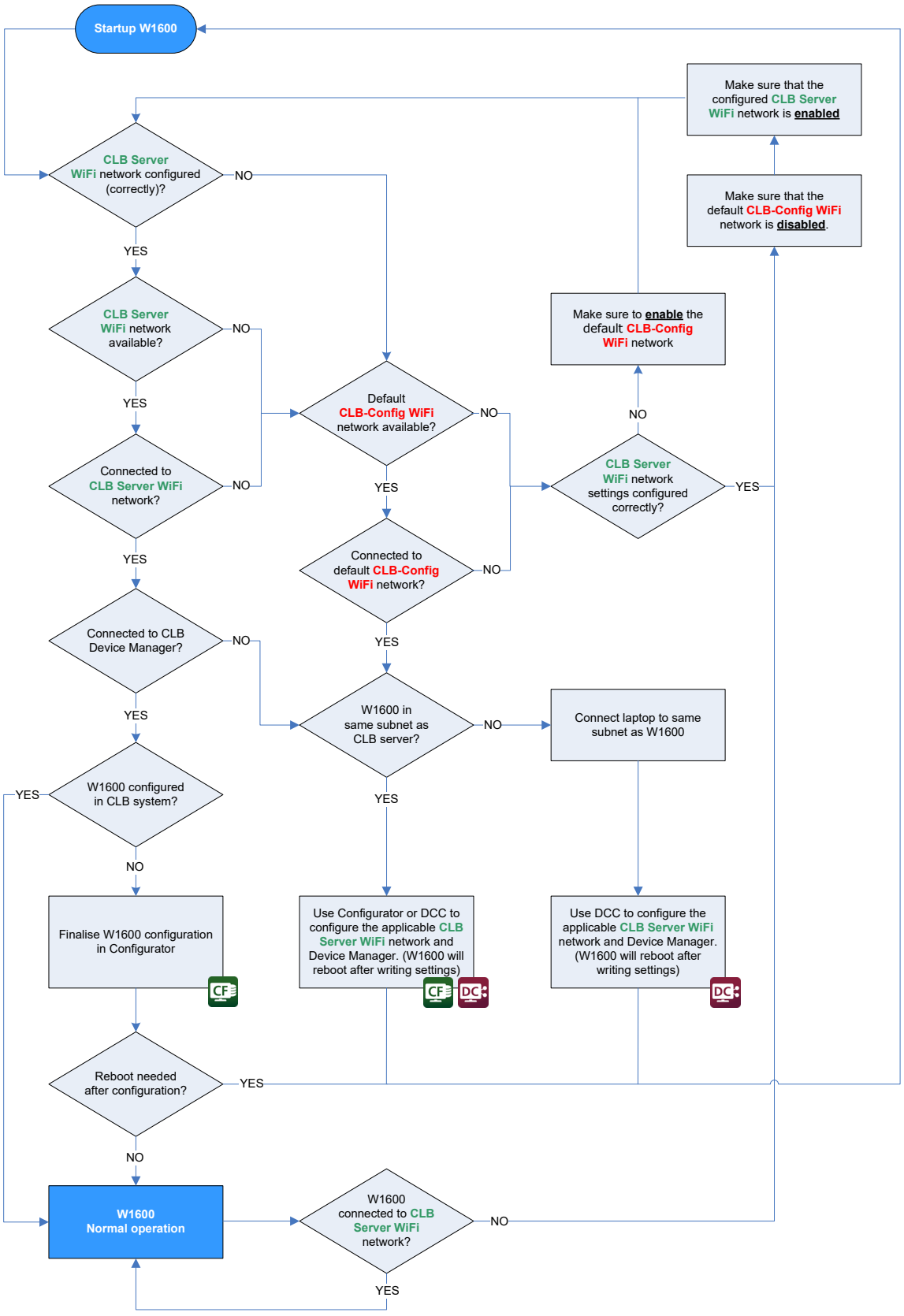
SSID: CLB-Config *(case-sensitive)*

Password: gVHEYJ,Cz@bHyS#9&k,/ *(case-sensitive)*

NOTE: Please make sure that the temporarily 'CLB-Config' network is not connected to the Unicontrol2 network. This is to avoid unexpected behaviour in case a W1600 connects to the configuration network while it is being used at location.

