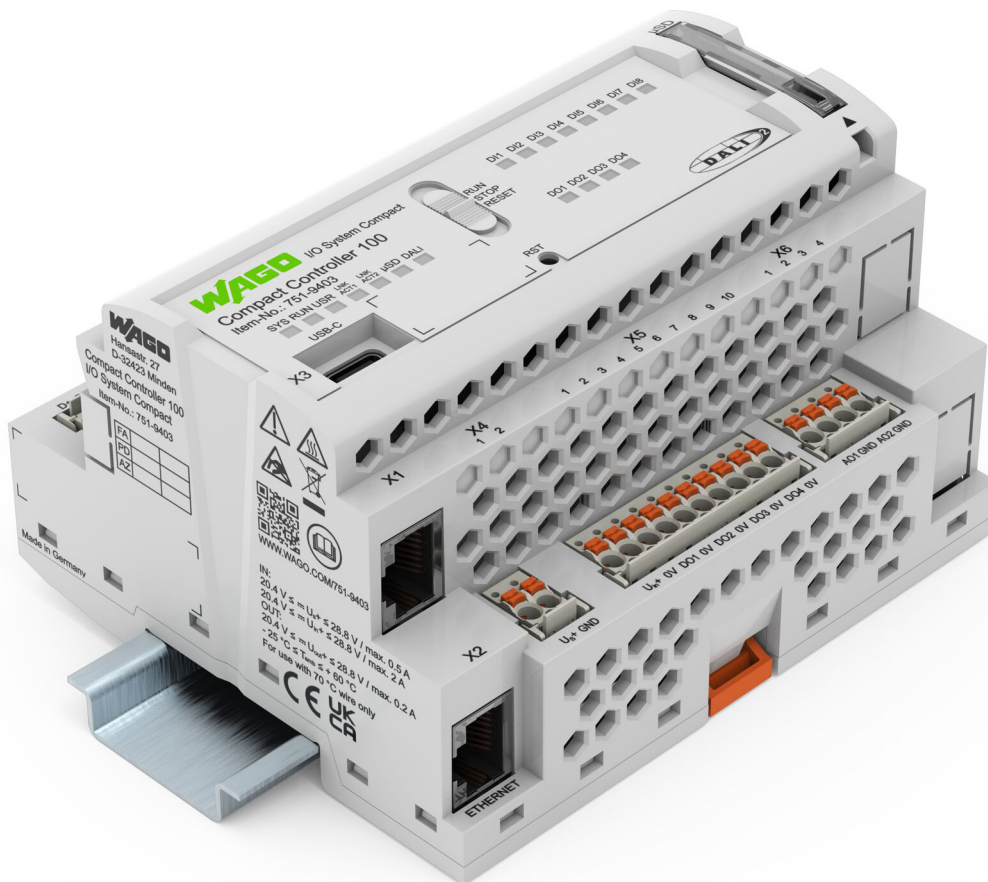


# WAGO I/O System Compact

WAGO Compact Controller 100

751-9403



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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

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We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally protected by trademark or patent.

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# 1 Provisions

## 1.1 Scope of Applicability

This document applies to:

**751-9403** (Compact Controller 100)

Compact Controller 100; 8DI 4DO 2AO 2NI1K/PT1K 1RS485, 1DALI; 2 × ETHERNET;  
SD

|                     |                                                                   |
|---------------------|-------------------------------------------------------------------|
| Version Firmware    | 04.06.xx(28) and above                                            |
| Product detail page | <a href="https://www.wago.com/751-9403">www.wago.com/751-9403</a> |

The product must only be installed and operated in accordance with the operating instructions. Knowledge of the operating instructions is required for proper use. You can find all documents and information on the detailed product page.

### Additional documents

-  **Manual** to CODESYS V3.5
-  **Library Description** for the WAGO “WAGOAppDALI.lib” library
-  **Application Note** for the WAGO “WAGOAppDALI.lib” library

## 1.2 Intended Use

Controllers of WAGO’s 751 Series I/O System Compact receive digital and analog signals from sensors and transmit them to the actuators or higher-level control systems. The signals can also be (pre-)processed with the controllers.

The product is an open type device and is designed for installation in an additional enclosure. In order to use it, it is connect to take protective measures suitable for the specific application.

- This product is intended for installation in automation technology systems.
- The product is designed for use in dry indoor rooms.
- Operation of the product is permitted in the industrial sector and in residential and commercial domains, including small businesses.
- Operation of the product in other application areas is only permitted when corresponding approvals and labeling are present.

### Improper Use

Improper use of the product is not permitted.

Improper use occurs in particular in the following cases:

- Non-observance of the intended use
- Use without protective measures in an environment in which moisture, salt water, salt spray mist, dust, corrosive fumes, gases, direct sunlight or ionizing radiation can occur
- Implementation of a Known Misuse

- Use of the product in areas with special risk that require continuous fault-free operation and in which failure of or operation of the product can result in an imminent risk to life, limb or health or cause serious damage to property or the environment (such as the operation of nuclear power plants, weapons systems, aircraft and motor vehicles)

### Warranty and Liability

The provisions of the latest WAGO General Terms and Conditions of Deliveries and Services (GTC) apply as well as the Software License Terms for Standard Software (SW-License) applicable to software products and software embedded in WAGO hardware products, both available at: [www.wago.com](https://www.wago.com).

In particular, the warranty is void when:

- The product is improperly used.
- The defect is based on (customer-)specific specifications (hardware and software configurations).
- Modifications of the hardware or software by the user or third parties were made that are not described in this documentation and are at least responsible for the occurrence of the defect.

Individual agreements always take precedence.

### Obligations of the installer/operator

Installers and operators bear responsibility for the safety of an installation or a system assembled with the product.

The installer/operator is responsible for the proper installation and the safety of the system. It must comply with the laws, standards, guidelines, local regulations, the state and the rules of technology applicable at the time of installation and must observe the guidelines and instructions described in the operating instructions. The installation requirements of the approvals must also be met.

In the event of non-compliance, operation of product within the scope of the approval is not permitted.

## 1.3 Typographical Conventions

### Number Notation

|             |                                   |
|-------------|-----------------------------------|
| 100         | Decimals: Normal notation         |
| 0x64        | Hexadecimals: C-notation          |
| '100'       | Binary: In single quotation marks |
| '0110.0100' | Nibbles separated by a period     |

### Text Markups

|               |                                                 |
|---------------|-------------------------------------------------|
| <i>italic</i> | Names of paths or files                         |
| <b>bold</b>   | Menu items, entry or selection fields, emphasis |
| Code          | Excerpts from program code                      |
| >             | Selection of a menu point from a menu           |
| "Value"       | Value entries                                   |

|      |                                   |
|------|-----------------------------------|
| [F5] | Identification of buttons or keys |
|------|-----------------------------------|

### Cross References / Links

|                                                                                   |                                                 |
|-----------------------------------------------------------------------------------|-------------------------------------------------|
|  | Cross references/links to a topic in a document |
|  | Cross references / links to a separate document |
|  | Cross references / links to a website           |
|  | Cross references / links to an email address    |

### Sequence of Action

- ✓ This symbol identifies a precondition.
- 1. Action step
- 2. Action step
  - ⇒ This symbol identifies an intermediate result.
- ➔ This symbol identifies the result of an action.
- Individual action step

### Lists

- Lists, first level
  - Lists, second level

### Figures

Figures in this documentation are for better understanding and may differ from the actual product design.

### Warning Messages

#### **DANGER**

##### Type and source of hazard

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

- Action step to reduce risk

#### **WARNING**

##### Type and source of hazard

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

- Action step to reduce risk

**⚠ CAUTION****Type and source of hazard**

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

- Action step to reduce risk

**⚠ NOTICE****Type and source of malfunction (property damage only)**

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

- Action step to reduce risk

**Information Notices****i Note****Information**

Indicates information, clarifications, recommendations, referrals, etc.

## 1.4 Legal Information

**Intellectual property**

The intellectual property of this document belongs to WAGO GmbH & Co. KG. The reproduction and distribution of its content (in whole or in part) is prohibited, unless otherwise provided by statutory provisions, written agreements or this document. In case of doubt, the written consent of WAGO GmbH & Co. KG must be obtained in advance.

Third-party products are always mentioned without any reference to patent rights. WAGO GmbH & Co. KG, or the manufacturer of third-party products, retains all rights regarding patent, utility model or design registration.

Third-party trademarks are referred to in the product documentation. The “®” and “TM” symbols are omitted hereinafter. The trademarks are listed in the Appendix:  **Protected Rights** [▶ 130](#).

**Subject to Change**

The instructions, guidelines, standards, etc., in this manual correspond to state of the art at the time the documentation was created and are not subject to updating service. The installer and operator bear sole responsibility to ensure they are complied with in their currently applicable form. WAGO GmbH & Co. KG retains the right to carry out technical changes and improvements of the products and the data, specifications and illustrations of this manual. All claims for change or improvement of products that have already been delivered – excepting change or improvement performed under guarantee agreement – are excluded.

### Licenses

The product contains open-source software. The requisite license information is saved in the product. This information is also available under  [www.wago.com](https://www.wago.com).

## 2 Safety



This section presents hazards that could occur if the product is used. Builders and operators must take all hazards into account when analyzing the risk of their installed systems.

Measures to reduce the risk of hazards that are foreseeable from the manufacturer's point of view (i.e., without knowledge of the specific system built) are explained in the respective sections of this documentation (e.g., in "Planning").

Builders and operators must implement explained risk reduction measures and also take their own measures depending on the residual risk.

### 2.1 General Safety Regulations

- This documentation is part of the product. Therefore, retain the documentation during the entire service life of the product. Pass on the documentation to any subsequent user of the product. In addition, ensure that any supplement to this documentation is included, if necessary.
- The product must only be installed and put into operation by qualified electrical specialists per EN 50110-1/-2 and IEC 60364.
- Set up permissions management for authorized persons.
  - Physical access may only be made by authorized persons.
  - Digital access may only be made by authorized persons.
- Comply with the laws, standards, guidelines, local regulations and accepted technology standards and practices applicable at the time of installation.

### 2.2 Electrical Safety

- Hazardous electrical voltage can cause electric shock or burns! Always disconnect all power supplies from the product before mounting, installing, troubleshooting or performing maintenance.
- Make sure the product does not carry any voltage before starting work.

#### Power Supply

- For non-hazardous active voltage per EN/UL/IEC 61010-1, SELV/PELV power supplies shall be used.
- Provide a suitable disconnect mechanism and overcurrent protection on the system side. The disconnect mechanism must be located near the product where it can be operated and be clearly associated with the product. The **OFF** position of the disconnect mechanism must be clearly marked.

#### Grounding/Protection/Fuses

- When handling the product, please ensure that environmental factors (personnel, work space and packaging) are properly equalized. Do not touch any conducting parts.
- Establish sufficient grounding. Make sure there is a flawless electrical connection between the DIN-rail and frame / additional enclosure.

#### Cables

- To minimize interference (e.g., by electromagnetic interference), maintain a spatial separation between control, signal and data lines and the power supply lines.
- Always design the connection cables for the maximum anticipated current load.

- High currents and the inherent heat generated by the product can cause additional heat generation at the clamping point. Plan for a correspondingly higher temperature range for the connecting cables, or reduce inherent heat by selecting larger conductor cross-sections.
- Only one conductor may be connected to each connection point (e.g., CAGE CLAMP® connection).

### Protection

- When working on the system (e.g., during maintenance), protect the facility part in question from accidental or unauthorized restart.

## 2.3 Mechanical Safety

- Before startup, please check the product for any damage that may have occurred during shipping. Do not put the product into operation in the event of mechanical damage.
- Do not open the product housing.

## 2.4 Thermal Safety

- The surface of the housing heats up during operation. Under special conditions (e.g., in the event of a fault or increased surrounding air temperature), touching the product may cause burns. Allow the product to cool down before touching it.
- Cooling of the product must not be impaired. Ensure air can flow freely and that the minimum clearances from adjacent products/areas are maintained.
- The temperature inside the additional enclosure must not exceed the ambient temperature permitted for the mounted product.

## 2.5 Indirect Safety

- Only use a dry or cloth or a clothed dampened with water to clean the product. Do not use cleaning agents, e.g., abrasive cleaners, alcohols or acetone.
- Do not use any contact spray for cleaning.
- The product is not resistant to materials with seeping and insulating properties, such as aerosols, silicones or triglycerides (found in some hand creams). If these substances occur in the environment of the product, install the product in an additional housing that is resistant to these substances as well.
- Only permit skilled personnel approved by WAGO to perform repair work.
- Replace any defective or damaged devices.
- Observe possible different technical specifications for mounting that does not correspond to the nominal mounting position.
- Only use accessories authorized by WAGO.

### 3 Overview

The controller is an automation device that can perform PLC control tasks. The controller is suitable for mounting on a DIN-rail and characterized by various interfaces.

The controller can be used for applications in mechanical and systems engineering, in the processing industry and in building technology.

The controller's features include integrated digital and analog inputs and outputs and a serial onboard interface per EIA-485/RS-485.

The controller enables the integration of controller functionality into a **DALI** network (DALI line).

The controller is used for digital control of lighting actuators, such as **control gears** ("Control Gears," electronic control gears or ECGs) in building automation, as well as for evaluating control devices (DALI sensors). DALI enables complex lighting scenes to be implemented with group functions.

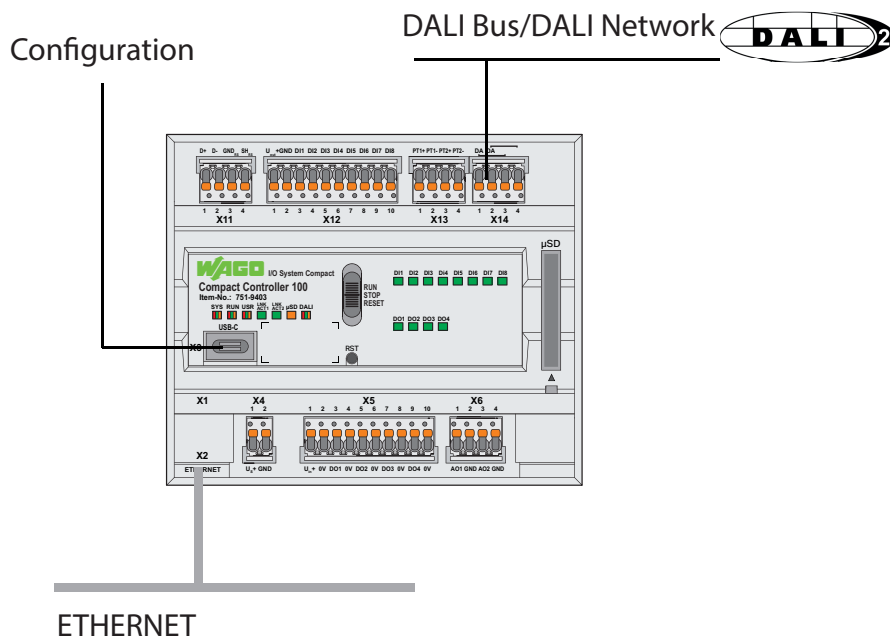


Figure 1: Overview of DALI Connections on the Controller

The controller complies with the DALI-2 standard DIN EN IEC 62386 and is listed with the DiiA.

The manufacturer-independent DALI standard aims to ensure the interoperability of DALI devices in lighting applications.

An external DALI bus supply is required to supply the controller.

The controller has two connection pairs (DA) for the bus lines for connecting the DALI bus (DALI line).

The bus line is installed in free topology. However, ring-shaped connections should be avoided. Because the cable length of a bus line is limited and the maximum cable lengths between bus devices must not be exceeded, general DALI guidelines must be observed.

The controller supports a total of 64 addresses for control gears (ECGs) and 64 addresses for control devices. You can select from several addressing methods for this. Once the addresses have been assigned, each of the DALI control devices can be assigned 16 groups and 16 scenes. A further 16 virtual groups can also be configured on the DALI bus.

The CODESYS programming software is used to program the controller. An extensive IEC-61131-3 library is available with simple modules for implementing complex lighting applications.

A colored LED on the controller housing indicates active and inactive operating modes, the presence of a DALI bus voltage, and internal states or error states of the controller.

# 4 Properties

## 4.1 View

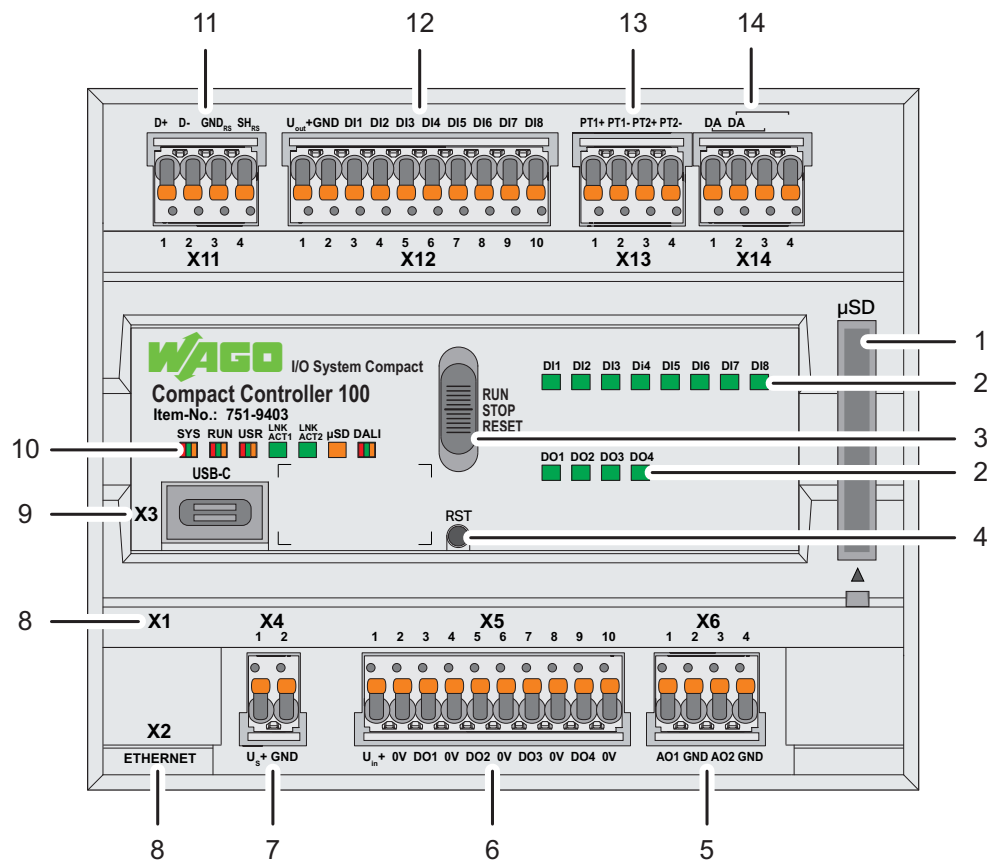


Figure 2: View

|    |                                                                                 |
|----|---------------------------------------------------------------------------------|
| 1  | <b>Memory Card Slot</b> <a href="#">[&gt; 24]</a>                               |
| 2  | DI/DO Status LEDs                                                               |
| 3  | <b>Mode Selector Switch</b> <a href="#">[&gt; 25]</a>                           |
| 4  | <b>Reset Button</b> <a href="#">[&gt; 25]</a>                                   |
| 5  | Analog Outputs                                                                  |
| 6  | Digital Outputs                                                                 |
| 7  | Supply Voltage                                                                  |
| 8  | ETHERNET ports                                                                  |
| 9  | USB Service Port                                                                |
| 10 | System LEDs (SYS, RUN, USR)<br>LNK ACT LEDs<br>Memory Card Slot LED<br>LED DALI |
| 11 | Communication Interface RS-485                                                  |
| 12 | Digital Inputs                                                                  |
| 13 | Analog Temperature Sensors                                                      |
| 14 | DALI Interface                                                                  |

4.2 Product Identification

4.2.1 Marking

The marking is located on the left side of the product.

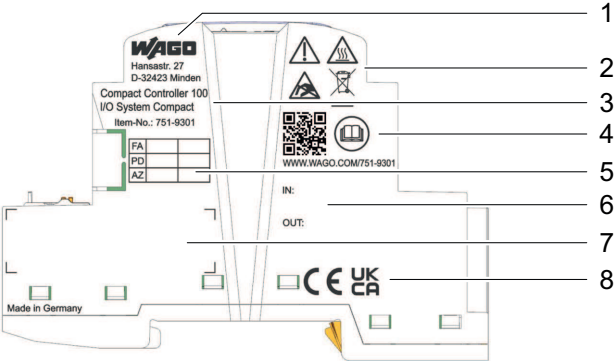


Figure 3: Marking (Example)

Table 1: Marking

|   |                                               |                                                                             |
|---|-----------------------------------------------|-----------------------------------------------------------------------------|
| 1 | Company logo and address                      |                                                                             |
| 2 | Symbols for warning notices                   | <a href="#">Disposal and Recycling [► 89]</a>                               |
| 3 | Product names and item numbers                |                                                                             |
| 4 | QR code with link to website                  |                                                                             |
| 5 | Update matrix                                 | <a href="#">Update Matrix [► 19]</a>                                        |
| 6 | Technical specifications                      | <a href="#">Technical Data, Approvals, Guidelines and Standards [► 131]</a> |
| 7 | Label                                         | <a href="#">Label [► 18]</a>                                                |
| 8 | Field for guidelines, approvals and standards | <a href="#">Technical Data, Approvals, Guidelines and Standards [► 131]</a> |

4.2.2 Label

The label is located on the left side of the product.

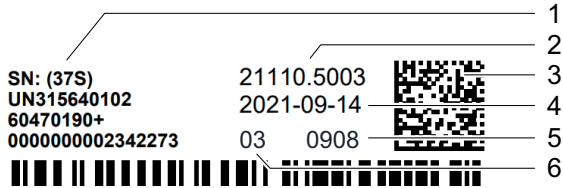


Figure 4: Label (Example)

Table 2: Etikett

|   |                                                            |  |
|---|------------------------------------------------------------|--|
| 1 | Product identifier (UII)                                   |  |
| 2 | Control number                                             |  |
| 3 | Product identifier (UII) in the form of a Data Matrix code |  |
| 4 | Date of manufacture (year-month-day)                       |  |
| 5 | Production plant identifier                                |  |
| 6 | Hardware revision number                                   |  |

4.2.2.1 UII

A UII (“Unique Item Identifier”) is provided for identification and traceability.

The 39-character UII is made up of several parts:

- It starts with three characters of the four-character data frame (per ISO/IEC 15481, possibly in parentheses)
- The 11-character manufacturer code assigned by an issuing agency in accordance with ISO/IEC 15459
- The eight-digit material number
- A single linking character, which is part of the data frame per ISO/IEC 15481
- The 16-digit “serial number”

**37SUN31564010260275037+000000002240938**

1.                      2.                      3.                      4.                      5.

Figure 5: UII Structure (Example)

Table 3: Structure of the UII

| Pos. | Number of Characters | Type of Identifier                           |
|------|----------------------|----------------------------------------------|
| 1.   | 3                    | Data frame (part 1, possibly in parentheses) |
| 2.   | 11                   | Manufacturer ID                              |
| 3.   | 8                    | Material number                              |
| 4.   | 1                    | Data frame (part 2)                          |
| 5.   | 16                   | Serial number                                |

### 4.2.3 Update Matrix

In the event of a factory update, the updated production data is documented in the update matrix. The initial manufacturing information on the product housing remains unchanged.

Table 4: Update Matrix

|           |            |                                                                       |
|-----------|------------|-----------------------------------------------------------------------|
| <b>FA</b> | XXXXXXXXXX | Production order number, 10-digit                                     |
| <b>PD</b> | WWYY       | WW: production week<br>YY: production year                            |
| <b>AZ</b> | FWHWFL     | FW: firmware index<br>HW: hardware index<br>FL: firmware loader index |

## 4.3 Connections

### 4.3.1 ETHERNET ports

The ETHERNET ports are for connecting to a LAN or the Internet for communication with the controller. A crossover cable or category 5e patch cable can be used.

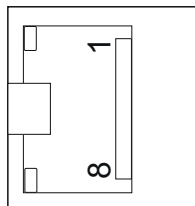


Figure 6: ETHERNET Interface Pin Assignment

Table 5: ETHERNET Interface Pin Assignment

| Contact | Signal | Description     |
|---------|--------|-----------------|
| 1       | TD+    | Transmit data + |
| 2       | TD-    | Transmit data - |
| 3       | RD+    | Receive data +  |
| 4       | NC     | Not assigned    |
| 5       | NC     | Not assigned    |
| 6       | RD-    | Receive data -  |
| 7       | NC     | Not assigned    |
| 8       | NC     | Not assigned    |
| Housing | Shield | Shield          |

#### 4.3.2 USB Service Port

The service interface is used for communication with WAGO Ethernet Settings.

You can establish an IP connection via this interface for commissioning and service purposes.

#### 4.3.3 Supply Voltage

Table 6: Pin Assignment Supply Voltage

| Contact | Signal           | Description    |
|---------|------------------|----------------|
| 1       | U <sub>s</sub> + | Supply voltage |
| 2       | GND              | Ground         |

#### 4.3.4 Digital Inputs

The controller has 8 digital input channels (24 VDC, type 3).

The input channels receive binary control signals from digital field devices (e.g., sensors, encoders, switches or proximity sensors).

The connection is made via a 10-pole picoMAX® Pluggable Connector with Push-in CAGE CLAMP®S technology.

The sensors are connected according to the following table.

Table 7: Digital Input Pin Assignments

| Contact | Signal             | Description                         |
|---------|--------------------|-------------------------------------|
| 1       | U <sub>out</sub> + | Supply voltage output (DI1 ... DI8) |
| 2       | GND                | Ground                              |
| 3       | DI1                | Digital input 1                     |
| 4       | DI2                | Digital input 2                     |
| 5       | DI3                | Digital input 3                     |
| 6       | DI4                | Digital input 4                     |
| 7       | DI5                | Digital input 5                     |
| 8       | DI6                | Digital input 6                     |
| 9       | DI7                | Digital input 7                     |
| 10      | DI8                | Digital input 8                     |

The inputs provide high-side switching. If the 24 V potential for the system power (X12,  $U_{out+}$ ) is switched to an input connection, the signal status of the corresponding input channel is set to “high.”

