

SYMEO LOCAL POSITIONING RADAR

Product: LPR[®]-1D24

Product Documentation



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HISTORY

Version	Date	Description
1.00	2015-06-18	Initial Release: Translation English
1.01	2015-07-24	Minor corrections, New: the chapters “Web User Interface” and “Mounting of the Fall Protection”
1.02	2016-01-28	Distance data Type 0x00 changed to Type 0x16, Distance Error Codes table updated. The chapter “WebUI User Interface” updated. New: Ethernet connector cable M12 – RJ45. Added: General Requirements for Compliance of Radio Apparatus, chapter 1.9
1.03	2016-04-20	New Software version, chapter 7 WebUI updated; Velocity data byte value updated; Chapter “Data Types”: added Type 0x01, Type 0x02; FSK channels configuration rules updated
1.04	2016-12-22	New Software version, chapter 7 WebUI updated; Valid from firmware version/application 5.0.0
1.05	2017-11-10	WebUI updated: Profinet function added; LPR®-1D24 address for Relays Switching Command matched; The new housing; Application L-Functionality added, chapter 8.4; Serial interface RS422/RS485, Can-Bus and Mini-USB are no longer available; LED Display subchapter 5.2 added; FCC Rules standard corrected: RSS-310; Chapter 9 “Description of Binary Protocol XP” updated; Valid from firmware version/application 6.0.0
1.06	2018-03-28	Updated Release Version Profinet application note to: DOC.EDO.000258.0002.EN; Profinet updated; WebUI updated to version 7.0.0; New function “Filter” in Settings added; New function “Payload Slave to Master” added under Settings -

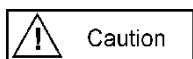
		> Measurement; New function "Time delay of network and forwarding hops" added under Settings -> Forwarding; The customer protocol accepts also CRC = 0 for incoming packets; Valid from firmware version/application 7.0.0
1.07	2018-06-20	Requirements for fall protection updated, see sections 1.1, 3 and 3.1
1.08	2018-09-12	WebUI updated to version 8.0.1; New BinProtXp message 0x25 (LOAD_DATA); Packet inspector supports incoming messages; Tightening torque for M12 connectors; Valid from firmware version/application 8.0.0
1.09	2018-12-05	WebUI updated to version 8.1.0
1.10	2019-03-27	Note added: the simultaneous use of the Profibus module and the relays is not possible
1.11	2019-11-06	New Firmware version 9.0.0; Added logging mode for logging to volatile memory; Added Russia country settings; Added plot with number of valid measurements, see section "Range measurement Statistics" 7.13.4
1.12	2020-02-14	Bug-Notification Note for Firmware Version 9.0.0 and older for Relay Zones Settings added, see section 7.6.12 and 8.2
1.13	2021-08-18	Pin assignment table for Ethernet corrected, see section 5.6.2; Relay zones description corrected, see section 7.6.12
1.14	2022-07-20	Note about using of logging mode added, see section 7.6.5
0015	2025-09-25	Valid from FW version 11.0.0, WebUI update; new option "Change features" under Settings added; opening angle values corrected; redesign of Symeo website, new branding; updated links to Download Product Documentation & Manuals; business address changed

SYMBOLS USED

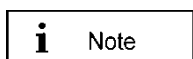
The following symbols are used throughout the documentation:



This symbol appears before instructions that must be followed at all times. Failure to comply with these instructions will result in personal injury.



This symbol appears before instructions that must be followed at all times. Failure to comply with these instructions will result in damage to equipment.

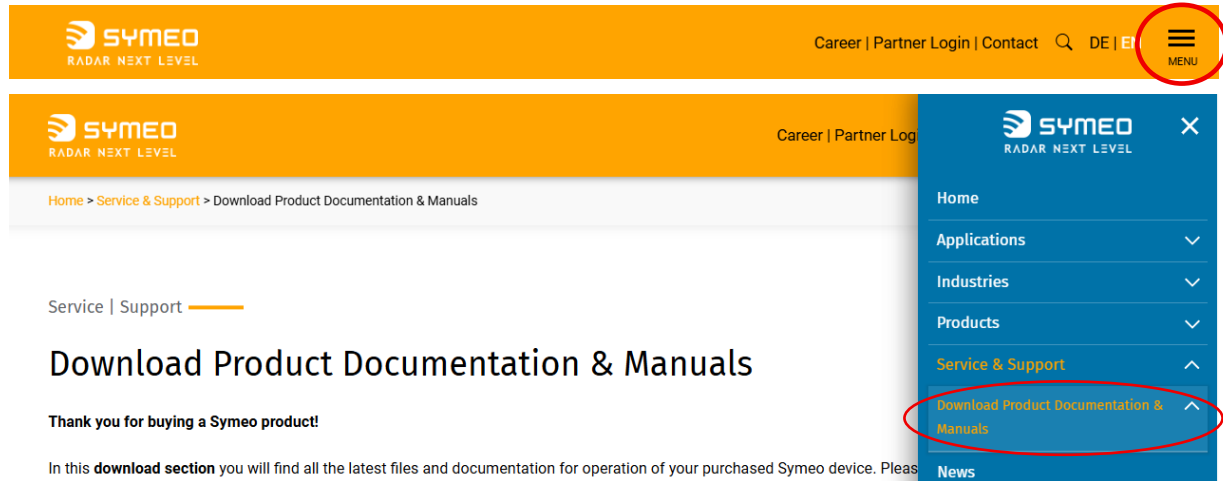


This symbol appears before information of particular importance.

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Delivery options and technical changes reserved.

Application-specific documentation is available in the main menu “Service & Support -> Download Product Documentation & Manuals” at www.symeo.com or from Symeo Support.



1 Safety Instructions

1.1 General



The LPR®-1D24 radars are purely tracking and assistance systems. They do not feature a functional safety level, e.g., Safety Integrity Level (SIL) or Performance Level (PL), as specified in functional safety standards (e.g., IEC 61508, EN ISO 13849, EN 62061).

Do not expose the radar to flames or heat above the specified temperature range.



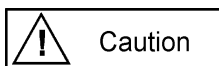
The LPR®-1D24 has to be secured with a fall protection. A fall protection is included in the delivery of the mounting bracket set MTM101758 available at Symeo.



Installed measurement paths need to be inspected and approved by qualified personal according to the instruction manual before putting them in operation.



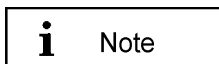
The radar may be used as an anti-collision warning system but must not interfere directly with the control of equipment, which may cause harm to persons or property.



Read the documentation before operation of the radar and follow the included safety notes.

Take note of the safety and operating instructions of the system in which you want to install the device.

Follow national safety standards and regulations.



Please make sure that you are aware of the latest technical document revision date. You can find it online on the website of Symeo GmbH in the main menu “*Service & Support -> Download Product Documentation & Manuals*” under:

<https://www.symeo.com/en/service-support/download-product-documentation-manuals/>

1.2 Mounting

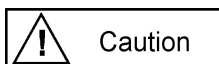


All mounting, installation and maintenance work must be carried out by an electrically qualified or trained person.



Screwed connections, mounting structures and the device itself must be examined at regular intervals, with respect to external damage and loosened connections especially if the radar is mounted exposed or is exposed to high stress.

1.3 Repairs and Modifications



Repairs or modifications on the devices should only be performed by Symeo GmbH.

Opening of the device is prohibited.

Any change or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The warranty shall be voided if defects are caused to the device by installing or exchanging system extensions.

1.4 Transport and Storage

Note

Use the original packaging or other suitable packaging for returns and whenever the system is to be transported. This ensures protection from crushing, impact, moisture and electrostatic discharge.

During setup and before operation, refer to the instructions for environmental conditions in this document and in the datasheet. Place the cables in such a way so that they do not build the possible cause of risk and are not damaged.

Do not drop the device and do not expose it to strong vibrations.

1.5 Power Supply

Caution

While installing or using it in open-air, the transient overvoltage cannot be excluded. Here, overvoltage protection is to be used for low voltage in accordance to DIN EN 61643-21 and IEC 61643-21.

While connecting the plug and sockets, please observe the correspondent chapter in this document "Specification of Connectors" and adhere to the specified tightening torques.

Do not use damaged cables (damaged insulation, bare wires). A defective cable may cause a fire hazard.

Be careful that the device can be damaged with reverse polarity despite of strict implementation of polarity reversal protection. In that case, the unit must be sent to the SYMEO service for further testing.

1.6 Setup and Operation

Caution

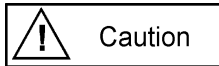
During mounting, make sure that no objects or liquids reach inside the device (risk of short-circuit).

Our units must not be exposed to aggressive vapour or liquids like given in an acid or alkaline environment.

In case of emergency (e.g. damaged housing, control elements or power cables, penetration of liquids or foreign bodies) switch off the device immediately, disconnect from the power line the device and inform your SYMEO service.

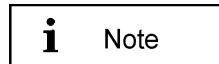
Protect the contacts of all sockets and plugs of the device from static electricity. Avoid touching the contacts. If touching the contacts is unavoidable, then one should take the following precautions: Touch a grounded object or wear a ground strap before touching the contacts. This will dissipate static charges.

Be aware that misuse, modification or damage of the sensor can lead to erroneous distance measurements.



The LPR®-1D24 must not be opened.

1.7 System Extensions and Accessories

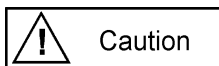


Data cables to peripheral devices must be shielded properly.

For LAN cabling, the requirements apply in accordance with EN 50173 and EN 50174-1/2. Use of either a Category 5 shielded cable for 10/100 Ethernet or Category 5e shielded cable for Gigabit Ethernet is a minimum requirement. The specifications of standard ISO/IEC 11801 must be complied with.

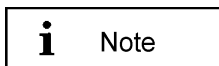
The warranty becomes void in case of any damages caused by replacement of components on the device during installation.

1.8 Additional Instructions



Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.9 General Requirements for Compliance of Radio Apparatus



The operation of this device requires compliance with regional radio regulations.

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.

2 Device Overview

The model number of LPR®-1D24 is **BSV101757**.

The LPR®-1D24 is a highly precise radio sensor for distance measurement. One pair of sensors enables long range measurements with high accuracy. At the same time, further measurement data such as the crane hook height or the load status can be transferred via the wireless LPR® channel. In addition, the relative approach speed of the LPR® sensors is also available.



Figure 1: LPR®-1D24 measurement path

Distance and speed can be used for internal collision avoidance decisions at predetermined distance thresholds. Optional on-board relays will be activated. All data is made available at standard interfaces of each unit in real-time.

The multi-channel radio antenna is integrated into the robust housing. Thus, the devices are easy to install and operate. Rough alignment between the facing units is sufficient for precise measurements, even for very long distances. Via a user-friendly HTML interface, the units can be easily configured and put into operation. Installing special software is not necessary.

Symeo LPR® radio works highly reliable even under adverse environmental conditions. Interference with any WiFi equipment operating in parallel can be excluded at all times. LPR®-1D24 sensors are maintenance-free.

A unique ID per unit allows operating multiple pairs in immediate vicinity.

2.1 Technical Data

The technical specifications for the LPR®-1D24 can be found in our datasheet under the following link:

<https://www.symeo.com/en/products/lpr-1d24/>

or

<https://www.symeo.com/en/service-support/download-product-documentation-manuals/>

The performance features of the purchased product depend on the version and production code (see chapter 7.4, „[Homepage -> Product properties -> Unit production code](#)”).

Radio Parameters

Frequency range: 24 GHz - 24,25 GHz

Transmission power: max. 100 mW EIRP

2.2 Field of View (FoV)

The LPR®-1D24 has an integrated antenna with $\pm 7^\circ$ opening angle horizontal and $\pm 5.5^\circ$ opening angle vertical.

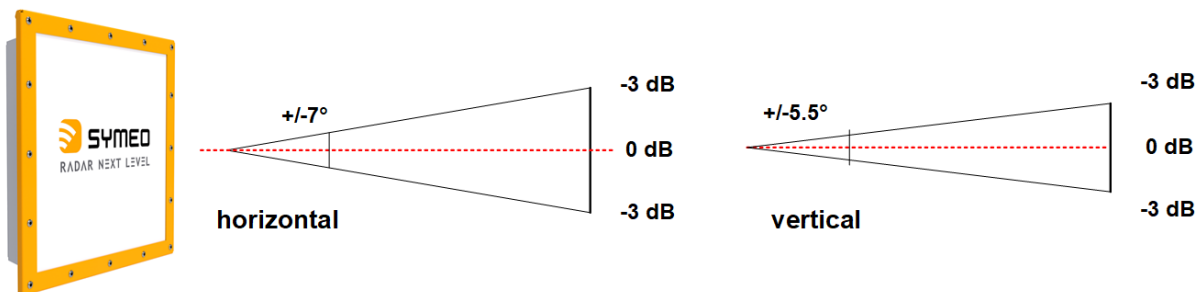
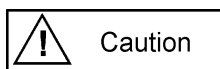


Figure 2: Field of view of LPR®-1D24



To achieve maximum performance and range, the two radars must be of the same orientation, preferably with plug connections facing downwards.

3 Mounting and Alignment

The LPR®-1D24 should be mounted with the separate mounting bracket set **MTM101758** (see *Figure 3*), which has to be ordered separately to the device.

Figure 3 shows a complete system including the mounting bracket. The bracket must be mounted with a pipe clamp on a pipe. The pipe diameter is best chosen between 40 mm and 75 mm. For mounting, a flat wrench of SW 13 is required.

For mounting the system, please proceed as follows:

- ⇒ At a suitable place, mount the LPR®-1D24 to a suitable pipe with the bracket. To adjust the radar, do not tighten the mounting bracket finally. Specified alignments have to be adhered to if indicated by Symeo.
- ⇒ A minimum distance of 3 meters between the measuring radars must be maintained to guarantee the specified accuracy. Mounting closer than the minimum distance decreases the accuracy at close proximity.
- ⇒ The radars must have the same orientation for mounting, for example both radars with connectors downwards. For outdoor use, the units have to be mounted with the connectors downwards.
- ⇒ The two radars should be mounted opposite to each other and there should be no offset horizontally and vertically from each other and the radars should not be twisted.
- ⇒ Now fix the radar by tightening the screws in the mounting bracket and the mounting bracket on the pipe in such a way that no modification is possible anymore. Flat wrench SW 13 is required.

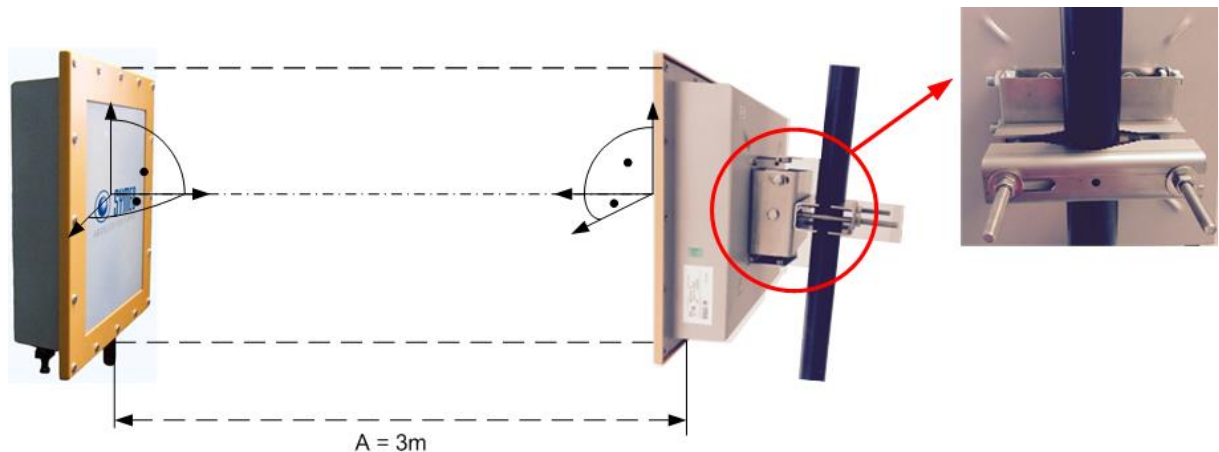


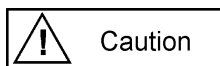
Figure 3: LPR®-1D24 inclusive mounting bracket

3.1 Mounting of Fall Protection

The LPR®-1D24 must be protected against fall. The fall protection included in the mounting bracket set MTM101758 consists of the following components (see *Figure 4*):

- A: 2 x ring nuts M5
- B: 2 x snap hooks 5 x 50 mm
- C: 1 x steel cable 3 mm x 1 m

The two ring nuts must be mounted on the back of the LPR®-1D24 laterally on the respective second screw from above, which are 4 mm longer than the other screws. Then the snap hook must be attached to the ring nuts. Please put the steel cable around a pipe or a bracket and hang it also into the snap hook (see *Figure 4*).



Caution

The fall protection should be installed before the assembly of the unit to secure it against falling.

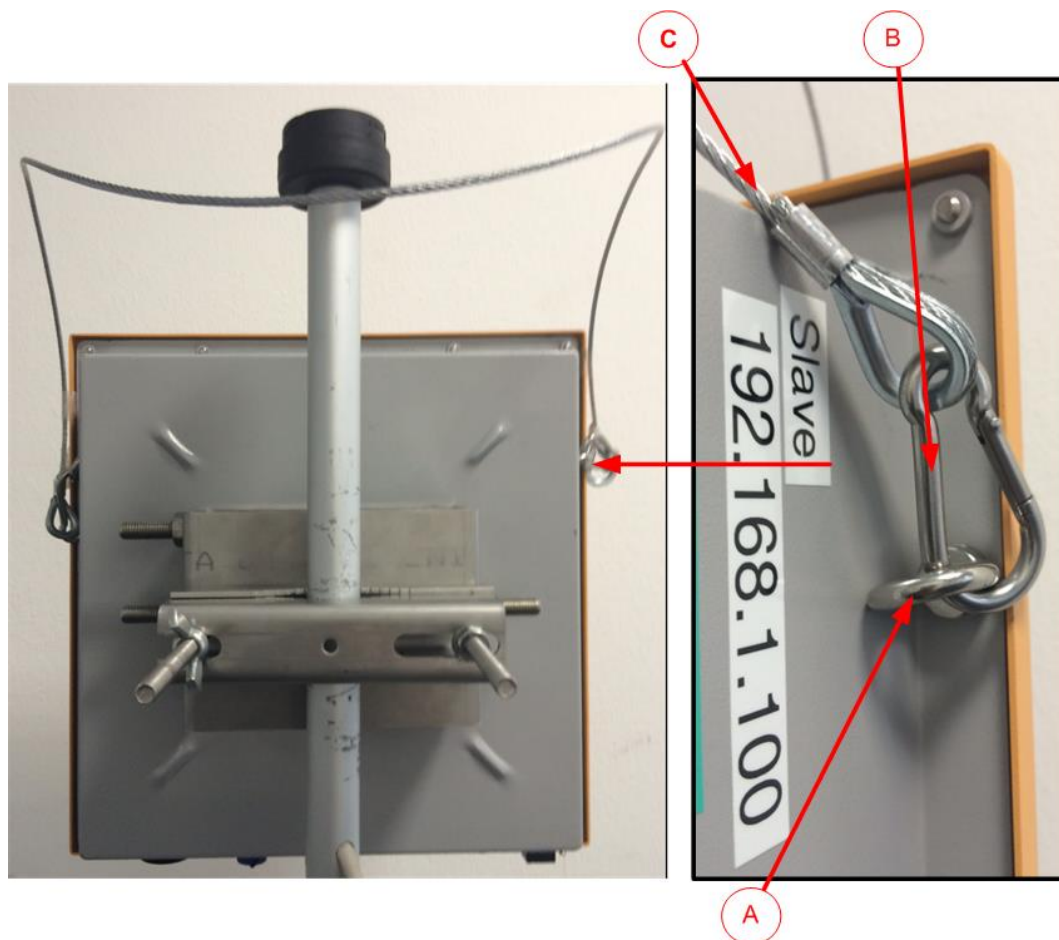


Figure 4: Mounting of fall protection

3.2 Fresnel Zone

The area for radio transmission between two antennas is called Fresnel zone. The main part of energy is concentrated in the first Fresnel zone.



Note

This area has to be free of any obstacles. Otherwise, the signal is interrupted or attenuated.

The radius of the first Fresnel zone can be calculated as follows:

$$b = 0.5 \cdot \sqrt{\lambda \cdot d}$$

λ is the wavelength and d the distance between the two antennas.

For a frequency of 24 GHz a wavelength λ of approx. 0.0125 m is calculated. The maximum radius between the two antennas is indicated with b . For different distances, the maximum radius is given in the following Table, see *Figure 5*.

Distance d	Radius b
10 m	0.18 m
50 m	0.40 m
100 m	0.56 m
250 m	0.89 m
500 m	1.25 m
1000 m	1.80 m

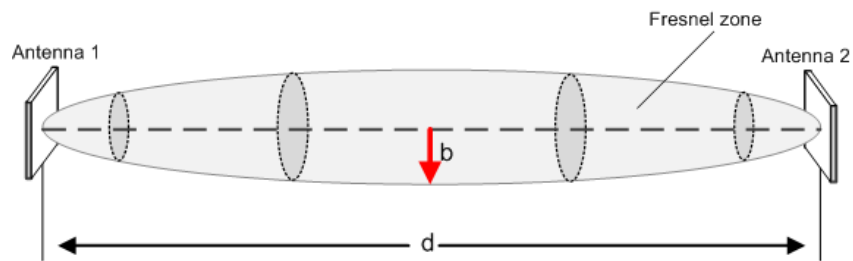


Figure 5: Calculation and figure of Fresnel zone

4 Requirements for Power Supply

The power supply should have the following characteristics:

- Potential-free
- Output power at least 25 W
- Output voltage 10 V DC to 36 V DC
- Short-term maximum current flow (when switched on):
 - At 24 V DC: 2000 mA for 50 ms
 - At 12 V DC: 2500 mA for 50 ms

5 Specification of Connectors

5.1 Overview of Connections

All connectors are fixed externally to the housing. *Figure 6* shows the connections in detail.

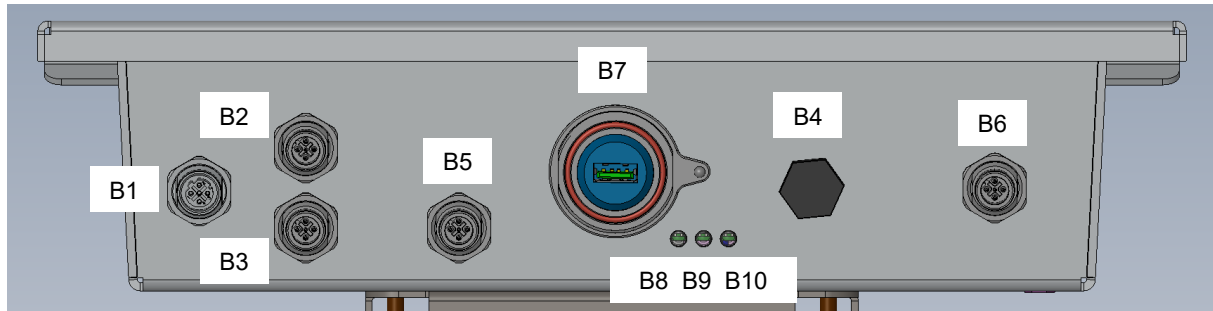


Figure 6: LPR®-1D24 Connectors - new Hardware Status - Deliveries from April 2017

- B1: Ethernet
- B2: Profibus IN (optional)
- B3: Profibus OUT/ Termination (optional)
- B4: Pressure equalization membrane
- B5: Relays (optional)
- B6: Power supply
- B7: USB – A (Logging)
- B8 - B10: Status LEDs

Previous Hardware State (Deliveries before April 2017)

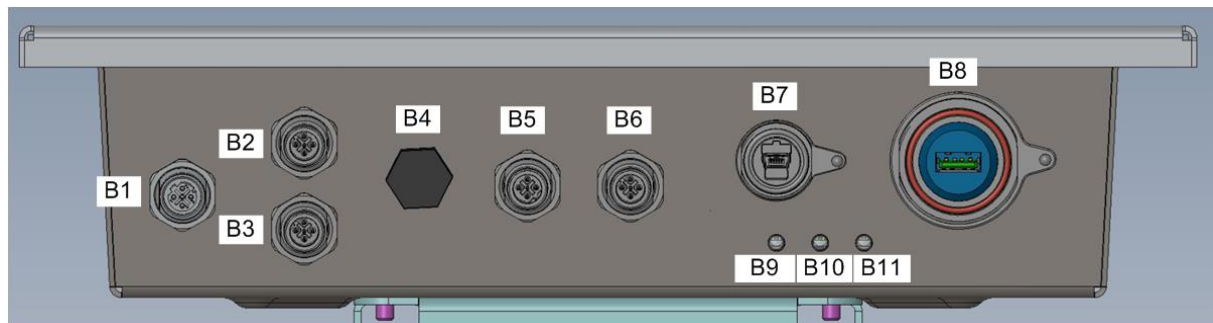


Figure 7: LPR®-1D24 Connectors - old Hardware Status - Deliveries before April 2017

- B1: Ethernet
- B2: Can-Bus IN/ Profibus IN (optional)
- B3: Can-Bus OUT/ Profibus OUT/ Termination (optional)
- B4: Pressure equalization membrane
- B5: Serial interface RS422/RS485 / Relays (optional)
- B6: Power supply
- B7: Mini-USB
- B8: USB – A (Logging)
- B9 - B11: Status LEDs



Note

On the following pages, you will find the connector type, the pin assignment, the product code and the Symeo order number. For more information, please see the corresponding Phoenix datasheets.