NOTE:

When the configured network is not available (anymore) the W1600 will subsequently try to connect with the default CLB-Config network, should this network be left active!


Startup W1600
Make sure that the configured CLB Server WiFi network is enabled
CLB Server WiFi network configured (correctly)?
NO
Make sure that the default CLB-Config WiFi network is disabled.
YES
CLB Server WiFi network available?
NO
Make sure to enable the default CLB-Config WiFi network
YES
Default CLB-Config WiFi network available?
NO
NO
Connected to CLB Server WiFi network?
NO
CLB Server WiFi network settings configured correctly?
YES
YES
YES
Connected to default CLB-Config WiFi network?
NO
Connected to CLB Device Manager?
NO
YES
YES
W1600 in same subnet as CLB server?
NO
Connect laptop to same subnet as W1600
YES
W1600 configured in CLB system?
YES
YES
NO
Finalise W1600 configuration in Configurator
Use Configurator or DCC to configure the applicable CLB Server WiFi network and Device Manager. (W1600 will reboot after writing settings)
Use DCC to configure the applicable CLB Server WiFi network and Device Manager. (W1600 will reboot after writing settings)
Reboot needed after configuration?
YES
NO
W1600 Normal operation
W1600 connected to CLB Server WiFi network?
NO
YES

2.5.2.2 Default settings

Setting	Description	Values*
Audio configuration		
Sample rate	Sample rate of audio connection	(8 kHz) / 16 kHz
Microphone volume	Alter this value if the sound from the room is to loud or to soft.	-12dB to 12dB (0dB)
Speaker volume	Alter this value if the sound in the room is to loud or to soft.	-12dB to 12dB (0dB)
Audio LED indication	Should the LED be turned on or off during an active audio connection	(On) of Off
Pre-trigger recording time	How many seconds of sound should be recorded before the sound trigger occurred	1s to 14s (8s)
Total recording time	The total time of a recording	2s to 16s (16s)
Interval between audio notifications	The minimum time between reporting an audio notification to the system	1s to 30s (30s)
Button configuration		
Min. LED brightness idle	The minimum brightness of the button LED's in idle mode**	0% to 50% (1%)
Max. LED brightness idle	The maximum brightness of the button LED's in idle mode**	0% to 50% (35%)
Pear push / handset		
Min. LED brightness idle	The minimum brightness of the pear push LED's in idle mode**	0% to 50% (1%)
Max. LED brightness idle	The maximum brightness of the pear push LED's in idle mode**	0% to 50% (5%)

* All values mentioned between ( ) are default values.

** LED brightness is adjusted between the configured min. and max. values by the module's light sensor.

2.5.2.3 Required software applications

- The W1600 is fully supported from suite v.3.9 or higher.
- Please refer to the Configurator manual for instructions on how to update this module's firmware and change the settings described above.

2.6 Specific remarks

2.6.1 Connector

There is only one allowed connector orientation! This is shown in 1.4.3.2.

2.7 Focus points

2.7.1 Planning engineer

A specific focus points for the planning engineer is to make sure the needed connectors are ordered separately and are available on the installation site.

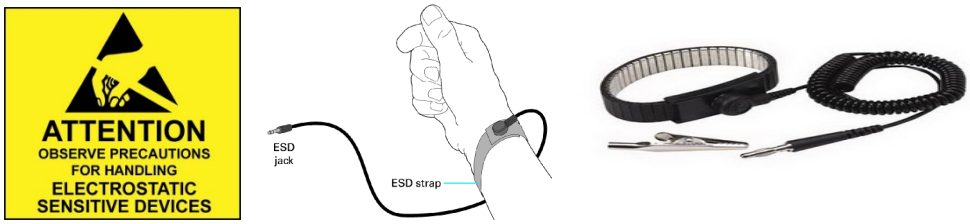
2.7.2 Programming engineer

There are no specific focus points for the programming engineer defined yet.