A green status LED for each channel indicates the signal status.

The meaning of the LED indicator is described in the section [🔗 Diagnostics via DIO LED Indicators \[p 84\]](#).

### **Note**

#### **Pay attention to potential!**

The power supply output  $U_{out+}/GND$  is not short-circuit-protected.

### **4.3.5 Digital Outputs**

The controller transmits binary control signals from an automation device to connected actuators (e.g., magnetic valves, contactors, transmitters, relays or other electrical loads).

The outputs provide high-side switching. If the signal status of an output channel is “high,” the 24 V potential for the field power supply is switched to the corresponding output connection.

The field supply powers the digital outputs.

A green status LED for each channel indicates the signal status; see DI/DO Status LEDs.

The field level of the digital outputs is electrically isolated from one another from the system level.

The specifications of the connections corresponding to EN 61010-2-201: DC circuit, general use

The controller has 4 digital output channels (24 VDC, 0.5 A).

The connection is made via a 10-pole picoMAX® Pluggable Connector with Push-in CAGE CLAMP®S technology.

The actuators are connected according to the following table.

Table 8: Pin Assignment for Digital Outputs

| Contact | Signal    | Description                        |
|---------|-----------|------------------------------------|
| 1       | $U_{in+}$ | Supply voltage input (DO1 ... DO4) |
| 2       | 0 V       | Ground                             |
| 3       | DO1       | Digital output 1                   |
| 4       | 0 V       | Ground                             |
| 5       | DO2       | Digital output 2                   |
| 6       | 0 V       | Ground                             |
| 7       | DO3       | Digital output 3                   |
| 8       | 0 V       | Ground                             |
| 9       | DO4       | Digital output 4                   |
| 10      | 0 V       | Ground                             |

The outputs provide high-side switching. If the signal status of an output channel is “high,” the 24 V potential for the field power supply is switched to the corresponding output connection.

A green status LED for each channel indicates the signal status.

The meaning of the LED indicator is described in the section [🔗 Diagnostics via DIO LED Indicators \[► 84\]](#).

#### 4.3.6 Analog Outputs

The controller generates standards 0 ... +10 V signals for the field range.

The product has two output channels, allowing direct connection of 2-wire actuators.

The actuators are connected via the AO1 and ground or AO2 and ground connections.

The channels have a common ground potential.

The output signal is output with a resolution of 12 bits.

The internal power supply powers the module.

The controller has two analog output channels.

The connection is made via a 4-pole picoMAX® Pluggable Connector with Push-in CAGE CLAMP®S technology.

The actuators are connected according to the following table.

Table 9: Pin Assignment for Analog Outputs

| Contact | Signal | Description     |
|---------|--------|-----------------|
| 1       | AO1    | Analog output 1 |
| 2       | GND    | Ground          |
| 3       | AO2    | Analog output 2 |
| 4       | GND    | Ground          |

#### 4.3.7 RTD Inputs

The controller has two RTD input channels.

Temperature sensors such as Pt1000 or Ni1000 in 2-wire technology can be connected directly.

The sensors are connected according to the following table.

The connection is made via a 4-pole picoMAX® Pluggable Connector with Push-in CAGE CLAMP®S technology.

Table 10: Analog Temperature Sensor Pin Assignments

| Contact | Signal | Description                 |
|---------|--------|-----------------------------|
| 1       | PT1+   | Analog temperature sensor 1 |
| 2       | PT1–   |                             |
| 3       | PT2+   | Analog temperature sensor 2 |
| 4       | PT2–   |                             |

The controller linearizes the measured resistance values and converts them into a numerical value proportional to the temperature or resistance of the selected sensor.

#### 4.3.8 Communication Interface

The communication interface integrated in the controller allows devices with an RS-485 interface to be connected.

The RS-485 interface guarantees a high level of interference immunity through differential transmission and electrically isolated signals.

The connection to the communication partner is made via connections D+, D-,  $GND_{RS}$  and  $SH_{RS}$ .

The shield connection is capacitively connected to the DIN-rail.

The interface operates in accordance with TIA/EIA 485.

The connected device can communicate directly via the controller used. The active communication channel works independently of the higher-level bus system in half-duplex mode at up to 115200 baud.

Table 11: Communication Interface X11 Pin Assignment

| Contact | Signal     | Description             |
|---------|------------|-------------------------|
| 1       | D+         | Transmit/receive data + |
| 2       | D-         | Transmit/receive data - |
| 3       | $GND_{RS}$ | Ground                  |
| 4       | $SH_{RS}$  | Shield                  |

#### 4.3.8.1 Operation as an RS-485 Interface

To minimize reflections at the end of the line, the RS-485 line must be terminated at the end with a 120  $\Omega$  line terminator. The RS-485 line is already terminated in the Compact Controller 100 with a bus termination resistor (121  $\Omega$ ). A bias network (pull-up and pull-down resistor) is also integrated in the Compact Controller 100 to keep the bus lines at a specified level when no other subscriber is active.

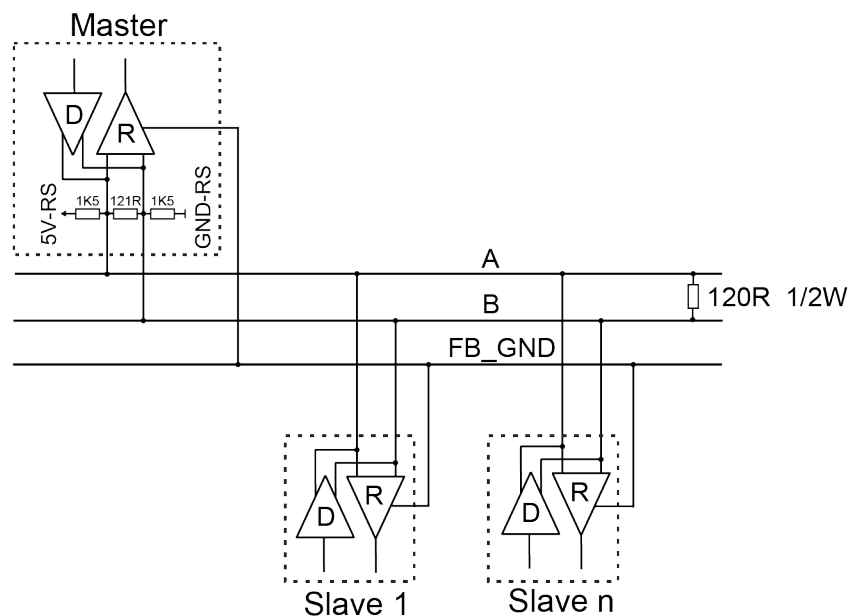


Figure 7: RS-485 Bus Termination

#### 4.3.9 DALI Interface

Table 12: DALI Interface, Pin Assignment

| Contact | Signal | Description     |
|---------|--------|-----------------|
| 1       | DA     | DALI connection |
| 2       |        |                 |

| Contact | Signal | Description     |
|---------|--------|-----------------|
| 3       | DA     | DALI connection |
| 4       |        |                 |

Contacts 1 and 3 and 2 and 4 are connected in parallel.

## 4.4 Memory Card Slot

The slot for the memory card is located on the front of the housing. A push-push mechanism is used to lock the memory card into the housing. The memory card is protected by a cover flap. The cover flap is sealable.

## 4.5 Indicators

### 4.5.1 System LEDs

Table 13: System/Fieldbus LED Indicators

| Designation | Color                | Description                                                                              |
|-------------|----------------------|------------------------------------------------------------------------------------------|
| SYS         | Red/green/orange/off | System status                                                                            |
| RUN         | Red/Green/Orange/Off | PLC program status                                                                       |
| USR         | Red/green/orange/off | User LED; programmable using function blocks from the WAGO libraries to control the LEDs |

### 4.5.2 LNK ACT LEDs

Table 14: LNK/ACT LED Indicators

| Designation            | Color     | Description                              |
|------------------------|-----------|------------------------------------------|
| LNK ACT 1<br>LNK ACT 2 | Green/off | ETHERNET Connection Status/Data Exchange |

### 4.5.3 Memory Card Slot LED

Table 15: Memory Card Slot LED Indicator

| Designation | Color      | Description        |
|-------------|------------|--------------------|
| μSD         | Orange/off | Memory card status |

### 4.5.4 DALI LED

Table 16: DALI LED Indicator

| Designation | Color                | Description |
|-------------|----------------------|-------------|
| DALI        | Red/green/orange/off | DALI Status |

### 4.5.5 DI/DO Status LEDs

Table 17: DI/DO LED Indicator

| Designation                | Color     | Description                          |
|----------------------------|-----------|--------------------------------------|
| DI1 ... DI8<br>DO1 ... DO4 | Green/off | Status of Digital Inputs and Outputs |

## 4.6 Control Elements

### 4.6.1 Mode Selector Switch

Table 18: Mode Selector Switch

| Pos.  | Actuation     | Function                                                                     |
|-------|---------------|------------------------------------------------------------------------------|
| RUN   | Latching      | <b>Normal operation</b><br>CODESYS V3 applications are running               |
| STOP  | Latching      | <b>Stop</b><br>All CODESYS V3 applications have stopped                      |
| RESET | Spring-return | Warmstart Reset or Coldstart Reset<br>(depending on how long it is actuated) |

Other functions can also be triggered with the reset button.

#### See also

- 📖 Warmstart Reset [► 85]
- 📖 Coldstart Reset [► 85]
- 📖 Software Reset [► 85]
- 📖 Controller Reset [► 85]

### 4.6.2 Reset Button

The reset button is installed within a recess to prevent accidental operation. The button can be pressed with suitable object (e.g., a pen).

#### See also

- 📖 Temporarily Setting a Fixed IP Address [► 61]
- 📖 Software Reset [► 85]
- 📖 Controller Reset [► 85]

## 4.7 DIN-Rail Contact

The product transmits electromagnetic interference to the DIN-rail via DIN-rail contacts. The DIN-rail contacts are automatically connected when the product is snapped on to the DIN-rail.

4.8 Circuit Diagram

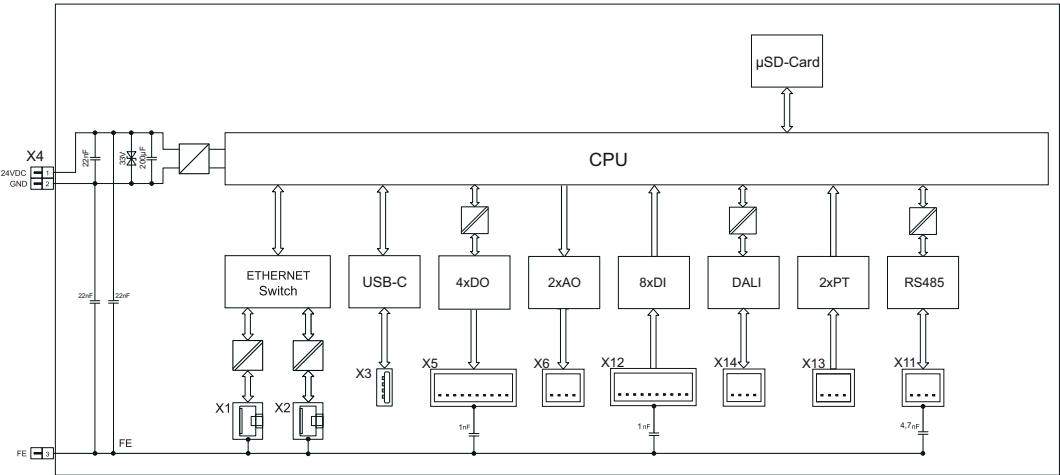


Figure 8: Circuit Diagram

# 5 Functions

## 5.1 Function Overview

Automation tasks can be executed in all IEC-61131-3-compatible languages with the CODESYS V3 programming system.

Implementation of task processing in the runtime system is optimized for Linux® with real-time extensions to provide maximal performance for automation tasks. Web visualization is also provided as visualization in addition to the development environment.

The controller provides 32 MB of program memory (flash), 128 MB of data memory (RAM) and 128 kB of remanent memory (retain and flag variables in an integrated NVRAM) for IEC 61131-3 programming in CODESYS applications.

The controller has a slot for a memory card. The memory card can be used to transfer device parameters, boot projects and other files from one controller to another. The memory card can be accessed via FTP as an additional drive.

Two ETHERNET ports and the integrated configurable switch allow wiring in all necessary configurations with a common network and common IP address for both ports, or with two separate networks with a separate IP address for each port.

The physical interfaces (ports) are assigned via logical bridges and can be configured via the WBM, for example.

Both interfaces support:

- 10BASE-T / 100BASE-TX
- Full/half duplex
- Auto-negotiation
- Auto-MDI(X) (automatic uplink and crossover switching)

The following fieldbus interfaces are implemented for exchange of process data:

- Modbus TCP Client/Server
- Modbus RTU Master/Slave (via RS-485)
- Gateway Modbus TCP to Modbus RTU
- EtherCAT Master
- EtherNet/IP Adapter
- EtherNet/IP Scanner
- DALI Multimaster

Fieldbus configuration with CODESYS V3 is possible.

The Web-Based Management (WBM) is also available for configuration. This system includes various dynamic HTML pages from which, among other things, information about configuration and the status of the controller can be called up. The WBM is already stored in the device and is presented and operated using an Web browser. It is also possible to store individual HTML pages in the implemented file system or to launch programs directly.

In the controller's initial state, the installed firmware is based on Linux® with special real-time extensions of the RT-Preempt patch. In addition, the following application programs are also installed on the controller, along with a number of different auxiliary programs:

- An SNMP server/client

- An FTP server
- An FTPS server (explicit connections only)
- An SSH server/client
- A Webserver
- An NTP client
- A BootP client
- A DHCP client
- A DHCP server
- A DNS server
- The CODESYS V3 runtime environment

Based on IEC-61131-3 programming, data processing takes place on site in the controller. The logical process results can be output directly to the actuators or transmitted via a connected fieldbus to the higher level controller.

## 5.2 Hardware Functions

### 5.2.1 Reset Functions

You can initiate various reset functions using the mode selector switch and the Reset button (RST).

#### See also

- 📖 Warmstart Reset [► 85]
- 📖 Coldstart Reset [► 85]
- 📖 Software Reset [► 85]
- 📖 Controller Reset [► 85]

## 5.3 Network Functions

### 5.3.1 Interface Configuration

The X1 and X2 network interfaces of the controller are connected with an integrated configurable 3-port switch, in which the third port is connected to the CPU.

The two interfaces and configurable switch enable wiring for:

- In a common network with a common MAC address and an IP address for both interfaces.
- In two separate networks with a common MAC address and its own IP address for each interface.

The physical interfaces (ports) are assigned via logical bridges and can be e.g., configured via the WBM.

| Bridge | Port                                                                              |                                                                                     |
|--------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|        | X1                                                                                | X2                                                                                  |
| 1      |  |  |
| 2      |                                                                                   |  |

Figure 9: Example of Interface Assignment

For interface X1, a fixed IP address can be set temporarily ("Fix IP Address" mode). The setting is carried out with the Reset button (see Section "Commissioning" > ... > "Temporarily Setting a Fixed IP Address").

Setting a fixed IP address has no effect on the mode previously set.

#### See also

 Temporarily Setting a Fixed IP Address [► 61]

#### 5.3.1.1 Operation in Switch Mode

For operation in Switch mode, the TCP/IP settings such as the IP address or subnet mask apply to both X1 and X2.

When switching to Switch mode, the X1 settings are applied as a new common configuration for X1 and X2.

The device is then no longer accessible via the IP address previously set for X2. This must be taken into account for applications that use X2 for communication.

#### 5.3.1.2 Operation with Separate Network Interfaces

When operating with separate network interfaces, both ETHERNET interfaces can be configured and used separately.

When switching to operating with separate interfaces, interface X2 is initialized with the setting values last valid for it. The connections on the X1 interface persist.

When operating with separate interfaces and fixed IP address, the device can still be accessed via the interface X2 via the regular IP address.

#### 5.3.1.3 MAC ID and IP Address Assignment Examples

##### One common network with one common IP address for both ports

| Bridge | Port                                                                                |                                                                                       |
|--------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|        | X1                                                                                  | X2                                                                                    |
| 1      |  |  |
| 2      |                                                                                     |  |

Figure 10: 1 bridge with 2 ports

Table 19: Assignment of MAC IDs and IP addresses for 1 bridge with 2 ports

| Bridge | MAC ID | IP Addr. | Port | MAC ID | Port | MAC ID |
|--------|--------|----------|------|--------|------|--------|
| 1      | 01     | 1        | X1   | 02     | X2   | 03     |

Two separate networks where each port has its own IP address



Figure 11: 2 bridges with 1/1 ports

Table 20: MAC ID and IP address assignment for 2 bridges with 1/1 ports

| Bridge | MAC ID | IP Addr. | Port | MAC ID | Port | MAC ID |
|--------|--------|----------|------|--------|------|--------|
| 1      | 01     | 1        | X1   | 01     |      |        |
| 2      | 02     | 2        |      |        | X2   | 02     |

5.3.2 Network Security

5.3.2.1 Users and Passwords

Users and Passwords

There are several user groups that can be used for different services.

A default password is set for all users. We strongly recommend changing these passwords on startup!

 **Note**

Change passwords!

The default passwords are documented in these instructions and therefore do not offer adequate protection.

- Change the passwords to meet your particular needs.

Services and Users

All password-protected services and their associated users are listed in the following table.

Table 21: Services and Users

| Service                        | User   |       |      |      |
|--------------------------------|--------|-------|------|------|
|                                | Linux® |       |      | SNMP |
|                                | root   | admin | user |      |
| Web-Based Management (WBM)     | X      | X     | X    |      |
| Linux® console                 | X      | X     | X    |      |
| Console-Based Management (CBM) | X      |       |      |      |

| Service | User   |       |      |      |
|---------|--------|-------|------|------|
|         | Linux® |       |      | SNMP |
|         | root   | admin | user |      |
| CODESYS |        | X     |      |      |
| FTP     | X      | X     | X    |      |
| FTPS    | X      | X     | X    |      |
| SSH     | X      | X     | X    |      |
| SNMP    |        |       |      | X    |

### Linux® User Group

The Linux® users group includes the actual users of the operating system that most services also use.

Table 22: Linux® user

| User  | Special Feature | Home Directory | Default password |
|-------|-----------------|----------------|------------------|
| root  | Super user      | /root          | wago             |
| admin | CODESYS user    | /home/admin    | wago             |
| user  | Normal user     | /home/user     | user             |

You can configure passwords for these users via the WBM or a terminal connection.

#### **Note**

#### Change passwords!

The default passwords are documented in these instructions and therefore do not offer adequate protection.

- Change the passwords to meet your particular needs.

#### **Note**

#### Valid characters for passwords

Passwords may contain only the following characters:

lowercase letters (a ... z), uppercase letters (A ... Z), numbers (0 ... 9) and special characters (! " # \$ % & ' ( ) \* + , . / : ; < = > ? @ [ ] ^ \_ ` { } | ~ -).

#### **Note**

#### Note password length!

For CODESYS, the password length must be greater than or equal to 1 character and less than 60 characters!

For the logged-in Linux® user, the password can be changed via the WBM “WBM User Configuration” page in the “Change Passwords” group.

Table 23: WBM “WBM User Configuration” Page – “Change Passwords” Group

| Parameters   | Explanation                                         |
|--------------|-----------------------------------------------------|
| Old Password | Enter the current password used for authentication. |
| New Password | Enter new password.                                 |

| Parameters       | Explanation                        |
|------------------|------------------------------------|
| Confirm Password | Enter new password again to check. |

### SNMP User Group

The SNMP service manages its own users. When first delivered, no users are stored in the system.

#### 5.3.2.2 Web Server Authentication

The HTTP and HTTPS Web protocols can be used to access the WBM pages. It is preferable to use HTTPS, since it uses the TLS protocol. The TLS protocol ensures secure communication with encryption and authentication.

The default setting for the controller allows strong encryption but uses only simple authentication methods. Since authentication plays a central role for all secure communication channels, using secure authentication is strongly recommended. The security certificate stored on the controller is the basis for authentication. The default location for the security certificate is /etc/lighttpd/https-cert.pem.

As delivered, the controller uses a generic security certificate in x509 format. To enable secure authentication, you must replace the generic security certificate with a security certificate specific to the individual device.

##### 5.3.2.2.1 TLS Encryption

When an HTTPS connection is established, the Web browser and Webserver negotiate what TLS version and what cryptographic method is used.

The permitted TLS versions and cryptographic methods can be set ("Standard"/"Strong"). With the "Standard" setting, TLS 1.0, TLS 1.1 and TLS 1.2 are allowed, as well as cryptographic methods that are no longer considered secure. Use is recommended only for backward compatibility with older systems.

With the "Strong" setting, the Webserver only allows TLS version 1.2 and strong algorithms. Older software and older operating systems may not support TLS 1.2 and the encryption algorithms.

#### Note

##### BSI TR-02102 Technical Guidelines

The rules for the "Strong" setting are based on the TR-02102 technical guidelines of the German Federal Office for Information Security (BSI). The policy is available at:

 [www.bsi.bund.de](https://www.bsi.bund.de).

#### Note

##### BSI Guide on Migration to TLS 1.2 or TLS 1.3

The German Federal Office for Information Security guidelines on migration to TLS 1.2 or TLS 1.3 contain "compatibility matrices" that show what software is compatible with TLS 1.2 or TLS 1.3. The guide is available at:  [www.bsi.bund.de](https://www.bsi.bund.de).

### 5.3.2.3 Root Certificates

For communication encrypted with TLS, root certificates are used to verify the authenticity of the communication partner.

A root certificate, which is signed by a certificate authority, serves to verify the validity of all certificates issued by this certificate authority.

The root certificates stored on the controller (root CA bundle) form the basis for authentication of services hosted on the Internet (e.g., email providers and cloud services).

The standard storage location for the root certificates is `/etc/ssl/certs/ca-certificates.crt`.

This file contains the certificates provided by Mozilla. A list of the included root certificates and their respective validity periods can be requested from the following address:

 <https://hg.mozilla.org/releases/mozilla-release/raw-file/79f079284141/security/nss/lib/ckfw/builtins/certdata.txt>

The root certificates can be updated on the controller by updating the file `/etc/ssl/certs/ca-certificates.crt`.

#### See also

 Update Root Certificates [► 87]

## 5.3.3 Network Configuration

### 5.3.3.1 Hostname/Domain Name

Without a hostname configuration, the controller is assigned a default name which includes the last three values of the controller's MAC address, e.g., "PFx00-A1A2A3." This name is valid for as long as a hostname was not configured, or hostname was not supplied to the controller via DHCP. See  [Configuration in the Web-Based Management System \(WBM\) \[► 65\]](#) for configuration.

When the hostname is set, a hostname supplied by a DHCP response is immediately active and displaces the configured or default hostname. If there are multiple network interfaces with DHCP, the last received hostname is valid. If only the configured name is to be valid, the network administrator must adjust the configuration of the active DHCP server so that no hostnames are transferred in the DHCP response.

The default hostname or the configured name is active again if the network interfaces are set to static IP addresses or if a hostname is not received via the DHCP response.

A similar mechanism is used for a domain name as for the hostname. The difference is that a default domain name is not set. As long as a domain name is not configured or supplied by DHCP, the domain name is empty.

### 5.3.3.2 Routing

As part of the TCP/IP configuration, the controller allows you to configure static routes, IP masquerading and port forwarding. Default gateways are configured via static routes, since default gateways are a special case of static routes.

A network station transmits to a gateway all network data packets for systems outside of its local network. This gateway is responsible for the appropriate routing of the data packets so that they reach the target system. To allow access to different target systems, it may be necessary to configure multiple gateways. This is configured by adding routing entries.

A routing entry consists of the following information:

- Destination address
- Destination mask
- Gateway address
- Gateway metric

On the basis of the target system configuration, consisting of the destination address and destination mask, a decision is made about which gateway a network data packet should be forwarded to. The target system can be specified through an individual IP address or an IP address range. For a network data packet to forward, the routing entry with the most specific destination address and destination mask entries is always selected. The default gateway corresponds to the least specific routing entry. All network data packets such that no specific routing entry exists for their destination address and destination mask are sent to this default gateway.

#### **Default gateway:**

If the value “default” is entered in the “Destination Address” field, a default gateway, also called a default route, is defined. The value “0.0.0.0” must then be set in the “Destination Mask” field.

#### **Route:**

If an IP address or IP address range is entered in the “Destination Address” field, then all network data packets that are directed to the network address or network address range are sent to the gateway address corresponding to the entry.

If the IP address of the gateway is outside the IP address space that the controller can reach, the associated route is not enabled.

A metric is assigned to each routing entry. If multiple routing entries are configured for the same destination address and destination mask, the metric specifies how the routing entries are prioritized. In this case, routing entries with a lower value for the metric are preferred over routing entries with a higher metric value.

The metric value of the configured routing entries can be specified for the controller. The default value for the metric is 20. Besides the manually configurable routes, default gateways can also be set via DHCP replies. All default gateways transferred via DHCP are assigned a permanent metric value of 10.

#### **Metric example:**

A controller obtains its IP configuration via a DHCP server and receives both the IP address and the network mask 192.168.1.10/24. Furthermore, a gateway with IP address 192.168.1.2 and metric value 20 is set up on the controller. Therefore, when no specific routing entry exists for the target address of network data packets, the controller sends them to gateway 192.168.1.2. Besides the IP address and network mask, the DHCP

server is now instructed to allocate a default gateway of 192.168.1.1. The controller gives this default gateway a metric value of 10. Therefore, the default gateway received via DHCP is preferred over the manually configured gateway.