Note

Mounting instructions in the datasheets must be followed.

5.2 LED-Display

The LEDs on the operating display B8, B9 und B10 (see *Figure 6*) indicate different statuses of the device. Refer to the table below for this information.

LED Display		Status of the Device
LED B8 (Left) not used		
LED B9 (Middle) Ethernet-Status & Profibus:		
LED OFF		No Link
Green LED ON		Link OK
Green LED flashes		Ethernet activity
LED B10 (Right):		
Blue LED ON		Startup process / Reboot etc.
Red LED ON		Measurement not possible
Green LED ON		Measurement OK

Table 1: LED Display

5.3 Power Supply

The LPR®-1D24 is powered by a 4-pin M12-Connector (*Figure 6 – Connection B6*).

5.3.1 Plugs

Recommended connector:

- **SACC-M12FST-4PECON-PG 9-M - 1418052 (obsolete)**
SACC-M12FST-4CON-PG 9-M - 1418052
 Cable diameter: 6 - 8 mm
 Tightening torque: 0.4 Nm
Symeo order number: MTE101761

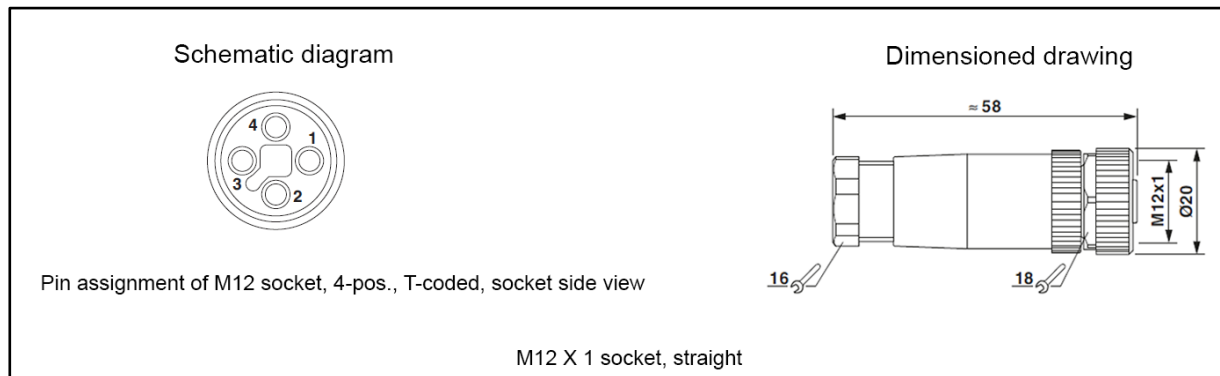


Figure 8: M12 Connector for power requirement

5.3.2 Pin Assignment

Power Supply 10 V DC – 36 V DC	M12 Connector
V_{DC+}	Pin 1
V_{DC+}	Pin 2 (bridged to Pin 1)
V_{DC-}	Pin 3
V_{DC-}	Pin 4 (bridged to Pin 3)

Table 2: Pin assignment power supply

5.4 Relay (Optional)

The LPR®-1D24 has a relay option. The relay contacts are routed via one 8-pin M12-connector outwards (*Figure 6 – Connection B5*).

The relay contacts are normally open.

Example: If no power is supplied to the device, the relay contacts are open (see *Figure 9*).

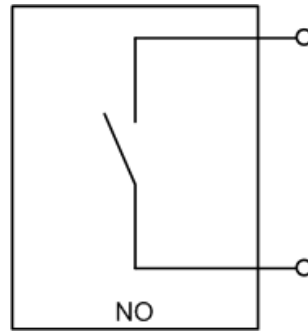


Figure 9: Scheme of normally open relay contacts

5.4.1 Plugs

Recommended connector:

- **SACC-M12FS-8CON-PG9-M - 1513347**
Cable diameter: 6 – 8 mm (PG9)
Tightening torque: 0.4 Nm
Symeo order number: MTE101847

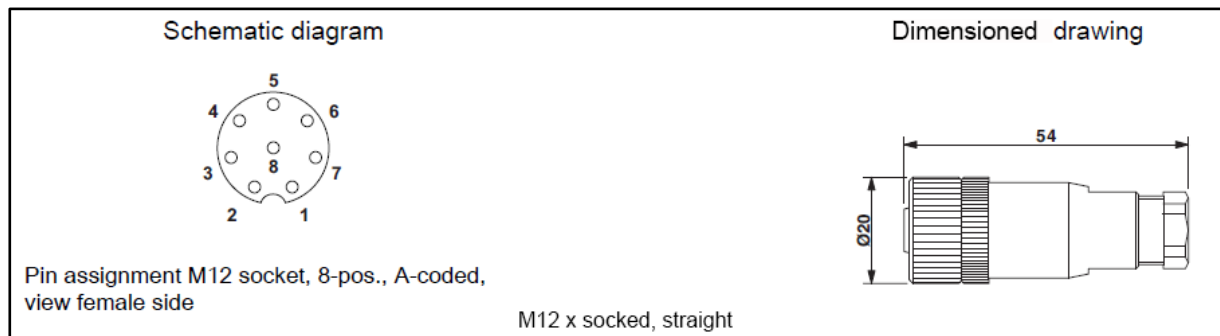


Figure 10: M12 Connector for relay

5.4.2 Pin Assignment

Pin assignment for relays is shown in *Table 3*.

Relay-Contact	Relay-Contact	M12 Connector
Relay A	13	Pin 1
Relay A	14	Pin 2
Relay B	13	Pin 3
Relay B	14	Pin 4
Relay C	13	Pin 5
Relay C	14	Pin 6
Relay D	13	Pin 7
Relay D	14	Pin 8

Table 3: Pin assignment relay

5.4.3 Contact Specification

Rated load:	1,2 A @ 25 V AC 1,2 A @ 30 V DC
Maximum switching voltage:	25 V AC 30 V DC
Maximum switching current:	8 A @ 25 V AC 5 A @ 30 V DC

Table 4: Contact specification

5.5 Profibus (Optional)

With our Product Discontinuation Notice PDN 25_006 from June 2025 we announced the discontinuation of the LPR®-1D24 with Profibus option (BSV101757 p). The last time Service Date will be end of 2027.

5.6 Ethernet M12

The LPR®-1D24 can be connected to Ethernet via M12-Connector (*Figure 6 – Connection B1*).

5.6.1 Plugs

Recommended connector:

- Connector Ethernet M12
 - **SACC-M12MSD-4CON-PG 7-SH - 1521258**
Cable diameter: 4 – 6 mm (PG7)
Tightening torque: 0.4 Nm
Symeo order number: MTE101768

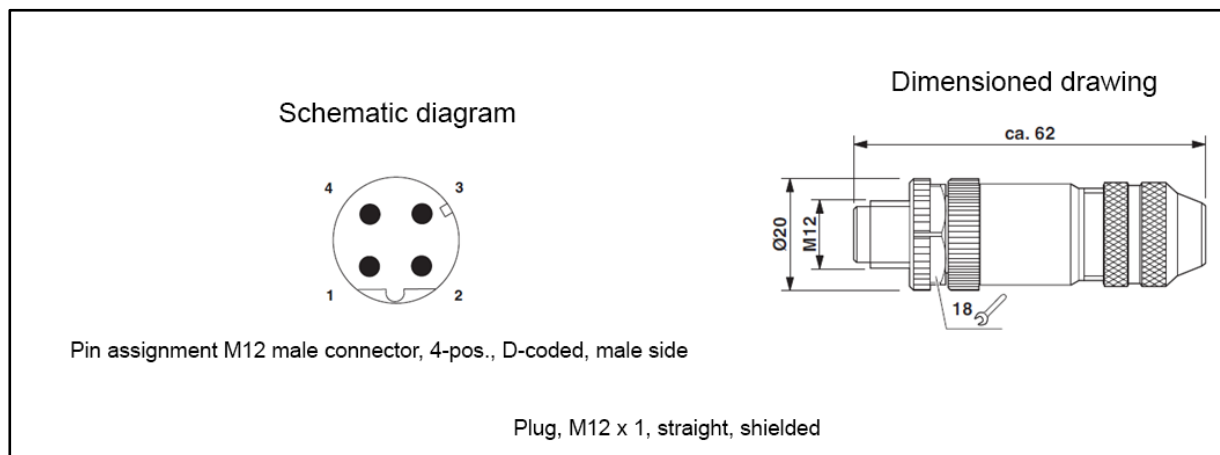


Figure 11: Ethernet M12

5.6.2 Pin Assignment

Signal	Color of Conductor PROFnet®	Color of Conductor EIA/TIA 568B	Pin Assignment
TD+	Yellow	White/Orange	1
TD-	Orange	Orange	3
RD+	White	White/Green	2
RD-	Blue	Green	4

Table 5: Pin assignment for Ethernet M12

5.6.3 Connector Cable M12 – RJ45

The connector cable M12 – RJ45 required for connecting via the Ethernet the LPR®-1D24 (with M12 connector) to a PC (with RJ 45 connector) for initial commissioning and configuration is available from Symeo:

- **Symeo order number:** MTE102007

5.7 USB – A Devices

The LPR®-1D24 has a USB-Flash Drive Connector, on which the data can be logged (*Figure 6 – Connection B7*).

5.7.1 Plugs

Recommended connector:

- USB-Flash Drive
 - USB-Flash Drive
 - Pin assignment according to USB-Standard
 - End cap flash drive: **DCA-17-03** from Samtec

6 LPR®-1D24 Housing Dimensions

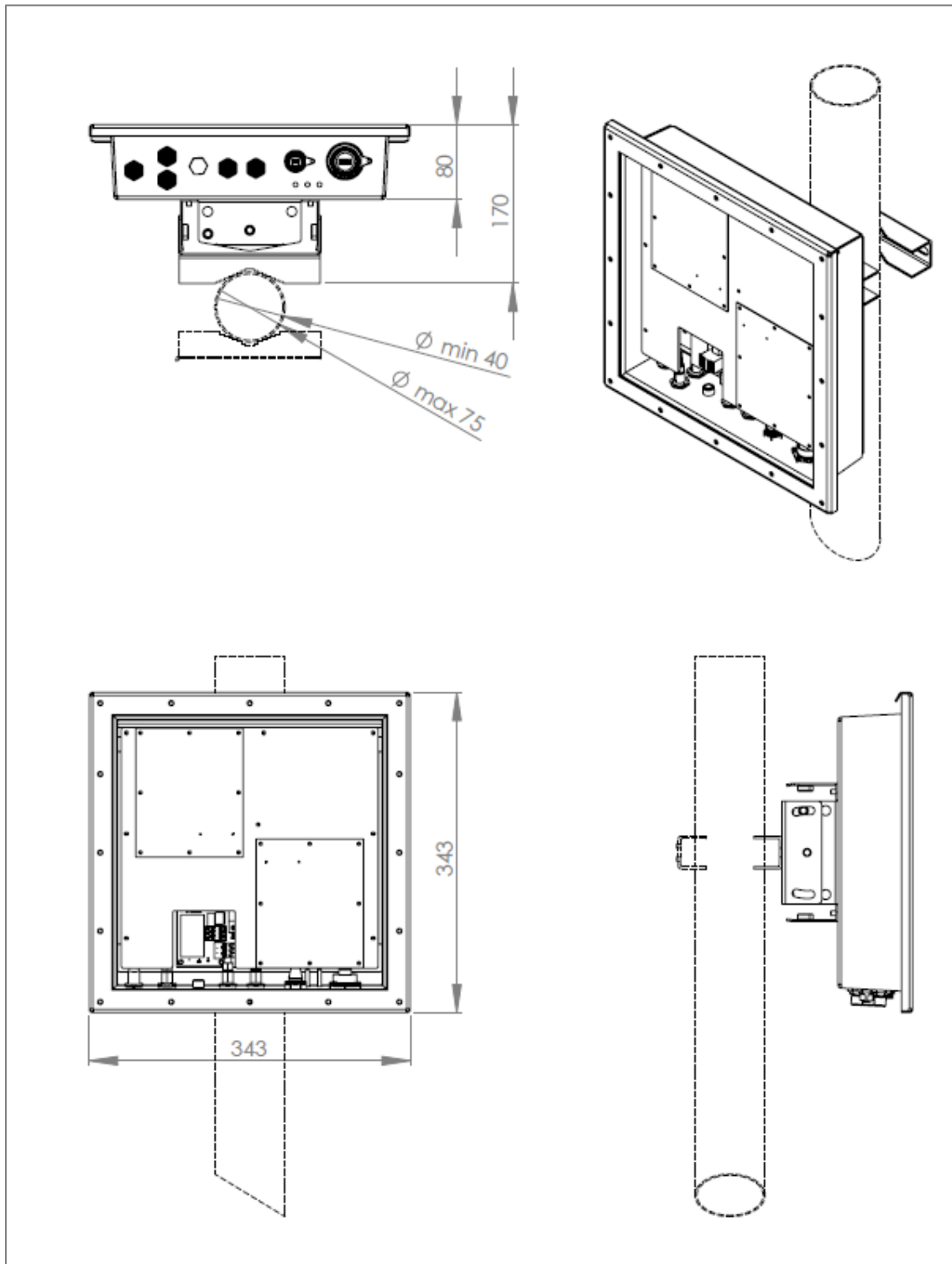
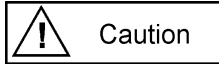


Figure 12: LPR®-1D24 Housing Dimensions

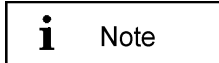
The minimum pipe diameter is 40 mm, the maximum pipe diameter is 75 mm.

7 Web User Interface for LPR®-1D24

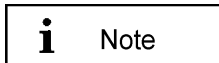
This chapter describes the LPR®-1D24 Web User Interface (WebUI).



Connection via the Ethernet is required.



For the Ethernet-connection, the connector cable M12 – RJ45 is required for configuration of the LPR®-1D24 with M12 and RJ45 connectors. This connector cable can be ordered by Symeo (see chapter 5.6.3).



Please read the Firmware Update Instructions „Readme_Firmware_Update_LPR-1D24.pdf “. You can find it online on the website of Symeo GmbH in the main menu “*Service & Support -> Download Product Documentation & Manuals*” in the sub-item “*Firmware*” -> *Notes of Firmware Update* under:

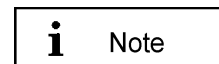
<https://www.symeo.com/en/service-support/download-product-documentation-manuals/>.

7.1 Establishing a TCP/IP Connection

In order for a radar to be successfully commissioned, the following requirements must be met:

- ⇒ The unit has been connected to the power supply.
- ⇒ Data link has been established over TCP/IP.

Once these prerequisites have been fulfilled, you can connect the unit to the network and commission the LPR®-1D24. How to do this is explained in the following chapters.



At delivery the IP-address of the LPR®-1D24 is set to **192.168.1.99**, if no IP address is specified on the housing of the LPR®-1D24. You can change the IP-address of the LPR®-1D24 via the web interface of the LPR®-1D24.

To get a connection between your PC and the LPR®-1D24 it is maybe necessary to change the network parameters of your computer. The PC and the LPR®-1D24 must be located in the same network. That means in this example that the first three numeric pads of both IP-addresses must be the same.

- ⇒ Disconnect your PC from the network.
- ⇒ Connect the LPR®-1D24 and the computer with a network cable.
- ⇒ Open the network settings of your computer (see *Figure 13*).

Network Settings for **Windows 11**:

Start Windows 11, type ‘network status’ into the search field of the taskbar and open the system control applet to configure your PC’s Ethernet interface (*Figure 13*). Under ‘Change adapter settings’ look for the Ethernet interface that is connected to the sensor and double click it. Open ‘Properties’ and look for ‘Internet Protocol Version 4 (TCP/IPv4)’. Edit the ‘Use following IP address’ settings. By default, the IP address of the sensor is set to 192.168.1.99.

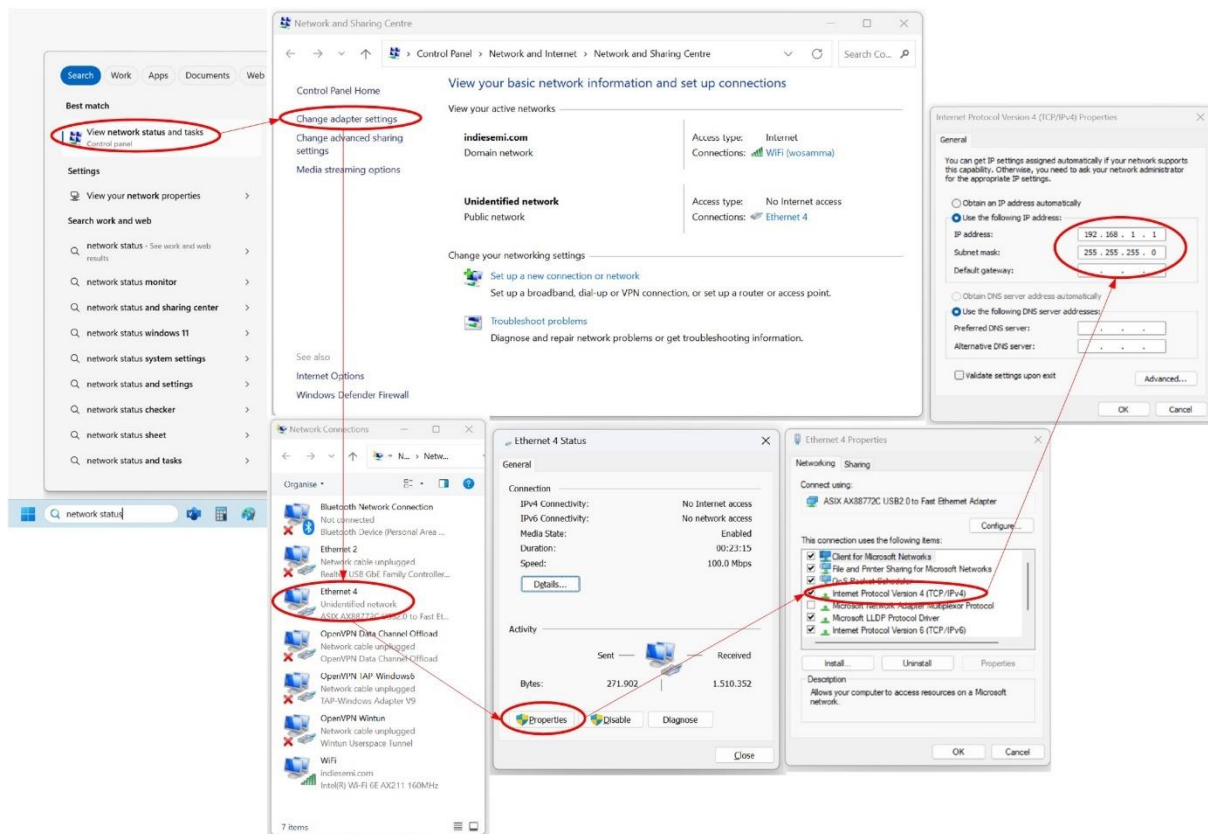
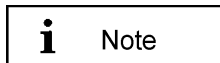


Figure 13: Network Settings

⇒ Enter a fixed IP-Address e.g., **192.168.1.1** and the subnet mask **255.255.255.0**.



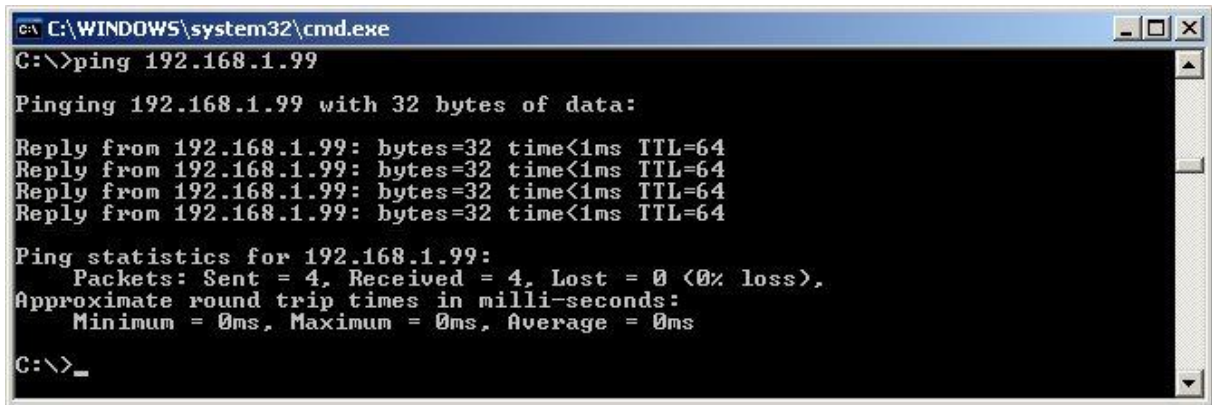
Note

If the firewall settings are too restrictive, you may not get access to the LPR®-1D24. In this case, deactivate the firewall temporarily.

The LPR®-1D24 should be available via your PC now. You can check the connection with a *ping* to the LPR®-1D24:

Open the Command-Window:

1. Press the Windows key + R to open the Run dialog box
2. Enter **cmd** and click **OK**
3. Enter in the cmd.exe window: **ping 192.168.1.99** or the IP-address of LPR®-1D24 unit and confirm.



```
C:\WINDOWS\system32\cmd.exe
C:\>ping 192.168.1.99

Pinging 192.168.1.99 with 32 bytes of data:

Reply from 192.168.1.99: bytes=32 time<1ms TTL=64
Reply from 192.168.1.99: bytes=32 time<1ms TTL=64
Reply from 192.168.1.99: bytes=32 time<1ms TTL=64
Reply from 192.168.1.99: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.1.99:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>_
```

Figure 14: Ping of LPR®-1D24

The LPR®-1D24 should answer with a *Reply*.

7.2 Open the Web User Interface



Note

A TCP/IP Connection is required.

After switching on, it may take some time until the connection to the WebUI is established.

⇒ Open your web browser. In the address bar of the web browser enter the IP-address of the LPR®-1D24: <http://192.168.1.99>. Press **Enter**.

A connection is established with your LPR®-1D24. The homepage of the LPR®-1D24 Web User Interface will appear, *Figure 15*.