2.7.3 Technician

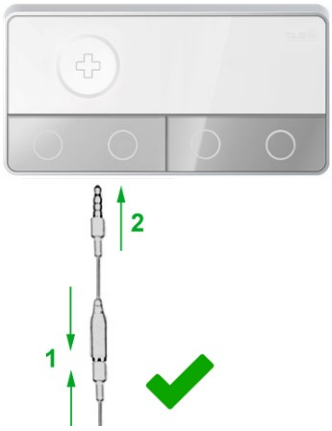
Other installation precautions

Take all necessary precautions to safely install the hardware.



2.7.3.1 Connecting peripherals on mini jack connector via safe release cables

The W1600 is able to detect mini jack connectors in order to prevent a possible short circuit or unintended message when connecting or disconnecting peripherals. However, this detection mechanism does not work when connecting the mini jack at a safe release cable. In order to allow the detection mechanism to work connect the safe release cable first, before connecting the cable to the module, as indicated in the image below.



Pear push

Image 15: Connecting a mini-jack safe release cable

2.8 Known issues and experience

There are no specific known issues defined yet.

2.9 FAQ

Question 1

Does the W1600 have I/O functionality on a jack port like the C1600 module?

Answer 1

No, for the W1600 this is where the microphone is located. As mentioned in this I-Form the W1600 module has only 2 I/O ports on the rear of the module.

2.10 Troubleshooting

2.10.1 Module identification

From the Configurator software the module can be identified. On the W1600, all LED indicators will blink and a tone is played from the speaker during the identification process.

2.10.2 Lost communication

The LED's will blink simultaneously if communication with the WiFi network is lost.

2.10.3 Error reporting

The module is able to report several errors to the system. Consult the configurator manual for instructions on how to view logs of module errors.

Error message to system	Severity	Description
Call button short circuit	Error	Call button (Button 1) of the module is pressed for more than 60s. Probably caused by a short circuit. In this case the hardware has to be replaced.
Button 2 short circuit	Error	Button 2 of the module is pressed for more than 60s. Probably caused by a short circuit. In this case the hardware has to be replaced.
Button 3 short circuit	Error	Button 3 of the module is pressed for more than 60s. Probably caused by a short circuit. In this case the hardware has to be replaced.
Button 4 short circuit	Error	Button 4 of the module is pressed for more than 60s. Probably caused by a short circuit. In this case the hardware has to be replaced.
Button 5 short circuit	Error	Button 5 of the module is pressed for more than 60s. Probably caused by a short circuit. In this case the hardware has to be replaced.
Pear push button short circuit	Error	One or more buttons of a connected Pear push device is pressed for more than 60s. Probably caused by a short circuit. In this case the hardware has to be replaced.
Codec could not be initialized	Error	There is a problem with the audio chip. The hardware has to be replaced.
Nurse call input short circuit	Error	The pear push call button connected to J5 is pressed for more than 60s. Probably caused by a short circuit
RAM error (RAM check fail)	Error	There is a problem with the sound recording memory. The hardware has to be replaced.
Incorrect sample rate measured	Error	There is a problem with the timing of the audiochip. The hardware has to be replaced.
Microphone/speaker connection error	Error	There is a problem with the microphone/speaker. The microphone is defect.
Voltage too low	Warning	The applied power adapter's capacity is too low to guarantee solid functioning of the module, or the applied power adapter cannot provide the required inrush current on start-up of the module.
Codec reset	Warning	The software from the audio chip is reset.

3 Manufacturer Contact Information

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