The routing entries are used to specify which gateways the network data packets are sent. If the controller is running in switched mode and only has one network interface, all network traffic passes through this network interface. If the controller is running in separated mode or contains a modem, it has more than one network interface. Therefore, it is possible for a network data packet to arrive at the controller on one network interface and depart on a different network interface. This forwarding between different network interfaces must be explicitly enabled; it is disabled when the controller is delivered. To enable the forwarding, "Routing enabled entirely" must be enabled in the "General Routing Configuration" group. In this case, the controller can function as a router.

For forwarding network communication through a router, it is necessary to note that corresponding routing entries must be provided not only for the router, but also for the respective endpoints of the communication. The routing entries of the endpoints must ensure that the desired network data packets are sent via the router, both when the connection is established and with the replies.

#### Host route example:

A host route is a route to an individual host. In the following example, a route to a host with IP address 192.168.1.2 is to be specified. The route passes through a gateway that can be reached via address 10.0.1.3. To configure a host route to the destination host on a controller connected to the gateway, the following settings must be made:

|                      |                 |                                    |
|----------------------|-----------------|------------------------------------|
| Destination address: | 192.168.1.2     | IP address of the destination host |
| Destination mask:    | 255.255.255.255 | Subnet mask of an individual host  |
| Gateway address:     | 10.0.1.3        | IP address of the gateway          |
| Gateway metric:      | 20              | Route priority                     |

#### Network route example:

A network route is a route to a subnet, which can contain multiple hosts. In the following example, a route to a subnet should be specified with network address 192.168.1.0. The route passes through a gateway that can be reached via address 10.0.1.3. To configure a network route to the destination network on a controller connected to the gateway, the following settings must be made:

|                      |               |                                    |
|----------------------|---------------|------------------------------------|
| Destination address: | 192.168.1.0   | IP address of the destination host |
| Destination mask:    | 255.255.255.0 | Subnet mask of an individual host  |
| Gateway address:     | 10.0.1.3      | IP address of the gateway          |
| Gateway metric:      | 20            | Route priority                     |

Besides configuration of static routes, the controller also supports IP masquerading. This can be enabled for selected network interfaces of the controller. Network data packets that depart the controller through a network interface for which IP masquerading has been enabled are given the IP address of the network interface as their sender address. If network data packets are forwarded through the controller, the network behind the controller is encapsulated under a single address.

Furthermore, the controller permits configuration of port forwarding entries. For port forwarding, the destination address and, if relevant, destination port of a network data packet that arrived at the controller via a previously configured network interface are overwritten. This makes it possible to forward network data packets through the controller to other addresses and ports. Forwarding can be configured for the TCP or UDP protocols.

### 5.3.4 Network Services

#### 5.3.4.1 DHCP Client

The controller can get network parameters from an external DHCP master via the DHCP Client service.

The following parameters can be obtained:

- IP Address
- Subnet Mask
- Router/Gateway
- Hostname
- Domain
- DNS Server
- NTP server

For the IP address, SubNet mask and router/gateway parameters, the entries are stored per ETHERNET port (X1, X2).

The Hostname and Domain parameters are stored according to the LIFO principle (Last In First Out). The settings from the last DHCP offer received are always used.

The DNS and NTP Server parameters are stored centrally for global use. All transmitted parameters are saved.

### 5.3.5 Cloud Connectivity

With the cloud connectivity functionality and an IEC library, the controller is available as a gateway for Internet-of-Things (IoT) applications. This means the controller can collect the data from all the connected devices, access the Internet via the built-in Ethernet interface or the mobile communications module and send the data to the cloud.

You can customize the cloud service to be used; Microsoft Azure and Amazon Web Services are available, among others.

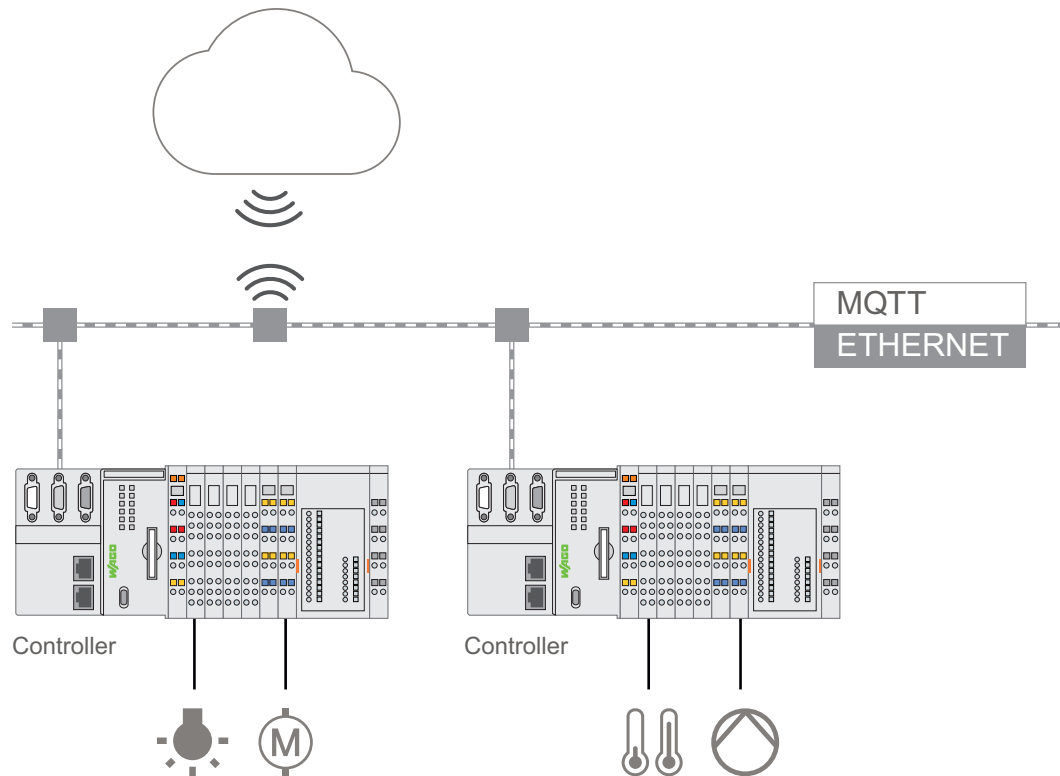


Figure 12: Connecting the Controllers to a Cloud Service (Example)

Data is transmitted from the controller to the cloud service as JSON files. The connection can be encrypted via TLS; see [🔒 TLS Encryption \[p 32\]](#).

You can find the settings that must be made in the controller to use the cloud connectivity functionality in the [🔒 Web-Based Management \(WBM\) \[p 65\]](#).

You can configure the communication parameters in the WBM, for example.

You can configure the data to be exchanged between the cloud and the controller from the IEC application with the corresponding CODESYS V3 library.

### **Note**

#### **Beachten Sie die zusätzlichen Dokumentationen!**

Eine detaillierte Beschreibung des Softwarepaketes Cloud Connectivity mit einem Controller und Informationen zur SPS-Programmierung finden Sie im Anwendungshinweis A500920 im Downloadbereich unter [🌐 www.wago.com](https://www.wago.com).

### **Note**

#### **Observe the necessary data protection and security settings!**

Before using the cloud connectivity functionality, please read the information on data protection and security in the corresponding manual in the download area at

[🌐 www.wago.com](https://www.wago.com).

Table 24: Components of the Cloud Connectivity Software Package

| Components                                      | Description                                                                                                                                                                      |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CODESYS V3:<br>WagoAppCloud<br>WagoAppSparkplug | IEC libraries to create the PLC application; function blocks make it possible to exchange data between the PLC and cloud service. The data transmission variables are definable. |

## 5.4 Memory Functions

The memory card is optional and serves as an additional memory area in addition to the internal memory or drive in the controller. The user program, user data, source code of the project or device settings can be saved to the memory card, and thus already existing project data and programs can be copied to one or more controllers.

If the memory card is inserted, this is incorporated under /media/sd in the directory structure of the file system inside the controller. This means that the memory card can be addressed like a removable medium on a PC.

### 5.4.1 Formatting

#### Note

##### **Note the pre-formatting of the memory card!**

Please note that memory cards ≤ 2 GB are often formatted with the “FAT16” file system type and can generate up to 512 entries in the root directory. For over 512 entries create these in a subdirectory or format the memory card with “FAT32” or “NTFS.”

### 5.4.2 Data Backup

The controller has a backup function and a restore function.

In the WBM, the required settings can be made in the “Configuration” tab on the “Package Server” > “Firmware Back-up” or “Firmware Restore” pages and the functions can be executed.

The storage medium (internal memory or memory card) and, if applicable, the storage location in the network can be set.

The data to be backed up and restored can also be selected:

- The CODESYS project (“PLC Runtime Project,” boot project, CODESYS settings)
- The device settings (“Settings”)
- The controller operating system and the root file system (“System”)
- All previous (“All”), only visible if not saved in the network

#### Note

##### **Note the firmware version!**

Restoring the operating system (“System” selection) is only permitted and possible if the firmware versions are the same at the time of backup and restore.

If necessary, refrain from restoring the operating system or adjust the firmware version to the firmware version at the time of the backup beforehand.

### 5.4.2.1 Backup Function

The backup function enables the data of the internal memory and device settings to be saved on the memory card during operation.

The network or the inserted memory card can be selected as the target medium.

The files of the internal drive are stored on the target medium in the media/sd/copy directory and in the corresponding subdirectories. Information that does not exist on the controller in the form of files is saved in XML format in the media/sd/settings directory.

If the memory card is selected as the target medium, the memory card slot LED flashes yellow/orange during the save operation.

The device settings and files of the internal drive are then saved on the target medium.

The controller has an automatic update function. If this function is enabled on a memory card before the data backup and a controller is booted from this memory card, this data is restored automatically on the internal memory of the controller.

#### Note

##### **Only one package may be copied to the network!**

If you have specified "Network" as the storage location, only one package may be selected for each storing operation.

#### Note

##### **No backup of the memory card!**

Backup from the memory card to the internal flash memory is not possible.

#### Note

##### **Account for backup time**

Generation of backup files can take several minutes. Stop the CODESYS program before you start the backup operation to help shorten the time required.

The backup function can be called up via the WBM "Firmware Backup" page in the "Configuration" tab, "Package Server" > "Firmware Backup" selection.

Table 25: WBM "Firmware Backup" Page – "Firmware Backup" Group

| Parameters          | Explanation                                                  |                                                                                                                                                      |
|---------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Boot Device         | Storage medium from which the device was booted              |                                                                                                                                                      |
| Destination         | Backup storage destination                                   |                                                                                                                                                      |
|                     | Memory Card                                                  | The data is written to the memory card. This selection only appears if a memory card is inserted and the device was not booted from the memory card. |
|                     | Network                                                      | The data is saved in the file system and then made available on the PC as a download.                                                                |
| PLC Runtime Project | Save PLC runtime project, boot project and CODESYS settings. |                                                                                                                                                      |
|                     | <input type="checkbox"/>                                     | PLC runtime project is not saved.                                                                                                                    |

| Parameters            | Explanation                                                                                                     |                                                                 |
|-----------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
|                       | <input checked="" type="checkbox"/>                                                                             | PLC runtime project is saved.                                   |
| Settings              | Save device settings                                                                                            |                                                                 |
|                       | <input type="checkbox"/>                                                                                        | Device settings are not saved.                                  |
|                       | <input checked="" type="checkbox"/>                                                                             | Device settings are saved.                                      |
| System                | Save device operating system and root file system                                                               |                                                                 |
|                       | <input type="checkbox"/>                                                                                        | The device operating system and root file system are not saved. |
|                       | <input checked="" type="checkbox"/>                                                                             | The device operating system and root file system are saved.     |
| Encryption            | Save data in encrypted form                                                                                     |                                                                 |
|                       | <input type="checkbox"/>                                                                                        | Data is saved unencrypted.                                      |
|                       | <input checked="" type="checkbox"/>                                                                             | Data is saved in encrypted form.                                |
| Encryption passphrase | Encryption passphrase<br>The input field only appears if the <b>Encryption</b> box is checked.                  |                                                                 |
| Confirm passphrase    | Encryption passphrase for confirmation<br>The input field only appears if the <b>Encryption</b> box is checked. |                                                                 |

#### 5.4.2.2 Restore Function

The restore function is used to load the data and device settings from the memory card to the internal memory during operation.

The network or, if it is inserted, the memory card can be selected as the source medium.

If the memory card is selected as the source medium, the memory card slot LED flashes yellow/orange during the charging operation.

When loading the data, the files are copied from the directory media/sd/copy/ of the source medium to the appropriate directories on the internal memory.

The device has an enabled and an disabled root partition. The system backup is stored on the disabled partition. Startup is then performed from the newly written partition. If the startup operation can be completed, the new partition is switched to enabled. Otherwise, booting is performed again from the old enabled partition during the next boot operation.

The boot project is loaded automatically and the settings automatically enabled after a restart. The "Home directory on memory card enabled" setting determines whether the boot project of the internal drive or the memory card is loaded. This setting can be called up on the WBM page "PLC Runtime Configuration" in the "Configuration" tab, selection "PLC Runtime".

#### Note

##### File size must not exceed the size of the internal drive!

Note that the amount of data in the media/sd/copy/ directory must not exceed the total size of the internal drive.

**Note****Restoration only possible from internal memory!**

If the product was booted from the memory card, the firmware cannot be restored.

**Note****Reset by restore**

A reset is performed when the system or settings are restored by CODESYS!

**Note****Connection loss through restore!**

If the restore changes the parameters of the ETHERNET connection, the WBM may then no longer be able to open a connection to the product.

Call up the WBM again with the correct IP address of the product in the address line.

**Note****Account for restore time**

The restore operation takes about 2 ... 3 minutes.

After the restore operation, the controller is restarted and is then ready for use again.

The restore function can be called up via the WBM "Firmware Restore" page in the "Configuration" tab, "Package Server" > "Firmware Restore" selection.

Table 26: WBM "Firmware Restore" Page – "Firmware Restore" Group

| Parameters            | Explanation                                                                                                                                             |                                                                                                                                                           |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source                | Data source for restore                                                                                                                                 |                                                                                                                                                           |
|                       | Memory Card                                                                                                                                             | The data is read from the memory card.<br>This selection is only enabled if a memory card is inserted and the device was not booted from the memory card. |
|                       | Network                                                                                                                                                 | The data is uploaded from the PC and restored.                                                                                                            |
| Boot Device           | Storage medium from which the device was booted                                                                                                         |                                                                                                                                                           |
| PLC Runtime Project   | Name of the backup file for the CODESYS project;<br>The input field is only enabled if the network is selected as the data source.                      |                                                                                                                                                           |
| Settings              | Name of the backup file for the settings;<br>the input field is only enabled if the network is selected as the data source.                             |                                                                                                                                                           |
| System                | Name of the backup file for the system data and the root file system;<br>the input field is only enabled if the network is selected as the data source. |                                                                                                                                                           |
| Decryption            | Data encryption                                                                                                                                         |                                                                                                                                                           |
|                       | <input type="checkbox"/>                                                                                                                                | The data was encrypted and saved.                                                                                                                         |
|                       | <input checked="" type="checkbox"/>                                                                                                                     | The data was saved unencrypted.                                                                                                                           |
| Decryption passphrase | Decryption passphrase;<br>the input field only appears if the <b>Decryption</b> box is checked.                                                         |                                                                                                                                                           |

### 5.4.3 Inserting a Memory Card during Operation

The fieldbus nodes and the PLC program are running.

Insert a memory card during ongoing operation.

During normal operation, the memory card is incorporated into the file system of the controller as a drive. No automatic copy operations are triggered.

The LED above the memory card flashes yellow/orange during the access.

The memory card is then ready for operation and available under /media/sd.

### 5.4.4 Removing the Memory Card during Operation

The fieldbus node and the PLC program are in operation and the memory card is plugged in.

Remove the memory card during ongoing operation.

#### Note

#### **Data can be lost during writing!**

Note that if you pull the memory card out during a write procedure, data will be lost.

The LED above the memory card flashes yellow/orange during the attempted access.

The controller then works without a memory card.

### 5.4.5 Setting the Home Directory for the Runtime System

The home directory for the runtime system is located in the controller's internal memory by default. An existing boot project may be saved in the home directory.

You can use the WBM to move the home directory for the runtime system to the memory card, e.g., to make more memory available for a large boot project or other files.

Some conditions must be met before moving the directory.

- A running IEC-61131 application must be stopped and the device brought to its initial state by calling the "Reset (Origin)" function. Any boot project is deleted.
- When moving the home directory to the memory card, insert a memory card formatted to support file system. Only the first partition of a memory card can be accessed at /media/sd and can be used as the home directory.

Only when the two conditions are met can the "Home directory on memory card enabled" checkbox be selected from the WBM on the "PLC Runtime" page.

The setting is applied by clicking the **[Submit]** button and takes effect after the next restart.

No files are applied from the old to the new home directory.

After moving the directory, a project must be loaded and a boot project created.

It should be noted that the memory card may not be removed under any circumstances as long as the home directory is there. If an application is running, system safety can be endangered by an uncontrolled controller crash.

Switching the home directory has no effect if the controller was booted from a memory card. The configuration state is saved, but only takes effect if the content of the memory card is copied to the internal memory.

#### 5.4.6 Load Boot Project

If a boot project exists, it may be loaded, depending on the home directory setting for the runtime system. The following table shows the possible results:

Table 27: Loading a Boot Project

| Boot Project Stored in Internal Flash Memory | Memory Card with Boot Project Inserted | “Home Directory on Memory Card Enabled” Checked | Loading boot project ...                                                                                         |
|----------------------------------------------|----------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| No                                           | No                                     | No                                              | No, no boot project exists                                                                                       |
|                                              |                                        | Yes                                             | No, no boot project exists                                                                                       |
|                                              | Yes                                    | No                                              | No, no boot project exists in the internal flash memory                                                          |
|                                              |                                        | Yes                                             | Yes, from memory card                                                                                            |
| Yes                                          | No                                     | No                                              | Yes, from internal flash memory                                                                                  |
|                                              |                                        | (Yes)<br>Invalid                                | No, invalid combination, since no boot project is allowed to exist in the internal flash memory for this setting |
|                                              | Yes                                    | No                                              | Yes, from internal flash memory                                                                                  |
|                                              |                                        | (Yes)<br>Invalid                                | No, invalid combination, since no boot project is allowed to exist in the internal flash memory for this setting |

## 5.5 Process Image

### 5.5.1 Analog Outputs AO

Table 28: Process Image - Analog Inputs AO1, AO2

| Output | Pin  | I/O Channel | Data Type | Description     |
|--------|------|-------------|-----------|-----------------|
| AO1    | X6.1 | X6.AO1      | WORD      | Analog output 1 |
| AO2    | X6.3 | X6.AO2      | WORD      | Analog output 2 |

The measurement range of the analog outputs is 0 ... 10 V.

Measured values are represented via the data type WORD (16 bit).

Table 29: Process Image – Process Values AO; 0 ... 10 V; 16 Bit; WORD

| Measured Value | Value Range |       |                     |
|----------------|-------------|-------|---------------------|
|                | Hex.        | Dec.  | Bin.                |
| 0 V            | 0x0000      | 0     | 0000.0000.0000.0000 |
| ...            | ...         | ...   | ...                 |
| 10 V           | 0x7FFF      | 32767 | 0111.1111.1111.1111 |

### 5.5.2 Analog Temperature Inputs PT

Table 30: Process Image – Temperature Inputs PT1+/PT1–, PT2+/PT2–

| Input | Pin   | I/O Channel   | Data Type | Description |
|-------|-------|---------------|-----------|-------------|
| PT1+  | X13.1 | X13.PT1+/PT1– | INT       | RTD input 1 |
| PT1–  | X13.2 |               |           |             |

| Input | Pin   | I/O Channel   | Data Type | Description |
|-------|-------|---------------|-----------|-------------|
| PT2+  | X13.3 | X13.PT2+/PT2– | INT       | RTD input 2 |
| PT2–  | X13.4 |               |           |             |

Analog temperature sensor inputs PT1+ / PT1– and PT2+ / PT2– are represented via the INT data type (16 bits) with a resolution of one digit per 0.1 °C.

On the hardware side, resistance values between 450 and 4400 Ω can be captured. The representation of resistance values outside this range is undefined.

Table 31: Process Image – Process Values PT; 450 ... 4400 Ohm; –60 ... 350 °C; 16 Bit

| Measured Value | Value Range |        |                      |
|----------------|-------------|--------|----------------------|
|                | Hex.        | Dec.   | Bin.                 |
| < –60 °C       | 0x8001      | –32767 | 1000.0000.0000.0000  |
| –60 °C         | 0xFDA8*     | –600   | 1111.1101.1010.1000* |
| ...            | ...         | ...    | ...                  |
| 350 °C         | 0x0DAC      | 3500   | 0000.1101.1010.1100  |
| > 350 °C       | 0x0DAC      | 3500   | 0000.1101.1010.1100  |

\*Temperature values below 0 °C are represented in binary and hexadecimal form using the two's complement representation.

### 5.5.3 Digital Inputs DI

Table 32: Process Image – Digital Inputs DI1 ... DI8

| Input | Pin    | I/O Channel | Data Type | Description     |
|-------|--------|-------------|-----------|-----------------|
| DI1   | X12.3  | X12.DI1     | BOOL      | Digital input 1 |
| DI2   | X12.4  | X12.DI2     | BOOL      | Digital input 2 |
| DI3   | X12.5  | X12.DI3     | BOOL      | Digital input 3 |
| DI4   | X12.6  | X12.DI4     | BOOL      | Digital input 4 |
| DI5   | X12.7  | X12.DI5     | BOOL      | Digital input 5 |
| DI6   | X12.8  | X12.DI6     | BOOL      | Digital input 6 |
| DI7   | X12.9  | X12.DI7     | BOOL      | Digital input 7 |
| DI8   | X12.10 | X12.DI8     | BOOL      | Digital input 8 |

Table 33: Process Image – Process Values of Digital Inputs – BOOL

| Measured Value | Value Range |      |       |
|----------------|-------------|------|-------|
|                | Hex.        | Dec. | Bin.  |
| 0 V            | ---         | ---  | FALSE |
| +24 V          | ---         | ---  | TRUE  |

### 5.5.4 Digital Outputs DO

Table 34: Process Image - Digital Outputs DO1 ... DO4

| Input/Output | Pin  | I/O Channel | Data Type | Description      |
|--------------|------|-------------|-----------|------------------|
| DO           | X5   | X5.DO       | BYTE      | Digital Outputs  |
| DO1          | X5.3 | X5.DO1      | BOOL      | Digital output 1 |
| DO2          | X5.5 | X5.DO2      | BOOL      | Digital output 2 |
| DO3          | X5.7 | X5.DO3      | BOOL      | Digital output 3 |
| DO4          | X5.9 | X5.DO4      | BOOL      | Digital output 4 |

Table 35: Process Image – Process Values, Digital Outputs – BOOL

| Measured Value | Value Range |      |       |
|----------------|-------------|------|-------|
|                | Hex.        | Dec. | Bin.  |
| 0 V            | ---         | ---  | FALSE |
| +24 V          | ---         | ---  | TRUE  |

# 6 Planning

## 6.1 Structure Guidelines

### 6.1.1 Safety Measures at the Installation Location

The product is an open type device. It must only be installed within appropriate enclosures, cabinets or electrical operation rooms that fulfill at least the following requirements:

- Offer adequate protection against direct or indirect contact.
- Offer adequate protection against UV irradiation.
- Restrict access to authorized personnel and may only be opened with tools.
- Ensure the required pollution degree in the vicinity of the system.
- Prevent fire from spreading outside of the enclosure.
- Guarantee mechanical stability.

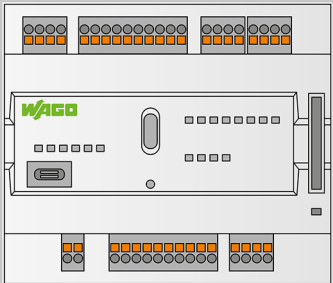
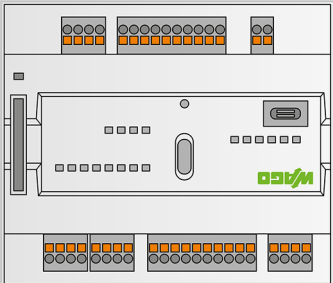
### 6.1.2 Mounting Position and Distances

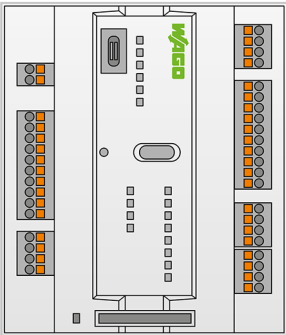
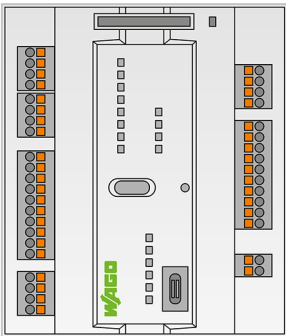
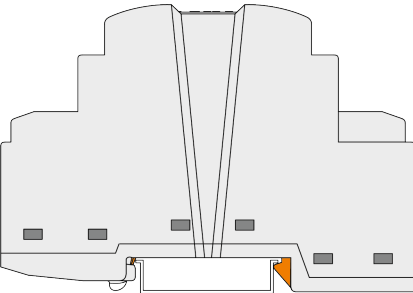
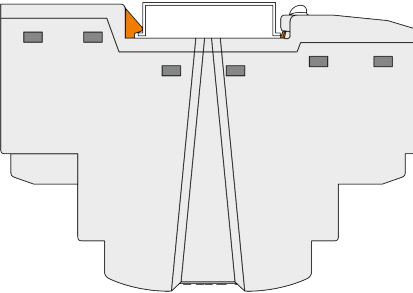
All specifications and handling steps refer to the nominal mounting position. Deviating mounting positions affect, for example:

- The permissible ambient temperature

The following mounting positions are permitted:

Table 36: Mounting Positions and Permissible Ambient Temperatures

| Mounting Position                                                                                                             | Permissible Ambient Temperature                       |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Horizontal (nominal mounting position)<br> | D = 10 mm: -25 ... +60 °C<br>D = 0 mm: -25 ... +55 °C |
| Horizontal 180 °<br>                       | D = 0 mm: -25 ... +55 °C                              |

| Mounting Position                                                                                                | Permissible Ambient Temperature |
|------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <div>Vertical</div>             | D = 0 mm: -25 ... +55 °C        |
| <div>Vertical 180 °</div>       | D = 0 mm: -25 ... +50 °C        |
| <div>Floor mounting</div>     | D = 0 mm: -25 ... +50 °C        |
| <div>Overhead mounting</div>  | D = 0 mm: -25 ... +50 °C        |

Maintain the following distances from adjacent products, cable ducts and the sides of housings and frames for the setup.