A language selection can be made using the flags in the top right corner of the homepage.

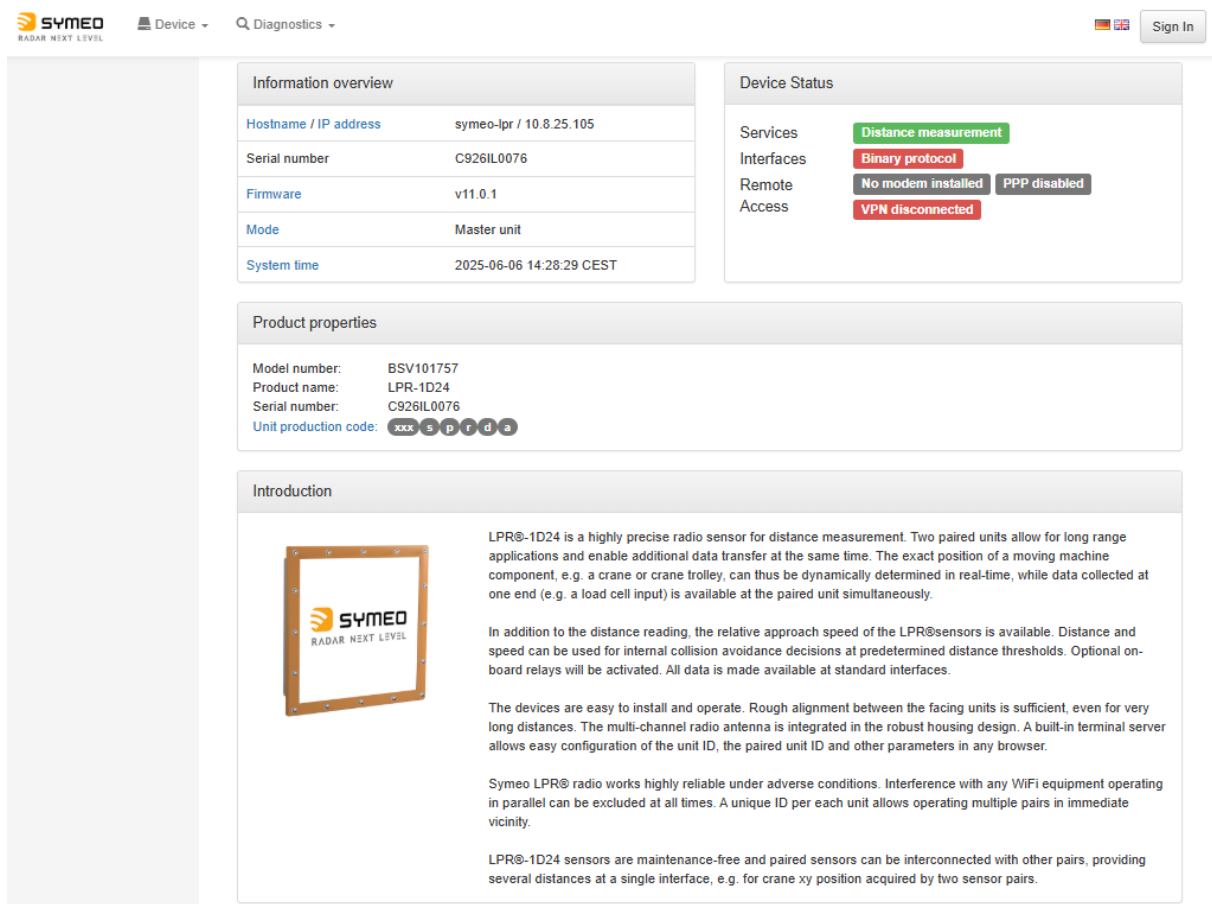
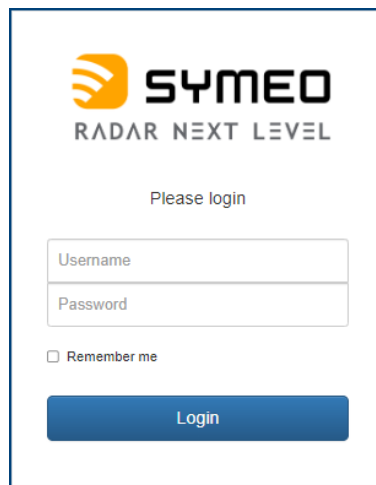


Figure 15: Open Web User Interface

7.2.1 Sign In

In order to be able to change settings a sign in to the WebUI is necessary. Press therefore “Login” in the upper right corner of the WebUI. You will be prompted to enter your information

for authentication. The dialog box with the username and password field will appear (see *Figure 16*).



The image shows a login dialog box for the SYMEO WebUI. At the top is the SYMEO logo with the tagline 'RADAR NEXT LEVEL'. Below the logo, it says 'Please login'. There are two input fields: 'Username' and 'Password'. Below these fields is a checkbox labeled 'Remember me'. At the bottom is a blue button labeled 'Login'.

Figure 16: WebUI Login

⇒ Enter the username "**syмео**" and the password "**54all2u**" and press "**Login**". Now your status is displayed as „*Logged in*“.

7.2.2 Initial Operation

When the WebUI is opened for the first time or after a software reset, the note „*Environment uninitialized*“ will appear (see *Figure 17*).

i Note

During the initial commissioning, you need to configure the operating region in which you want to use this unit. This is necessary to abide to the radio signal restrictions enforced by the local authorities. Your selection will have impact on the bandwidth as well as on the maximum transmit power and hence maximum range of the radar unit.

Since this is a mandatory setting, all functionality of this device will remain disabled, until the country setting has been successfully configured.

The screenshot shows the SYMEO web interface with the user logged in as 'symeo'. The 'Information overview' section displays the following details:

Hostname / IP address	symeo-lpr / 192.168.1.99
Serial number	EC26IL0252
Firmware	v11.0.0
Mode	Master unit
System time	2025-06-06 13:41:47 CEST

The 'Device Status' section shows:

- Services: Distance measurement (active)
- Interfaces: Binary protocol (active)
- Remote Access: No modem installed, PPP disabled, VPN disconnected

A red banner indicates 'Environment uninitialized' with the message: 'The working environment of this station has not been set, yet. Before you can use this device, you need to configure the operating country. This is necessary to abide to the radio signal restrictions enforced by the local authorities. Since this is a very important setting, all functionality of this device will remain disabled, until the working environment is confirmed. To configure the working environment, please use the button below.' A 'Configure environment' button is visible.

The 'Product properties' section lists:

- Model number: BSV101757
- Product name: LPR 1D24
- Serial number: EC26IL0252
- Unit production code: 000000

The 'Introduction' section includes an image of the SYMEO LPR-1D24 sensor and text describing its capabilities as a highly precise radio sensor for distance measurement, its ease of installation, and its reliability under adverse conditions.

Figure 17: Initial operation - Environment uninitialized

⇒ Click the „*Configure environment*“ button to configure the working environment.

The screenshot shows the 'Initial setup of environment' screen. The 'Information overview' and 'Device Status' sections are identical to Figure 17. The 'Initial setup of environment' section features a 'Country' dropdown menu set to 'United Kingdom of Great Britain and Northern Ireland' and a 'Save' button. A note states: 'Please select your country to determine the operation environment. This is important to abide to the regulations of your local authorities concerning the radio signal specifications. The setting has to be the same on all Symeo devices in one setup.'

Figure 18: Initial setup of environment of LPR®-1D24

⇒ Select your country to determine the operating environment and confirm it with the „*Save*“ button (see *Figure 18*).

The setting has to be the same on all Symeo devices used in a specific country.

⇒ Now activate the settings by clicking the „*Activate changes*“ button (see *Figure 19*).

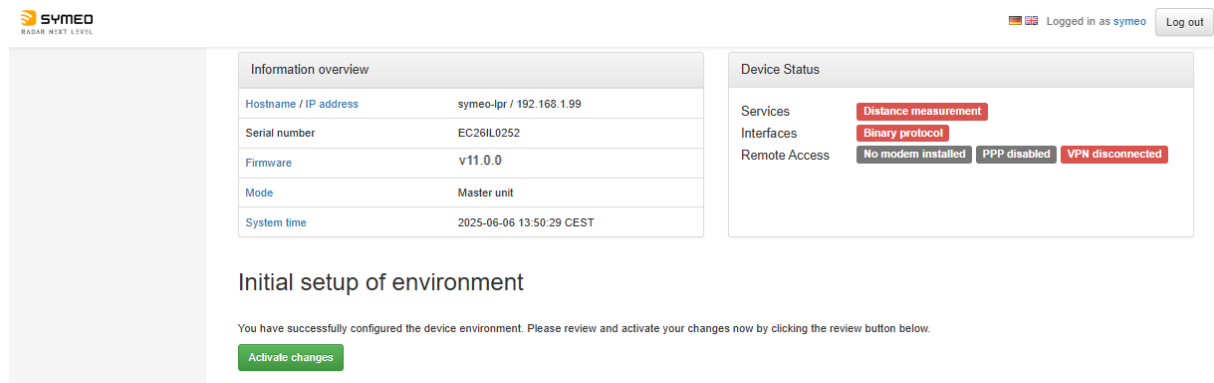


Figure 19: Initial setup of environment - Activate changes

The following window appears:

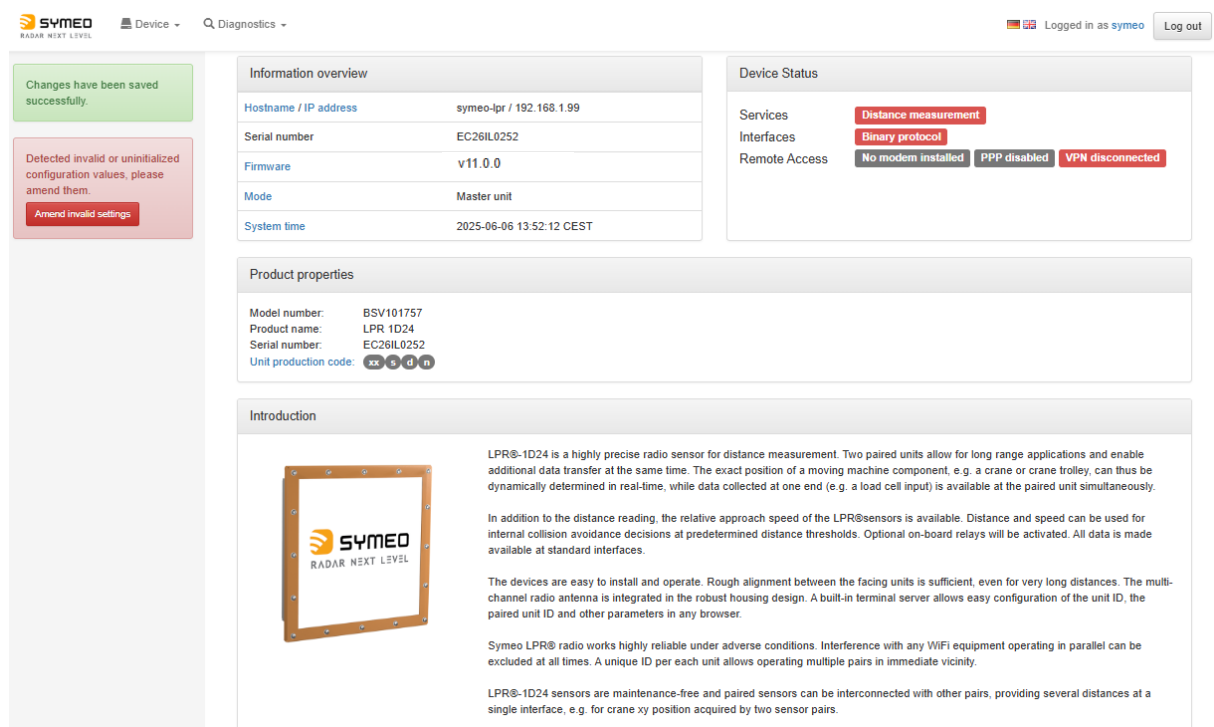


Figure 20: Initial setup of environment - Amend invalid settings

In the top left corner, the red frame appears which indicates that for a functioning measuring distance, the parameter values, which have not yet been set or are invalid, are still to be processed. This is always the case during the initial operation.

⇒ Click the „Amend invalid settings“ button.

Mandatory Settings

SYMEO

RADAR NEXT LEVEL

Device
Diagnostics

Logged in as symeo
Log out

Detected invalid or uninitialized configuration values, please amend them.
Amend invalid settings

Settings
Customer protocol
Filter
Forwarding
LAN
Logging
Measurement
Modem
Network routes
Profinet
Remote access
Timezone
VPN remote access

Information overview

Hostname / IP address	symeo-lpr / 192.168.1.99
Serial number	EC26IL0252
Firmware	v11.0.0-20-g0fc7ce7
Mode	Master unit
System time	2025-06-06 13:56:24 CEST

Device Status

Services
Interfaces
Remote Access

Distance measurement
Binary protocol
No modem installed
PPP disabled
VPN disconnected

Measurement

LPR group ID
1

Integer number in range 1..1022
Group identifier of one pair of LPR units associated together. Has to be the same on units measuring with each other.

Measurement mode
Master unit

Measuring mode for the LPR-1D24 unit. Any measuring pair of LPR-1D24 stations has to consist of one master and one slave unit.

Number of FSK communication channels
20

Number of different FSK communication channels available. Must be the same value for all stations at the same site. The smaller the number of FSK channels, the higher the measurement bandwidth.

FSK communication channel
-1

ValueError: value violates lower boundary
Integer number in range 151..170
Data communication channel number. Has to be the same on all units needing to communicate with each other.

Measurement channel
NA

ValueError: value is not a valid selectable option
Changes ramp slope of measurements. Has to be configured identically on master and slave unit of one pair. Can be changed to separate interfering pairs when other pairs are close by.

Customer specific offset
0
m

Number in range -1.0..1.0 m
This offset is added to the measured distance and is to be used only for replacement of LPR-1D24 Master units with production date before December 2016 (see application note DOC.EDO.000241). Offset value which needs to be added is 0.52 m.

Payload Slave to Master
50 bytes (up to 33 Hz measurement rate)

Concerns only the payload from slave to master. For master to slave transmissions 200 bytes payload is always possible. This setting must be the same on master and slave.

Submit changes

Figure 21: Settings window for mandatory values

You will be automatically guided to the settings menu sub-item „*Measurement*“, where strictly necessary parameters must be set. Further information about these mandatory settings please refer to the chapter 7.6.6.

⇒ If you have entered all these settings, click the „*Submit changes*“ button.

Parameters have been checked. Please save changes below.

There are unsaved changes. After you are finished editing, save your changes.

Review...

Settings

- Customer protocol
- Filter
- Forwarding
- LAN
- Logging
- Measurement**
- Modem
- Network routes
- Profinet
- Remote access
- Timezone
- VPN remote access

Information overview

Hostname / IP address	symeo-lpr / 192.168.1.99
Serial number	EC26IL0252
Firmware	v11.0.0-20-g0fc7ce7
Mode	Master unit
System time	2025-06-06 14:03:02 CEST

Device Status

Services: Distance measurement

Interfaces: Binary protocol

Remote Access: No modem installed, PPP disabled, VPN disconnected

Measurement

LPR group ID: 1
Integer number in range 1..1022
Group identifier of one pair of LPR units associated together. Has to be the same on units measuring with each other.

Measurement mode: Master unit
Measuring mode for the LPR-1D24 unit. Any measuring pair of LPR-1D24 stations has to consist of one master and one slave unit.

Number of FSK communication channels: 20
Number of different FSK communication channels available. Must be the same value for all stations at the same site. The smaller the number of FSK channels, the higher the measurement bandwidth.

FSK communication channel: 151
Value has changed from "-1"
Integer number in range 151..170
Data communication channel number. Has to be the same on all units needing to communicate with each other.

Measurement channel: 0
Value has changed from "NA"
Changes ramp slope of measurements. Has to be configured identically on master and slave unit of one pair. Can be changed to separate interfering pairs when other pairs are close by.

Customer specific offset: 0 m
Number in range -1.0..1.0 m
This offset is added to the measured distance and is to be used only for replacement of LPR-1D24 Master units with production date before December 2016 (see application note DOC.EDO.000241). Offset value which needs to be added is 0.52 m.

Payload Slave to Master: 50 bytes (up to 33 Hz measurement rate)
Concerns only the payload from slave to master. For master to slave transmissions 200 bytes payload is always possible. This setting must be the same on master and slave.

Submit changes Review changes

Figure 22: Change of mandatory values

7.3 Change Settings, Review and Save Changes

Upon pressing the „Submit changes” button in any settings sub item, the WebUI is updated and the choice of valid settings is adapted to your made changes. The settings will however not be applied to the radar until you press the „Save all changes and perform reboot” button in the „Review changes” page or the „Save all changes without reviewing” button in the „Review...” dropdown menu in the top left corner of this page.

- ⇒ You can review your changes by clicking the „Review...” button in the top left corner of the homepage (see Figure 23) or the „Review changes” button at the bottom of the screen (see Figure 22).

SYMEO RADAR NEXT LEVEL Device Diagnostics Logged in as symeo Log out

There are unsaved changes. After you are finished editing, save your changes.
Review...
Save all changes without reviewing
Discard all changes

Customer protocol
Filter
Forwarding
LAN
Logging
Measurement
Modem
Network routes
Profinet
Remote access
Timezone
VPN remote access

Information overview

Hostname / IP address	symeo-lpr / 192.168.1.99
Serial number	EC26IL0252
Firmware	v11.0.0-20-g0fc7ce7
Mode	Master unit
System time	2025-06-06 14:05:29 CEST

Device Status

Services: Distance measurement
Interfaces: Binary protocol
Remote Access: No modem installed, PPP disabled, VPN disconnected

Measurement

LPR group ID: 1
Integer number in range 1..1022
Group identifier of one pair of LPR units associated together. Has to be the same on units measuring with each other.

Measurement mode: Master unit
Measuring mode for the LPR-1D24 unit. Any measuring pair of LPR-1D24 stations has to consist of one master and one slave unit.

Number of FSK communication channels: 20
Number of different FSK communication channels available. Must be the same value for all stations at the same site. The smaller the number of FSK channels, the higher the measurement bandwidth.

FSK communication channel: 151
Value has changed from "-1"
Integer number in range 151..170
Data communication channel number. Has to be the same on all units needing to communicate with each other.

Measurement channel: 0
Value has changed from "NA"
Changes ramp slope of measurements. Has to be configured identically on master and slave unit of one pair. Can be changed to separate interfering pairs when other pairs are close by.

Customer specific offset: 0 m
Number in range -1.0..1.0 m
This offset is added to the measured distance and is to be used only for replacement of LPR-1D24 Master units with production date before December 2016 (see application note DOC.EDO.000241). Offset value which needs to be added is 0.52 m.

Payload Slave to Master: 50 bytes (up to 33 Hz measurement rate)
Concerns only the payload from slave to master. For master to slave transmissions 200 bytes payload is always possible. This setting must be the same on master and slave.

Submit change Review changes

Review changes

Changed settings

Measurement Settings				
Parameter	Old value	New value	Unit	Actions
FSK communication channel	-1	151		
Measurement channel	NA	0		

Save all changes Discard all changes

Figure 23: Save or Discard all changes

- ⇒ Confirm the changes by clicking the „Save all changes“ button. The dialog box „Changes have been applied“ will now appear (see Figure 24).
- ⇒ If you would like to discard all changes made after the last save, press „Discard all changes“ in the dropdown menu „Review...“ in the top left corner of this page or at the bottom of the screen.

After saving, it takes several seconds until the measurement is restarted with the new settings. Some settings additionally require a reboot of the radar.

i Note

Please note that **all** parameter changes must be submitted and saved as described above. Only then the changes will be applied to the device.

The screenshot shows the SYMEO web interface. At the top left, there is a green box with the text "Changes have been saved successfully." Below this, the "Information overview" section displays the following data:

Hostname / IP address	symeo-lpr / 192.168.1.99
Serial number	EC26IL0252
Firmware	v11.0.0-20-g0fc7ce7
Mode	Master unit
System time	2025-06-06 14:08:49 CEST

Below the table, it says "Review changes" and "No changes." To the right, the "Device Status" section shows:

- Services: Distance measurement (active)
- Interfaces: Binary protocol (active)
- Remote Access: No modem installed, PPP disabled, VPN disconnected

Figure 24: Changes have been saved

You can always come back to the start page if you press on the Symeo symbol  in the top left-hand corner of this page.

7.4 Homepage

On the home page (see Figure 25), miscellaneous information about the LPR®-1D24 will be displayed. Beside the „Information overview“ and the „Device Status“ which is displayed on each page, you can also see here the „Product properties“ of the unit. Below is a brief introduction about the sensor.

The screenshot shows the SYMEO web interface homepage. At the top left, there is a green box with the text "Logged in". Below this, the "Information overview" section displays the following data:

Hostname / IP address	symeo-lpr / 10.8.25.105
Serial number	C926IL0076
Firmware	v11.0.1
Mode	Master unit
System time	2025-06-04 14:41:43 CEST

To the right, the "Device Status" section shows:

- Services: Distance measurement (active)
- Interfaces: Binary protocol (active)
- Remote Access: No modem installed, PPP disabled, VPN disconnected

Below these, the "Product properties" section displays:

Model number:	BSV101757
Product name:	LPR-1D24
Serial number:	C926IL0076
Unit production code:	xxx 5 1 1 1 1 1

At the bottom, the "Introduction" section contains text about the LPR®-1D24 sensor, its features, and installation instructions. A small image of the SYMEO logo is also present.

Figure 25: The Home Page of LPR®-1D24

On top of every page, the device status is shown (see *Figure 26*):

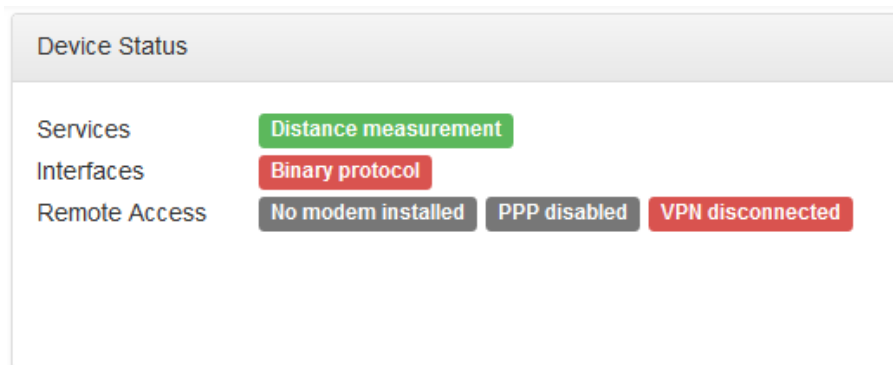
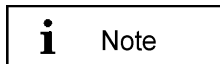


Figure 26: WebUI - Device Status

- The „*Device Status*” shows the status of the Services, of the interfaces and the Remote Access status.
 - The service status „*Distance measurement*” and the interface status „*Binary protocol*” will be displayed in green, if the measurement path is configured correctly and the customer equipment has been connected to the binary protocol. This also applies to the Remote Access Option if it is available, configured and connected.



It takes some seconds after switching on or after a reboot before the indicator color changes to green. A yellow color could indicate an error in the configuration settings.

- The interface status „*Binary protocol*” button is only green if the customer equipment is connected to the binary port.

The „*Information overview*” window (see *Figure 27*) shows:

- Hostname / IP address of the LPR®-1D24
- Serial number
- Firmware
- Mode: Master or Slave
- System time

Information overview	
Hostname / IP address	symeo-lpr / 10.8.25.105
Serial number	C926IL0076
Firmware	v11.0.1
Mode	Master unit
System time	2025-06-04 14:43:37 CEST

Figure 27: WebUI - Information overview

Under the field “*System time*” (see *Figure 28*), you can either choose to

- use the system time of your computer or
- enter the time in the current timezone configured for the unit or as UTC time

Set system time

New system time

You can either choose to use the system time of your computer by clicking this button:

Set to current time of this system

Or you can enter the new date and time for this unit manually. You can choose to enter the time in the current timezone configured for the unit or as UTC time. Please select the appropriate option.