The distance (D) from the power supply is 0 ... 10 mm, depending on the mounting position. For adjacent components on a DIN-rail, a distance below this minimum is possible if necessary.

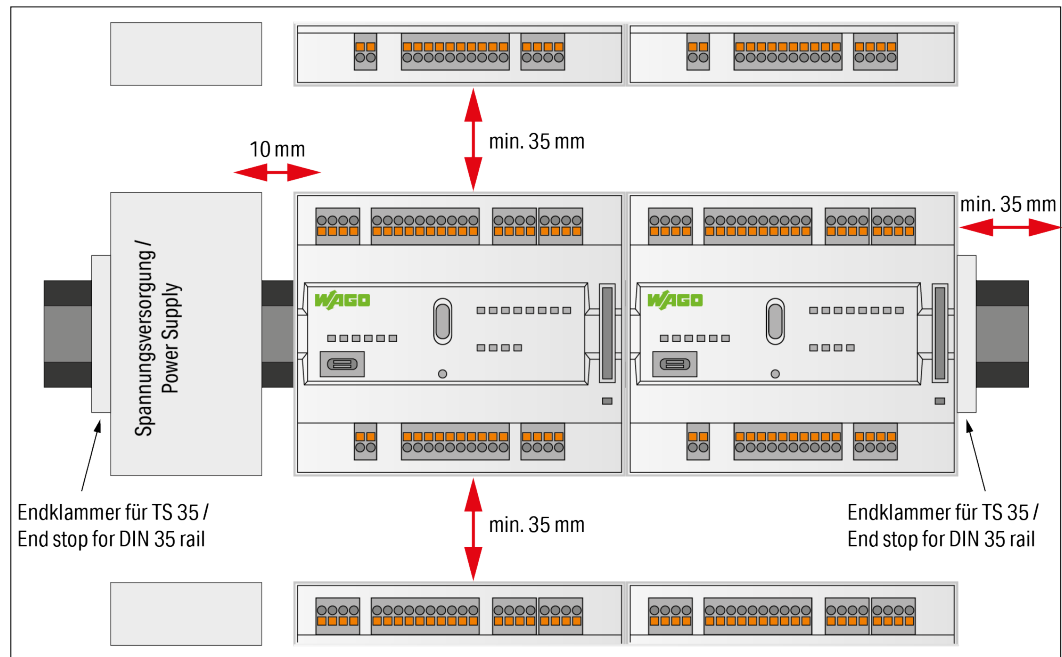


Figure 13: Distances

The distances leave space for heat dissipation and installation/wiring. The distances from cable ducts also prevent conducted electromagnetic interference from affecting operation.

If installation space is limited in the control cabinet or small installation distribution board, use angled network cables or patch cables for the X1 and X2 network connections if necessary.

### 6.1.3 DIN-Rail Characteristics

- The material must have high corrosion resistance.
- The DIN-rail geometry must not be altered.
- Prevent bending and twisting (torsion) e.g., by using sufficient attachment points.
- Use countersink-head screws, blind rivets, etc., to countersink the attachment points beneath the node structure.
- The component DIN-rail contact (CuSn6) must not form a galvanic element with the DIN-rail that is capable of generating a differential voltage of more than 0.5 V (saline solution of 0.3% at 20°C/68°F).

### 6.1.4 EMC Installation

- **Ground DIN-rails.**  
Ground the DIN-rails to divert electromagnetic interference.
- **Use shielded cables for data and signal lines.**  
Electromagnetic interference is reduced and signal quality increased. Measurement errors, data transmission faults and interference due to excessive voltage can be prevented!
- **Keep data and signal lines separate from interference sources.**  
Route data and signal lines separately from all power supply cables and other sources of high electromagnetic emissions (e.g., frequency converters or drives).

- **Connect the cable shielding with the ground potential.**

Integrated shielding is mandatory to meet technical specifications regarding measurement accuracy. Establish the connection between the cable shielding and ground potential at the inlet of the cabinet or housing. This grounding allows induced interferences to dissipate and be kept away from devices in the cabinet or housing.

- **Improve shielding performance with a large contact area.**

A low-impedance connection between shielding and ground achieves better shielding performance. For this purpose, connect the shielding over a large surface area, e.g., using the WAGO Series 790 Shield Connection System. This is especially recommended for large-scale systems where equalizing or high impulse currents may occur.

### 6.1.5 Grounding

Snapping the product onto the grounded DIN-rail grounds it via the spring contacts on the underside.

### 6.1.6 Data Security

Professional planning and configuration are an important prerequisite for ensuring the confidentiality, availability and integrity of data.

#### Random Influences

Data transmission and processing can be disrupted by random influences, such as temporary electromagnetic disturbances. Proper setup can significantly reduce the likelihood of corruption or destruction of data.

For additional information see:  [EMC Installation \[► 48\]](#).

#### Deliberate Influences

##### Use in ETHERNET Areas

ETHERNET products are designed for use in local networks. Please note the following when using ETHERNET products in your system:

- Do not connect control components and control networks to an open network such as the Internet or an office network.  
WAGO recommends putting control components and control networks behind a fire-wall.
- In the control components, close all ports and services not required by your application to minimize the risk of cyber attacks and to enhance cybersecurity.  
Only open the ports and services for the duration of the commissioning/configuration.
- Limit physical and electronic access to all automation components to authorized personnel only.
- To reduce the risk of unauthorized access to your system, change the default passwords during initial commissioning.
- To reduce the risk of unauthorized access to your system, regularly change the passwords used.
- To verify that the measures taken meet your security requirements, regularly perform threat analyses.
- To restrict access to and control of individual products and networks, employ a “defense-in-depth” mechanism in your system’s security configuration.

### Additional documents

-  **White Paper Cybersecurity in Production Facilities**

All the documentation and information is available at:  [www.wago.com](https://www.wago.com).

### Use of Cloud Services

#### **Note**

##### **Please note the risks of using cloud services!**

If you use third-party cloud services, sensitive data is transferred to the cloud service provider on your own responsibility. External access may result in manipulated data and/or unwanted control commands affecting the performance of your control system.

- Use encryption methods to protect your data.
- Observe the information provided by the Federal Office for Information Security – “Cloud: Risks and Security Tips.”
- Observe comparable publications of the responsible authorities of your country.

Additional information is available at:  [www.bsi.bund.de](https://www.bsi.bund.de).

### 6.1.7 Buffering

To compensate for power interruptions per IEC 61131 (PS-1 or PS-2), external buffering is required.

Buffer capacity depends on the node configuration, which is why it is not possible to provide general information on the required capacity.

## 6.2 Requirements for Wiring and Accessories

### 6.2.1 DALI Network and Bus Supply

#### **DANGER**

##### **Transmission of the mains voltage via the DALI data line in case of error**

When operating several lighting groups in different circuits, there is a risk that line voltage can transfer to other lighting groups via the DALI data line in the event of error.

- Therefore, generally deenergize all lighting circuits on your network when working on data lines.

#### **Note**

##### **Observe IEC standard!**

Note the validity of DIN EN IEC 62386 when setting up your DALI network!  
The following descriptions for setting up a DALI network are only recommendations.

### 6.2.1.1 DALI Bus Topology

A DALI master can control 1 line with DALI slaves.

The possible number of slaves depends on the DALI bus supply used.

Each slave can be assigned to 16 individual groups and 16 individual scenes.

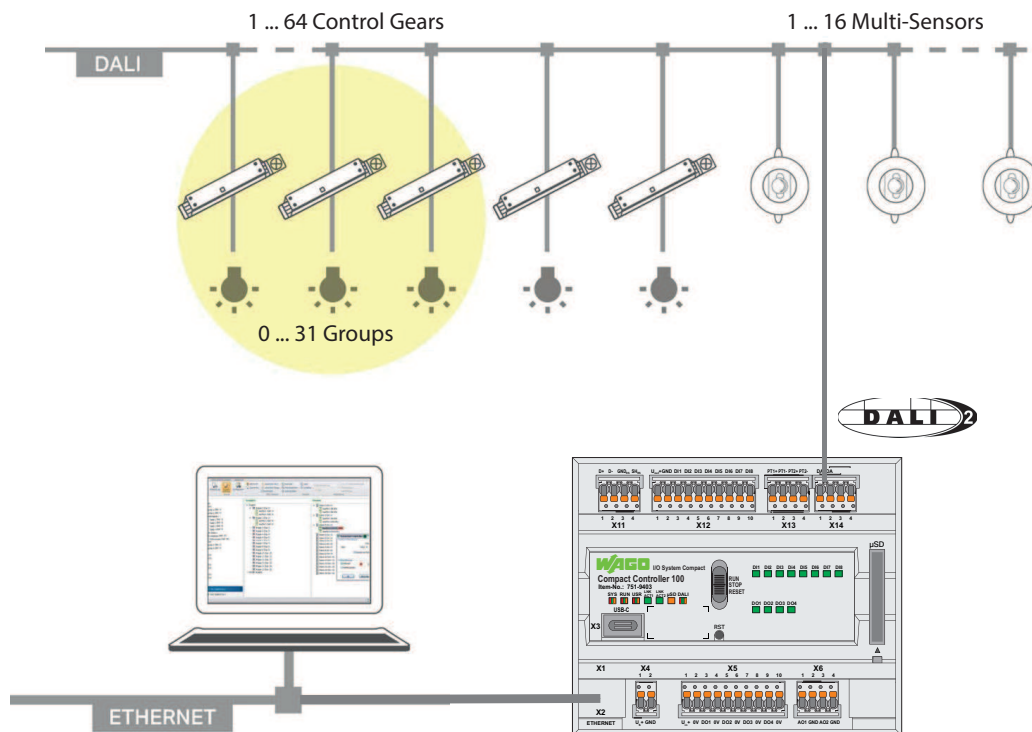


Figure 14: DALI Network

Generally, 64 addresses for DALI sensors can also be allocated.

The actual possible number of sensors is determined by the following influencing factors:

- Number of addresses per multi-sensor
- Sensor power consumption
- Bus performance

A maximum of 16 multi-sensors per I/O module are recommended for use with the WAGO Compact Controller 100 DALI (751-9403).

The topology of the DALI bus is not specified. Line, tree, star, and mixed structures are possible. However, ring-shaped connections should be avoided.

The same installation guidelines apply to the installation of lighting systems as to supply cables.

This also applies to the installation of special rooms (“harmonized installation requirements”).

### 6.2.1.2 DALI Bus Supply

An external DALI bus supply is required to operate a DALI bus network on the controller.

The DALI bus supplies available from WAGO are not suitable for this.

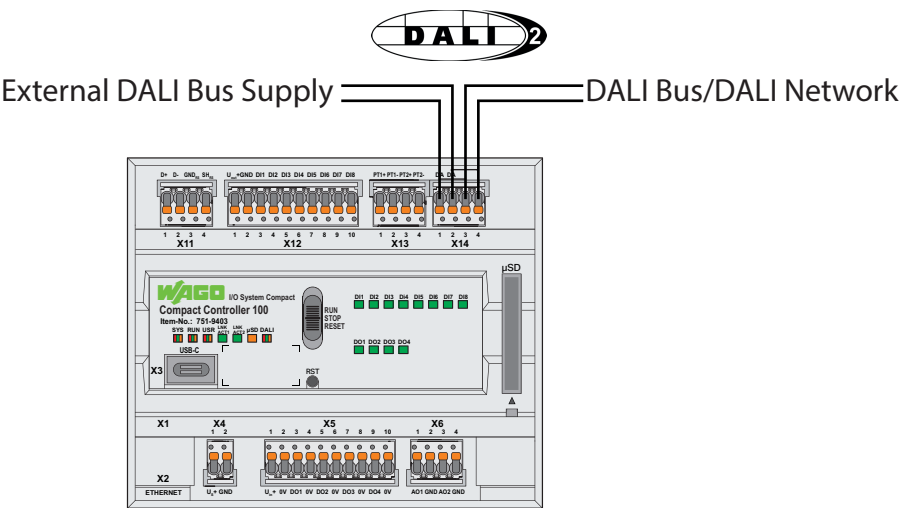


Figure 15: External DALI Bus Supply

The DALI bus supply is connected to the connection pair 1/2 or to the connection pair 3/4 of the X14 connector.

6.2.1.3 DALI Bus Cable

The control cable for the DALI bus consists of a pair of wires that can be laid together with the 230 V installation. For example, a 5-wire cable can be used for this, in which both the power supply and the DALI control cable are accommodated.

The minimum conductor cross-section depends on the cable length.

Table 37: Wire Cross-Section depending on Cable Length

| Cable length    | Cable cross-section (min.) |
|-----------------|----------------------------|
| < 100 m         | 0.5 mm²                    |
| 100 m ... 150 m | 0.75 mm²                   |
| > 150 m         | 1.5 mm² (16 AWG)           |

**Note**

**Maximum cable length: 300 m!**

The maximum voltage drop on the DALI line must not exceed 2 V. This limits the maximum cable length between the most distant DALI components to 300 m, depending on the cable cross-section.

6.2.1.4 DALI-1 Compatibility

**Note**

**DALI-1 compatibility not guaranteed**

Because the DALI-1 standard was not subject to certification tests, electronic control gear (ECG) has hit the market that did not comply with the timing requirements of EN 62386. With the introduction of the DALI-2 standard, the limits for permissible timing are being reviewed.

DALI-1 ECGs can be connected to the controller, but compatibility and functionality are not guaranteed.

## 7 Transport and Storage

The original packaging offers optimal protection during transport and storage.

- Store the product in suitable packaging, preferably the original packaging.
- Only transport the product in suitable containers/packaging.
- Make sure the product contacts are not contaminated or damaged during packing or unpacking.
- Observe the specified ambient climatic conditions for transport and storage.

## 8 Installation and Removal

### 8.1 Mounting on the DIN-Rail

Mount the product per EN 60715 by snapping it onto the DIN-rail without tools:

1. Tilt the product slightly.
2. Place the product, with the DIN-rail guide, on the top edge of the DIN-rail.

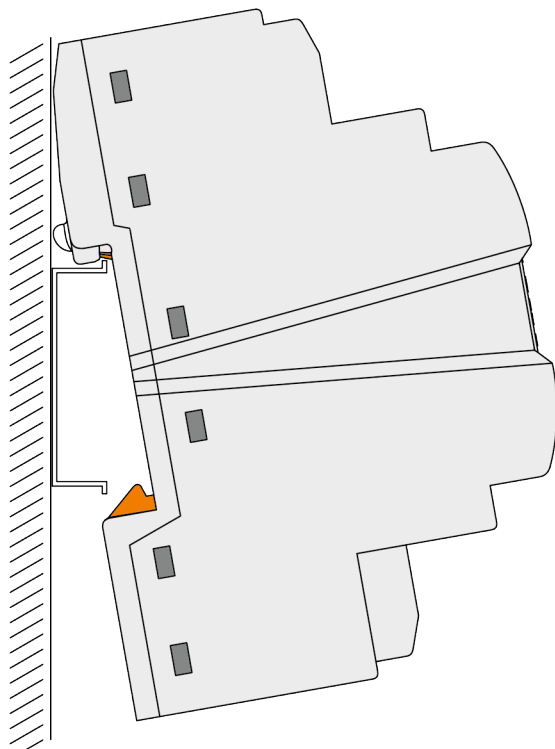


Figure 16: Inserting Controller

3. Press the product onto the DIN-rail.
4. Push down until the product audibly snaps into place.
5. Gently shake the product to ensure that it is correctly locked into place.
6. To ensure secure fastening on the DIN-rail, fit end stops on either side of the product (with a block arrangement: on either side of the products).

### 8.2 Removal from the DIN-Rail

1. To remove, pull the DIN-rail release tab down.  
Use a screwdriver or operating tool for this purpose.  
⇒ The product is now unlocked.
2. Tilt the product forward and unhook it from the DIN-rail.

### 8.3 Connectors

#### 8.3.1 Delivery Condition

When the product is delivered, the female connectors are included but not plugged in.

#### 8.3.2 WAGO Pluggable Connectors

##### 8.3.2.1 Pulling the Female Connector

WAGO recommends using the unlocking tool for WAGO 2092 Series Pluggable Connectors (referred to in the following text as the “unlocking tool”). You can find more information on the unlocking tool in [www.wago.com/2092-1630](https://www.wago.com/2092-1630).

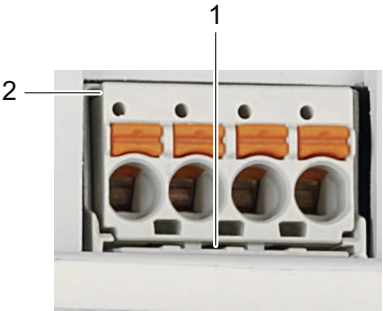


Figure 17: Removing the Female Connector without Wiring (Application Example)

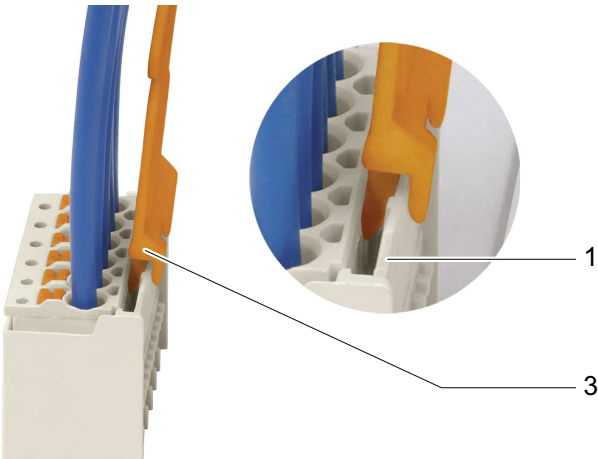


Figure 18: Removing the Female Connector with Wiring (Application Example)

| Position | Description                              |
|----------|------------------------------------------|
| 1        | Male locking latch                       |
| 2        | Overhanging edge of the female connector |
| 3        | Unlocking tool                           |

##### 8.3.2.1.1 Pulling with the Unlocking Tool

Proceed as follows to remove the female connector using the unlocking tool:

###### Removing the Female Connector without Wiring

1. Place the unlocking tool (3) onto the locking latch (1).
2. Insert the unlocking tool until it hits the stop.
  - ⇒ The wedge opens the locking latch, leasing the locking mechanism.

3. Grasp the underside of the overhanging edge of the female connector (2).
4. Pull out the female connector.

### Removing the Female Connector with Wiring

1. Place the unlocking tool (3) onto the locking latch (1).
2. Insert the unlocking tool until it hits the stop.
  - ⇒ The wedge opens the locking latch, leasing the locking mechanism.
3. Pull on the unlocking tool together with the conductors to remove the female connector.

#### 8.3.2.1.2 Pulling with Other Tools

If you do not have an unlocking tool available, you can also remove the female connector with a WAGO operating tool.

#### Pulling the Female Connector

##### **WARNING**

##### **Do not insert the operating tool into the ventilation slots!**

Components inside the product may be damaged if the blade of the operating tool enters the ventilation slots. This may lead to serious damage with a risk of injury caused by malfunction, overheating or electric shock!

- When using the operating tool, make sure it is positioned correctly between the locking latch and the female connector!

##### **NOTICE**

##### **Do not pull on the conductors when using an operating tool!**

Pulling on the conductors can loosen the contact.

1. Do **not** pull on the conductors!
2. Grasp the underside of the overhanging edge of the female connector to pull it out.

1. Use the operating tool to push the locking tab (1) away from the female connector.
2. Grasp the underside of the overhanging edge of the female connector (2).
3. Pull out the female connector.

#### 8.3.2.2 Plugging the Female Connector

##### **DANGER**

##### **Be sure to use the correct slot on the female connector!**

Mismatching the input female connector into the output connector may lead to a hazardous voltage of 230 V on the output side.

- Make sure the female connector is properly mated to the correct slot!

Proceed as follows to plug the female connector into the corresponding male header:

1. Insert the female connector into the corresponding male header.
2. Push the female connector into the male header until the female connector snaps into position with an audible click.
3. When inserting with wiring: Check that the female connector is seated securely by gently pulling on the wires.

## 9 Connection

### 9.1 Connecting the Supply Voltage

- Connect the power supply to connector X4, pin 1 (US+) and pin 2 (GND), as well as to connector X5, pin 1 (Uin+) and pin 2 (0V). Use the connectors included in the delivery (female connector with item number 2091-1122 resp. female connector with item number 2091-1130).

Switch on the power supply for connector X5 before or at least simultaneously with the power supply for connector X4!

### 9.2 Connecting the DALI Network and Bus Supply

1. Use the included connector (female connector with item number 2091-1124) for connection.
2. Connect the DALI bus supply to connections X14, pin 1 and pin 2 (DA) or pin 3 and pin 4 (DA).
3. Connect the DALI bus network to connections X14, pin 3 and pin 4 (DA) or pin 1 and pin 2 (DA).

# 10 Commissioning

The controller uses the fixed IP address 192.168.42.42 to communicate with a PC.

## 10.1 Switching On

Before switching the controller on, verify that you have:

- Properly installed the controller
- Connected all the required data cables to the corresponding interfaces and secured the connectors with their attached locking screws
- Connected the electronics and field-side power supply
- Performed appropriate potential equalization on your machine/system
- Implemented the shielding properly

To switch the controller on, switch your power supply unit on.

Brief flashing of the LEDs indicates that the controller is starting up.

After a few seconds, the SYS LED signals a successful controller boot operation.

The CODESYS V3 runtime system starts simultaneously.

If there is an executable IEC 61131-3 program stored and running on the controller, the RUN LED lights up green.

If no executable program is stored on the controller or the mode selector switch is set to STOP, this is also indicated by the RUN LED (see section ).

## 10.2 Setting an IP address

The controller uses the fixed IP address 192.168.42.42 to communicate with a PC.

In the controller's initial state, the following IP addresses are active for the ETHERNET interface (Port X1 and Port X2):

Table 38: Default IP Addresses for ETHERNET Interfaces

| ETHERNET Interface    | Default Setting                                                                     |
|-----------------------|-------------------------------------------------------------------------------------|
| X1/X2 (Switched Mode) | Dynamic assignment of IP address using DHCP ("Dynamic Host Configuration Protocol") |

- Adapt IP addressing to your specific system structure to ensure that the PC and the controller can communicate with one another using one of the available configuration tools (e.g., WBM or WAGO ETHERNET Settings – see section [🔗 Configuration ▶ 65](#)).

**Example for incorporating the controller (192.168.2.17) into an existing network:**

- The IP address of the host PC is **192.168.1.2**.
- The controller and host PC must be in the same subnet (regardless of the IP address of the host PC).
- With a subnet mask of **255.255.255.0**, the first three digits of the IP address of the host PC and controller must match so that they are located in the same subnet.

Table 39: Network Mask 255.255.255.0

| Host-PC     | Subnet Address Range for the Controller        |
|-------------|------------------------------------------------|
| 192.168.1.2 | 192.168.1.1 oder 192.168.1.3 ... 192.168.1.254 |

**See also**

 Configuration [► 65]

**10.2.1 IP Connection via USB**

You can establish an IP connection via USB for commissioning and for service purposes.

1. Connect the controller to your PC via the USB service interface and a USB service cable.
2. If you are using Windows® 10 , go to step 4.
  - ⇒ In Windows® 7, the controller behaves like an external drive after connection. A driver for the IP connection via USB is stored on the drive.
3. Install this driver.
  - ⇒ Communication is then possible via the IP connection via USB.
4. Call up the fixed IP address 192.168.42.42 in the browser.
  - ➔ The Web-Based Management of the controller opens.
  - ➔ You can use it to make all the necessary settings on the controller.

**10.2.2 Changing an IP Address in “WAGO Ethernet Settings”**

The Microsoft Windows® application “WAGO Ethernet Settings” is a software used to identify the controller and configure network settings.

For data communication, you can use the WAGO USB service cable or, if applicable, the IP network.

1. Switch off the power supply to the controller.
2. Establish a suitable connection between the controller and your PC.
3. Switch on the power supply to the controller again.
4. Start the “WAGO Ethernet Settings” program.

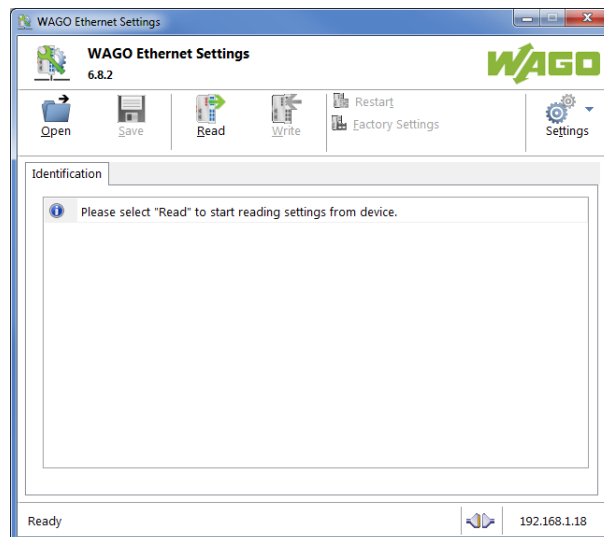


Figure 19: WAGO Ethernet Settings – Start Screen (Example Figure)

5. Click the **[Read]** button to read and identify the connected controller.
6. Select the **“Netzwerk”** tab:

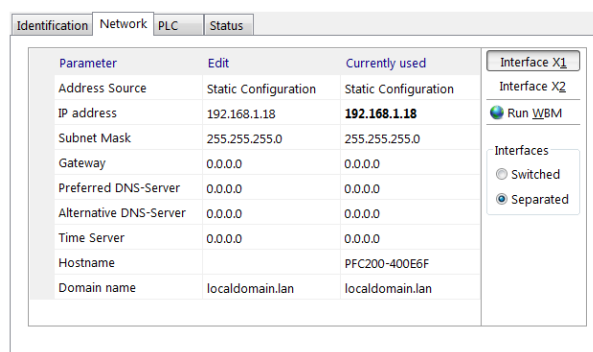


Figure 20: WAGO Ethernet Settings – Network Tab (Example Figure)

7. To assign a fixed address, select “Static configuration” on the **“Source”** line under **“Input”**. DHCP is normally enabled as the default setting.
8. In the **“Input”** column, enter the required IP address and, if applicable, the address of the subnet mask and gateway.
9. Click the **[Write]** button to apply the address in the controller. (If necessary, “WAGO Ethernet Settings” will restart your controller automatically. This action can take about 30 seconds.)
10. You can now close “WAGO Ethernet Settings” or make other changes directly in the Web-Based Management system as required. To do so, click the **[Start WBM]** button in the right-pane.

### 10.2.3 Temporarily Setting a Fixed IP Address

This operation temporarily sets the IP address for interface X1 to the fixed address “192.168.1.17.”

If the switch is switched on, the fixed address is also used for interface X2. When the switch is disabled, the original address setting for interface X2 is not changed. No reset is carried out.

To temporarily set a fixed IP address, proceed as follows:

1. Set the mode selector switch to the STOP position.
  2. Press the reset button for more than 8 seconds.
- ➔ Execution of the setting is signaled by the “SYS” LED flashing orange.

To cancel the setting, proceed as follows:

- Perform a software reset or power the product off and on again.

#### 10.2.4 Setting the IP Address via the WBM

You can change the IP address of the controller directly via the built-in Web-Based Management without additional tools.

1. Use a suitable network cable to connect the controller and your PC.
2. Open an internet browser on the PC.
3. Call up the WBM on the controller. To do this, enter the following in the input line of the browser: “https://<IP address>/wbm”.
4. If you do not know the IP address, determine the IP address as described above.  
⇒ You will then be asked to authenticate.
5. Enter the user name “user” and the corresponding password (“user” by default).  
⇒ If you have not already changed the default password, you are asked to change the password now.
6. Open the “Configuration” tab.
7. In the navigation, select the “Networking” item and “TCP/IP Configuration” subitem.
8. In the “TCP/IP Configuration” group, select the “Static IP” entry in the “IP Source” selection field.
9. Enter the required IP address in the “Static IP Address” input field.
10. Enter the required subnet mask in the “Subnet Mask” input field.
11. Click the **[Submit]** button to apply the changes.  
⇒ Changing the IP address interrupts the connection to the controller.
12. Establish a new connection with the new IP address.

#### 10.2.5 Assigning an IP Address Using DHCP

The controller can obtain its dynamic IP address from a server (DHCP). In contrast to fixed IP addresses, dynamically assigned addresses are not stored permanently. Therefore, a DHCP server must be available each time the controller is restarted.

If an IP address has been assigned by means of DHCP (default setting), it can be determined through the settings and the output of the specific DHCP server.

In conjunction with the DNS server associated with DHCP, the device can be reached using its hostname. This consists of a prefix and the MAC address or part of it. The MAC address of the product is printed on the label on the side of the product.

The following example shows the corresponding output of “Open DHCP”.

```

C:\OpenDHCP>
C:\OpenDHCP>
C:\OpenDHCP>OpenDHCP.exe -v
Open DHCP Server Version 1.75 Windows Build 1052 Starting...
Logging: All
Warning: No IP Address for DHCP Static Host 00:ff:a4:0e:ef:99 specified
Warning: No IP Address for DHCP Static Host ff:00:27:7b:01 specified
Warning: No IP Address for DHCP Static Host ff:00:27:7b:02 specified
Warning: No IP Address for DHCP Static Host ff:00:27:7b:03 specified
Default Lease: 36000 (sec)
Server Name: DESKTOP-67WMSRM
Detecting Static Interfaces..
Lease Status URL: http://127.0.0.1:6789
Listening On: 192.168.2.1
Network changed, re-detecting Static Interfaces..
DHCPDISCOVER for 00:30:de:46:68:98 () from interface 192.168.2.1 received
Host 00:30:de:46:68:98 (Host0030de466898) offered 192.168.2.201
Lease Status URL: http://127.0.0.1:6789
Listening On: 192.168.2.1
Network changed, re-detecting Static Interfaces..
DHCPREQUEST for 00:30:de:46:68:98 () from interface 192.168.2.1 received
Host 00:30:de:46:68:98 (Host0030de466898) allotted 192.168.2.201 for 36000 seconds

```

Figure 21: “Open DHCP”, Example Figure

In the example shown, the prefix is “Host” and the MAC ID is “00:30:de:46:68:98”.

The host name is “Host0030de466898”.

### 10.3 Testing the Connection

- ✓ The host PC can be reached on the network.
  - ✓ The power supply is switched on.
  - ✓ Operational readiness has been established.
1. Open the command prompt on the host PC.
  2. Enter the “ping” command with the assigned IP address (e.g., “ping 192.168.1.17”) and click the **Enter** button to confirm.
    - ⇒ If the connection is successful, the ping request is answered.
  3. If there is a connection error (“Timeout” error message), check the network settings and repeat the ping request.
- ➔ Communication via the connection is now possible.

### 10.4 Changing Passwords

#### Note

##### Change passwords!

The default passwords are documented in these instructions and therefore do not offer adequate protection.

- Change the passwords to meet your particular needs.

#### Note

##### Valid characters for passwords

Passwords may contain only the following characters:

lowercase letters (a ... z), uppercase letters (A ... Z), numbers (0 ... 9) and special characters (! " # \$ % & ' ( ) \* + , . / : ; < = > ? @ [ ] ^ \_ ` { } | ~ -).

To increase security, passwords should contain a mix of lowercase letters, uppercase letters, numbers and special characters.

Passwords should not contain generally known names, dates of birth and other information that is easy to guess.

Therefore, change the default passwords before commissioning the controller.

Default passwords are assigned for the “Linux® Users” user group and are listed in the table  **Linux® user** [► 31].

To change the passwords via WBM, proceed as follows:

1. Connect the controller to a PC via one of the network interfaces (X1, X2).
2. Start a Web browser on the PC and call up the controller WBM.
3. Log on to the controller as user “root,” “admin” or “user” with the default password.
4. Change the password for the logged-in user on the WBM “Configuration of the users for the WBM” page.
5. In this way, change the passwords for all users.

To change the passwords using a terminal program, proceed as follows:

1. Connect the controller to a PC via the X1 network interface.
2. Start a terminal program on your PC.
3. Log in on the controller as the “root” user with the default password.
4. Change the password for all users with the “passwd root,” “passwd admin” and “passwd user” commands.

## 10.5 Switch Off/Restart

Switch off the power supply to shut down the controller.

To reset the controller software (reboot), press the reset button. Alternatively, you can switch off the controller and switch it back on again.

### Note

#### **Do not power cycle the controller after changing any parameters!**

Some parameter changes require a controller restart for the changes to apply. Saving the changes takes some time.

Do not power cycle the controller to perform a restart, i.e., changes may be lost by shutting down the controller too soon.

Only restart using the software reboot function. This ensures that all memory operations are completed correctly and completely.

#### **See also**

-  Software Reset [► 85]

## 10.6 Configuration

### 10.6.1 Configuration in the Web-Based Management System (WBM)

The HTML pages (hereinafter referred to as “pages”) of the Web-Based Management are used to configure the controller. To access the WBM via a Web browser, proceed as follows:

1. Connect the controller to your PC via ETHERNET interface X1 and the ETHERNET network or via the USB service port and a USB service cable.
2. Launch a Web browser on your PC.
3. Enter “https://” in the address bar of your Web browser, followed by the IP address of the controller and “/wbm,” e.g., “https://192.168.1.17/wbm.” Note that the PC and controller must be located in the same subnet; see Setting an IP address.

If you do not know the IP address and cannot determine it, temporarily switch the controller to the fixed preset IP address “192.168.1.17,” see Temporarily Setting a Fixed IP Address.

**Note**

**Take usage by the CODESYS program into account!**

If the controller is at capacity due to a CODESYS program, this may result in slower processing in the WBM. As a result, timeout errors are sometimes reported in some circumstances.

- Stop the CODESYS application via the WBM before making extensive configurations.

⇒ When the connection has been established, a login window opens.

**Authentication**

Hostname: PFC200V3-42E739  
Application: Web-based Management

Username  
username

Password  
password

< cancel      > Login

Figure 22: Log-in Window

4. Enter the username and password.
  5. Click the button [**> Login**].
- ➔ The navigation bar and tabs of the WBM are displayed according to the user selected.

If you have disabled cookies in your Web browser, you can continue to use the WBM as long as you move directly inside it. However, if you fully reload the website (e.g., with **[F5]**), you must log in again since the Web browser is then not able to store the data of your login session.

### 10.6.1.1 User Administration of WBM

To allow settings to be made only by a select group of users, limit access to WBM functions through User Administration.

#### **Note**

##### **Change passwords!**

The default passwords are documented in these instructions and therefore do not offer adequate protection.

- Change the passwords to meet your particular needs.

If you do not change these passwords, a warning will appear each time you open a website after logging in.

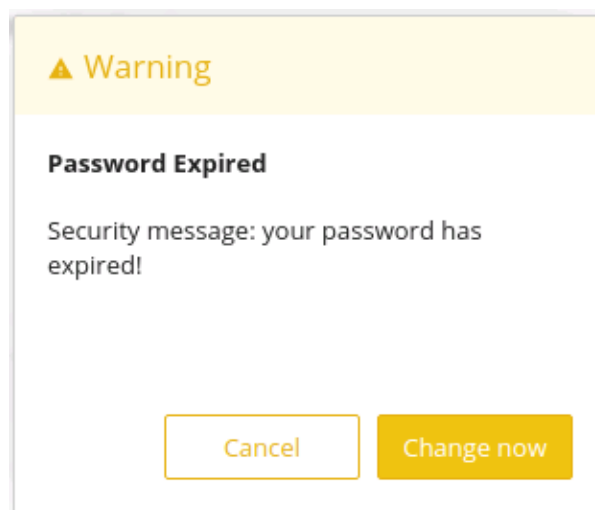


Figure 23: Password Reminder

Clicking the **[[Change now]]** button takes you directly to the WBM page where you can change the password.

Table 40: Default Passwords on Delivery

| User  | Rights              | Password |
|-------|---------------------|----------|
| root  | All (administrator) | wago     |
| admin | All (administrator) | wago     |
| user  | Limited             | user     |

#### **Note**

##### **General Rights of WBM Users**

The WBM users “admin” and “user” have rights beyond the WBM to configure the system and install software.

User administration for controller applications is configured and managed separately.

Access to the WBM pages is as follows.

The “root” user has the same rights as the “admin” user and is therefore not listed separately.

### 10.6.1.2 WBM Page Overview and Access Rights

The WBM pages require the access rights listed in the table below. Users with lower privileges may not be able to access the pages or may only be able to view them.

Table 41: Access Rights for WBM Pages

| Tab           | Navigation         |                        | WBM Page Title                           | User  |
|---------------|--------------------|------------------------|------------------------------------------|-------|
| Information   | Device Status      |                        | Device Status                            | user  |
|               | Vendor Information |                        | Vendor Information                       | user  |
|               | PLC Runtime        |                        | PLC Runtime Information                  | user  |
|               | Legal Information  | WAGO Licenses          | WAGO Software License Agreement          | user  |
|               |                    | Open Source Licenses   | Open Source Licenses                     | user  |
|               |                    | WBM Licenses           | WBM Third Party License Information      | user  |
|               |                    | Trademarks Information | Trademarks Information                   | user  |
|               | WBM Version        |                        | WBM Version Info                         | user  |
| Configuration | PLC Runtime        |                        | PLC Runtime Configuration                | user  |
|               | Networking         | TCP/IP Configuration   | TCP/IP Configuration                     | user  |
|               |                    | Ethernet Configuration | Ethernet Configuration                   | user  |
|               |                    | Host/Domain Name       | Configuration of Host and Domain Name    | user  |
|               |                    | Routing                | Routing                                  | user  |
|               |                    | STP/RSTP               | Spanning Tree Protocol                   | user  |
|               | Clock              |                        | Clock Settings                           | user  |
|               | Administration     | Create Image           | Create bootable Image                    | admin |
|               | Package Server     | Firmware Backup        | Firmware Backup                          | admin |
|               |                    | Firmware Restore       | Firmware Restore                         | admin |
|               |                    | Active System          | Active System                            | admin |
|               | Mass Storage       |                        | Mass Storage                             | admin |
|               | Software Uploads   |                        | Software Uploads                         | admin |
|               | Ports and Services | Network Services       | Configuration of Network Services        | admin |
|               |                    | NTP Client             | Configuration of NTP Client              | admin |
|               |                    | PLC Runtime Services   | PLC Runtime Services                     | admin |
|               |                    | SSH                    | SSH Server Settings                      | admin |
|               |                    | DHCP Server            | DHCP Server Configuration                | admin |
|               |                    | DNS                    | Configuration of DNS Server              | user  |
|               | Cloud Connectivity | Status                 | Overview                                 | admin |
|               |                    | Connection 1           | Configuration                            | admin |
|               |                    | Connection 2           | Configuration                            | admin |
|               | SNMP               | General Configuration  | Configuration of general SNMP parameters | admin |
|               |                    | SNMP v1/v2c            | Configuration of SNMP v1/v2c parameters  | admin |
|               |                    | SNMP v3                | Configuration of SNMP v3 Users           | admin |
|               | Commissioning      |                        | Commissioning Settings                   | admin |
|               | Docker             |                        | Docker Settings                          | admin |
|               | Users              |                        | WBM User Configuration                   | user  |
| Fieldbus      | OPC UA             |                        | OPC UA Configuration                     | admin |

| Tab        | Navigation         |                         | WBM Page Title                                  | User  |
|------------|--------------------|-------------------------|-------------------------------------------------|-------|
|            | BACnet             | Status                  | BACnet Status                                   | admin |
|            |                    | Configuration           | BACnet Configuration                            | admin |
|            |                    | Data Link               | BACnet Data Link                                | admin |
|            |                    | Storage Location        | BACnet Storage Location                         | admin |
|            |                    | Info                    | BACnet Info                                     | admin |
| Security   | Open VPN/IPsec     |                         | OpenVPN / IPsec Configuration                   | admin |
|            | Firewall           | General Configuration   | General Firewall Configuration                  | admin |
|            |                    | Interface Configuration | Interface Configuration                         | admin |
|            |                    | MAC Address Filter      | Configuration of MAC Address filter             | admin |
|            |                    | User Filter             | Configuration of User Filter                    | admin |
|            | Certificates       |                         | Certificates                                    | admin |
|            | Boot Mode          |                         | Boot mode configuration                         | admin |
|            | TLS                |                         | Security Settings                               | admin |
|            | Integrity          |                         | Advanced Intrusion Detection Environment (AIDE) | admin |
| Diagnostic | WAGO Device Access |                         | WAGO Device Access                              | admin |
|            | Log Message        |                         | Log Message Viewer                              | user  |
|            | Download           |                         | Download                                        | admin |
|            | Network Capture    |                         | Network Capture                                 | admin |

### 10.6.1.3 General Page Information

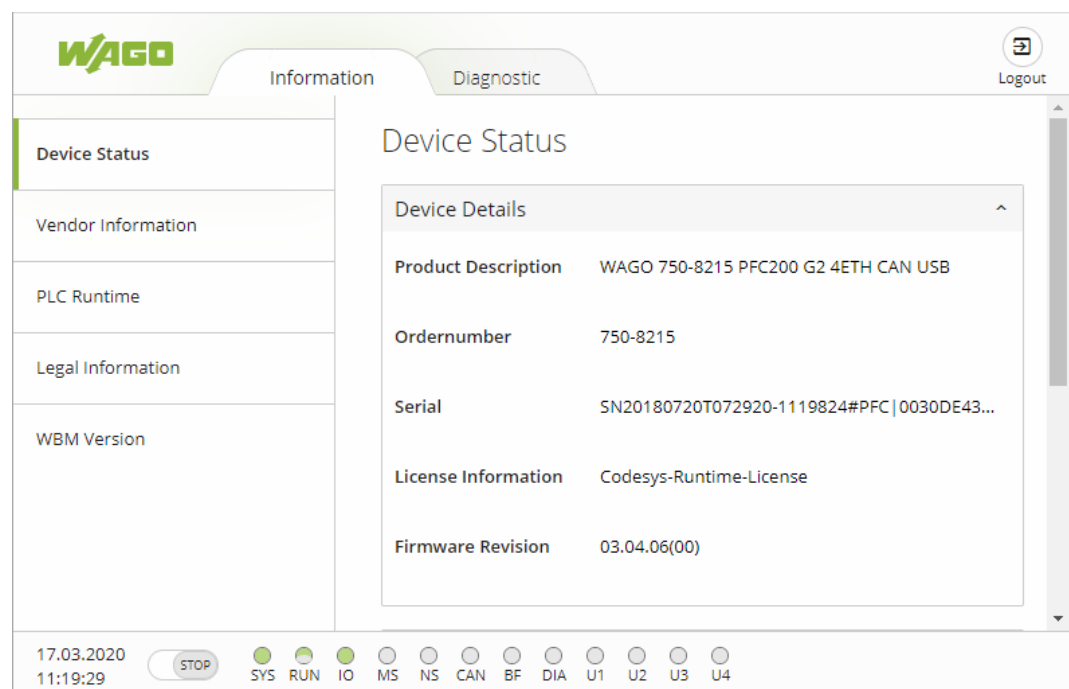


Figure 24: WBM Browser Window (Example)

The tabs for the various WBM areas and the **[Reboot]** and **[Logout]** buttons are displayed in the header of the browser window. The **[Reboot]** button only appears if you are logged in as an administrator. You can use the **[Reboot]** button to reboot the controller. Rebooting may take a few minutes. Use the **[Logout]** button to log the current user out if you do not want to use the interface any longer. You then return to the login prompt.

If not all tabs can be displayed in the selected width of the window, a tab with ellipsis (...) is displayed in place of the tabs that cannot be displayed. This allows you to select the tabs that are not shown using a pull-down menu.

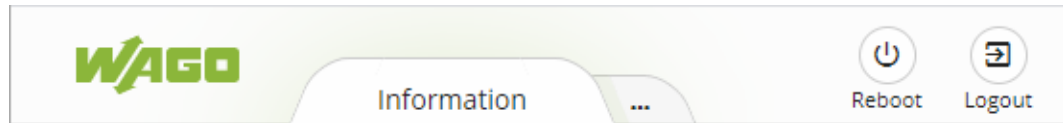


Figure 25: WBM Header with Tabs that Cannot be Displayed (Example)

The navigation tree is shown on the left side of the browser window. The content of the navigation tree depends on the selected tab. You can use this navigation tree to go to the individual pages and, if applicable, their subpages.

The current device status is indicated in the status bar.

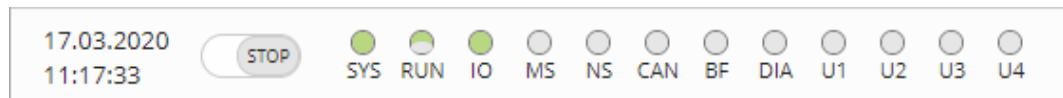


Figure 26: WBM Status Bar (Example)

- Date and time – local time and date on the device
- Status of the mode selector switch
- LED status of the device:

The LEDs are labeled with their respective names. The states are symbolized by a graphic. The following representations are possible:

- Gray: The LED is switched off.
- Full color: The LED is switched on with the respective color.
- Half color: The LED is flashing the corresponding color. The other half of the surface is then either gray or also colored. The latter means that the LED is flashing sequentially in different colors.

A tool tip containing more detailed information opens and remains as long as the cursor is positioned over an LED. The text that is displayed also contains the message that put the LED into its current status. The time of the message is also included.

The states displayed in the WBM do not always exactly correspond to those on the controller. Data has a runtime during transmission and can only be queried at certain intervals. The time between two queries is 30 seconds.

### 10.6.2 Configuration with “WAGO Ethernet Settings”

The “WAGO Ethernet Settings” program allows you to read out system information about your controller, make network settings and enable/disable the Webserver.

#### **Note**

##### **Note the software version!**

To configure the controller, use at least version 06.15.01, dated 2021-02-08, of “WAGO Ethernet Settings”!

After launching “WAGO ETHERNET Settings,” you must select the corresponding interface.

You can use a suitable USB-C service cable or, if applicable, the IP network for data communication.

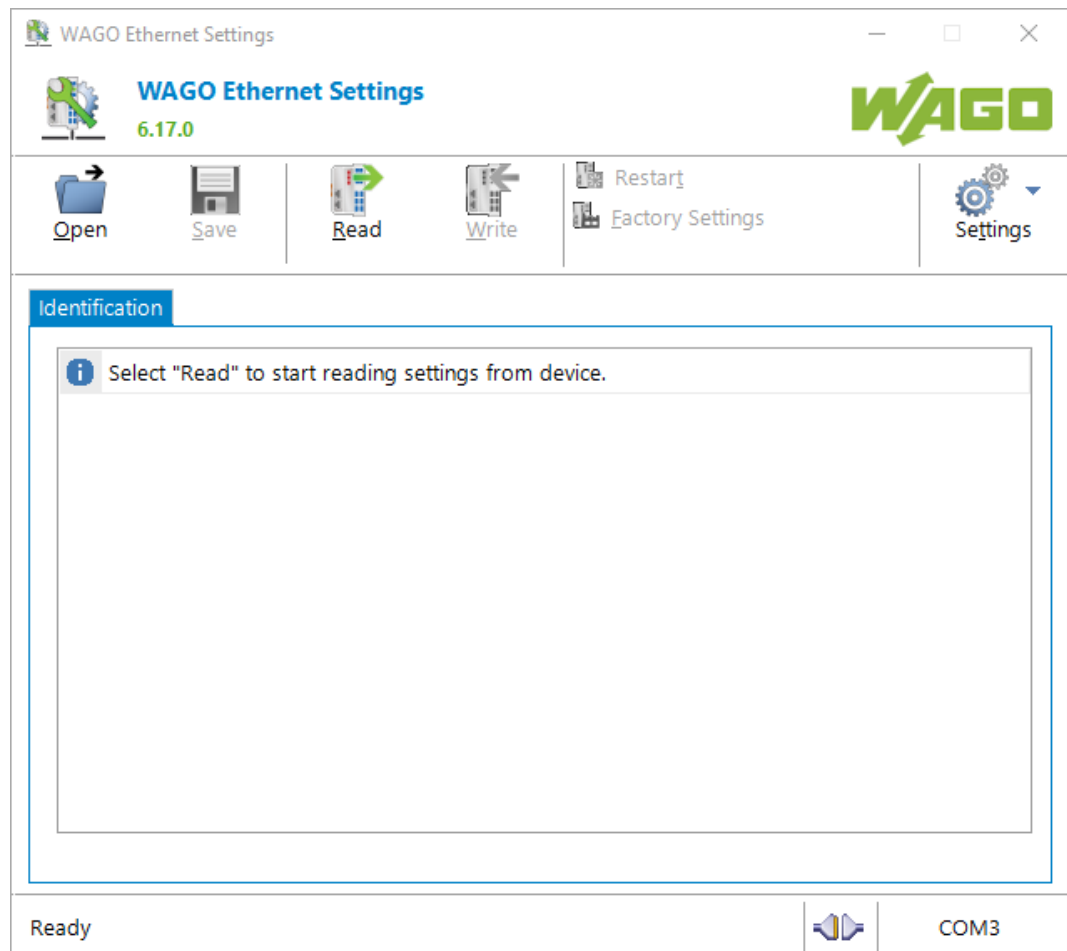


Figure 27: “WAGO Ethernet Settings” – Start Screen (Example)

- To do so, click “Settings” and then “Communication.”
- ➔ In the “Communication Settings” window that then opens, modify the settings according to your needs.

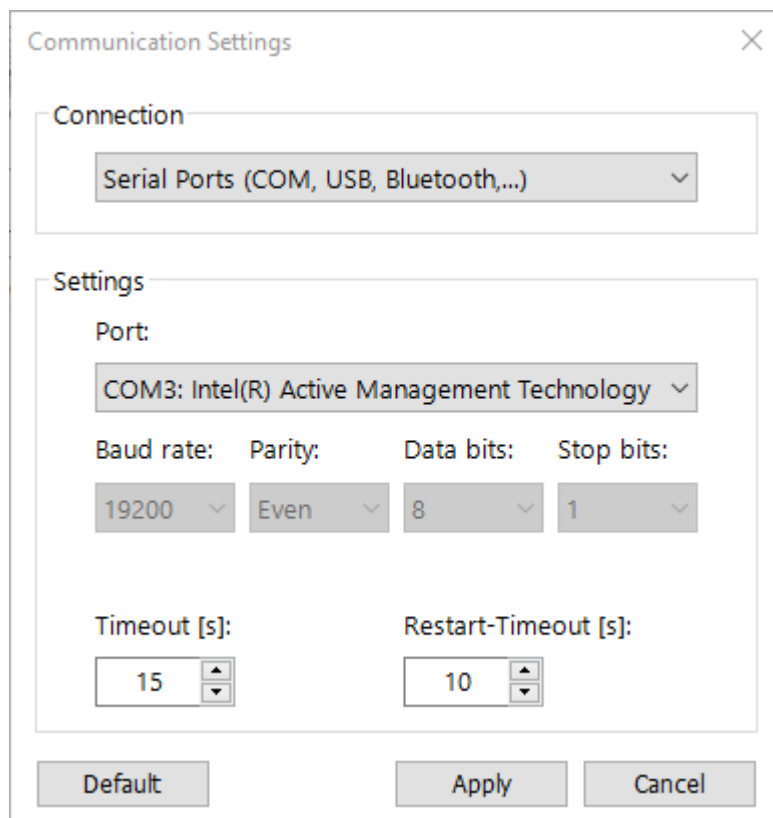


Figure 28: “WAGO ETHERNET Settings” – Communication Link (Example)

Once you have configured “WAGO Ethernet Settings” and click **[Apply]**, the connection to the controller is established automatically.