New date and time

CEST

2018-10-10 15:12:58

Set time

Figure 28: Set system time

The „*Product properties*” window (see Figure 29) displays:

- Model number (Product ID)
- Product name
- Serial number
- Unit production code (gives conclusions regarding the equipment and the performance features of the purchased product)

Product properties

Model number:	BSV101757
Product name:	LPR-1D24
Serial number:	DACH0001
Unit production code:	xxx s p r d a

Figure 29: WebUI - Product properties

⇒ Click the “*Unit production code*” button under the menu item „*Product properties*” (see Figure 29). The table with the product features will be displayed.

The table below shows a complete list of all the features available for this unit (see Figure 30).

Product features		
Please inspect the table below to see a complete list of all features available for this unit.		
Feature description	Production code element	Active
LPR®-1D24 metal housing with integrated multiple antennas (redundant range measurement), 1D controller, interface TCP/IP; range 50 m; accuracy: +/-20 cm (3 σ)	s	Yes
Profibus	p	Yes
4 opening relay switches	r	Yes
Data transmission of user data and relay switch commands via radio signal	d	Yes
High accuracy for range measurement +/-2.5 cm (1 σ)	a	Yes
Range option: 0 to 200 m	x	No
Range option: 0 to 500 m	xx	No
Range option: 0 to 1000 m	xxx	Yes
Profinet	n	No

Figure 30: WebUI - Product features



Note

Not all product features can be combined with each other. For example, simultaneous use of the Profibus module and the relays is not possible.



Note

The performance features of the purchased product depend on the version and production code. For more Information, please contact Symeo support.



Note

The additional features can be added later to the standard device.
 After clarifying the commercial details, Symeo generates a file, which can be installed on the device by the customer in a similar way as a firmware update. Any number of stations can be updated with the same file. For more information, please refer to the chapter 7.8.

7.5 Device

In this menu (see Figure 31), the following subpages are available:

- Settings
- Upload configuration
- Change features
- Downloads
- Firmware update
- Factory reset
- Reboot device

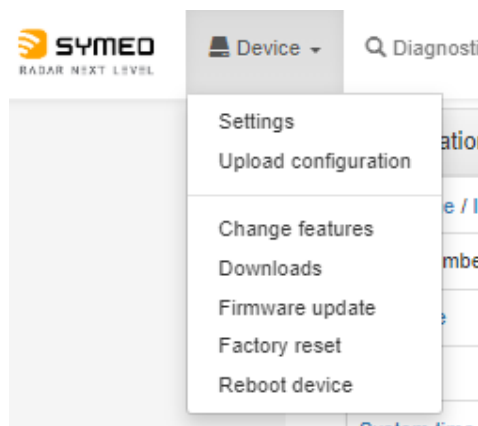


Figure 31: Device Menu

7.6 Device - Settings

In this menu (see Figure 32), the following subpages are available:

- Customer protocol
- Filter
- Forwarding
- LAN
- Logging
- Measurement
- Modem
- Network routes
- Profibus
- Profinet
- Relay mapping
- Relay zones
- Remote access
- Timezone
- VPN remote access

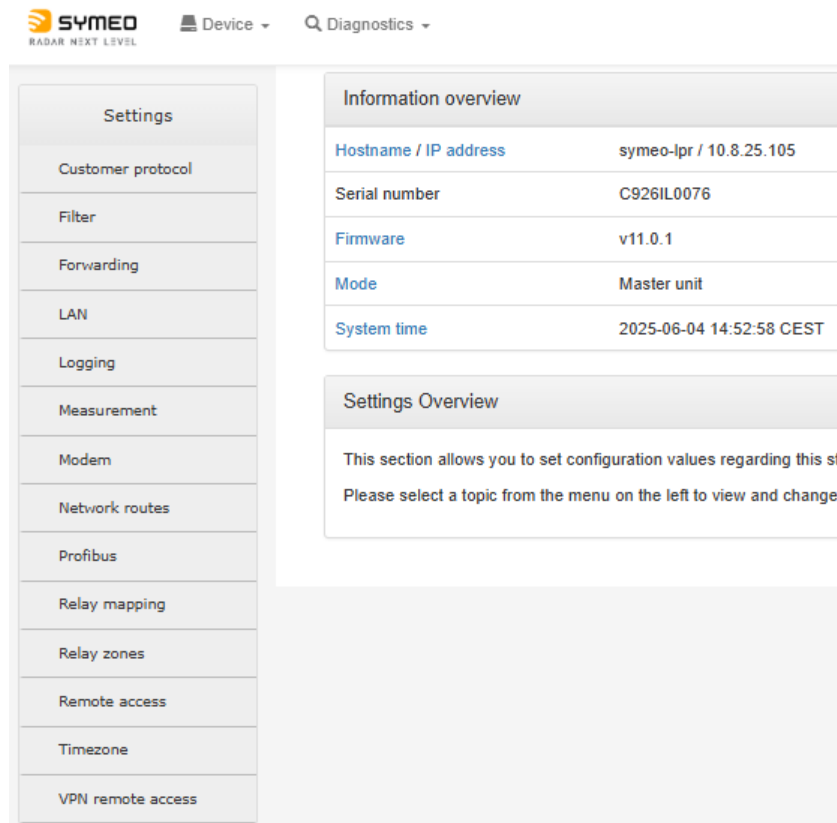


Figure 32: Device - Settings Menu

This section enables you to adjust configuration settings of this unit. This includes configuring the network interface and the device environment.

Please select a topic from the menu on the left to view and to change the corresponding properties.



Note

To commission the unit, the entries must be always done under the menu item „*Measurement*“.

If you want to change the default settings of the IP addresses and ports, you must also make changes under the menu items „*Customer protocol*“ and „*LAN*“ (all other settings only when required).

Some settings are only displayed on the screen if the necessary hardware is available (e.g. Profibus, Profinet or Relay).

7.6.1 Device - Settings - Customer Protocol

In this menu (see Figure 33), the following settings are available:

- **Mode of customer protocol** –
 - Interface to customer - either TCP or UDP
- **Port** –
 - Port of customer protocol binary XP
- **Protocol frame length** –
 - Frame length of customer protocol binary XP

- **TX requests –**
 - Generates TX requests to inform the customer that the LPR®-1D24 is ready to process a new USER_DATA message
- **Enable custom output interval –**
 - Enables a custom output interval of own distance. If disabled, the own measured distance is output with the measurement rate. The current measurement rate you can find under „Diagnostics -> Range measurement statistics”
- **Output interval of own distance –**
 - Output interval of own measured distance in milliseconds. Outputs interval of the data record at the customer interface.
- **Output forwarded relay commands**
 - Outputs relay switch messages forwarded by another LPR®-1D24 unit.

Customer protocol

Mode of customer protocol	TCP server (customer connects to LPR-1D24 unit) Interface to customer - either TCP or UDP
Port	3046 Integer number in range 1100..65535 Port of customer protocol binary XP
Protocol frame length	47 Integer number in range 47..100 byte Frame length of customer protocol binary XP
TX requests	Disabled Generate TX request's to inform the customer, that LPR unit is ready to process a new USER_DATA message
Enable custom output interval	Enabled Enable a custom output interval of own distance. If disabled, the own measured distance is output with measurement rate. If disabled and the device is in slave mode, no error messages are generated.
Output interval of own distance	100 Integer number in range 25..60000 ms Output interval of own measured distance in milliseconds
Output forwarded relay commands	Disabled Output relay switch messages, forwarded by another LPR1D24 unit

Submit changes

Figure 33: Device - Settings - Customer protocol

7.6.2 Device - Settings - Filter

In this menu (see Figure 34), the following settings are available:

- **Enable advanced filtering**
 - Enables speed dependent filtering method
 - Decreases filter lag time and measurement noise



Note

The filter should only be enabled under good measuring conditions.



Note

This function must be set on the Master unit.

Figure 34: Device - Settings - Filter

7.6.3 Device - Settings - Forwarding

The LPR®-1D24 can forward the following data from one radar to another:

- The measured distance
- USER- and RELAY-data received by customer protocol (can only be forwarded via radio transmission)
- Data already forwarded by another LPR®-1D24

In this menu (see *Figure 35* and *Figure 36*), the following settings are available:

- **Radio channel forwarder** (is activated by default) –
 - Forwards all possible data via radio channel to partner LPR®-1D24. The maximum data amount, which can be transmitted, is 200 bytes. If more than 50 bytes shall be transferred from Slave to Master via radio transmission, please adjust setting „Measurement -> Payload Slave to Master”
 - See Application example in the chapter 8.3.
- **LAN forwarder** (must be first activated by the user) –
 - Forwards all possible data (USER- and RELAY-data is only forwarded via LAN if it was forwarded via radio channel beforehand) via LAN to connected LPR®-1D24 units. A destination IP address must be set (see *Figure 36*)
 - The forwarding takes place via UDP - therefore a UDP broadcast address can also be set as the destination IP address to forward the data to more than one LPR®-1D24. The customer can enter USER- and RELAY- data records. These are forwarded with the injection rate, **but not faster** than the LPR®-1D24 measurement rate (about 30 Hz)
- **Destination IP address** (available if „LAN forwarder“ is enabled) –
 - Destination IP address of connected LPR®-1D24 radar
- **Enable custom forward interval** –
 - Enables a custom forward interval of the unit's distance data (see *Figure 36*). This can be necessary if a slow processing device is at the end of the forwarding chain. If disabled, the own measured distance is forwarded with the measurement rate.
- **Output interval of own distance** (available if „LAN forwarder“ is enabled)
 - Output interval of own measured distance to be forwarded over LAN.
- **Time delay of network and forwarding hops** –

- Compensates the time delay caused by network and forwarding hops. The forwarded distance is recalculated, based on the current velocity and the set time delay.

i Note

No configuration is required on the respective LPR®-1D24 receiving radar.

i Note

The amount of forwarded data via radio transmission influences the measurement rate of the device.

Forwarding

Radio channel forwarder

Enabled

Forward packages via radio channel to partner LPR1D24 unit

LAN forwarder

Disabled

Forward packages via LAN to connected LPR1D24 unit

Enable custom forward interval

Disabled

Enable a custom forward interval of own distance. If disabled, the own measured distance is forwarded with measurement rate.

Time delay of network and forwarding hops

0

ms

Integer number in range 0..500 ms

Compensate the time delay caused by network and forwarding hops. The forwarded distance is recalculated, based on the current velocity.

Submit changes

Figure 35: Device - Settings - Forwarding

i Note

If you want to enable „LAN forwarder“ to forward distance data and user data to the LPR®-1D24 that is connected via LAN, or if you want to activate the own forwarding interval, you must confirm this by pressing the „Submit changes“ button to enter the Destination IP address or the Output interval.

Forwarding

Radio channel forwarder	Enabled	
	Forward packages via radio channel to partner LPR-1D24 unit	
LAN forwarder	Enabled	
	Forward packages via LAN to connected LPR-1D24 unit	
Destination IP address	0.0.0.0	
	Destination IP address of connected LPR-1D24 unit	
Enable custom forward interval	Enabled	
	Enable a custom forward interval of own distance. If disabled, the own measured distance is forwarded with measurement rate.	
Output interval of own distance	100	ms
	Integer number in range 25..60000 ms Output interval of own measured distance to be forwarded over LAN	
Time delay of network and forwarding hops	0	ms
	Integer number in range 0..500 ms Compensate the time delay caused by network and forwarding hops. The forwarded distance is recalculated, based on the current velocity.	

Submit changes

Figure 36: Device - Settings - Forwarding - Parameter setting

7.6.4 Device - Settings - LAN

In this menu, (see *Figure 37*), the following settings are available:

- Link type
- Address Mode
- IP-Address
- Netmask
- Gateway
- Hostname (Local hostname, this name will also be offered to the DHCP server in DHCP mode)
- DNS (IP of name server - domain name system)
- Syslog (IP of server for syslog messages)
- NTP Server (IP or hostname of time server - network time protocol)

LAN

Link type

Autonegotiation

Address Mode

Static IP

IP-Address

192.168.1.99

Netmask

255.255.255.0

Gateway

0.0.0.0

Hostname

symeo-lpr

Local hostname, this name will also be offered to the DHCP server in DHCP mode

DNS

0.0.0.0

IP of name server (domain name system)

Syslog

0.0.0.0

IP of server for syslog messages

NTP Server

0.0.0.0

IP or hostname of time server (network time protocol)

Submit changes

Figure 37: Device - Settings - LAN Settings

7.6.5 Device - Settings - Logging

In this menu (see Figure 38), you can choose the logging mode:

- **Logging mode –**
 - Defines whether unit logs system events and measurements to a storage device. The following settings are available here:
 - Disabled
 - Log to SD card if available
 - Log to USB stick if available
 - Log to USB stick if available, use SD card as fallback
- **PC external logging**
 - When enabled, detailed measurement data can be forwarded to another device running Symeo's FusionEngine, e.g., to collect data from multiple sensors on a single device. The following settings are available here:
 - PC IP address -
IP address of PC for logging detailed LPR data externally
 - PC logging slot -
This slot determines the UDP ports for logging radar sensor data externally. These ports are used to forward, e.g., the distance and temperature readings.

The figure displays two screenshots of the SYMEO web interface, specifically the 'Logging' settings page. Both screenshots show a 'Logging' header and a 'Submit changes' button at the bottom left.

Top Screenshot:

- Logging mode:** A dropdown menu set to 'Log to SD card if available'. Below it, a description reads: 'Defines whether unit logs system events and measurements to a storage device.'
- PC external logging:** A dropdown menu set to 'Disabled'. Below it, a description reads: 'When enabled, detailed measurement data can be forwarded to another device running Symeo's FusionEngine, e.g., to collect data from multiple sensors on a single device.'

Bottom Screenshot:

- Logging mode:** A dropdown menu set to 'Log to SD card if available'. Below it, a description reads: 'Defines whether unit logs system events and measurements to a storage device.'
- PC external logging:** A dropdown menu set to 'Enabled'. Below it, a description reads: 'When enabled, detailed measurement data can be forwarded to another device running Symeo's FusionEngine, e.g., to collect data from multiple sensors on a single device.'
- PC IP address:** A text input field containing '192.168.1.3'. Below it, a description reads: 'IP address of PC for logging detailed LPR data externally'.
- PC logging slot:** A text input field containing '0'. Below it, a description reads: 'Integer number in range 0..19. This slot determines the UDP ports for logging radar sensor data externally. These ports are used to forward, e.g., the distance and temperature readings.'

Figure 38: Device - Settings - Logging



Note

The logging function is only to be activated temporarily in case of trouble shooting. The Symeo Support Team must be informed under support@symeo.com prior to the activation.

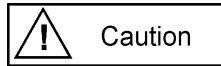
7.6.6 Device - Settings - Measurement

In this menu (see *Figure 39*), the following settings are available:

- **LPR group ID –**
 - Group identifier of one pair of LPR®-1D24, associated together. Has to be the same on units measuring with each other. Diverse measurement paths must also be adjusted to different group IDs
- **Measurement mode –**
 - Measuring mode for the LPR®-1D24. Any measuring pair of LPR®-1D24 has to consist of one Master and one Slave unit
- **Number of FSK communication channels –**
 - Number of different FSK communication channels available. Must be the same value for all radars at the same site. The smaller the number of FSK channels, the higher the measurement bandwidth
- **FSK communication channel –**
 - Data communication channel number. Has to be the same on all units that need to communicate with each other
- **Measurement channel –**

- Changes ramp slope of measurements. Has to be configured identically on Master and Slave unit of one pair. Can be adapted to separate interfering pairs close to each other

- **Customer specific offset –**

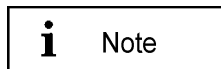


- This offset will be added to the measured distance and may only be used for the replacement of LPR®-1D24 Master units with a production date before December 2016 (please observe the Application Note “DOC.EDO.000241.0001.EN_Replacement_procedure_for_LPR-1D24_Master-Units_delivered_before_12.2016.pdf” on the website of Symeo GmbH in the main menu “*Service & Support -> Download Product Documentation & Manuals*”). The Offset value that must be entered is 0.52 m

- **Payload Slave to Master –**

- Adjusts the internal delay time reserved for radio transmission data
- If less than 50 bytes need to be forwarded via radio transmission the setting “50 bytes” should be used
- If more than 50 bytes (maximum 200 bytes) need to be forwarded via radio transmission, the setting “200 bytes” should be used.

Concerns only the payload from slave to master; for master to slave transmissions 200 bytes payload is always possible.



These settings must be the same on Master and Slave.

Measurement

LPR group ID

2

Integer number in range 1..1022
Group identifier of one pair of LPR units associated together. Has to be the same on units measuring with each other.

Measurement mode

Master unit

Measuring mode for the LPR-1D24 unit. Any measuring pair of LPR-1D24 stations has to consist of one master and one slave unit.

Number of FSK communication channels

20

Number of different FSK communication channels available. Must be the same value for all stations at the same site. The smaller the number of FSK channels, the higher the measurement bandwidth.

FSK communication channel

35

Integer number in range 16..35
Data communication channel number. Has to be the same on all units needing to communicate with each other.

Measurement channel

19

Changes ramp slope of measurements. Has to be configured identically on master and slave unit of one pair. Can be changed to separate interfering pairs when other pairs are close by.

Customer specific offset

0

m
Number in range -1.0..1.0 m
This offset is added to the measured distance and is to be used only for replacement of LPR-1D24 Master units with production date before December 2016 (see application note DOC.EDO.000241). Offset value which needs to be added is 0.52 m.

Payload Slave to Master

50 bytes (up to 33 Hz measurement rate)

Concerns only the payload from slave to master. For master to slave transmissions 200 bytes payload is always possible. This setting must be the same on master and slave.

Submit changes

Figure 39: Device - Settings - Measurement

When the General settings function (*Device -> Settings -> Measurement*) is opened the first time, FSK communication channel and Measurement channel must be configured. The values for the FSK communication channel must be in the range given for the specific country, here between 16...35 (see *Figure 39*).

Example Configuration of One Pair of LPR®-1D24:

Measurement

LPR group ID

1000

Integer number in range 1..1022
Group identifier of one pair of LPR units associated together. Has to be the same on units measuring with each other.

Measurement mode

Master unit

Measuring mode for the LPR-1D24 unit. Any measuring pair of LPR-1D24 stations has to consist of one master and one slave unit.

Number of FSK communication channels

20

Number of different FSK communication channels available. Must be the same value for all stations at the same site. The smaller the number of FSK channels, the higher the measurement bandwidth.

FSK communication channel

17

Integer number in range 16..35
Data communication channel number. Has to be the same on all units needing to communicate with each other.

Measurement channel

9

Changes ramp slope of measurements. Has to be configured identically on master and slave unit of one pair. Can be changed to separate interfering pairs when other pairs are close by.

Customer specific offset

0

m
Number in range -1.0..1.0 m
This offset is added to the measured distance and is to be used only for replacement of LPR1D24 Master units with production date before December 2016 (see application note DOC.EDO.000241). Offset value which needs to be added is 0.52 m.

Payload Slave to Master

50 bytes (up to 33 Hz measurement rate)

Concerns only the payload from slave to master; for master to slave transmissions 200 bytes payload is always possible. This settings must be the same on master and slave!

Submit changes

Measurement

LPR group ID

1000

Integer number in range 1..1022
Group identifier of one pair of LPR units associated together. Has to be the same on units measuring with each other.

Measurement mode

Slave unit

Measuring mode for the LPR-1D24 unit. Any measuring pair of LPR-1D24 stations has to consist of one master and one slave unit.

Number of FSK communication channels

20

Number of different FSK communication channels available. Must be the same value for all stations at the same site. The smaller the number of FSK channels, the higher the measurement bandwidth.

FSK communication channel

17

Integer number in range 16..35
Data communication channel number. Has to be the same on all units needing to communicate with each other.

Measurement channel

9

Changes ramp slope of measurements. Has to be configured identically on master and slave unit of one pair. Can be changed to separate interfering pairs when other pairs are close by.

Payload Slave to Master

50 bytes (up to 33 Hz measurement rate)

Concerns only the payload from slave to master; for master to slave transmissions 200 bytes payload is always possible. This settings must be the same on master and slave!

Submit changes

Figure 40: Example configuration of one measurement pair Master and Slave unit

i Note

Configuration rules:

- To prevent mutual disturbance of multiple LPR®-1D24, multiple use of the same FSK channel in the radio coverage of the devices must be avoided (e.g. do not use two routes with the same FSK channel).
- If pairs of the LPR®-1D24 are mounted within radio coverage, the FSK channels should be at least two channels apart from each other, e.g. 16, 18.
- Furthermore, these LPR®-1D24 pairs should also get different measurement channels, e.g. 0 or 1.

Example Configuration:

FSK: 16 Measurement channel: 0
FSK: 18 Measurement channel: 1

7.6.7 Device - Settings - Modem

In this menu (see *Figure 41*), the following settings are available:

- **PPP** - Point to Point protocol connection
- **APN address**
- **APN username**
- **APN password**

Figure 41: Device - Settings - Modem

7.6.8 Device - Settings - Network Routes

In this menu (see *Figure 42*), you can adapt the network routes.

⇒ Click the „+ add route” button.

Figure 42: Device - Settings - Network Routes

The dialog box „Add route” will appear.

⇒ Press the „Add route” button.

Figure 43: Device - Settings - Network Routes - Add route

Here you can check the made changes and add the new route (see Figure 44). In the field “Type” you can choose between “Host” and “Network” settings.

Route	Type	Target IP address	Network Netmask	Gateway
1	Network	192.168.98.1	255.255.255.0	192.168.97.1

Figure 44: Device - Settings - Network Routes - Review changes

7.6.9 Device - Settings - Profibus



Note

This function is only available under the menu “Device -> Settings” if the unit production code “p” (Profibus) is available.

With our Product Discontinuation Notice PDN 25_006 from June 2025 we announced the discontinuation of the LPR®-1D24 with Profibus option (BSV101757 p). The last time Service Date will be end of 2027. You will find this note in the main menu “Service & Support -> Download Product Documentation & Manuals” at www.symeo.com.

In this menu (see *Figure 45*), you can set the Profibus slave address:

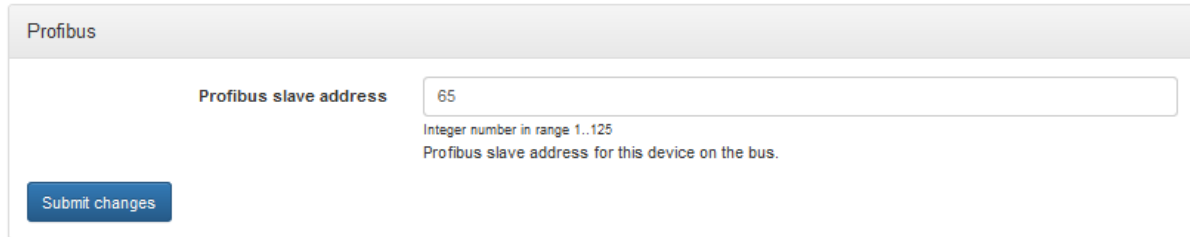


Figure 45: Device - Settings - Profibus

For information how to connect the Profibus interface to your system, please refer to our application note “DOC.EDO.000060.0002.EN_app_note_LPR-1D24_Profibus.pdf”. This could be found online on the website of Symeo GmbH in the main menu “Service & Support -> Download Product Documentation & Manuals”. There you will also find the latest firmware version and the corresponding GSD file. You can also download the GSD file valid for a specific firmware version directly from the device under „Device -> Downloads” (see *Figure 46*).

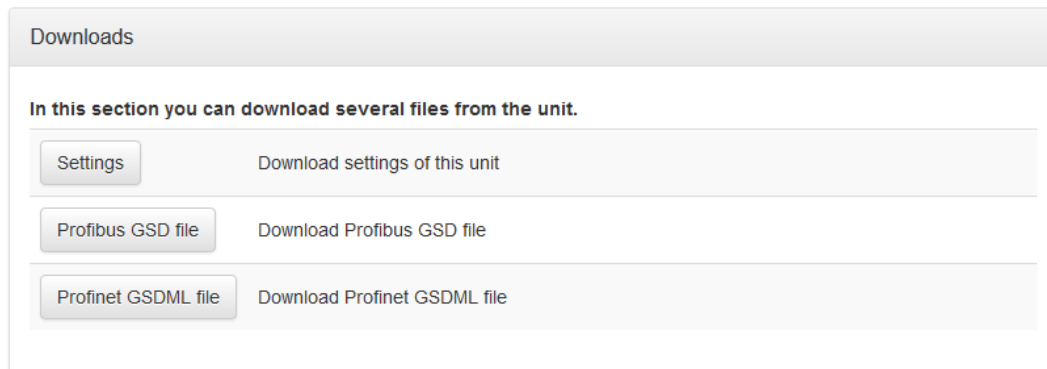
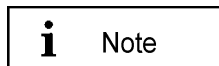


Figure 46: Device - Settings - Downloads, Profibus GSD file

7.6.10 Device - Settings - Profinet



Note

This function is only available under the menu „Device -> Settings” if the unit production code "n" (Profinet) is available.

In this menu (see *Figure 47*), you can view the settings of the Profinet interface.

The following settings are obtained from the Profinet controller. You cannot change them here.

- ⇒ Click the „Refresh” button to reload the view or press „Clear Profinet settings” to delete the current settings (see *Figure 47*).

Profinet settings

The following settings are obtained from the profinet controller. You cannot change it here.

Parameter	Value
MAC address	00:04:a3:db:b7:cb
Device name	lpr1d24-82-left
IP address	0.0.0.0
Netmask	0.0.0.0
Gateway	0.0.0.0

Refresh
Clear Profinet settings

Figure 47: Device - Settings - Profinet



Caution

This device complies with Profinet Conformance Class A.

It has one Ethernet interface (M12-Connector), one MAC address and up to two IP addresses:

an IPv4 IP address (default 192.168.1.99) and a Profinet IP address (optional).

IPv4 address and Profinet IP address of a device must not be the same, i.e. all IP addresses in the network segment must be unique.

For example, if two devices are connected via a network switch, up to 4 (four) different IP addresses must be assigned.



Note

When setting up a Profinet connection between the PLC side and the several LPR®-1D24 units, the update time under the menu item “IO cycle” should be set to greater than or equal to 32 ms (Figure 48). Shorter update times can lead to connection problems between the PLC and the LPR®-1D24, even though the network connection has otherwise been set up correctly.

To set this parameter correctly in the PLC, call up the general properties of the radar, select ‘Real-time settings’, go to ‘IO cycle’ and manually set the ‘Update time’ to at least 32 ms. After changing this setting, the LPR®-1D24 must be restarted.

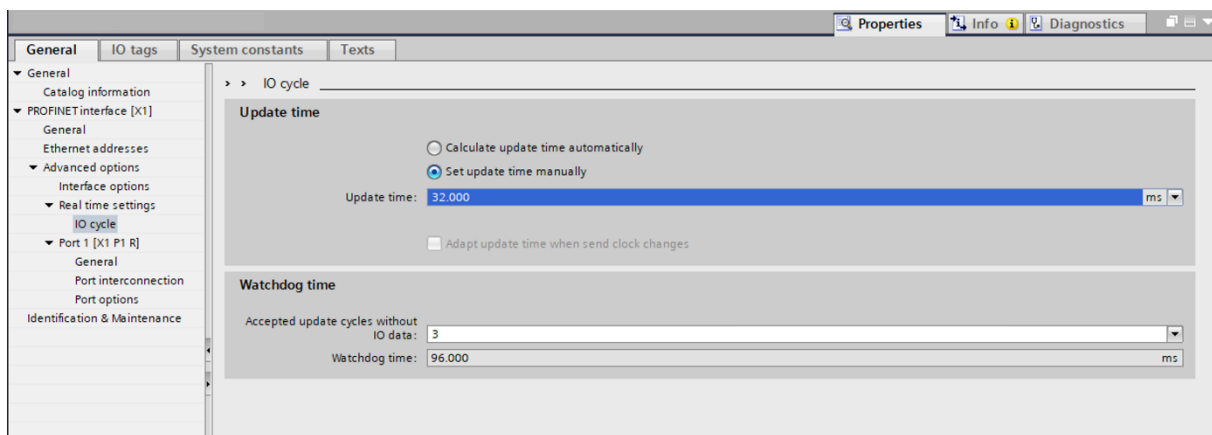


Figure 48: Profinet - Update time

For information how to connect the Profinet interface to your system, please refer to our application note “DOC.EDO.000258.0002.EN_app_note_LPR-1D24_Profinet.pdf”, which can be found online on the website of Symeo GmbH in the main menu “*Service & Support -> Download Product Documentation & Manuals*”. There you will also find the latest firmware version and the corresponding GSDML file. You can also download the GSDML file valid for a specific firmware version directly from the device under „*Device -> Downloads*” (see Figure 49).

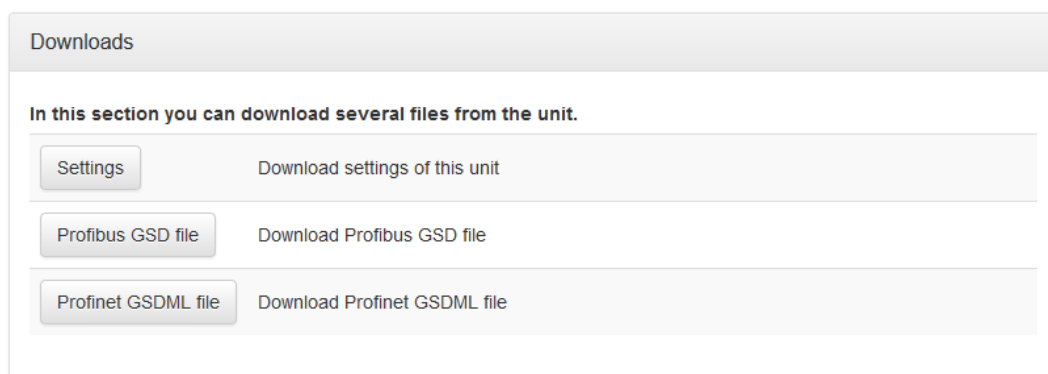


Figure 49: Device - Settings - Downloads, Profinet GSDML file

7.6.11 Device - Settings - Relay Mapping

In this menu (see Figure 50), the following settings are available:

- **Relay 1**
- **Timeout Relay 1** (only applicable if relay is remote controlled)
- **Relay 2**
- **Timeout Relay 2** (only applicable if relay is remote controlled)
- **Relay 3**
- **Timeout Relay 3** (only applicable if relay is remote controlled)
- **Relay 4**
- **Timeout Relay 4** (only applicable if relay is remote controlled)

Under the items Relay (1, 2, 3, 4) you can choose the following settings:

- System Health -> Relay will open if there is no longer a valid distance measurement

- Controlled by Zone 1 state -> Relay will open when measured distance is below this value
- Controlled by Zone 2 state -> Relay will open when measured distance is below this value
- Remote controlled by Customer Interface -> Relay will be operated by the external relay switching command (see chapter 9.2.3)
- Remote controlled by Profinet -> Relay is switched by a relay switching command via Profinet
- Remote controlled by other LPR®-1D24 unit -> Relay is switched by a relay switching command via the air interface (see chapter 9.2.3).

Relay mapping

Relay	Control Type	Timeout (ms)	Notes
Relay 1	Remote controlled by Customer Interface (Network)	1000	Integer number in range 0..30000 ms Timeout of relay 1 (only applicable if relay is remote controlled)
Relay 2	Remote controlled by Customer Interface (Network)	1000	Integer number in range 0..30000 ms Timeout of relay 2 (only applicable if relay is remote controlled)
Relay 3	Remote controlled by Customer Interface (Network)	1000	Integer number in range 0..30000 ms Timeout of relay 3 (only applicable if relay is remote controlled)
Relay 4	Remote controlled by Customer Interface (Network)	1000	Integer number in range 0..30000 ms Timeout of relay 4 (only applicable if relay is remote controlled)

[Submit changes](#)

Figure 50: Device - Settings - Relay mapping

Relay 3

- Remote controlled by Customer Interface (Network)
- System Health
- Controlled by Zone 1 state
- Controlled by Zone 2 state
- Remote controlled by other LPR1D24 unit

The relays, which receive Relay Switching Commands externally or via radio, will be opened if one or more Relay Switching Commands are not received in time. To prevent this problem, you can set a timeout for each relay.

Only when the set timeout is exceeded without receiving a Relay Switching Command, the relays open.

7.6.12 Device - Settings - Relay Zones

This function is only available if the device is equipped with relays.

In this menu (see *Figure 51*), the following settings are available:

- **Zone 1 distance** –
 - Relay assigned to zone 1 will open if measured distance is below this value, e.g. the distance when the stopping zone is reached
- **Zone 2 distance** –
 - Relay assigned to zone 2 will open if measured distance is below this value, e.g. the distance when the warning zone is reached.

 **Note**

Please take note of the following information regarding the *Relay Zones Settings* for Firmware Version **9.0.0 and older**:
The value for *Zone 2 distance* must **always be greater** than the value for *Zone 1 distance*.

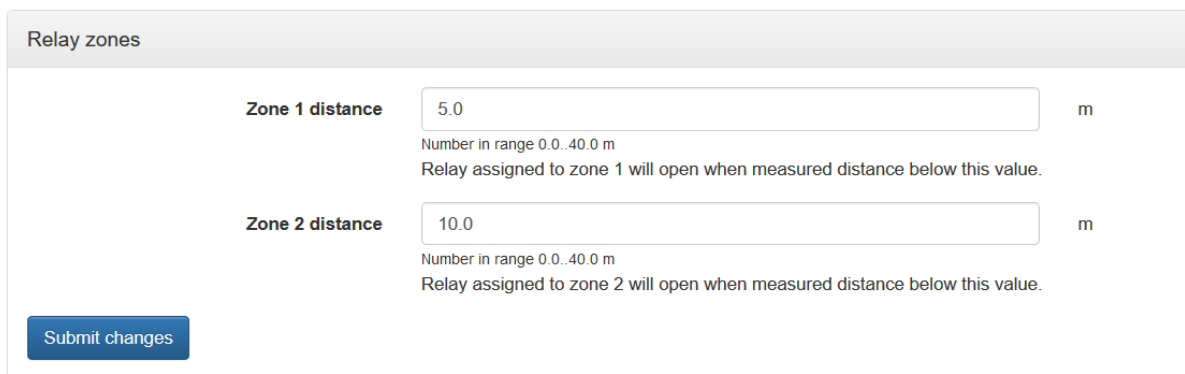


Figure 51: Device - Settings - Relay zones

Please see the example for the Relay Zones Settings in the chapter 8.2.

7.6.13 Device - Settings - Remote Access

This function allows to configure a VPN-access if required:



Figure 52: Device - Settings - Remote Access Settings

 **Warning**

If you disable http, the access to the WebUI of this unit will be disabled.
An access to the WebUI is then only possible via HTTPS.

For configuration of the VPN remote access, please refer to the chapter 7.6.15.

7.6.14 Device - Settings - Timezone

In this menu (see *Figure 53*), the following settings are available:

- **Timezone** –
 - Must be set to custom timezone if needed timezone is not in the dropdown menu
- **Custom timezone** –
 - Needs to be filled if customer specific timezone is used.

Figure 53: Device - Settings - SystemTime Settings

7.6.15 Device - Settings - VPN Remote Access

In this menu (see *Figure 54*), you can choose the following VPN remote access settings:

- **OpenVPN Client** (activate / deactivate)
- **PPP** (Point to Point protocol connection, activate / deactivate)
- **APN address**
- **APN username**
- **APN password**
- **Current VPN certificate name**
- **Change VPN certificate** – Choose new certificate
 - The certificate must be an All-In-One certificate. All keys and certificates must be contained in the same file.

VPN remote access

Figure 54: Device - Settings - VPN Remote Access Settings

7.7 Device - Upload Configuration

In this menu (see *Figure 55*), you can upload a local configuration file.

Upload configuration

Please choose a local configuration file for upload:

Browse...

Upload configuration

SYMEO RADAR NEXT LEVEL

Device

Diagnostics

Logged in as symeo Log out

There are unsaved changes. After you are finished editing, save your changes.

Review...

Save all changes without reviewing

Discard all changes

Information overview

Hostname / IP address	symeo-lpr / 10.8.25.106
Serial number	CS26IL0005
Firmware	v11.0.2
Mode	Master unit
System time	2025-09-19 10:52:27 CEST

Device Status

Services

Distance measurement

Interfaces

Binary protocol

Remote

No modem installed

PPP disabled

Access

VPN disconnected

Upload configuration

You successfully uploaded your configuration file. The new configuration is not yet active, you first need to review the changes and activate them. You can use the button below to review the changes.

Review changes

Figure 55: Device - Application Settings

- ⇒ Click the „Browse” button to choose a local configuration file for upload.
- ⇒ Click the „Upload configuration” button to upload your configuration.
- ⇒ Review and confirm the changes. The new configuration is now active.

7.8 Device - Change Features

In this menu (see Figure 56), you can add additional features to the standard devices.

After clarifying the commercial details, Symeo generates a file for the customer. This file can be installed on the device by the customer in a similar way as a firmware update. Any number of registered stations can be updated with the same file.

- ⇒ Select the file provided by Symeo and click the “Browse” button.

Change features

Please choose a local file for the update:

Browse...

Upload file

Figure 56: Device - Change features

- ⇒ Upload the file provided by Symeo by clicking “Upload file” button.
- ⇒ After the upload is completed choose “Apply features change” button.
- ⇒ If feature change was finished successfully, the device will be restarted automatically (see Figure 57).

⇒ After that the production code is changed accordingly, and the new features are available (see Example below).

Change features

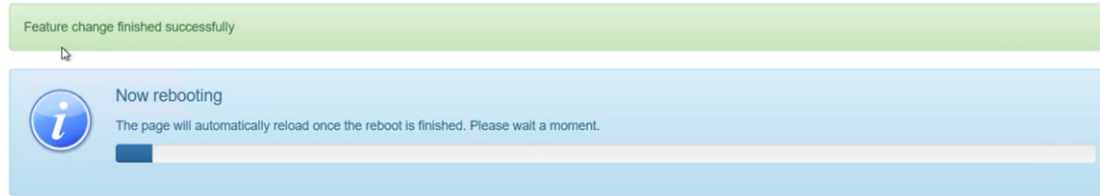


Figure 57: Device - Change features - rebooting device

Example Change features:

Product properties

Model number: BSV101757
 Product name: LPR-1D24
 Serial number: C926IL0076
 Unit production code: **s v**

Your original unit production code: s,v

Change features

Please choose a local file for the update:

Browse... 6_sven_toggle_profinet.tar

Upload file Uploading, please wait...

Upload the file provided by Symeo

Change features

Upload complete

Apply feature change **Cancel**

Apply feature change

Change features

Feature change finished successfully

Now rebooting
 The page will automatically reload once the reboot is finished. Please wait a moment.

The page will automatically reload after the reboot is finished

Product properties

Model number: BSV101757
 Product name: LPR-1D24
 Serial number: C926IL0076
 Unit production code: **s v n**

Updated unit production code: s,v,n

7.9 Device - Downloads

In this menu (see *Figure 58*), you can download several files from the unit.

- Download settings of this unit (all configuration parameters)
- Download Profibus GSD file
- Download Profinet GSDML file

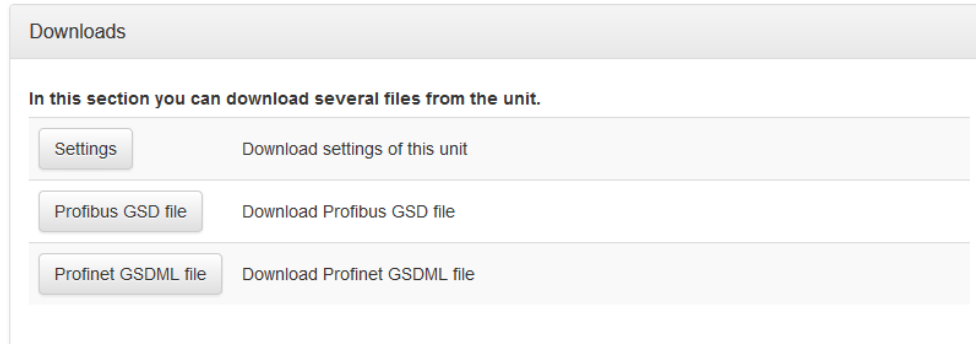


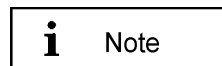
Figure 58: Device - Downloads

7.10 Device - Firmware Update

In this menu (see *Figure 59*), the following settings are available:

- Update the firmware

Use the „Browse“ button to find the firmware file provided by Symeo and press „Upload firmware“.



Please use the **latest firmware version .tar.gz file**. You can find it online on the website of Symeo GmbH in the main menu “Service & Support -> Download Product Documentation & Manuals” in the sub-item “Firmware” under:

<https://www.symeo.com/en/service-support/download-product-documentation-manuals/>

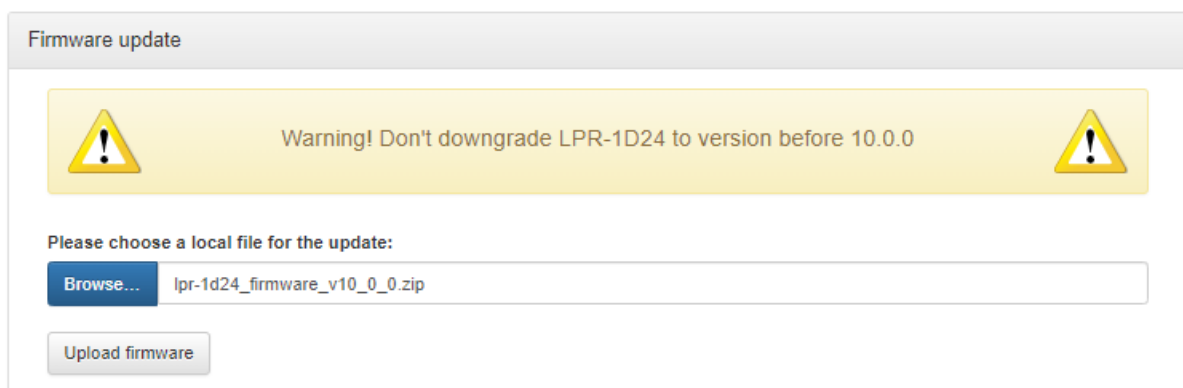


Figure 59: Device - Firmware update



Don't downgrade LPR®-1D24 to a version before **10.0.0**.

A successful firmware upload will be indicated. To activate the new firmware it is necessary to flash the firmware and reboot the unit (see *Figure 60*). Therefore, you have to click on the „Flash firmware“ button.

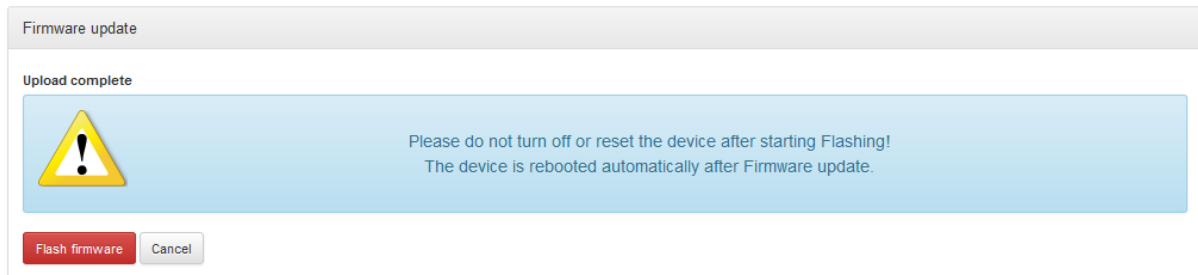


Figure 60: Device - Device configuration - Firmware update success message

i Note

All radars that measure or forward data together should have the same firmware version. Therefore, both units (Master and Slave) have to be upgraded.

i Note

The previous setting „Device -> Settings -> Customer protocol -> Mode of customer protocol“ is lost for Firmware versions **older than 8.0.0** after the upgrade to the new Firmware version in case that it had been changed under the previous Firmware version from default value (TCP server).

i Note

Please read the Notes on the Firmware Update „Readme_Firmware_Update_LPR-1D24.pdf“. You can find it online on the website of Symeo GmbH in the main menu „Service & Support -> Download Product Documentation & Manuals“ in the sub-item „Firmware“ under:

<https://www.symeo.com/en/service-support/download-product-documentation-manuals/>

7.11 Device - Factory Reset

In this menu (see *Figure 61*), you can restore factory settings:

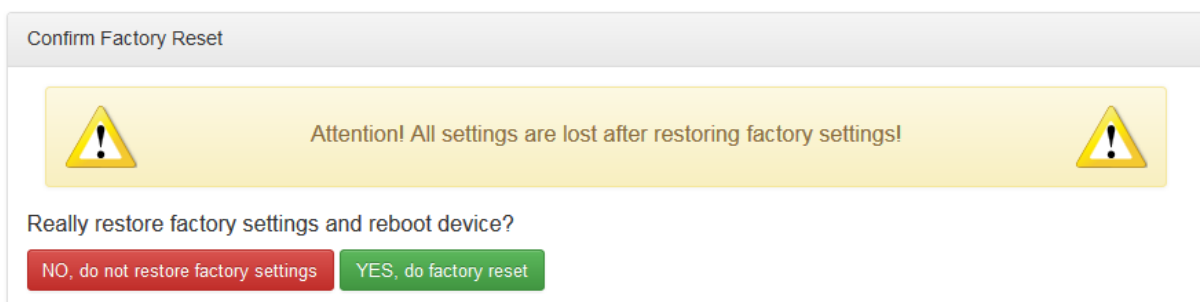
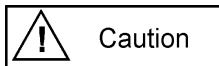


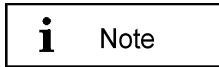
Figure 61: Device - Factory Reset

Please press „YES, do factory reset“ if you want to perform a reboot.



Caution

Attention! All settings are lost after restoring factory settings!



Note

Note that factory reset will also reset passwords.

7.12 Device - Reboot Device

In this menu (see *Figure 62*), the following settings are available:

- Reboot the device

Confirm reboot

Really reboot device?

NO, do not reboot

YES, reboot device

Rebooting station

The page will automatically reload once the reboot is finished. Please wait a moment.

Estimated reboot progress

Figure 62: Device - Reboot Device

Please press „YES, reboot device“ if you want to perform a reboot.

The homepage will automatically reload once the reboot is finished.