If “WAGO Ethernet Settings” has already been started with the correct parameters, you can establish a connection to the controller by clicking **[Read]**.

#### 10.6.2.1 Identification Tab

An overview of the connected product is given here.

In addition to some fixed values like the item no., MAC address and firmware version, this also indicates the IP address currently in use and the configuration method you used.

| Identification | Network                                 | PLC | Status |
|----------------|-----------------------------------------|-----|--------|
| Item Number    | 750-8210                                |     |        |
| Description    | WAGO 750-8210 PFC200 G2 4ETH            |     |        |
| FW Version     | 04.01.09(00)                            |     |        |
| HW Version     | 01                                      |     |        |
| FWL Version    | 2021.10.0w04.00.00 IDX=14               |     |        |
| Serial Number  | 37SUN31564010260372744+9999999999999999 |     |        |
| MAC address    | 0030DE46C828                            |     |        |
| IP address     | 192.168.1.10 (Static Configuration)     |     |        |
| Runtime system | CODESYS V3                              |     |        |

Figure 29: "WAGO Ethernet Settings" – Identification Tab (Example)

### 10.6.2.2 Network Tab

This tab is for configuring network settings.

Values can be changed in the "Input" column, and the parameters actually being used at the time are shown in the "Currently in Use" column.

| Identification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Network              | PLC                  | Status                                                                                     |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|--------------------------------------------------------------------------------------------|-----------|------|----------------|--------------------------|----------------|----------------------|----------------------|--------------------------|------------|--------------|---------------------|-----------------|-------------|---------------|---------------|--------------------------------------------------------------------------------------------|---------|---------|---------|----------------------|---------|---------|------------------------|---------|---------|-------------|---------|---------------|----------|--|-----------------|-------------|-----------------|-----------------|--|
| <table> <tr> <th>Parameter</th><th>Edit</th><th>Currently used</th><th>Interface X<sub>1</sub></th></tr> <tr> <td>Address Source</td><td>Static Configuration</td><td>Static Configuration</td><td>Interface X<sub>2</sub></td></tr> <tr> <td>IP address</td><td>192.168.1.10</td><td><b>192.168.1.10</b></td><td>Run <u>W</u>BM</td></tr> <tr> <td>Subnet Mask</td><td>255.255.255.0</td><td>255.255.255.0</td><td rowspan="6">           Interfaces<br/> <input checked="" type="radio"/> Switched<br/> <input type="radio"/> Separated         </td></tr> <tr> <td>Gateway</td><td>0.0.0.0</td><td>0.0.0.0</td></tr> <tr> <td>Preferred DNS-Server</td><td>0.0.0.0</td><td>0.0.0.0</td></tr> <tr> <td>Alternative DNS-Server</td><td>0.0.0.0</td><td>0.0.0.0</td></tr> <tr> <td> Time server</td><td>0.0.0.0</td><td>not available</td></tr> <tr> <td>Hostname</td><td></td><td>PFC200V3-46C828</td></tr> <tr> <td>Domain name</td><td>localdomain.lan</td><td>localdomain.lan</td><td></td></tr> </table> |                      |                      |                                                                                            | Parameter | Edit | Currently used | Interface X <sub>1</sub> | Address Source | Static Configuration | Static Configuration | Interface X <sub>2</sub> | IP address | 192.168.1.10 | <b>192.168.1.10</b> | Run <u>W</u> BM | Subnet Mask | 255.255.255.0 | 255.255.255.0 | Interfaces<br><input checked="" type="radio"/> Switched<br><input type="radio"/> Separated | Gateway | 0.0.0.0 | 0.0.0.0 | Preferred DNS-Server | 0.0.0.0 | 0.0.0.0 | Alternative DNS-Server | 0.0.0.0 | 0.0.0.0 | Time server | 0.0.0.0 | not available | Hostname |  | PFC200V3-46C828 | Domain name | localdomain.lan | localdomain.lan |  |
| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Edit                 | Currently used       | Interface X <sub>1</sub>                                                                   |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |
| Address Source                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Static Configuration | Static Configuration | Interface X <sub>2</sub>                                                                   |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |
| IP address                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 192.168.1.10         | <b>192.168.1.10</b>  | Run <u>W</u> BM                                                                            |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |
| Subnet Mask                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 255.255.255.0        | 255.255.255.0        | Interfaces<br><input checked="" type="radio"/> Switched<br><input type="radio"/> Separated |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |
| Gateway                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.0.0.0              | 0.0.0.0              |                                                                                            |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |
| Preferred DNS-Server                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.0.0.0              | 0.0.0.0              |                                                                                            |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |
| Alternative DNS-Server                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.0.0.0              | 0.0.0.0              |                                                                                            |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |
| Time server                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0.0.0.0              | not available        |                                                                                            |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |
| Hostname                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                      | PFC200V3-46C828      |                                                                                            |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |
| Domain name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | localdomain.lan      | localdomain.lan      |                                                                                            |           |      |                |                          |                |                      |                      |                          |            |              |                     |                 |             |               |               |                                                                                            |         |         |         |                      |         |         |                        |         |         |             |         |               |          |  |                 |             |                 |                 |  |

Figure 30: "WAGO Ethernet Settings" – Network Tab (Example)

#### Source

Specify which method the controller should use to determine its IP address: static, via DHCP or via BootP.

#### IP Address, Subnet Mask, Gateway

Here you can enter the specific network parameters for static configuration.

**Note****Restricted setting for default gateways!**

Only default gateway 1 can be set via “WAGO Ethernet Settings.” Default gateway 2 can only be set in the WBM!

**Preferred DNS Server, Alternative DNS server**

Here you can enter the IP address of an accessible DNS server for resolving network names if necessary.

**Time Server**

Here you can enter the IP address of a time server if the controller is to set its system time via NTP.

**Host Name**

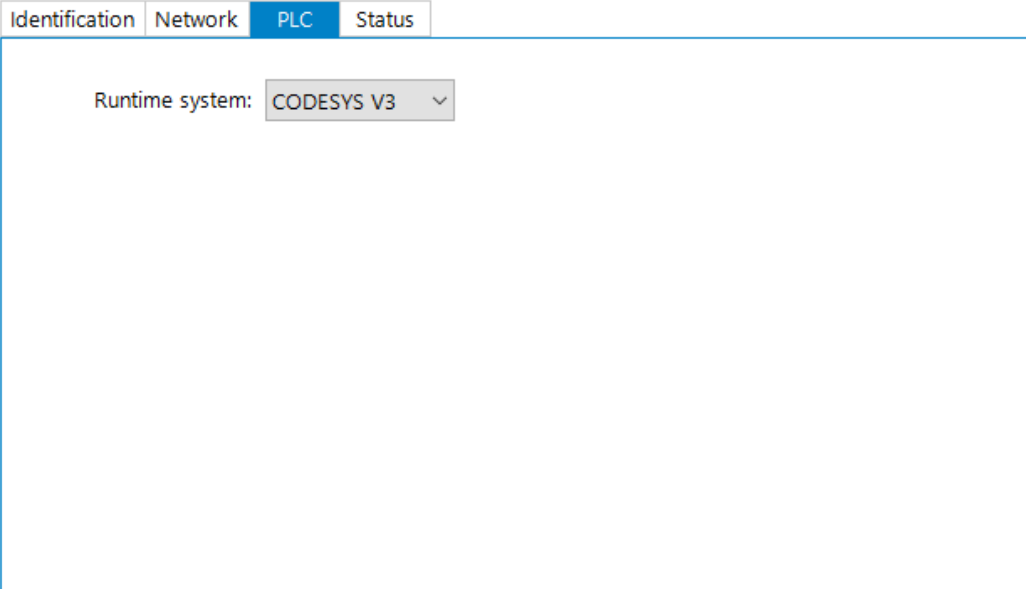
This indicates the controller's host name. Upon delivery, the host name is composed of the string “CC100-” and the last three bytes of the MAC address. This default value is also used whenever the chosen name in the “Input” column is deleted.

**Domain Name**

This shows the current domain name. This setting can be automatically overwritten with dynamic configurations, e.g., DHCP.

**10.6.2.3 PLC Tab**

Here you can select the runtime system.



The screenshot shows a web interface with four tabs: Identification, Network, PLC, and Status. The PLC tab is selected and highlighted in blue. Below the tabs, there is a label 'Runtime system:' followed by a dropdown menu. The dropdown menu is open, showing 'CODESYS V3' as the selected option. The rest of the tab area is empty.

Figure 31: “WAGO Ethernet Settings” – Protocol Tab (Example)

**10.6.2.4 Status Tab**

This shows general information about the controller's status.

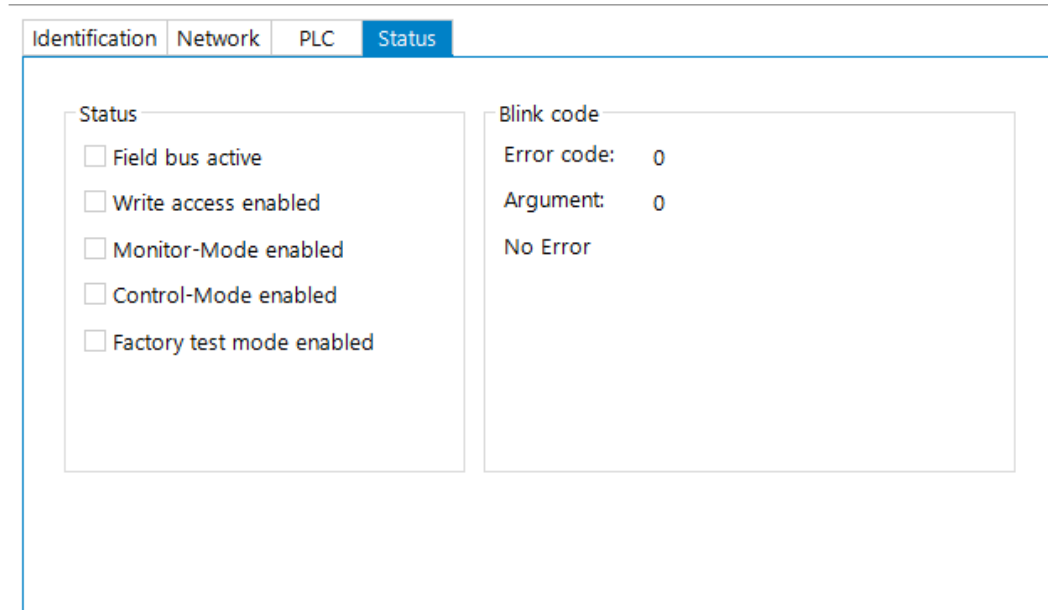


Figure 32: “WAGO Ethernet Settings” – Status Tab (Example)

## 10.7 Commissioning DALI

For the commissioning example described below, the WAGO Compact Controller 100 DALI and the DALI network must be set up and connected correctly and must be functioning properly.

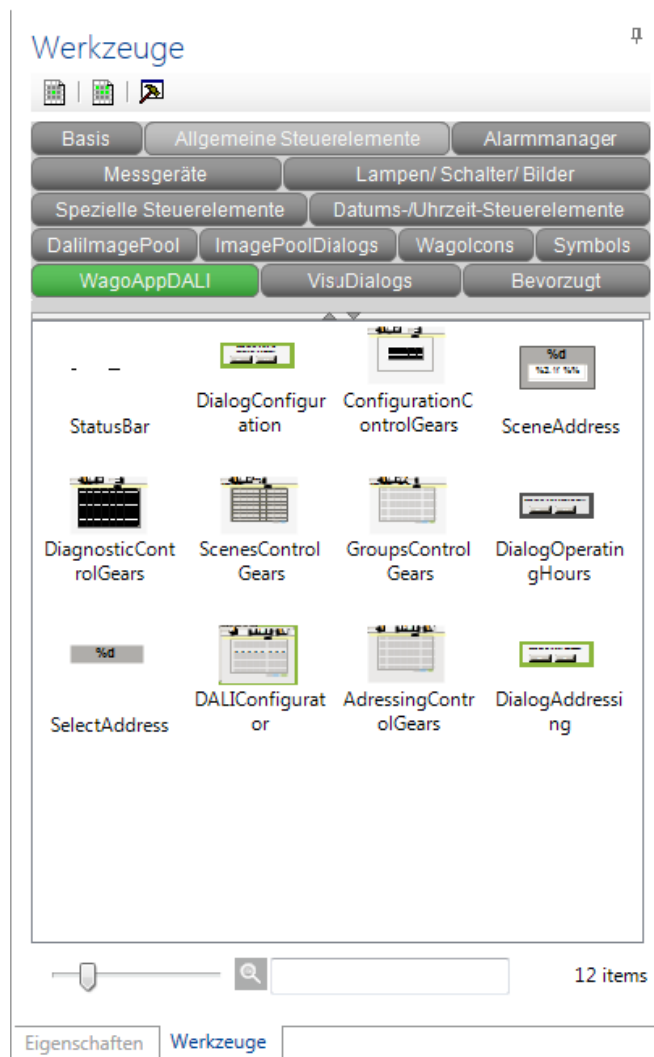
- The 24 V power supply of the controller is connected to connection X4 (U<sub>s</sub>+, GND).
- The external DALI bus supply is connected to connection X14, e.g., to module pair 1/2 (DA).
- The DALI bus is connected to connection X14, e.g., to module pair 3/4 (DA).
- At least 1 DALI control gear is connected to the DALI bus.
- A PC for configuration is connected to the controller via ETHERNET.
- Alternatively, the PC is connected to the controller via the USB service interface.
- The network settings of the PC match the network settings of the controller.

### 10.7.1 Commissioning with the CODESYS Web Visualization

The DALI Multi-Master Module is accessed via the CODESYS V3 library “WAGOApp-DALI” and the integrated Web visualization.

1. Launch the CODESYS programming interface on your PC.
2. Create a new project for the Compact Controller CC100 V2 DALI (751-9403).
3. Open the library manager and integrate the “WagoAppDALI” library into the project.
4. To integrate the visualization interface into the project, first create an empty visualization page.

5. Then open the page and integrate the “DALIConfigurator” element via the “Tools” > “WagoAppDALI” tab.



- ➔ The following block and program calls should be integrated in the main program:

## FbDaliMaster

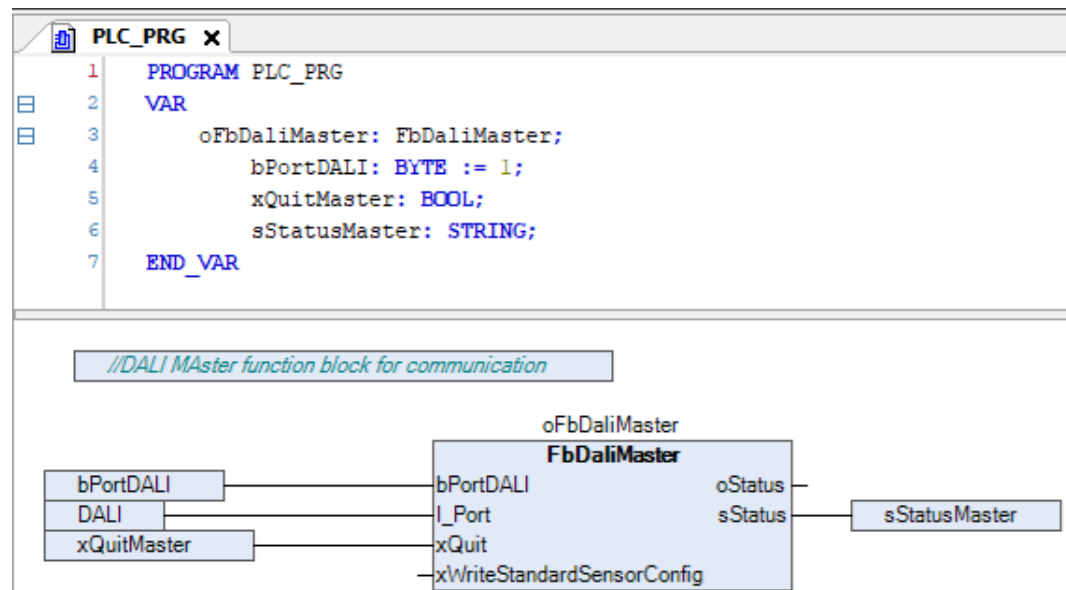


Figure 33: FbDaliMaster – Communication with the Module

For DALI communication, an instance of the “FbDaliMaster” function block is created in the respective program. The CC100 DALI Compact Controller requires a master module.

The value “1” must be entered at the “bPortDALI” input.

The text “DALI” must be entered at the “I\_Port” input.

The current status of the block is output at the “sStatus” output.

At the “xQuit” input, faults that have occurred can be acknowledged via a positive edge.

The DALI modules are assigned to the DALI Master Module via the corresponding type variable (e.g., typMultiSensorType1/2) of the individual modules.

## FbtypMultiSensorType1/2

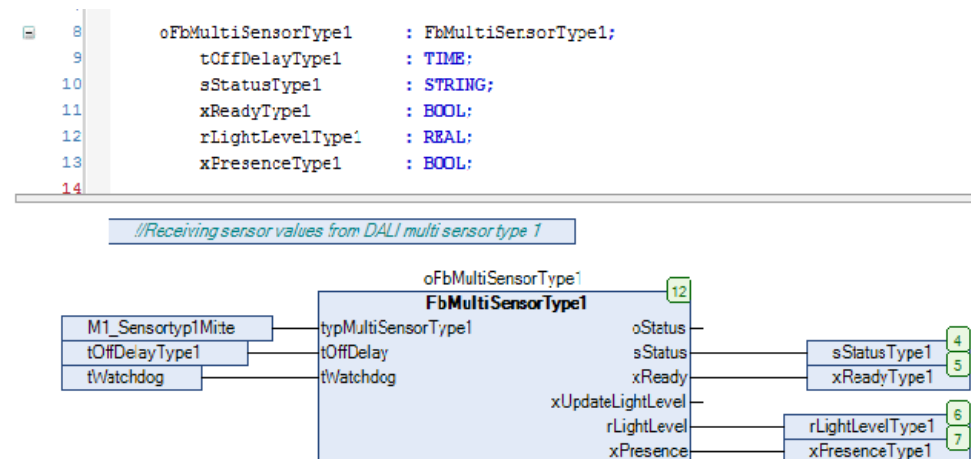


Figure 34: FbMultiSensorType1 – Sensor Values of Sensor Type 1

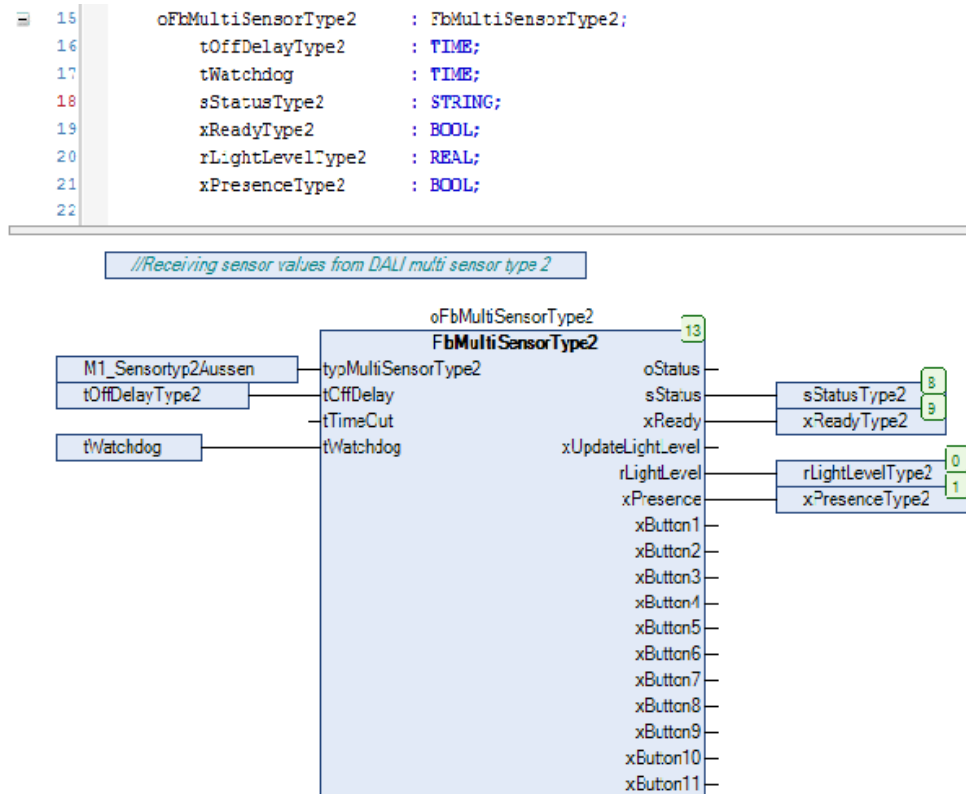


Figure 35: FbMultiSensorType2 – Sensor Values of Sensor Type 2

One instance of the “FbMultiSensorType1” or “FbMultiSensorType2” function block is declared per sensor for reading sensor type 1 or sensor type 2, respectively.

The presence signal transmitted by the sensor coupler is output at the “xPresence” output.

The switch-off delay for the presence detector can be defined at the “tOffDelay” input.

The address of the presence detector is set in “typMultiSensorType1/2.”

The values of the light sensor can be received with the same instance of the function block.

The measured light intensity is output at the “rLightLevel” output.

The address of the light sensor is also set via “typMultiSensorType1/2.”

A time period for the watchdog timer can be specified via the “tWatchdog” input.

The “xReady” output signals whether the module is ready for operation or whether the module is currently performing an operation.

The current module status is output via the “sStatus” output.

The “FbMultiSensorType2” function block also includes the “xButton1 ... 11” outputs.

These outputs can be used to evaluate the remote control of the sensor.

Each output represents a button on the remote control.

The address of the infrared receiver is also set via “typMultiSensorType2.”

### FbDaliSwitchOnOff

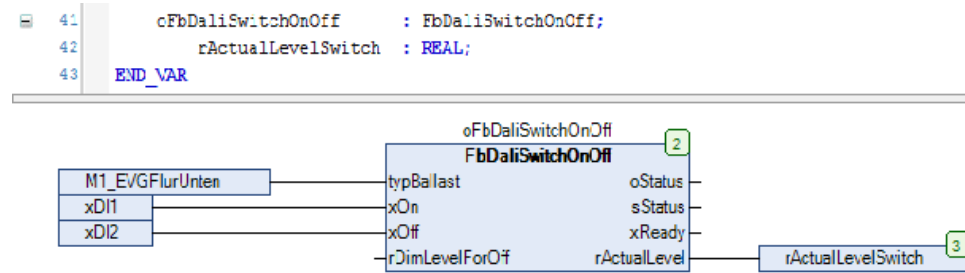


Figure 36: FbDaliSwitchOnOff

The “FbDaliSwitchOnOff” function block can be used to switch a DALI ECG on or off using digital input signals, for example.

The digital inputs available in the controller can be used for this purpose.

The signal for switching on is defined at the “xOn” input.

The signal for switching off at input “xOff.”

The address of the ECG to be switched is set in “typBallast.”

The “rActualLevel” output provides a return signal about the current switched status.

### PrgDaliConfigurator

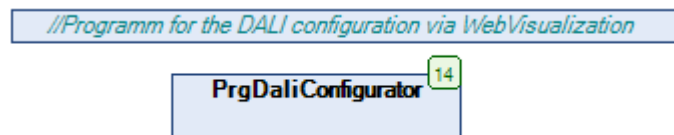


Figure 37: PrgDaliConfigurator Program for the Configuration Interface

The “PrgDaliConfigurator” program is required to use the Web visualization.

The project configuration is now complete, and the program can be transferred and launched.

To do so, click the “Program” tab and then click the **[Connect]** button.

Once the transfer has been completed successfully, launch the program on the same “Program” tab by clicking the **[Start]** button.

For further configuration, follow the instructions in section “ECG Addressing via the Web Visualization” of the application note “CDS3 Application Note WagoAppDALI.”

#### 10.7.2 Note on reset commands

After some commands, some time must be given to DALI subscribers to complete an operation. For the “RESET” command, that is a time window of 350 ms according to the DIN EN IEC 62386 standard and for the “RESET MEMORY BANK (DTR0)” command, 10.1 s. No DALI telegrams can be sent to the DALI bus in that time.

# 11 CODESYS V3 Runtime Environment

## 11.1 Basic Information

### Note

#### Read CODESYS V3 documentation!

Information on installing, commissioning and programming CODESYS V3 is available in the manual for CODESYS V3.

## 11.2 CODESYS V3 Priorities

A list of priorities implemented for the controller is provided below as supplementary information to the CODESYS V3 documentation.