7.13 Diagnostics

In this menu (see *Figure 63*), the following subpages are available:

- Operating System Status
- Hardware Status
- Storage device
- Range measurement statistics
- Relay status
- Record measurement data
- Packet monitor
- Packet inspector
- Station scan

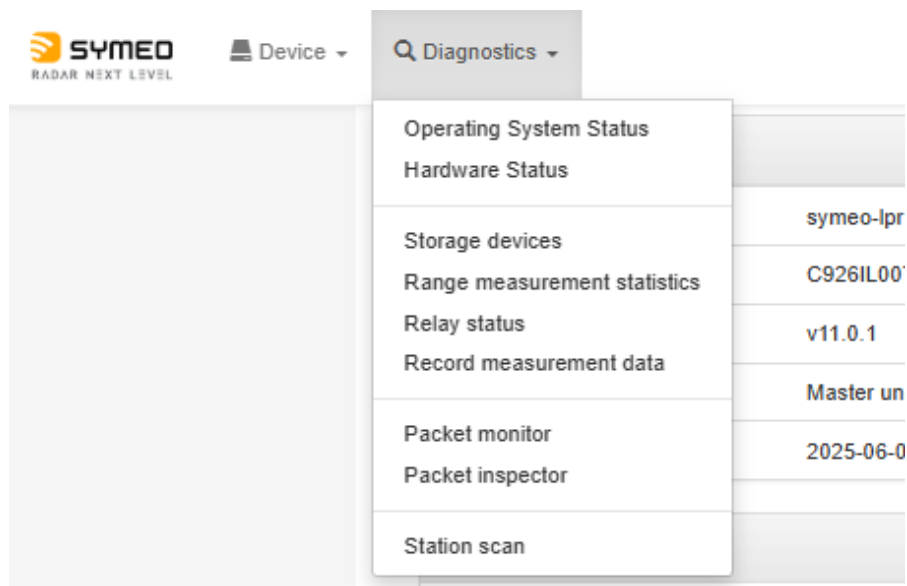


Figure 63: Diagnostics Menu

7.13.1 Diagnostics - Operating System Status

In this menu (see Figure 64), the operating system status can be displayed.

In case of problems, this information may be requested by Symeo support.

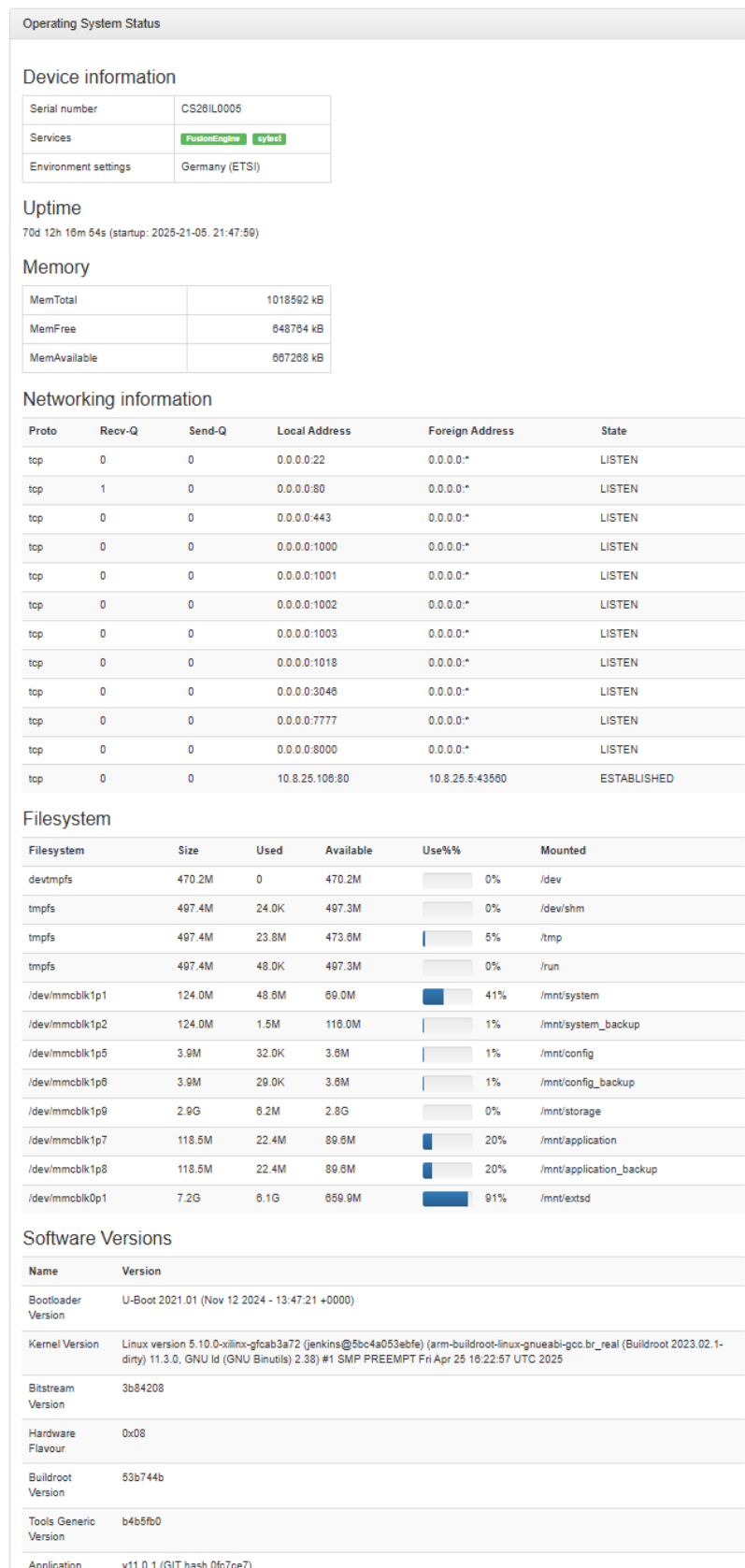


Figure 64: Diagnostics - Operating System Status

7.13.2 Diagnostics - Hardware Status

In this menu (see *Figure 65*), system values and system voltages are displayed.
In case of problems, this information may be requested by Symeo support.

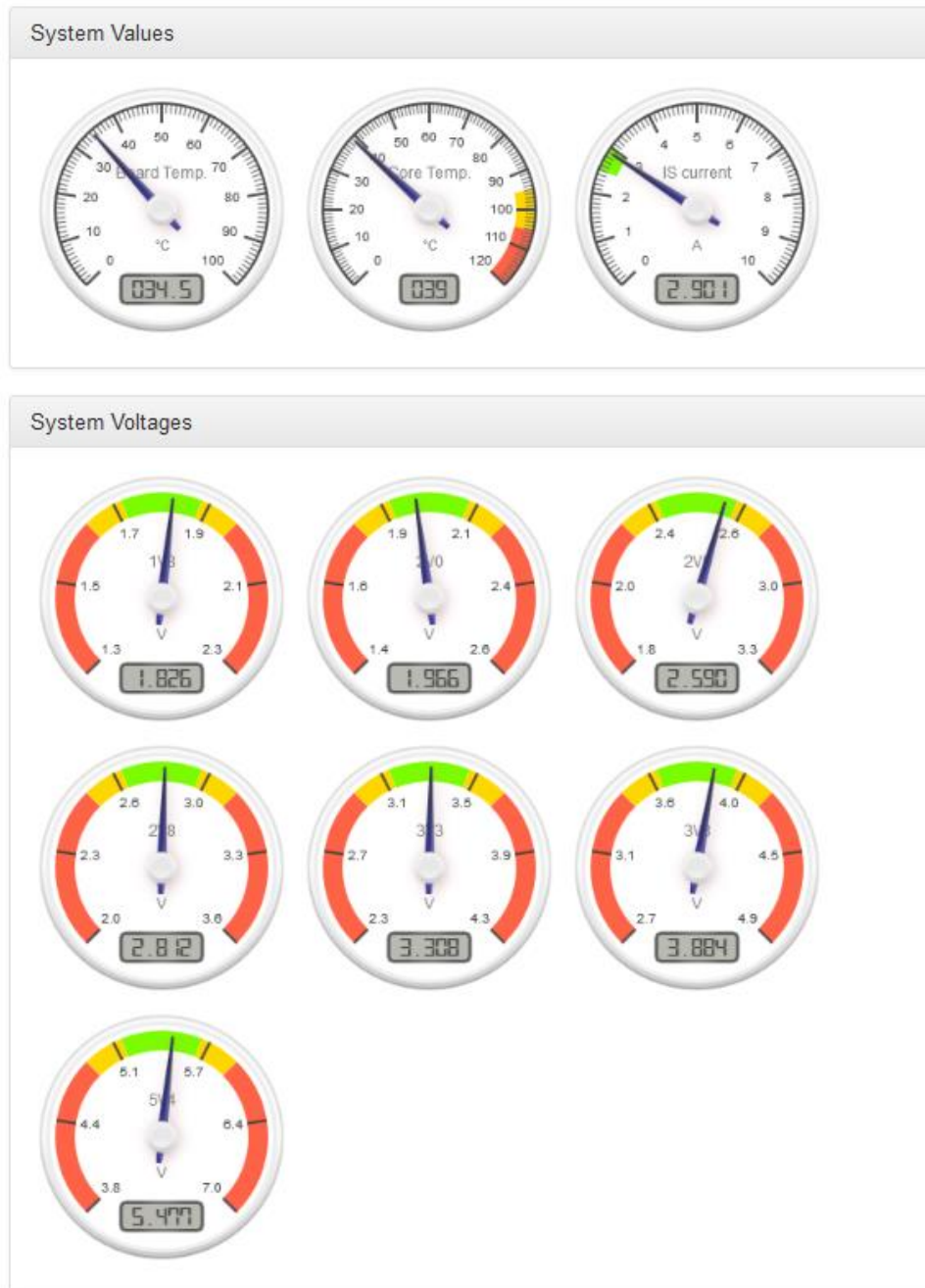


Figure 65: Diagnostics - Hardware Status

This display is automatically refreshed every 5 seconds.

7.13.3 Diagnostics - Storage Devices

In this menu (see *Figure 66*), you can select the storage devices to format them if necessary. Under the „Format“ button, you can select the filesystem for the device:

- ext2
- ext3
- ext4 (recommended)
- vfat.

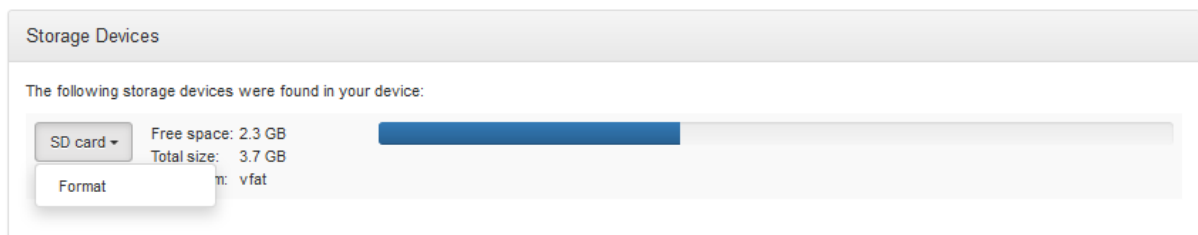


Figure 66: Diagnostics - Storage Devices

7.13.4 Diagnostics - Range Measurement Statistics

This section allows you to view raw measurements and range statistics. Please select a topic from the menu on the left (see *Figure 67*) to view the corresponding information.

- Live range measurement
- Signal strength statistics
- Measurement rate statistics
- Number valid measurements statistics

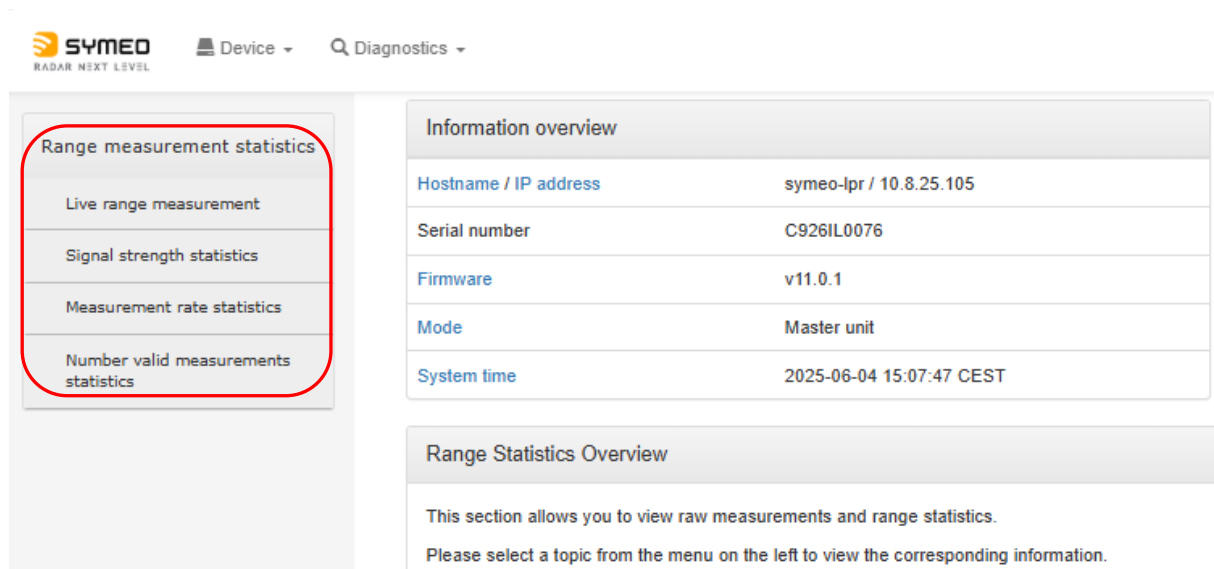


Figure 67: Diagnostics - Range Measurement Statistics

Live Range Measurement

In this menu (see *Figure 68*), the current distance and the current RSSI value (Signal strength) will be displayed, furthermore, the distance over time graph.

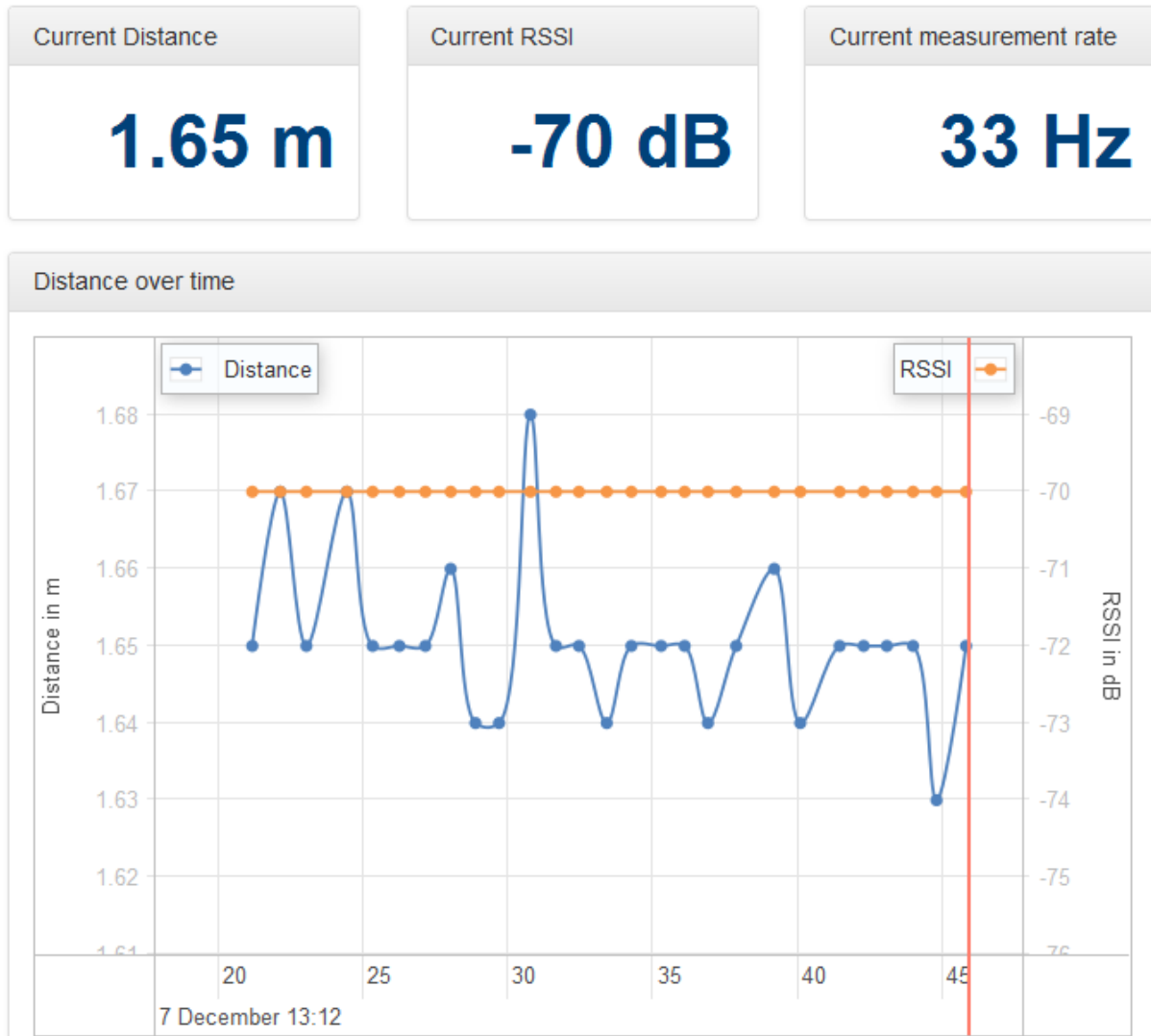


Figure 68: Diagnostics - Distance over time graph

By pointing the mouse in the graph and using the scroll wheel, you can downsize or enlarge the timeline.

Signal Strength Statistics



Figure 69: Diagnostics - RSSI over distance diagram

This diagram shows the recorded distance-signal strength pairs since the last power-on. You can use it to detect abnormal signal propagation routes at certain constellations of the two LPR®-1D24, as the signal strength should decrease with increasing distance.

The diagram is automatically refreshed every 10 seconds.

The distance axis displays the distance between the two LPR®-1D24, and the RSSI axis the received signal strength in dB. As the signal strength at specific distances may vary, the statistical distribution of the signal strength is also recorded. Displayed are the mean received signal strength, the 10 % quantile and the 90 % quantile. The quantiles give you information about how many recorded signal strength values were lower than the corresponding line. 10 % of the recorded signal strengths were lower than the 10 % quantile line and 90 % were lower than the 90 % quantile line, leaving 80 % in between those two lines. This way you get an idea of the signal strength distribution per distance without including extreme outliers. This helps identifying distances with increased signal distortions (e.g. due to multipath signal propagation), as the variance of the signal strength there usually increases.

Measurement Rate Statistics

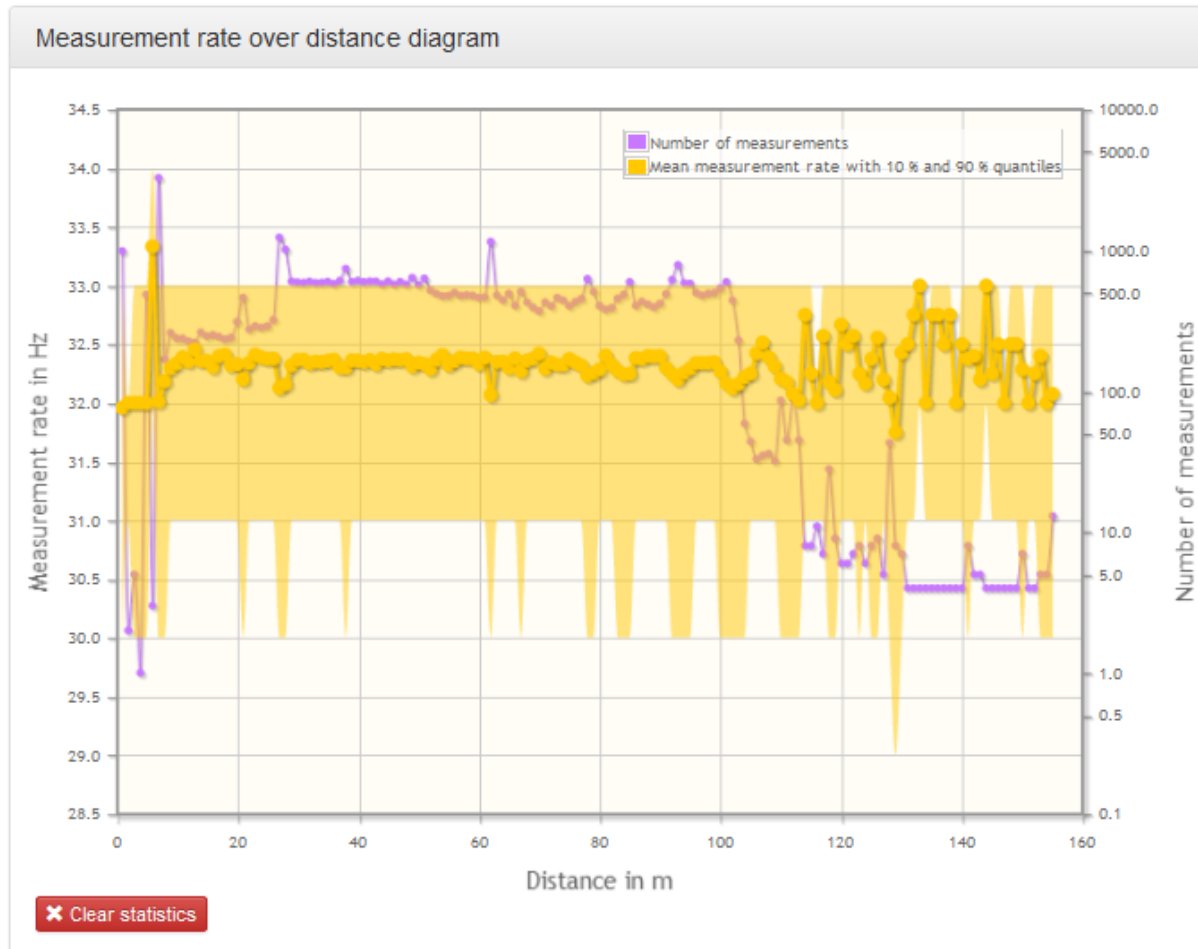


Figure 70: Diagnostics - Measurement rate over distance diagram

This diagram shows the recorded distance-measurement rate pairs since the last power-on. You can use it to detect systematical measurement errors at certain constellations of the two LPR®-1D24, as the measurement rate decreases in this case.

The diagram is automatically refreshed every 10 seconds.

The distance axis displays the distance between the two LPR®-1D24, and the measurement rate axis the current rate of range measurements in Hertz. As the measurement rate at specific distances may vary, the statistical distribution of the measurement rate is also recorded. Displayed are the mean measurement rate, the 10 % quantile and the 90 % quantile. The quantiles give you information about how many recorded measurement rate values were lower than the corresponding line. 10 % of the recorded measurement rates were lower than the 10 % quantile line and 90 % were lower than the 90 % quantile line, leaving 80 % in between those two lines. This way you get an idea of the measurement rate distribution per distance without including extreme outliers. This helps identifying distances with increased errors in range measurement (e.g. due to multipath signal propagation), as the measurement rate decreases as errors are encountered.

Number Valid Measurements Statistics

Number of valid measurements over distance diagram.

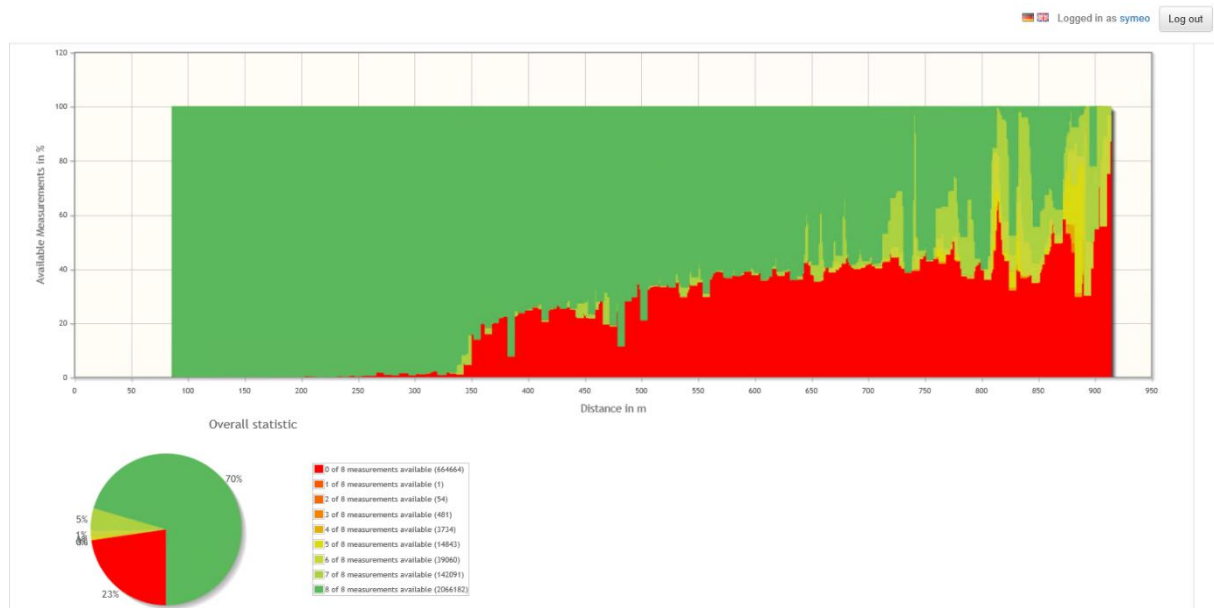


Figure 71: Diagnostics - Number of valid measurements over distance diagram

This diagram shows the recorded number of valid measurements pairs since the last power-on. You can use it to detect abnormal signal propagation routes at certain constellations of the two LPR® stations.