Table 42: CODESYS V3 Priorities

| Scheduler                              | Task                                 | Linux® Priority | IEC Priority | Comment                                                                                                                         |
|----------------------------------------|--------------------------------------|-----------------|--------------|---------------------------------------------------------------------------------------------------------------------------------|
| Preemptive Scheduling - Real-time area | Local or fieldbus - HIGH             | -95 ... -86     |              | Local bus (-88)                                                                                                                 |
|                                        | Operating mode switch monitoring     | -85             |              | Task registers changes to the mode selector switch and changes the state of the PLC application. (start, stop, reset warm/cold) |
|                                        | CODESYS Watchdog                     | -83             |              | Execution of the watchdog functions                                                                                             |
|                                        | Cyclic and event-controlled IEC task | -55 ... -53     | 1 ... 3      | For real-time tasks which must not be influenced in execution by external interfaces (e.g., fieldbus).                          |
|                                        | Local of fieldbus - MID              | -52 ... -43     |              | CAN (-52 ... -51) PROFIBUS (-49 ... -45) Modbus slave/master (-43)                                                              |
|                                        | Cyclic and event-controlled IEC task | -42 ... -32     | 4 ... 14     | For real-time tasks which must not influence fieldbus communication during execution.                                           |
|                                        | Local or fieldbus - LOW              | -13 ... -4      |              |                                                                                                                                 |
| Fair Scheduling - Non-real-time area   | CODESYS communication                | Background (20) |              | Communication with the CODESYS development environment                                                                          |

| Scheduler | Task                                                | Linux® Priority | IEC Priority | Comment                                           |
|-----------|-----------------------------------------------------|-----------------|--------------|---------------------------------------------------|
|           | Cyclic, event-controlled and free-wheeling IEC task |                 | 15           | Incl. standard priority of the visualization task |

### 11.3 Memory Areas for CODESYS V3 - Neutral

The memory areas for CODESYS V3 are specified in the appendix in the “[🔗 Technical Data, Approvals, Guidelines and Standards \[► 131\]](#)” section.

#### 11.3.1 Program and Data Memory

The program memory (also code memory) has a maximum size of 32 MB. The data memory has a maximum size of 128 MB.

Both areas are separate from each other and are requested when downloading to the system depending on the scope of the program. If the size limit is exceeded, it is displayed as an error.

#### 11.3.2 Function Block Limitation

Together with the data memory to be used by the application, memory is required for the individual program function blocks in the system.

The size of the administration space is calculated from the function block limitation \* 12 (i.e., 4096 Byte \* 12).

The actual size of the main memory required in the system for data is the sum of global program and data memory and function block limitation memory.

#### 11.3.3 Remanent Memory

A total of 128 kbytes of remanent memory is available for the IEC-61131 application.

The remanent area is divided into the retain area and the persistence area. The areas are automatically distributed by CODESYS V3.

# 12 DALI

## 12.1 Dedicated IEC Application

The CODESYS V3 library “WAGOAppDALI” can be integrated for programming your own IEC application. The library contains a special DALI master module for processing the data. This module sets the DALI Multi-Master Module into operation.

### Note

**Download the CODESYS V3 library free of charge.**

To create and use your own IEC application, you can download the current version of the CODESYS V3 library “WAGOAppDALI” free of charge from the WAGO website at: [www.wago.com](http://www.wago.com)

## 12.2 Operation

The controller can query and check the status of the connected devices on the DALI line by systematic polling. Systematic polling can also be configured to enable polling of the active devices to be conducted more rapidly per cycle than the inactive devices.

Some selected settings of the devices are saved in a permanently updated controller-internal database when configuring the DALI network. The operating hours of the devices (active times of the lights) are also recorded.

## 12.3 Replacing, Adding or Removing DALI Components

If a defective device must be replaced, the replacement device can be reconfigured automatically using the “Auto-Replace” function.

### Note

**Controller must be restarted after changing the DALI line!**

If an existing DALI line is changed, i.e., one or more devices are added or removed, the DALI Multi-Master Module must be restarted. This restart maintains the “auto replace” function.

# 13 Diagnostics

## 13.1 Diagnostics via Indicators

### 13.1.1 Diagnostics via LED Indicators: System

The “SYS” LED indicates the following diagnostics:

Table 43: “SYS” Diagnostic LED

| Status             | Explanation                                                      | Remedy                                                                                                                               |
|--------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Green              | Ready for operation; system start completed without errors       | ---                                                                                                                                  |
| Orange             | Product is in startup/boot process and RST button is not pressed | ---                                                                                                                                  |
| Flashing orange    | “Fix IP Address” mode; temporary setting until the next reboot   | 1. Connect to the product using the default address (192.168.1.17).<br>2. Restart the product to restore the original value setting. |
| Flashing green/red | Firmware update mode                                             | ---                                                                                                                                  |

The “RUN” LED displays the PLC program status with the following diagnostics:

Table 44: “RUN” Diagnostic LED

| Status                     | Explanation                                                                               | Remedy                                                                                                                                                                                                                                                                      |
|----------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Green                      | Applications loaded and all have status “RUN”                                             | ---                                                                                                                                                                                                                                                                         |
| Green, flashing            | No application and no boot project loaded                                                 | • Load an application or boot project.                                                                                                                                                                                                                                      |
| Red                        | Applications loaded and all have status “STOP”                                            | • Set the mode selector switch to “RUN” to start the application.                                                                                                                                                                                                           |
| Green/red, flashing        | At least one application with status “RUN” and status “STOP”                              | • Start the stopped application.                                                                                                                                                                                                                                            |
| Red, goes out briefly once | Warm start reset completed                                                                | ---                                                                                                                                                                                                                                                                         |
| Red, goes out longer once  | Cold start reset completed                                                                | ---                                                                                                                                                                                                                                                                         |
| Red, flashing              | At least one application after exception (e.g., memory access error) in the “STOP” status | 1. Restart the application by resetting via the mode selector switch or in the associated IDE.<br>2. If the application cannot be started, restart the controller.<br>3. Contact WAGO Support if the error occurs again.                                                    |
| Orange/green, flashing     | Load above threshold value 1                                                              | • Try to reduce the load on the system:<br>• Change the CODESYS program.<br>• Terminate any fieldbus communication that is not essential or reconfigure the fieldbuses.<br>• Remove any non-critical tasks from the RT area.<br>• Select a longer cycle time for IEC tasks. |

| Status | Explanation                                                             | Remedy                                                                                                                                                                                                                                                                                                                 |
|--------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Orange | Runtime system in debug state (breakpoint, step mode, individual cycle) | <ol style="list-style-type: none"> <li>1. Resume the application in the associated IDE with step mode or start. If applicable, remove breakpoints.</li> <li>2. If the connection has been interrupted, set the mode selector switch to "STOP" and then back to "RUN" to enable the application to continue.</li> </ol> |
| OFF    | No runtime system loaded                                                | <ul style="list-style-type: none"> <li>• Enable a runtime system, e.g., via the WBM.</li> </ul>                                                                                                                                                                                                                        |

The "USR" LED displays the following diagnostics:

Table 45: "USR" Diagnostics LED

| Status           | Explanation                                | Remedy |
|------------------|--------------------------------------------|--------|
| red/green/orange | Programmable status from the user program. | ---    |

### 13.1.2 Diagnostics via LED Indicators: LNK ACT

The "LNK|ACT" LED displays the network connection status with the following diagnostics:

Table 46: LNK ACT Diagnostic LED

| Status         | Explanation                             | Remedy                                                                                                                |
|----------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Off            | No network communication.               | <ul style="list-style-type: none"> <li>• If necessary, check the network connections and network settings.</li> </ul> |
| Green          | Existing connection to physical network | ---                                                                                                                   |
| Flashing green | Network communication occurring.        | ---                                                                                                                   |

### 13.1.3 Diagnostics via LED Indicators: Memory Card Slot

The LED for the memory card slot displays the memory card status with the following diagnostics:

Table 47: Memory Card Slot Diagnostic LED

| Status          | Explanation                                | Remedy |
|-----------------|--------------------------------------------|--------|
| Off             | No read or write access to the memory card | ---    |
| Flashing yellow | Read or write access to the memory card    | ---    |
| Yellow, steady  | Read or write access to the memory card    | ---    |

### 13.1.4 Diagnostics via DALI LED Display

The "DALI" LED displays the following diagnostics:

Table 48: "DALI" Diagnostics LED

| Status        | Explanation                     | Remedy |
|---------------|---------------------------------|--------|
| OFF           | DALI service is not running.    | ---    |
| Green, steady | DALI Service runs trouble-free. | ---    |

| Status          | Explanation                                                                                                                                                              | Remedy                            |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Green, flashing | DALI device identification is active.                                                                                                                                    | • Wait for device identification. |
| Orange, steady  | DALI telegram error, e.g., "framing error"                                                                                                                               | ---                               |
| Red, steady     | DALI service not available <ul style="list-style-type: none"> <li>• Bus error, e.g., bus supply missing or bus short circuit.</li> <li>• Other, unknown error</li> </ul> | ---                               |

### 13.1.5 Diagnostics via DIO LED Indicators

The "DI<n>" LEDs display the following diagnostics:

Table 49: Diagnostics LEDs DI<n>

| Status | Explanation                             | Remedy |
|--------|-----------------------------------------|--------|
| Off    | Digital input <n> is at low potential.  | ---    |
| Green  | Digital input <n> is at high potential. | ---    |

The "DO<n>" LEDs display the following diagnostics:

Table 50: Diagnostics LEDs DIO<n>

| Status | Explanation                                    | Remedy |
|--------|------------------------------------------------|--------|
| Off    | Digital input/output <n> is at low potential.  | ---    |
| Green  | Digital input/output <n> is at high potential. | ---    |

# 14 Service

## 14.1 Clearing Reset Functions

### 14.1.1 Warmstart Reset

All CODESYS V3 applications are reset during a warm start reset. All global data is set to its initialization values. This corresponds to the CODESYS V3 IDE command “Reset warm.”

- To perform a warm start reset, set the mode selector switch to “Reset” and hold it there for two to seven seconds.
- ➔ Execution of the reset is signaled by the red “RUN” LED briefly going out when the mode selector switch is released.

### 14.1.2 Coldstart Reset

All CODESYS V3 applications are reset during a cold start reset. All global data and the retain variables are set to their initialization values. This corresponds to the CODESYS V3 IDE command “Reset cold.”

1. To perform a coldstart reset, set the mode selector switch to “Reset” and hold it there for more than seven seconds.
  - ⇒ Execution of the reset is signaled after seven seconds by the “RUN” LED going out for an extended period.
2. You can then release the mode selector switch.

### 14.1.3 Software Reset

The product is restarted during a software reset.

- To perform a software reset, set the mode selector switch to the “RUN” or “STOP” position and press the reset button for more than 1 second but less than 8 seconds.
- ➔ All LEDs light up briefly in green to signal reset completion. After a few more seconds, the “SYS” LED signals the successful controller boot operation.

### 14.1.4 Controller Reset

#### **NOTICE**

#### **Do not switch the controller off!**

The controller can be damaged by interrupting the factory reset process.

- Do not switch the controller off during the factory reset process and do not disconnect the power supply!

**i Note****All parameters and passwords are overwritten!**

With the reset, all parameters and passwords are overwritten.

Saved boot projects, including existing Web visualization data, are deleted.

Post-installed firmware functions are not overwritten.

Software licenses are retained.

- If you have any questions, contact WAGO Support.

To perform a “controller reset,” proceed as follows:

1. Press and hold the Reset button.
2. Slide the mode selector switch to the “RESET” position and hold it in this position.
3. Hold both buttons until the “SYS” LED flashes red/green alternately after approx. 8 seconds.
4. If the “SYS” LED flashes red/green alternately, release the mode selector switch and the reset button.

➔ The controller has been reset and restarts automatically.

**i Note****Do not interrupt the reset operation!**

If you release the reset button too early, the product restarts without performing the controller reset.

## 14.2 Inserting and Removing a Memory Card

### 14.2.1 Inserting a Memory Card

**i Note****Note the insertion direction!**

Note the insertion direction when inserting the memory card.

1. Use an operating tool or screwdriver to open the transparent cover flap by folding it upwards. The point where to position the tool is marked with an arrow.
2. Insert the memory card into the slot provided.
3. Push the memory card all the way in. When you let go, the memory card will move back a little and then snap in place (a push-push mechanism).
4. Push the cover flap back in by folding it downwards until it snaps in.
5. You can seal the closed flap through the hole in the enclosure next to the flap.

### 14.2.2 Removing a Memory Card

1. Remove any seal.

2. Use an operating tool or screwdriver to open the transparent cover flap by folding it upwards. An error indicates where to apply the tool.
3. To remove the memory card, you must first push it slightly into the slot (a push-push mechanism). This releases the mechanical locking mechanism.
4. As soon as you let go of the memory card, the spring pushes the memory card out a bit.
5. Remove the memory card.
6. Push the cover flap back in by folding it downwards until it snaps in.

### 14.3 Update Root Certificates

If you want to update the root certificates on the controller, proceed as follows:

1. Download the current Root CA bundle from the website <https://curl.haxx.se/ca> to your PC.
2. Rename the file "ca-certificates.crt."
3. Transfer the file to the controller in the /etc/ssl/certs directory using an SFTP or FTP client.
4. Restart the controller. Use the reboot function in the WBM to do this.

### 14.4 Firmware Updates

#### **NOTICE**

##### **Property damage due to interruption!**

Interrupting the update process can damage the product.

- Complete the update/downgrade process!

#### **Note**

##### **Have the matching documentation ready for the target firmware version!**

A firmware update can modify, remove or add controller properties and functions. As a result, described properties or functions of the controller may not be available or available properties or functions may not be described in the documentation.

1. Therefore, use only documentation appropriate for the target firmware after an update.
2. If you have any questions, contact WAGO Support.

#### **Note**

##### **Note the firmware version!**

The product is compatible with firmware 19 or higher.

Downgrading to a version  $\leq$  firmware 19 is not permitted.

You can update the firmware in two different ways using:

- WAGOupload
- Memory card and WBM

#### 14.4.1 Using WAGOupload to Update/Downgrade Firmware

1. Launch WAGOupload.
  2. Click the **[Update Firmware]** action.
  3. In the “Select target controllers” dialog, enter the IP address of your controller in the “Transfer via TCP/IP” option.
  4. Click **[Find Controller]**.
    - ⇒ Your controller is now displayed in the list.
  5. Select the displayed controller and click **[Next]**.
  6. In the “Select Update File” dialog, select the \*.wup firmware file for the required firmware.
  7. Click **[Next]**.
  8. Click **[Next]** to confirm the summary.
  9. Wait until the operation ends with a status message and only then click **[Exit]** to close the window.
- ➔ The newly installed firmware is now available on your controller.

#### 14.4.2 Using a Memory Card and WBM to Update/Downgrade Firmware

1. First, copy the firmware image file of the required firmware (\*.img) to the memory card using a suitable PC tool.
  2. Save your application and the controller settings.
  3. Switch off the controller.
  4. Insert the memory card with the firmware image to install into the memory card slot.
  5. Switch on the controller.
    - ⇒ The controller is started from the memory card with the firmware image to be installed.
  6. After booting the controller, open the WBM “Administration”> “Create Boot Image” page (you may have to change the IP address temporarily for this).
  7. Create a new boot image on the internal memory. Click the **[Start Copy]** button.
  8. Switch off the controller after completing the operation.
  9. Remove the memory card.
  10. Switch on the controller again.
- ➔ The controller now starts from the internal memory with the newly installed firmware version.

# 15 Decommissioning

## 15.1 Disposal and Recycling

|                                                                                   |                                                                                                                                                       |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>WEEE Mark</b><br>Electrical and electronic equipment may not be disposed of with household waste. This also applies to products without this mark. |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|

Electrical and electronic equipment contain materials and substances that can be harmful to the environment and health. Electrical and electronic equipment must be disposed of properly after use. Environmentally friendly disposal benefits health, protects the environment from harmful substances in electrical and electronic equipment and enables sustainable and efficient use of resources.

- Observe the national and local regulations for the disposal of electrical and electronic equipment, lithium-ion batteries, lead–acid batteries and packaging.
- Clear any data stored on electrical and electronic equipment.
- Remove lithium-ion batteries, lead–acid batteries or memory cards that are added to the electrical and electronic equipment.
- Wear appropriate personal protective equipment when removing the lithium-ion batteries/lead–acid batteries.
- Dispose of the removed lithium-ion batteries/lead–acid batteries according to your local waste regulations (e. g. collection boxes at the retail or local collection points).
- Have electrical and electronic equipment sent to a local collection point.
- Dispose of all types of packaging to ensure a high level of recovery, reuse and recycling.
- Transport packages from the B2B area can be taken back free of charge via a return system in accordance with the Packaging Act. Please contact our service provider Interseroh directly. The corresponding certificate can be found at: [🌐 corporate-certificates](#).
- Throughout Europe, Directives 2006/66/EC, 94/62/EC and 2012/19/EU (WEEE) apply. National directives and laws may differ.

# 16 Appendix

## 16.1 Device Types

The controller supports the device types listed below.

### “Control Gears”



Table 51: “Control Gears”

| Icon | Type | Designation                                     |
|------|------|-------------------------------------------------|
|      | 0    | Fluorescent lamp (standard ECG)                 |
|      | 1    | Separate emergency lighting                     |
|      | 2    | Discharge lamp                                  |
|      | 3    | Low voltage halogen lamp                        |
|      | 4    | Filament lamp                                   |
|      | 5    | Converting the digital signal into a DC voltage |
|      | 6    | LED lamp                                        |
|      | 7    | Switching function                              |
|      | 8    | Color control device                            |
|      | 9    | Sequencer                                       |
|      | 15   | Load referencing                                |
|      | 16   | Thermal gear protection                         |
|      | 17   | Dimming curve selection                         |
|      | 19   | Centrally supplied emergency operation          |
|      | 20   | Load shedding                                   |
|      | 21   | Thermal lamp protection                         |
|      | 23   | Non-replaceable light source                    |

| Icon                                                                              | Type | Designation                                                   |
|-----------------------------------------------------------------------------------|------|---------------------------------------------------------------|
|  | 49   | Integrated bus power supply                                   |
|  | 50   | Memory bank extension                                         |
|  | 51   | Energy report                                                 |
|  | 52   | Diagnostics and maintenance                                   |
|  | 250  | <b>Error message:</b> duplicate address or undefined response |
| [List of all detected device types]                                               | 255  | Multiple device types are supported.                          |

### “Sensors”



Table 52: “Sensors”

| Icon                                                                                | Type            | Designation                                                   |
|-------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------|
|   | 0               | Universal input                                               |
|  | 1               | Button                                                        |
|  | 2               | Absolute input                                                |
|  | 3               | Presence Detectors                                            |
|  | 4               | Light sensor                                                  |
|  | 32              | Feedback                                                      |
|  | [+ device type] | <b>Error message:</b> duplicate address or undefined response |

### “Sensor type 1”



Table 53: “Sensor type 1”

| Icon                                                                                | Designation                              |
|-------------------------------------------------------------------------------------|------------------------------------------|
|  | Light sensor                             |
|                                                                                     | MSensor<br>• Brightness sensor function  |
|  | Presence Detectors                       |
|                                                                                     | MSensor<br>• Presence detection function |

| Icon                                                                                                 | Designation                                                   |
|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
|                     | Button                                                        |
| <br>[+ device type] | <b>Error message:</b> duplicate address or undefined response |

### “Sensor type 2”



Table 54: “Sensor type 2”

| Icon                                                                                                   | Designation                                                   |
|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
|                       | Light sensor                                                  |
|                                                                                                        | MSensor<br>• Brightness sensor function                       |
|                       | Presence Detectors                                            |
|                                                                                                        | MSensor<br>• Presence detection function                      |
|                       | Remote control                                                |
|                                                                                                        | MSensor<br>• Remote control device                            |
|                      | Button                                                        |
| <br>[+ device type] | <b>Error message:</b> duplicate address or undefined response |

## 16.2 WBM Pages

The following sections contain a description of the parameters and setting options for the Web-Based Management (WBM) pages.

### 16.2.1 “Information” Tab

#### 16.2.1.1 “Device Status” Page

The “Device Status” page shows information about product identification and the most important network properties.

#### “Device Details” Group

The product properties are displayed in this group.

Table 55: WBM “Device Status” Page – “Device Details” Group

| Parameters                   | Explanation                                               |
|------------------------------|-----------------------------------------------------------|
| Product Description          | Product Designation                                       |
| Order Number                 | Product Item Number                                       |
| Unique Item Identifier (UII) | Unique product identification number                      |
| License Information          | Notification that the CODESYS runtime system is available |

| Parameters        | Explanation      |
|-------------------|------------------|
| Firmware Revision | Firmware Version |

### “Network TCP/IP Details” Group

The network and interface properties of the product are displayed in this group.

Table 56: WBM “Device Status” Page – “Network TCP/IP” Group

| Parameters        | Explanation                                                                                                                                                                                                                          |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DIP Switch Status | Status of the address selector switch;<br>this area only appears if an address selector switch is available.                                                                                                                         |
| DIP Switch Mode   | Address Selector Switch Setting                                                                                                                                                                                                      |
|                   | Off (0) IP address assignment via e.g., WBM                                                                                                                                                                                          |
|                   | static (1 ... 254) Static IP address assignment via address selector switch                                                                                                                                                          |
|                   | dhcp (255) Dynamic IP address assignment via DHCP                                                                                                                                                                                    |
| DIP Switch Value  | Set value of the address selector switch                                                                                                                                                                                             |
| Interface <n>     | Currently configured interface;<br>the properties are displayed in a separate area for each configured interface.                                                                                                                    |
| Mac Address       | MAC address used for product identification and addressing                                                                                                                                                                           |
| IP Source         | Current reference type of the IP address                                                                                                                                                                                             |
|                   | none No IP allocation method is selected;<br>this occurs, for example, if a bridge was added due to changes to the bridge configuration.<br>Select a source in the <b>Configuration</b> tab on the <b>TCP/IP Configuration</b> page. |
|                   | static IP Static IP address assignment                                                                                                                                                                                               |
|                   | dhcp Dynamic IP address assignment via DHCP                                                                                                                                                                                          |
|                   | bootp Dynamic IP address assignment via BootP (if BootP is supported)                                                                                                                                                                |
|                   | external The IP address may be assigned by the fieldbus application;<br>this occurs e.g., if the IP address is controlled by the application.                                                                                        |
| IP Address        | Current product IP address                                                                                                                                                                                                           |
| Subnet Mask       | Current product subnet mask                                                                                                                                                                                                          |

#### 16.2.1.2 “Vendor Information” Page

You can find the manufacturer and address on the “Vendor Information” page.

#### 16.2.1.3 “PLC Runtime Information” Page

The “PLC Runtime Information” page contains information on the enabled runtime system.

You will also find a link here to open WebVisu.

### “Runtime” Group

Table 57: WBM “PLC Runtime Information” Page – “Runtime” Group

| Parameters | Explanation                                                                                 |
|------------|---------------------------------------------------------------------------------------------|
| Version    | Currently enabled runtime system<br>If the runtime system is disabled, “None” is displayed. |

### “WebVisu” Group

You will find a link that you can use to open WebVisu.

#### 16.2.1.4 “WAGO Software License Agreement” Page

The “WAGO Software License Agreement” page lists the license terms for the WAGO software used in the product.

#### 16.2.1.5 “Open Source Licenses” Page

The license conditions for the open source software used for the product are listed in alphabetical order on the “Open Source Licenses” page.

#### 16.2.1.6 “WBM Third Party License Information” Page

On the “WBM Third Party License Information” page, you can find the license text of the open source licenses that apply to the WBM itself.

#### 16.2.1.7 “Trademarks Information” Page

On the “Trademarks Information” page you will find a list of property and trademark rights.

#### 16.2.1.8 “WBM Version” Page

On the “WBM Version” page, you can find the version information for the various sections (“plug-ins”) that the WBM contains. This information may be useful for support if an error is found in the WBM.

### 16.2.2 “Configuration” Tab

#### 16.2.2.1 “PLC Runtime Configuration” Page

On the “PLC Runtime Configuration” page, you will find the settings for the boot project created with the programming software and the settings for the web visualization created in the runtime system.

### “General PLC Runtime Configuration” Group

The runtime system change is effective immediately.

The home directory change only takes effect after the product restarts. For this purpose, use the WBM reboot function. Do not switch off the product too early.

Table 58: WBM “PLC Runtime Configuration” Page – “General PLC Runtime Configuration” Group

| Parameters                            | Explanation                                                                    |                                                      |
|---------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------|
| PLC Runtime Version                   | Selection of the enabled PLC runtime system                                    |                                                      |
|                                       | None                                                                           | No runtime system is enabled.                        |
|                                       | CODESYS V3                                                                     | The CODESYS V3 runtime system is enabled.            |
| Home directory on memory card enabled | Selection of the storage location for the home directory of the runtime system |                                                      |
|                                       | <input type="checkbox"/>                                                       | The home directory is stored in the internal memory. |
|                                       | <input checked="" type="checkbox"/>                                            | The home directory is moved to the memory card.      |
| [Submit]                              | Apply change                                                                   |                                                      |

**Note****All data is deleted when switching the runtime system.**

The runtime system's home directory is completely deleted when switching the runtime system!

**Note****Insert a memory card before switching the home directory!**

Only the first partition of a memory card can be accessed at /media/sd and can be used as the home directory.

- When moving the home directory to the memory card, insert a memory card formatted to support file system.

**“Webserver Configuration” Group**

The change applies immediately.

Table 59: WBM “PLC Runtime Configuration” Page – “Webserver Configuration” Group

| Parameters                | Explanation                                                                    |                                                           |
|---------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------|
| CODESYS 3 Webserver State | Status (enabled/disabled) of the CODESYS V3 Webserver                          |                                                           |
| Default Webserver         | Selection of the page display when only entering the IP address of the product |                                                           |
|                           | Web-Based Management                                                           | The Web-Based Management is displayed.                    |
|                           | WebVisu                                                                        | The web visualization of the runtime system is displayed. |
| [Submit]                  | Apply change                                                                   |                                                           |

In its default setting, the WBM is called up when only entering the IP address.

To update the display after switching, enter the IP address again in the address line of the Web browser.

To display the web visualization, the Webserver must be enabled (in WBM under “Ports and Services” > “PLC Runtime Services”) and there must be a suitably configured application.

Regardless of the default Webserver setting, the WBM can be called up at any time with “https://<IP address>/wbm” and the Web visualization with “https://<IP address>/web-visu”.

**Note****Possible error messages when calling up the web visualization**

The “500 – Internal Server Error” message indicates that the Webserver is not enabled. A page with the header “WebVisu not available” means that no application has been loaded in the product using web visualization.