The diagram is automatically refreshed every 10 seconds.

The distance axis X displays the distance between the two LPR® stations, and the Y axis the number of valid measurements. This helps identifying distances with increased signal distortions (e.g. due to multipath signal propagation).

7.13.5 Diagnostics - Relay Status

In this menu (see Figure 72), the current relay output of this unit is displayed.

Relay states

Current relay output of this unit

Relay	State
relay 1	closed
relay 2	opened
relay 3	opened
relay 4	opened

Control relays

Figure 72: Diagnostics - Relay states

By pressing the „Control relays” button, you can bridge the normal relay control and test the opening and closing of the relays one by one or altogether (see Figure 73 and Figure 74).

Override automatic relay control

Really override automatic relay control?


Attention! If you override the automatic relay control, the function of the system (e.g. collision avoidance) is turned off for 60 seconds!


No, continue normal operation
YES, override

Figure 73: Diagnostics - Control relays - override

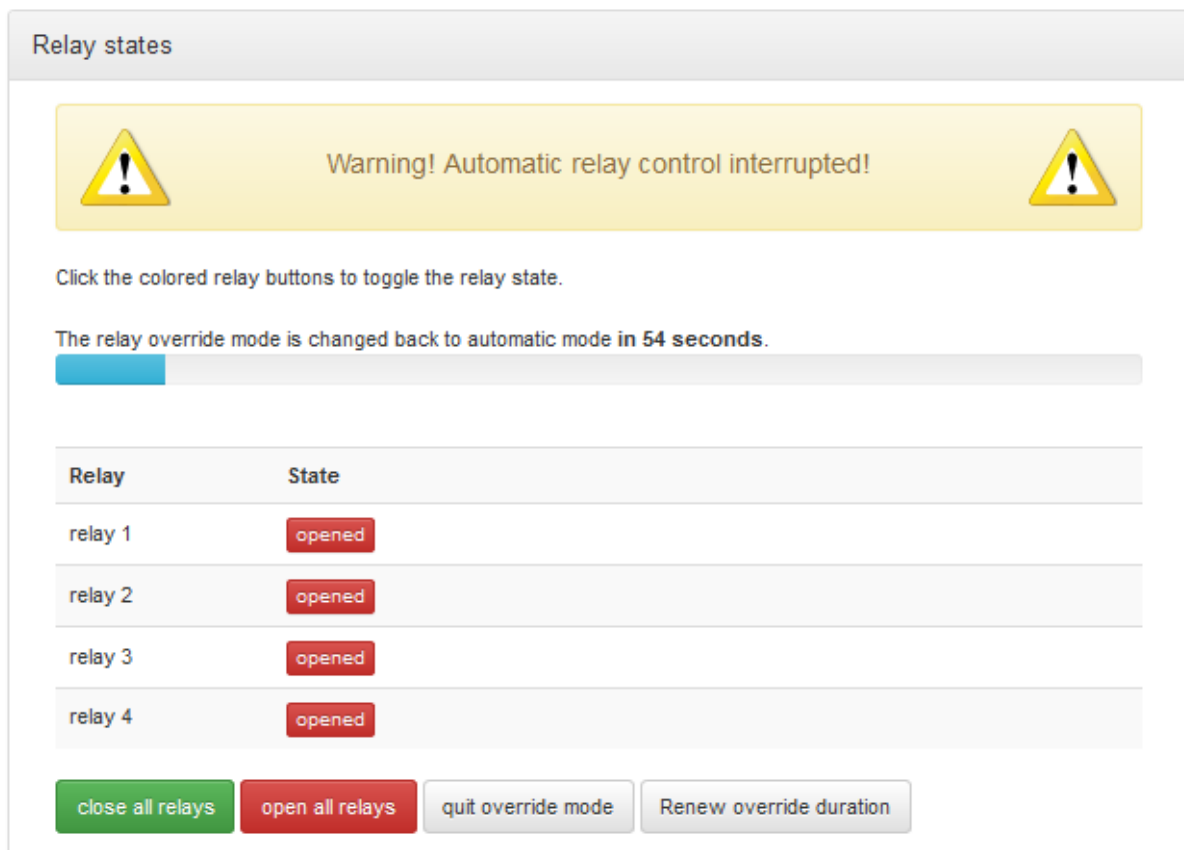


Figure 74: Diagnostics - Control relays - Relay states



Warning

This should never be done in live-operation, but at best during commissioning or maintenance operation.

7.13.6 Diagnostics - Record Measurement Data

In this menu (see *Figure 75*), you can record the measurement data.

Under „Control“ you can change logging mode. The following options are available:

- Disabled
- Log to SD card if available
- Log to USB stick if available
- Log to USB stick if available, use SD card as fallback

⇒ Click the drop-down menu window „Change logging mode“ (see *Figure 75*) to choose the logging mode.

Control

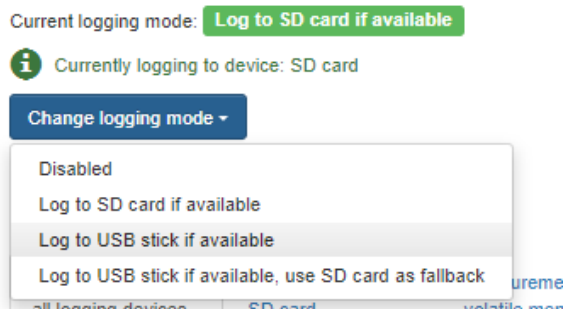


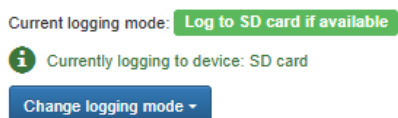
Figure 75: Diagnostics - Record measurement data - Change logging mode

⇒ Choose one of the settings and refresh the page using the F5 key.

Under the menu “Measurements”, you can view recorded measurement data (see Figure 76):

- Measurements from all logging devices
- Measurements from SD card
- Measurement from volatile memory

Control



Measurements

Measurements from all logging devices

Measurements from SD card

Measurements from volatile memory

☐	Name	Size	Viewable files	Actions
☐	 sytest	160.5 MiB		 
☐	 syslog	51.1 MiB		 
☐	 meas_2025-08-28_094716	5.3 MiB		 
☐	 meas_2025-08-28_094519	2.3 MiB		 
☐	 meas_2025-02-08_115941	29.3 MiB		 
☐	 meas_2025-02-08_070000	147.0 MiB		 
☐	 meas_2025-02-08_010000	178.6 MiB		 
☐	 meas_2025-02-07_190000.tar.xz	44.3 MiB		 
☐	 meas_2025-02-07_130000.tar.xz	46.1 MiB		 
☐	 meas_2025-02-07_070000.tar.xz	47.2 MiB		 
☐	 meas_2025-02-07_010000.tar.xz	48.2 MiB		 
☐	 meas_2025-02-06_190000.tar.xz	48.5 MiB		 
☐	 meas_2025-02-06_134057.tar.xz	42.9 MiB		 

Figure 76: Diagnostics - Record measurement data

7.13.7 Diagnostics - Packet Monitor

In this menu (see *Figure 77*), you can view the quantity of transmitted and received packets from the various data packages.

Packet monitor		
Packet type	Number of received packets	Number of send packets
Customer Interface		
Own distance	N/A	950302
Other distance	N/A	0
TX request	N/A	0
Userdata	feature locked	feature locked
Relay switch	feature locked	N/A
Radio channel Forwarder		
Other distance	0	0
Userdata	0	0
Relay switch	0	0
LAN Forwarder		
Own distance	N/A	0
Other distance	0	0
Userdata	0	0
Relay switch	0	0
Refresh Reset		

Figure 77: Diagnostics - Packet monitor

If problems occur, this information can be requested by Symeo support.

7.13.8 Diagnostics - Packet Inspector

With this window, you can see the customer protocol output at the binary port (see *Figure 78*).

For it, you must press the „*Get new data*“ button to display data from the last 10 records. Then you must select one record by driving over with the mouse and pressing the left mouse button.

By expanding of „*Hexadecimal view*“ and/or „*Detailed view*“, you can view this data in the appropriate format.

Under the „*Outgoing packets/Incoming packets*“ button, the outgoing and incoming data packets will be shown.

Packet inspector

Clear view

Get new data

Outgoing packets ▾

Overview

Time stamp	Type	Description	Age (seconds)
16:12:10.542	16	Distance Data (GID: 1000, SID: 2, Distance: 126.0m, Error code: 0)	0.093
16:12:10.443	16	Distance Data (GID: 1000, SID: 2, Distance: 126.001m, Error code: 0)	0.193
16:12:10.343	16	Distance Data (GID: 1000, SID: 2, Distance: 126.002m, Error code: 0)	0.293
16:12:10.243	16	Distance Data (GID: 1000, SID: 2, Distance: 126.002m, Error code: 0)	0.392
16:12:10.145	16	Distance Data (GID: 1000, SID: 2, Distance: 126.0m, Error code: 0)	0.491
16:12:10.043	16	Distance Data (GID: 1000, SID: 2, Distance: 126.001m, Error code: 0)	0.593
16:12:09.944	16	Distance Data (GID: 1000, SID: 2, Distance: 125.999m, Error code: 0)	0.692
16:12:09.843	16	Distance Data (GID: 1000, SID: 2, Distance: 125.999m, Error code: 0)	0.793
16:12:09.742	16	Distance Data (GID: 1000, SID: 2, Distance: 126.002m, Error code: 0)	0.893
16:12:09.643	16	Distance Data (GID: 1000, SID: 2, Distance: 126.005m, Error code: 0)	0.993

Hexadecimal view

7e 16 17 d0 00 01 ec 30 ff ff ff ff fc 9e 15 ae 00 44 d3 df 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 e2 88 34 6e f2 7f

Detailed view

Identifier	Value	Length	Data type
Start identifier	0x7e	1	
Type	0x16	1	
Source address	0x 17 d0	2	
Distance [mm]	126000	4	signed integer
Velocity [mm/s]	-1	4	signed integer
Level [dB/10]	-866	2	signed integer
Reserved	0x 15 ae 00 44 d3 df 00 00	8	
Error	0	2	unsigned integer
Reserved	0x 00 e2 88 34	20	
CRC	0x 6e f2	2	
End identifier	0x7f	1	

Figure 78: Diagnostics - Packet inspector

7.13.9 Diagnostics - Station Scan

In this menu (see *Figure 79*), all Symeo units found in your current local area network (LAN) will be displayed.

Station scan				
The following Symeo stations were found in your current local area network (LAN).				
Serial number	MAC address	IP address	Temporary IP address	
EN4AJN0011	54:35:df:00:46:0f	10.8.25.103	0.0.0.0	Change
D94AJM0047	54:35:df:00:2f:49	10.8.25.104	0.0.0.0	Change
C926IL0076	00:04:a3:db:e4:1d	10.8.25.105	0.0.0.0	Change
CS26IL0005	d8:80:39:4b:3d:8b	10.8.25.106	0.0.0.0	Change
EN6FR20041	54:35:df:00:50:c5	10.8.25.107	0.0.0.0	Change
DX275U0021	54:35:df:00:48:5f	10.8.25.160	0.0.0.0	Change
EN4AJN0012	54:35:df:00:46:05	10.8.25.203	0.0.0.0	Change
D94AJM0041	54:35:df:00:2f:56	10.8.25.204	0.0.0.0	Change
C926IL0077	00:04:a3:db:b4:e9	10.8.25.205	0.0.0.0	Change
CS26IL0002	d8:80:39:4a:40:21	10.8.25.206	0.0.0.0	Change
EN6FR20063	54:35:df:00:50:a9	10.8.25.207	0.0.0.0	Change
Rescan				

Figure 79: Diagnostics - Station scan

8 Application

In this chapter, you will find the necessary settings for some of the most common applications.

8.1 Application 1: Distance Measurement

The basic application is the distance measurement between two LPR®-1D24.

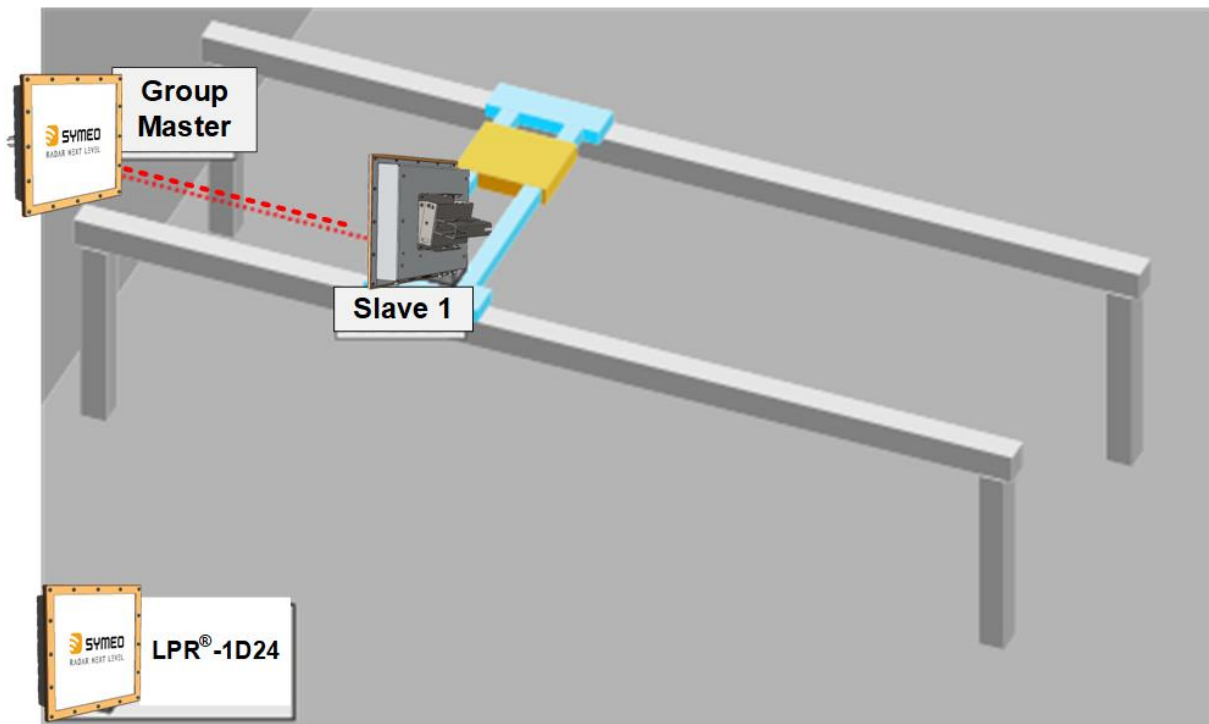


Figure 80: Distance measurement between two LPR®-1D24

The necessary settings for this must be made under „*Device -> Settings -> Measurement*“:

Example Configuration of One Pair of LPR®-1D24:

Measurement

LPR group ID	1	Integer number in range 1..1022 Group identifier of one pair of LPR units associated together. Has to be the same on units measuring with each other.
Measurement mode	Master unit	Measuring mode for the LPR-1D24 unit. Any measuring pair of LPR-1D24 stations has to consist of one master and one slave unit.
Number of FSK communication channels	20	Number of different FSK communication channels available. Must be the same value for all stations at the same site. The smaller the number of FSK channels, the higher the measurement bandwidth.
FSK communication channel	16	Integer number in range 16..35 Data communication channel number. Has to be the same on all units needing to communicate with each other.
Measurement channel	4	Changes ramp slope of measurements. Has to be configured identically on master and slave unit of one pair. Can be changed to separate interfering pairs when other pairs are close by.
Customer specific offset	0 m	Number in range -1.0..1.0 m This offset is added to the measured distance and is to be used only for replacement of LPR-1D24 Master units with production date before December 2016 (see application note DOC.EDO.000241). Offset value which needs to be added is 0.52 m.
Payload Slave to Master	50 bytes (up to 33 Hz measurement rate)	Concerns only the payload from slave to master. For master to slave transmissions 200 bytes payload is always possible. This setting must be the same on master and slave.

Submit changes

Measurement

LPR group ID	1	Integer number in range 1..1022 Group identifier of one pair of LPR units associated together. Has to be the same on units measuring with each other.
Measurement mode	Slave unit	Measuring mode for the LPR-1D24 unit. Any measuring pair of LPR-1D24 stations has to consist of one master and one slave unit.
Number of FSK communication channels	20	Number of different FSK communication channels available. Must be the same value for all stations at the same site. The smaller the number of FSK channels, the higher the measurement bandwidth.
FSK communication channel	16	Integer number in range 16..35 Data communication channel number. Has to be the same on all units needing to communicate with each other.
Measurement channel	4	Changes ramp slope of measurements. Has to be configured identically on master and slave unit of one pair. Can be changed to separate interfering pairs when other pairs are close by.
Payload Slave to Master	50 bytes (up to 33 Hz measurement rate)	Concerns only the payload from slave to master. For master to slave transmissions 200 bytes payload is always possible. This setting must be the same on master and slave.

Submit changes

Figure 81: Example Configuration of one measuring pair - Master and Slave unit

**Note****Configuration rules:**

- To prevent mutual disturbance of multiple LPR®-1D24, multiple use of the same FSK channel in the radio coverage of the devices must be avoided (e.g. do not use two routes with the same FSK channel).
- If pairs of the LPR®-1D24 are mounted within radio coverage, the FSK channels should be at least two channels apart from each other, e.g. 16, 18.

Furthermore, these LPR®-1D24 pairs should also get different measurement channels, e.g. 0 or 1.

If on one site more than 10 measurement paths are built close together, the number of FSK communication channels should be increased to prevent disturbance by the double use of FSK channels. If not, the default value should always be maintained.

Once these settings were made, the radar measures and outputs on the default IP address 192.168.1.99 the data with an output interval of 10 Hz on port 3046.

Changes of these default values can be made under „*Device-> Settings -> LAN*” and „*Device -> Settings -> Customer protocol*” (see chapter 7.6.1 and 7.6.4).

**Warning**

The customer specific offset may only be used for exchanging of the LPR®-1D24 Master units with a production date before December 2016. For further information, please refer to the Application Note “DOC.EDO.000241.0001.EN_Replacement_procedure_for_LPR-1D24_Master-Units_delivered_before_12.2016.pdf”. You can find it online on the website of Symeo GmbH in the main menu “*Service & Support -> Download Product Documentation & Manuals*”.

8.2 Application 2: Distance Measurement between two Cranes including Relay Control

i Note

This application is only available if the LPR®-1D24 is ordered with the corresponding production code ("r") (see *Figure 29* and *Figure 30*).

This application measures the distance between two bridges and triggers a relay if it is below the zone distance (anti-collision warning system).

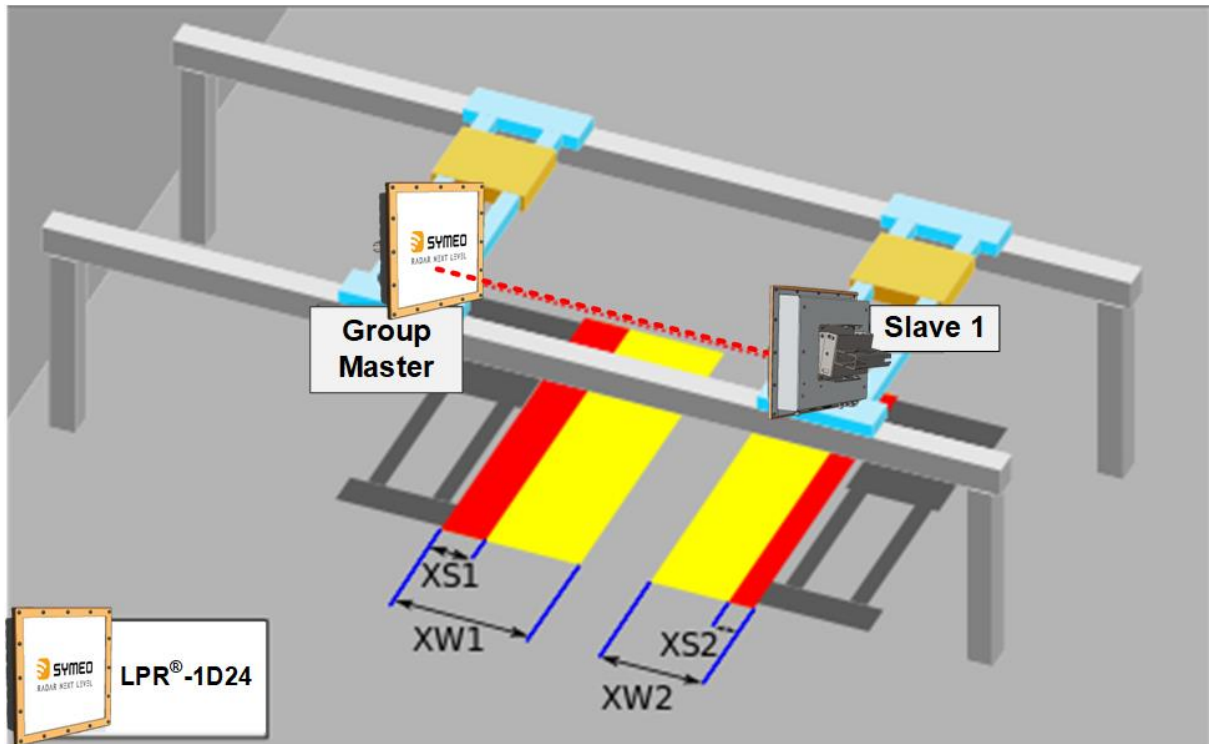


Figure 82: Distance measurement between two cranes with relay control

The setting for the distance measurement works as described under Application1. To define the relay zone distance, settings under „Device -> Settings -> Relay zones“ are necessary.

Relay zones Settings

Zone 1 distance

10

m

Type: floating point number, Range: 0.0..40.0 m
Relay assigned to zone 1 will open when measured distance below this value.

Zone 2 distance

20

m

Type: floating point number, Range: 0.0..40.0 m
Relay assigned to zone 2 will open when measured distance below this value.

Change

Figure 83: Setting of Zone (usually identical on Master and Slave by crane toward crane measurement)

i Note

Please take note of the following information regarding the Relay Zones Settings for Firmware Version **9.0.0 and older**:
The value for *Zone 2 distance* must **always be greater** than the value for *Zone 1 distance*.

Usually, in the case of an anti-collision warning system between two cranes, the stop areas (Xs) and the warning areas (Xw) are the same for both cranes.

In *Figure 82*, the distance XS1 corresponds to the distance to Zone 1 and the XW1 to the distance to Zone 2 on the Master as well as the XS2 the distance to Zone 1 and the XW2 the distance to Zone 2 on the Slave.

Relays assigned to these zones will open when measured distances are below these values. These settings can be made under „*Device -> Settings -> Relay zones*“.

Relay mapping

Relay 1 Remote controlled by Customer Interface (Network)

Timeout Relay 1 1000 ms
Integer number in range 0..30000 ms
Timeout of relay 1 (only applicable if relay is remote controlled)

Relay 2 Remote controlled by Customer Interface (Network)

Timeout Relay 2 1000 ms
Integer number in range 0..30000 ms
Timeout of relay 2 (only applicable if relay is remote controlled)

Relay 3 Remote controlled by Customer Interface (Network)

Timeout Relay 3 1000 ms
Integer number in range 0..30000 ms
Timeout of relay 3 (only applicable if relay is remote controlled)

Relay 4 Remote controlled by Customer Interface (Network)

Timeout Relay 4 1000 ms
Integer number in range 0..30000 ms
Timeout of relay 4 (only applicable if relay is remote controlled)

Submit changes

Figure 84: Relay mapping (usually identical on Master and Slave for crane to crane measurement)

In the example in *Figure 84*, Relay 1 is assigned to Zone 1 and Relay 2 to Zone 2. This means, when the distance between the cranes is below the range value of Zone 2 (20m) Relay 2 will be triggered (opened). If it is also below the range value of Zone 1 (10m), the Relay 1 will be additionally triggered.

If the distance values are exceeded again, the relays return to their original state (closed).

If the measurement fails or when a device is switched off, all relays will be opened for safety reasons.

It is also possible to switch the relays from an external customer device (e.g. a PLC) through a Relay Switching Command (described in section 9.2.3). In this case, the customer has to determine which relay switching data has to be sent and when it has to be sent.

For this, the device must have the optional feature „Data transmission of user data and relay switch commands via radio signal”.

If the relay data should be transmitted via the air interface, you have to enable the option forwarding under „Device -> Settings -> Forwarding”.

The screenshot shows the 'Forwarding' settings window. It contains the following elements:

- Radio channel forwarder:** A dropdown menu set to 'Enabled'. Below it, the text reads: 'Forward packages via radio channel to partner LPR1D24 unit'.
- LAN forwarder:** A dropdown menu set to 'Disabled'. Below it, the text reads: 'Forward packages via LAN to connected LPR1D24 unit'.
- Enable custom forward interval:** A dropdown menu set to 'Disabled'. Below it, the text reads: 'Enable a custom forward interval of own distance. If disabled, the own measured distance is forwarded with measurement rate.'
- Time delay of network and forwarding hops:** A text input field containing the value '0', followed by 'ms'. Below the field, it says: 'Integer number in range 0..500 ms' and 'Compensate the time delay caused by network and forwarding hops. The forwarded distance is recalculated, based on the current velocity.'
- Submit changes:** A blue button at the bottom left.

Figure 85: Settings - Forwarding

The setting „Radio channel forwarder” must be enabled.

Furthermore, this Relays Switching Command must then be assigned to one or more relays (see Figure 50).

The relays, which receive Relay Switching Commands externally or via radio, will be opened if one or more Relay Switching Commands are not received in time. To prevent this problem, you can set a timeout for each relay.

Only when the set timeout is exceeded without receiving a Relay Switching Command, the relays open.

The time limit can be set under „Device -> Settings -> Relay mapping” (see Figure 50).

8.3 Application 3: Distance Measurement and User Data Transmission

In this application additional user data is transmitted via the air interface, e.g. user data from PLC 1 should be transmitted to PLC 2 via air interface (or vice versa), see *Figure 86*.

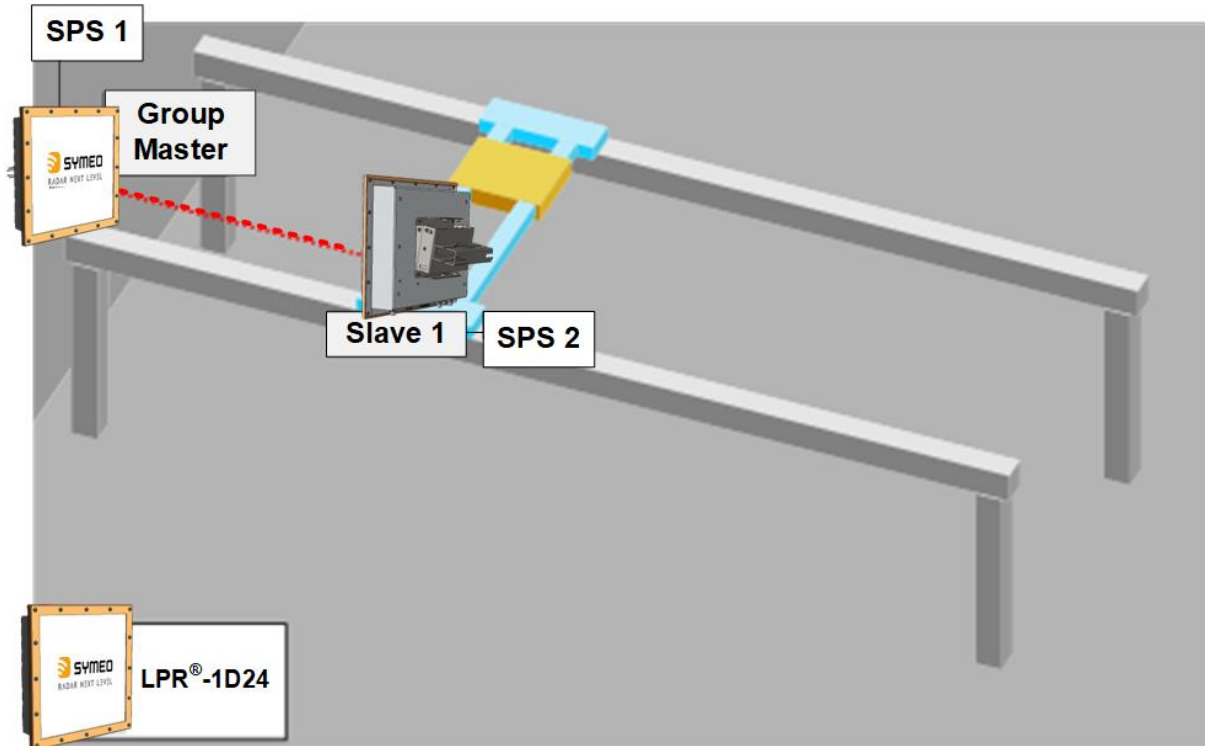


Figure 86: Simple distance measurement between two units and user data transmission

In addition to the settings described in Application 1, you only have to activate the forwarding of these user data via „Radio channel forwarder -> Enable” by selecting „Enabled” option.

See „Device -> Settings -> Forwarding“, *Figure 87*.

Forwarding

Radio channel forwarder

Enabled

Forward packages via radio channel to partner LPR1D24 unit

LAN forwarder

Disabled

Forward packages via LAN to connected LPR1D24 unit

Enable custom forward interval

Disabled

Enable a custom forward interval of own distance. If disabled, the own measured distance is forwarded with measurement rate.

Time delay of network and forwarding hops

0

ms

Integer number in range 0..500 ms

Compensate the time delay caused by network and forwarding hops. The forwarded distance is recalculated, based on the current velocity.

Submit changes

Figure 87: Forwarding Settings

8.4 Application 4: L-Functionality

In this application, the binary data from both measurement paths can be retrieved from all LPR®-1D24 (e.g. the distance data of the trolley and the bridge measurement can be read on the crane trolley).

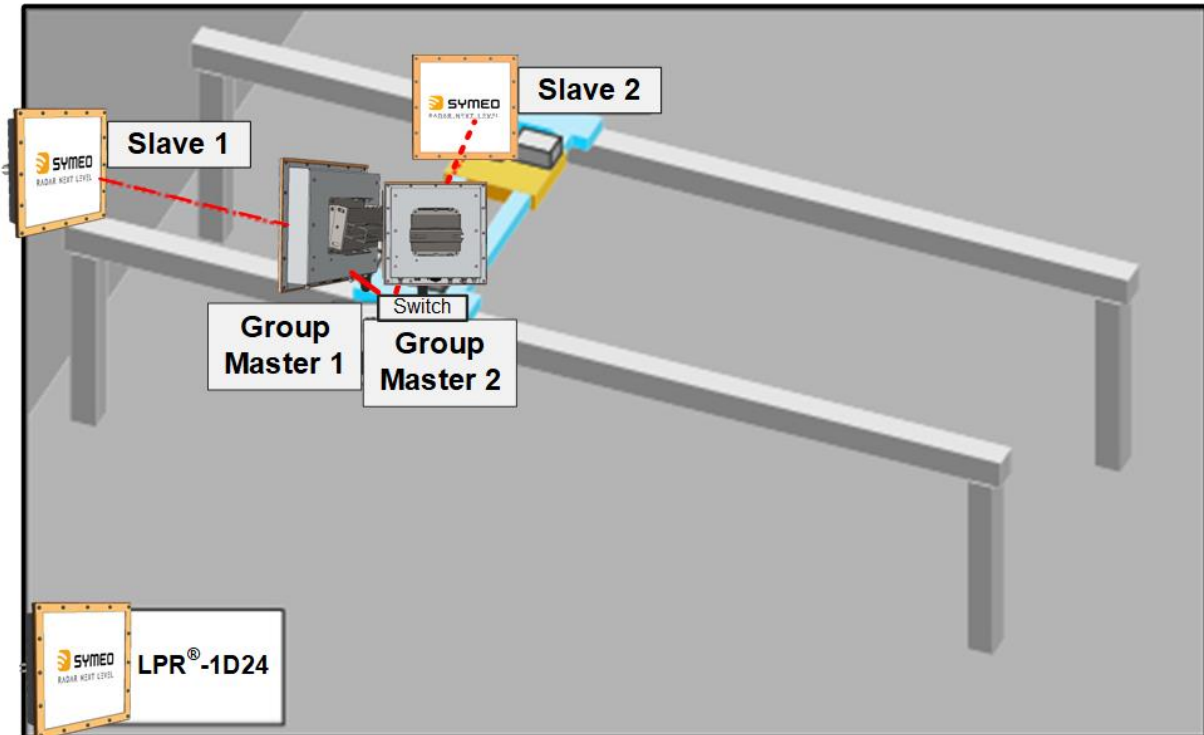


Figure 88: L-Functionality

In addition to the settings described in Application 1, you have to activate the forwarding of the distance data via „Radio channel forwarder -> Enabled“.

See „Device -> Settings -> Forwarding“, Figure 89.

Forwarding

Radio channel forwarder

Enabled

Forward packages via radio channel to partner LPR1D24 unit

LAN forwarder

Disabled

Forward packages via LAN to connected LPR1D24 unit

Enable custom forward interval

Disabled

Enable a custom forward interval of own distance. If disabled, the own measured distance is forwarded with measurement rate.

Time delay of network and forwarding hops

0

ms

Integer number in range 0..500 ms

Compensate the time delay caused by network and forwarding hops. The forwarded distance is recalculated, based on the current velocity.

Submit changes

Figure 89: Forwarding Settings

By pressing the „Submit changes“ button in the „Forwarding Settings“ window an additional field „Destination IP address“ appears, where you have to enter the IP address of the destination unit, which can be connected either directly or via a network cable (see *Figure 90*).

It does not matter whether two Masters, two Slaves or one Master and one Slave are connected for example on the bridge.

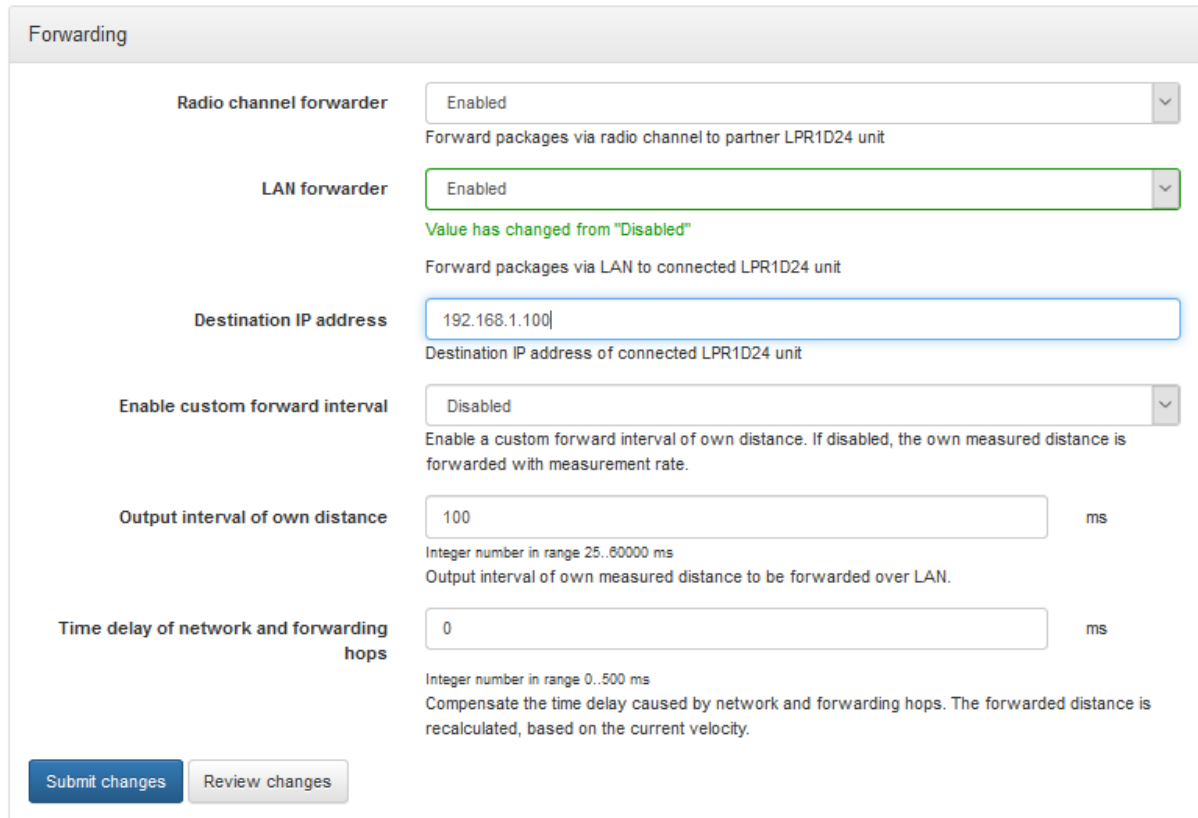


Figure 90: Forwarding Settings - Submit/Review changes

If you want to have all data, e.g. only on the trolley unit, a transfer from Master 1 to Master 2 is sufficient (see *Figure 88*), thus the forwarding settings on Master 1 with the destination address of Master 2 must be set.

If the data should be available on all units, you must also set the forwarding settings on Master 2 with the destination IP address of Master 1.



Warning

Please make sure that the both devices connected via Ethernet must have different IP addresses.

9 Description of Binary Protocol XP (1D Messages)

9.1 General Description

This protocol describes the interface between the LPR®-1D24 and the user. The binary protocol XP provides information in high density. Its structure ensures a simple implementation. The transfer is done in single data frames.

9.1.1 Structure of Data Packet

Each data packet has the same fixed length and begins with the START symbol (0x7e).

Figure 91 shows the general structure of a data packet.



Figure 91: Structure of the data packet

The START- and STOP-field in each data packet are the symbols 0x7e and 0x7f. TYPE indicates the type of the data packet. There can be defined up to 256 different types. The TYPE-field is followed by the DATA-field. The DATA field contains the real data of the packet of the type TYPE. The CRC-field contains a check sum. The check sum is applied to all previous data fields (TYPE + DATA) except the START data field.

All multi byte integers (e.g. CRC field) are encoded in Network-Byte-Order (Big-Endian). All signed integers are represented in two's complement representation.

9.1.2 CRC

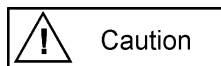
The CRC-16-IBM with polynomial $x^{16}+x^{15}+x^2+1$ is used for the CRC. The CRC is calculated over all data fields (TYPE and DATA), but not for the START and END field.

The customer protocol also accepts CRC = 0 for incoming packets.

9.2 Data Types

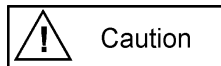
All data packets use the fixed frame protocol. The protocol length can be set under the menu „*Device -> Settings -> Customer protocol -> Protocol frame length*“. The default setting is 47 bytes.

To get a connection to the customer device, a TCP/IP or a UDP connection between the LPR®-1D24 and the customer device must be established. When using the TCP/IP protocol (default setting), the customer device must initiate the connection to port 3046 on the LPR®-1D24.



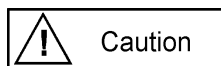
The TCP-connection can be set by the user in the WebUI under the menu „*Device -> Settings -> Customer protocol -> Mode of customer protocol*“. The default value for the port is 3046.

When using the UDP variant of the fixed frame protocol, the IP address and the UDP port of the receiving computer must be configured in the LPR®-1D24 WebUI. The protocol mode can be changed to „*UDP*“ under the menu „*Device -> Customer protocol -> Mode of customer protocol*“. Compared to the TCP fixed frame option the UDP fixed frame does not verify if the data packed arrived. The content is the same as for the TCP fixed frame protocol.



The UDP-connection can be chosen by the user in the WebUI under the menu „*Device -> Settings -> Customer protocol -> Mode of customer protocol*“. The default value for the port is 3046.

If the connection is established, the PC has to read the data from the LPR®-1D24 in fixed blocks (e.g. 47 bytes). The first byte is always the START-byte and the second byte is always the TYPE-byte. The relevance of the following data depends on the data type, however, the position of all information (e.g. distance, velocity level etc.) remains always the same in the data packet. For example, for the data packet type 0x16 (distance data) the measured velocity is *always* written in data bytes 9.-12 of the packet.



If data is sent to the LPR®-1D24, it has to be filled up to the same fixed protocol length (i.e. to 47 bytes for the default settings). It is not important, what data is used to fill up the data packets, however, the use of zero bytes could facilitate a possible troubleshooting.

9.2.1 Type 0x01 - User Data

User Data can be fed into the LPR®-1D24 and then transmitted to another LPR®-1D24 via the frequency channel. There the user data can be read out.

Direction: LPR®-1D24 ↔ User

Content	Length (byte)	Data type	Value
START	1	unsigned integer	0x7E
TYPE	1	unsigned integer	0x01
Source (LPR®-1D24 address)	2	see chapter 9.3.1.	0x####
User Data	8	depends on application	0x##### #####
CRC	2	unsigned integer	0x####
END	1	unsigned integer	0x7F

Table 6: Data Type 0x01 - User Data

Total length: 15 bytes

9.2.2 Type 0x02 - Send Request

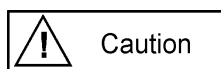
Direction: LPR®-1D24 → User

Content	Length (byte)	Data type	Value
START	1	unsigned integer	0x7E
TYPE	1	unsigned integer	0x02
CRC	2	unsigned integer	0xC181
END	1	unsigned integer	0x7F

Table 7: Data Type 0x02 - Send request

Total length: 5 bytes

This packet is sent from the LPR®-1D24 continuously. It informs the user that the LPR®-1D24 is able to receive data from the user. The user may only send one single data frame after receiving a send request.



A Send Request is only sent if the „TX requests“ field is activated in the WebUI under „Device -> Settings -> Customer protocol“.

9.2.3 Type 0x03 - Relays Switching Command

Direction: User → LPR®-1D24

Content	Length (byte)	Data Type	Value
START	1	unsigned integer	0x7E
TYPE	1	unsigned integer	0x03
Destination (LPR®-1D24 address)	2	See chapter 9.3.1	0x####
Relay Selection (Bitmask) (Bit 1..4 → Relay 1..4) Bit significance 0-7 starting with 0 as the lowest (set) Bit value.	1	unsigned integer	0x##
Relay Switch (Bitmask)	1	unsigned integer	0x##
CRC	2	unsigned integer	0x####
END	1	unsigned integer	0x7F

Table 8: Data Type 0x03 - Relays Switching Command

Total length: 9 bytes

With the relay selection (bitmask) relays are selected which can be controlled. The relays that are chosen within the Relay Selection bitmask will be switched according to the Relay Switch bitmask. Example: A Relay Selection value = $0x14_{\text{hex}} = 00010100_{\text{bin}}$ and a Relay Switch value = $0xFF_{\text{hex}} = 11111111_{\text{bin}}$ will switch relays 2 and 4 ON - the state of the other relays remains unchanged.

No acknowledgment of the relay switch command will be sent because this data frame can be forwarded to other LPR®-1D24s and thus no reception on the destination unit is guaranteed.

9.2.4 Type 0x16 - Distance Data

Direction: LPR®-1D24 → User

Content	Length (byte)	Data Type	Value
START	1	unsigned integer	0x7E
TYPE	1	unsigned integer	0x16
Source (LPR® address)	2	see chapter 9.3.1	0x####
Distance [mm]	4	signed integer	0x#### ##
Velocity [mm/s]	4	signed integer	0x#### ##
Level [dB/10]	2	signed integer	0x####
Temperature [°C/100]	2	signed integer	0x####
Counter	4	unsigned integer	0x#### ##
Reserved	2		
Error	2	unsigned integer	0x####
Reserved	20		
CRC	2	unsigned integer	0x####
END	1	unsigned integer	0x7F

Table 9: Data Type 0x16 - Distance Data Output for Group Master

Total length: 47 bytes

9.2.5 Type 0x25 - Load Data

Load data contains information about the active load shapes and a height information.

They can be fed into the LPR®-1D24 via the customer port and then transmitted to another LPR®-1D24 via the frequency channel.

Direction: User → LPR®-1D24

Content	Length (byte)	Data type	Value
START	1	unsigned integer	0x7E
TYPE	1	unsigned integer	0x25
Source address	2	see chapter 9.3.1	0x####
Flags (Bitmask) ¹⁾	1	unsigned integer	0x##
Inactive Shapes (Bitmask) ²⁾	1	unsigned integer	0x##
Height [cm] ³⁾	2	unsigned integer	0x##
CRC	2	unsigned integer	0x####

END	1	unsigned integer	0x7F
-----	---	------------------	------

Table 10: Data Type 0x25 - Load Data

Total length: 11 bytes

1) Flags:

Bit 0: Has up state flag / has hoist limit switch

Bit 1: Up state flag / Hoist limit switch

Bit 2: Has inactive shapes bitmask flag

Bit 3: Has height information flag

Bit 4 – 7: reserved

2) Inactive Shapes bitmask: Contains information about the current state of the hoist and load shapes (bit=0: shape active, bit=1: shape inactive)

Bit 0: hoist shape

Bit 1 – 3: load shapes

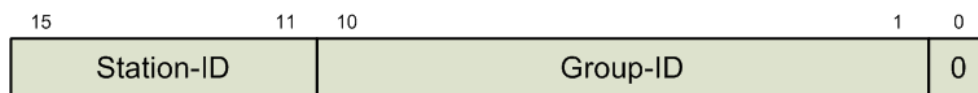
Bit 4 – 7: reserved

3) The current value of the height sensor in cm, where 0 means the hoist/load is at the top position.

9.3 Remarks

9.3.1 LPR®-1D24 Address

LPR®-1D24 addresses are completely defined by a 16-bit value:



0	Reserved
Group-ID:	The Group-ID of the unit (1..1022)
Station-ID:	The Station-ID of the unit (SID)
for Distance Data:	Master and Slave SID is <i>always</i> 2 (SID = 2)
for Relays Switching Command:	SID = 1 for Master and SID = 2 for Slave

Table 11: LPR®-1D24 address

9.3.2 Distance Error Codes

The distance data contains an error field, which indicates the status of the distance measurement. The following errors can occur:

Value	Description
0x00	No error → measurement valid
0x01	No measurement signal
0x02	Peak to low → measurement signal is imprecise
0x04	Implausible speed
0x05	Measurement failed
0x14	Measured distance is larger than the theoretical limit
0x15	Synchronization error
0x16	Synchronization error
0x19	Synchronization error
0xfe	Outlier detected (only diversity)
0xff	No data received

Table 12: Error codes