### 16.2.2.2 “TCP/IP Configuration” Page

The TCP/IP settings for the ETHERNET interfaces are shown on the “TCP/IP configuration” page.

#### “Bridge Interfaces” Group

The properties are displayed in a separate area for each configured bridge.

Table 60: WBM “TCP/IP Configuration” Page – “Bridge Interfaces” Group

| Parameters              | Explanation                                                                                                              |                                                                             |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Bridge <n>              | Settings for the selected bridge                                                                                         |                                                                             |
| Current IP Address      | Current IP address                                                                                                       |                                                                             |
| Current Subnet Mask     | Current subnet mask                                                                                                      |                                                                             |
| Current Default Gateway | IP address of the current default gateway                                                                                |                                                                             |
| IP Source               | Select IP addressing                                                                                                     |                                                                             |
|                         | Static IP                                                                                                                | Static IP addressing                                                        |
|                         | DHCP                                                                                                                     | Dynamic IP addressing                                                       |
|                         | BootP                                                                                                                    | Dynamic IP addressing (This option is only displayed if BootP is supported) |
| Static IP Address       | Enter static IP address;<br>The IP address is enabled if “Static IP” is enabled in the <b>IP Source</b> selection field. |                                                                             |
| Subnet Mask             | Enter subnet mask;<br>The subnet mask is enabled if “Static IP” is enabled in the selection field <b>IP Source</b> .     |                                                                             |
| Default Gateway         | Enter the IP address of the default gateway                                                                              |                                                                             |
| [Submit]                | Apply change;<br>The change takes effect immediately.                                                                    |                                                                             |

#### “Dummy Interfaces” Group

The properties are displayed in a separate area for each configured dummy interface.

Table 61: WBM “TCP/IP Configuration” Page – “Dummy Interfaces” Group

| Parameters          | Explanation                                                                                                              |                      |
|---------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------|
| Dummy <n>           | Settings for the selected dummy interface                                                                                |                      |
| Current IP Address  | Current IP address                                                                                                       |                      |
| Current Subnet Mask | Current subnet mask                                                                                                      |                      |
| IP Source           | Select IP addressing.                                                                                                    |                      |
|                     | Static IP                                                                                                                | Static IP addressing |
| Static IP Address   | Enter static IP address;<br>The IP address is enabled if “Static IP” is enabled in the <b>IP Source</b> selection field. |                      |
| Subnet Mask         | Enter subnet mask;<br>The subnet mask is enabled if “Static IP” is enabled in the selection field <b>IP Source</b> .     |                      |
| [Submit]            | Apply change;<br>The change takes effect immediately.                                                                    |                      |

#### “VLAN Interfaces” Group

The properties are displayed in a separate area for each configured VLAN interface.

Table 62: WBM "TCP/IP Configuration" Page – "VLAN Interfaces" Group

| Parameters          | Explanation                                                                                                              |
|---------------------|--------------------------------------------------------------------------------------------------------------------------|
| VLAN <n>            | Settings for the selected VLAN interface                                                                                 |
| Current IP Address  | Current IP address                                                                                                       |
| Current Subnet Mask | Current subnet mask                                                                                                      |
| IP Source           | Select IP addressing.                                                                                                    |
|                     | Static IP      Static IP addressing                                                                                      |
|                     | DHCP          Dynamic IP addressing                                                                                      |
| Static IP Address   | Enter static IP address;<br>The IP address is enabled if "Static IP" is enabled in the <b>IP Source</b> selection field. |
| Subnet Mask         | Enter subnet mask;<br>The subnet mask is enabled if "Static IP" is enabled in the selection field <b>IP Source</b> .     |
| [Submit]            | Apply change;<br>The change takes effect immediately.                                                                    |

**"DNS Server" Group**

Table 63: WBM "TCP/IP Configuration" Page – "DNS Server" Group

| Parameters       | Explanation                                                                                                                                        |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Enabled          | Enabled DNS servers;<br>The index reflects the query order.                                                                                        |
| Assigned by DHCP | DNS servers assigned by DHCP (or BootP);<br>If no DNS server has been assigned by DHCP (or BootP), "no DNS Servers assigned by DHCP" is displayed. |
| Assigned by user | Addresses of the DNS servers entered by the user;<br>If no server has been entered, "no DNS Servers configured" is displayed.                      |
| [Delete]         | Delete selected entry;<br>The button is only displayed if there are entries.                                                                       |
| New Server IP    | Enter additional DNS server addresses;<br>A maximum of 3 addresses are possible.                                                                   |
| [Add]            | Add new entry.                                                                                                                                     |

**16.2.2.3 "Ethernet Configuration" Page**

The settings for ETHERNET are located on the "Ethernet Configuration" page.

**"Bridge Configuration" Group**

Table 64: WBM "Ethernet Configuration" Page – "Bridge Configuration" Group

| Parameters       | Explanation                                                                                                                                                                                              |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bridge 1 ... <n> | Assignment of physical ports X1 ... X<n> to a logical bridge;<br>click the respective option button to do so. The assignment is marked in color.<br>A port can only be assigned to one bridge at a time. |
| [Submit]         | Apply change;<br>The change takes effect immediately.                                                                                                                                                    |

**"Switch Configuration" Group**

Table 65: WBM "Ethernet Configuration" Page – "Switch Configuration" Group

| Parameters  | Explanation                                                    |
|-------------|----------------------------------------------------------------|
| Port Mirror | Switch on/off mirroring of the data traffic between the ports. |
|             | None      Both ETHERNET ports are operating normally.          |

| Parameters           | Explanation                                           |                                                                                                                  |
|----------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|                      | X1                                                    | All data traffic between X1 and the product is mirrored on X2.                                                   |
|                      | X2                                                    | All data traffic between X2 and the product is mirrored on X1.                                                   |
| Broadcast Protection | Set broadcast limit to protect against overload.      |                                                                                                                  |
|                      | Disabled                                              | No broadcast packet limit                                                                                        |
|                      | 1 ... 5 %                                             | Limits incoming broadcast packets to the selected percentage of the total possible data throughput (10/100 Mbit) |
| Rate Limit           | Set the basic limit for incoming data traffic.        |                                                                                                                  |
|                      | Disabled                                              | No limitation of the incoming data traffic                                                                       |
|                      | 64 kbps ... 99 mbps                                   | Limits the incoming data traffic to the entered value                                                            |
| [Submit]             | Apply change;<br>The change takes effect immediately. |                                                                                                                  |

### “Ethernet Interface Configuration” Group

Table 66: WBM “Ethernet Configuration” Page – “Ethernet Interface Configuration” Groups

| Parameters                   | Explanation                                                                                                                                                                                                                                         |                                               |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| Interface X<n>               | A separate area is displayed for each interface in the controller.                                                                                                                                                                                  |                                               |
| Enabled                      | Enable/disable interface.                                                                                                                                                                                                                           |                                               |
|                              | <input type="checkbox"/>                                                                                                                                                                                                                            | The interface is disabled.                    |
|                              | <input checked="" type="checkbox"/>                                                                                                                                                                                                                 | The interface is enabled.                     |
| Broadcast Protection Enabled | Enable/disable broadcast protection.<br>This checkbox is only displayed if the product supports this function.                                                                                                                                      |                                               |
|                              | <input type="checkbox"/>                                                                                                                                                                                                                            | Broadcast protection is disabled.             |
|                              | <input checked="" type="checkbox"/>                                                                                                                                                                                                                 | Broadcast protection is enabled.              |
| Multicast Protection Enabled | Enable/disable multicast protection.<br>This checkbox is only displayed if the product supports this function.                                                                                                                                      |                                               |
|                              | <input type="checkbox"/>                                                                                                                                                                                                                            | Multicast protection is disabled.             |
|                              | <input checked="" type="checkbox"/>                                                                                                                                                                                                                 | Multicast protection is enabled.              |
| MAC Learning                 | Enable/disable “MAC Learning” functionality for the interface.                                                                                                                                                                                      |                                               |
|                              | <input type="checkbox"/>                                                                                                                                                                                                                            | The “MAC Learning” functionality is disabled. |
|                              | <input checked="" type="checkbox"/>                                                                                                                                                                                                                 | The “MAC Learning” functionality is enabled.  |
| Current Speed/Duplex         | Current transmission rate and current transmission method                                                                                                                                                                                           |                                               |
| Speed/Duplex                 | Select transmission rate and transmission method;<br>the drop-down menu is generated depending on the device and interface.<br>When “Autonegotiation” is selected, the connection modalities are negotiated automatically between the peer devices. |                                               |
| [Submit]                     | Apply change;<br>The change takes effect immediately.                                                                                                                                                                                               |                                               |

#### 16.2.2.4 “Configuration of Host and Domain Name” Page

Settings for the hostname and domain name are possible on this page.

### “Hostname” Group

Table 67: WBM “Configuration of Host and Domain Name” Page – “Hostname” Group

| Parameters     | Explanation                                           |
|----------------|-------------------------------------------------------|
| Currently used | Hostname currently used                               |
| Configured     | Enter optional hostname                               |
| [Clear]        | Delete optional hostname and restore default          |
| [Submit]       | Apply change;<br>The change takes effect immediately. |

If a hostname is supplied via a DHCP response, this is enabled in the system. If there are several network interfaces with DHCP, the last received hostname is always valid.

If only the hostname configured here is to be valid, the configuration of the DHCP server must be adapted so that no hostnames are transferred in the DHCP response.

### “Domain Name” Group

Table 68: WBM “Configuration of Host and Domain Name” Page – “Domain Name” Group

| Parameters     | Explanation                                           |
|----------------|-------------------------------------------------------|
| Currently used | Currently used domain name                            |
| Configured     | Enter optional domain name                            |
| [Clear]        | Delete optional domain name                           |
| [Submit]       | Apply change;<br>The change takes effect immediately. |

If a domain name is supplied via a DHCP response, this is enabled in the system. If there are several server network interfaces with DHCP, the last received domain name is always valid.

If only the domain name configured here is to be valid, the configuration of the DHCP server must be adapted so that no domain names are transferred in the DHCP response.

#### 16.2.2.5 “Routing” Page

On the “Routing” page you can find settings and information on the routing between the network interfaces.

### “IP Forwarding through multiple interfaces” Group

Table 69: WBM “Routing” Page – “IP Forwarding through multiple interfaces” Group

| Parameters | Explanation                                                                                                                                                                                                   |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enabled    | Allow forwarding of IP data packets between different network interfaces                                                                                                                                      |
|            | <input type="checkbox"/> Settings under “Static Routes” are applied without allowing IP data packets that reach the controller on one network interface to leave the controller on another network interface. |
|            | <input checked="" type="checkbox"/> IP packets may be forwarded between the interfaces. Additional settings may be required.                                                                                  |
| [Submit]   | Apply change;<br>The change takes effect immediately.                                                                                                                                                         |

### “Custom Routes” Group

Each configured static route has its own area in the display. If no static routes have been entered, “(no custom routes)” is displayed.

Table 70: WBM "Routing" Page – "Custom Routes" Group

| Parameters          | Explanation                                                                                                                                                                                                                                                                                                                               |                                                                                          |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Enabled             | Using the selected route                                                                                                                                                                                                                                                                                                                  |                                                                                          |
|                     | <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                  | The route is not used.                                                                   |
|                     | <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                       | The route is used.                                                                       |
| Destination Address | Target address of the subscriber                                                                                                                                                                                                                                                                                                          |                                                                                          |
|                     | Default                                                                                                                                                                                                                                                                                                                                   | Any network devices can be reached.                                                      |
|                     | Network Address                                                                                                                                                                                                                                                                                                                           | Only a specific network device or device from the specified address pool can be reached. |
| Destination Mask    | Subscriber subnet mask<br>If "default" is entered for Destination Address, the value "0.0.0.0" must be entered.                                                                                                                                                                                                                           |                                                                                          |
| Gateway Address     | Address of the gateway<br>If the "Interface" input field is empty, an entry is required here. If a value is entered in the "Interface" input field, the input here is optional.                                                                                                                                                           |                                                                                          |
| Gateway Metric      | Metric of the route<br>When there are multiple routes with the same destination address and destination mask, the metric specifies the gateway to which network data packets are first sent. Priority is given to routes with a lower value for the metric. The lowest value is 0.<br>The highest value is $2^{32} - 1 = 4.294.967.295$ . |                                                                                          |
| Interface           | Interface through which the packets sent to the destination address are routed<br>Bridges (br0 ... br3), Modem (wwan0) or VPN interface names can be used. If the "Gateway Address" input field is empty, an entry is required here. If a value is entered in the "Gateway Address" input field, the input here is optional.              |                                                                                          |
| [Submit]            | Apply change;<br>The change takes effect immediately.                                                                                                                                                                                                                                                                                     |                                                                                          |
| [Delete]            | Delete selected entry;<br>The button is only displayed if there are entries.                                                                                                                                                                                                                                                              |                                                                                          |
| [Add]               | Add new entry.                                                                                                                                                                                                                                                                                                                            |                                                                                          |

**"Dynamic Routes (assigned by DHCP)" Group**

All default gateways received via DHCP are displayed. Default gateways configured via DHCP are given the metric value 10, which means that they are normally used before the statically configured default gateways.

Each dynamic route has its own area in the display. If no dynamic routes are received via DHCP, "(no dynamic route)" appears.

**"IP Masquerading" Group**

Each entry has its own area in the display.

Table 71: WBM "Routing" Page – "IP Masquerading" Group

| Parameters | Explanation                                                                                                                  |                              |
|------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Enabled    | Use IP masquerading                                                                                                          |                              |
|            | <input type="checkbox"/>                                                                                                     | IP masquerading is not used. |
|            | <input checked="" type="checkbox"/>                                                                                          | IP masquerading is used.     |
| Interface  | Select one of the specified names of a network interface<br>Any network interface name can be selected by selecting "other." |                              |

| Parameters | Explanation                                                                  |
|------------|------------------------------------------------------------------------------|
| [Submit]   | Apply change;<br>The change takes effect immediately.                        |
| [Delete]   | Delete selected entry;<br>The button is only displayed if there are entries. |
| [Add]      | Add new entry.                                                               |

An entry is only transferred to the system if “Enabled” is enabled in the “General Routing Configuration” group. This allows you to configure a default setting that is not applied until the general switch-on.

### “Port Forwarding” Group

Each entry has its own area in the display.

Table 72: WBM “Routing” Page – “Port Forwarding” Group

| Parameters          | Explanation                                                                                                                               |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Enabled             | Use Port Forwarding                                                                                                                       |
|                     | <input type="checkbox"/> Port forwarding is not used.                                                                                     |
|                     | <input checked="" type="checkbox"/> Port forwarding is used.                                                                              |
| Interface           | Select one of the specified names of a network interface<br>Any network interface name can be selected by selecting “other.”              |
| Port                | Select the port on which the product receives network data packets to be forwarded.                                                       |
| Protocol            | Select the protocol to be used for port forwarding;<br>TCP, UDP or both protocols can be selected.                                        |
| Destination Address | Select the network address of the target subscriber<br>This address replaces the original destination address of the network data packet. |
| Destination Port    | Select port number of the target subscriber<br>This value replaces the original destination port of the network data packet.              |
| [Submit]            | Apply change;<br>The change takes effect immediately.                                                                                     |
| [Delete]            | Delete selected entry;<br>The button is only displayed if there are entries.                                                              |
| [Add]               | Add new entry.                                                                                                                            |

An entry is only transferred to the system if “Enabled” is enabled in the “General Routing Configuration” group. This allows you to configure a default setting that is not applied until the general switch-on.

### 16.2.2.6 “Clock Settings” Page

On this page, date and time settings are possible.

### “Timezone and Format” Group

Table 73: WBM “Clock” Page – “Timezone” Group

| Parameters | Explanation                                        |
|------------|----------------------------------------------------|
| Timezone   | Select time zone, default setting:                 |
|            | AST/ADT “Atlantic Standard Time,” Halifax          |
|            | EST/EDT “Eastern Standard Time,” New York, Toronto |

| Parameters  | Explanation                                                                                                                                                                                                           |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | CST/CDT "Central Standard Time," Chicago, Winnipeg                                                                                                                                                                    |
|             | MST/MDT "Mountain Standard Time," Denver, Edmonton                                                                                                                                                                    |
|             | PST/PDT "Pacific Standard Time", Los Angeles, Whitehouse                                                                                                                                                              |
|             | GMT/BST "Greenwich Mean Time", GB, P, IRL, IS, ...                                                                                                                                                                    |
|             | CET/CEST "Central European Time," B, DK, D, F, I, CRO, NL, ...                                                                                                                                                        |
|             | EET/EEST "Eastern European Time," BUL, FI, GR, TR, ...                                                                                                                                                                |
|             | CST "China Standard Time"                                                                                                                                                                                             |
|             | JST "Japan/Korea Standard Time"                                                                                                                                                                                       |
| TZ string   | Time zone not selectable above: Enter the name of the time zone, country and city<br>Determine the valid name of a time zone: <a href="http://www.timeanddate.com/time/map/">http://www.timeanddate.com/time/map/</a> |
| Time Format | Time format: 12h / 24h                                                                                                                                                                                                |
| [Submit]    | Apply change;<br>The change takes effect immediately.                                                                                                                                                                 |

### “UTC Time and Date” Group

Table 74: WBM “Clock” Page – “UTC Time and Date” Group

| Parameters | Explanation                                           |
|------------|-------------------------------------------------------|
| UTC Date   | Date                                                  |
| UTC Time   | GMT Time                                              |
| [Submit]   | Apply change;<br>The change takes effect immediately. |

### “Local Time and Date” Group

Table 75: WBM “Clock” Page – “Local Time and Date” Group

| Parameters | Explanation                                           |
|------------|-------------------------------------------------------|
| Local Date | Local Date                                            |
| Local Time | Local Time                                            |
| [Submit]   | Apply change;<br>The change takes effect immediately. |

## 16.2.2.7 “Create bootable Image” Page

You can create a bootable image on the “Create Bootable Image” page.

### “Create bootable image from boot device” Group

Once the destination has been determined and output, it is then checked and the results of this check are displayed below the settings.

Table 76: WBM “Create bootable Image” – “Create bootable image from boot device” Group

| Parameters  | Explanation                                                                                                                                                                                         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Boot Device | Displays the storage medium from which the system was booted                                                                                                                                        |
| Destination | Selection of the target of the image to be created;<br>Depending on which medium has been booted, the following destination is available for selection after boot-up for the image to be generated: |
|             | Boot system: Target partition for “bootable image”:                                                                                                                                                 |
|             | Memory Card Internal Flash                                                                                                                                                                          |
|             | Internal Memory Memory Card                                                                                                                                                                         |

| Parameters   | Explanation                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [Start Copy] | Start copy operation <ul style="list-style-type: none"> <li>• If the outcome of the test is positive, copying begins immediately.</li> <li>• If errors have been detected, a corresponding message is displayed and copying is not started.</li> <li>• If warnings have been issued, these are displayed again and you must then confirm that you still wish to continue.</li> </ul> |

- Free space on target device:  
If the available memory space is less than 5 % a warning is displayed. You can still start the copy operation despite the warning. If the available space is too low, a corresponding message is displayed and copying cannot be started.
- Device being used by CODESYS:  
If the device is being used by CODESYS, a warning is displayed. Although it is not recommended, you can still start the copy operation despite this warning.

### 16.2.2.8 “Firmware Backup” Page

You can find the controller data backup settings on the “Firmware Backup” page.

#### “Firmware Backup” Group

Table 77: WBM “Firmware Backup” Page – “Firmware Backup” Group

| Parameters                          | Explanation                                                                                                                                                                                                                                                                                                                               |                          |                                                                                                                                                         |                                     |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Boot Device                         | Storage medium from which the device was booted                                                                                                                                                                                                                                                                                           |                          |                                                                                                                                                         |                                     |
| Destination                         | Backup storage destination                                                                                                                                                                                                                                                                                                                |                          |                                                                                                                                                         |                                     |
|                                     | <table> <tr> <td>Memory Card</td><td>The data is written to the memory card.<br/>This selection only appears if a memory card is inserted and the device was not booted from the memory card.</td></tr> <tr> <td>Network</td><td>The data is saved in the file system and then made available on the PC as a download.</td></tr> </table> | Memory Card              | The data is written to the memory card.<br>This selection only appears if a memory card is inserted and the device was not booted from the memory card. | Network                             |
| Memory Card                         | The data is written to the memory card.<br>This selection only appears if a memory card is inserted and the device was not booted from the memory card.                                                                                                                                                                                   |                          |                                                                                                                                                         |                                     |
| Network                             | The data is saved in the file system and then made available on the PC as a download.                                                                                                                                                                                                                                                     |                          |                                                                                                                                                         |                                     |
| PLC Runtime Project                 | Save PLC runtime project, boot project and CODESYS settings.                                                                                                                                                                                                                                                                              |                          |                                                                                                                                                         |                                     |
|                                     | <table> <tr> <td><input type="checkbox"/></td><td>PLC runtime project is not saved.</td></tr> <tr> <td><input checked="" type="checkbox"/></td><td>PLC runtime project is saved.</td></tr> </table>                                                                                                                                       | <input type="checkbox"/> | PLC runtime project is not saved.                                                                                                                       | <input checked="" type="checkbox"/> |
| <input type="checkbox"/>            | PLC runtime project is not saved.                                                                                                                                                                                                                                                                                                         |                          |                                                                                                                                                         |                                     |
| <input checked="" type="checkbox"/> | PLC runtime project is saved.                                                                                                                                                                                                                                                                                                             |                          |                                                                                                                                                         |                                     |
| Settings                            | Save device settings                                                                                                                                                                                                                                                                                                                      |                          |                                                                                                                                                         |                                     |
|                                     | <table> <tr> <td><input type="checkbox"/></td><td>Device settings are not saved.</td></tr> <tr> <td><input checked="" type="checkbox"/></td><td>Device settings are saved.</td></tr> </table>                                                                                                                                             | <input type="checkbox"/> | Device settings are not saved.                                                                                                                          | <input checked="" type="checkbox"/> |
| <input type="checkbox"/>            | Device settings are not saved.                                                                                                                                                                                                                                                                                                            |                          |                                                                                                                                                         |                                     |
| <input checked="" type="checkbox"/> | Device settings are saved.                                                                                                                                                                                                                                                                                                                |                          |                                                                                                                                                         |                                     |
| System                              | Save device operating system and root file system                                                                                                                                                                                                                                                                                         |                          |                                                                                                                                                         |                                     |
|                                     | <table> <tr> <td><input type="checkbox"/></td><td>The device operating system and root file system are not saved.</td></tr> <tr> <td><input checked="" type="checkbox"/></td><td>The device operating system and root file system are saved.</td></tr> </table>                                                                           | <input type="checkbox"/> | The device operating system and root file system are not saved.                                                                                         | <input checked="" type="checkbox"/> |
| <input type="checkbox"/>            | The device operating system and root file system are not saved.                                                                                                                                                                                                                                                                           |                          |                                                                                                                                                         |                                     |
| <input checked="" type="checkbox"/> | The device operating system and root file system are saved.                                                                                                                                                                                                                                                                               |                          |                                                                                                                                                         |                                     |
| Encryption                          | Save data in encrypted form                                                                                                                                                                                                                                                                                                               |                          |                                                                                                                                                         |                                     |
|                                     | <table> <tr> <td><input type="checkbox"/></td><td>Data is saved unencrypted.</td></tr> <tr> <td><input checked="" type="checkbox"/></td><td>Data is saved in encrypted form.</td></tr> </table>                                                                                                                                           | <input type="checkbox"/> | Data is saved unencrypted.                                                                                                                              | <input checked="" type="checkbox"/> |
| <input type="checkbox"/>            | Data is saved unencrypted.                                                                                                                                                                                                                                                                                                                |                          |                                                                                                                                                         |                                     |
| <input checked="" type="checkbox"/> | Data is saved in encrypted form.                                                                                                                                                                                                                                                                                                          |                          |                                                                                                                                                         |                                     |
| Encryption passphrase               | Encryption passphrase<br>The input field only appears if the <b>Encryption</b> box is checked.                                                                                                                                                                                                                                            |                          |                                                                                                                                                         |                                     |

| Parameters         | Explanation                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------|
| Confirm passphrase | Encryption passphrase for confirmation<br>The input field only appears if the <b>Encryption</b> box is checked. |
| [Create Backup]    | Start backup operation                                                                                          |

### **Note**

#### **Note the firmware version!**

Restoring the operating system ("System" selection) is only permitted and possible if the firmware versions are the same at the time of backup and restore.

If necessary, refrain from restoring the operating system or adjust the firmware version to the firmware version at the time of the backup beforehand.

### **Note**

#### **Only one package may be copied to the network!**

If you have specified "Network" as the storage location, only one package may be selected for each storing operation.

### **Note**

#### **No backup of the memory card!**

Backup from the memory card to the internal flash memory is not possible.

### **Note**

#### **Account for backup time**

Generation of backup files can take several minutes. Stop the CODESYS program before you start the backup operation to help shorten the time required.

## **16.2.2.9 "Firmware Restore" Page**

The settings for restoring the controller data are shown on the "Firmware Restore" page.

### **"Firmware Restore" Group**

Table 78: WBM "Firmware Restore" Page – "Firmware Restore" Group

| Parameters          | Explanation                                                                                                                                                              |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source              | Data source for restore                                                                                                                                                  |
|                     | Memory Card<br>The data is read from the memory card.<br>This selection is only enabled if a memory card is inserted and the device was not booted from the memory card. |
|                     | Network<br>The data is uploaded from the PC and restored.                                                                                                                |
| Boot Device         | Storage medium from which the device was booted                                                                                                                          |
| PLC Runtime Project | Name of the backup file for the CODESYS project;<br>The input field is only enabled if the network is selected as the data source.                                       |
| Settings            | Name of the backup file for the settings;<br>the input field is only enabled if the network is selected as the data source.                                              |

| Parameters            | Explanation                                                                                                                                          |                                   |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| System                | Name of the backup file for the system data and the root file system; the input field is only enabled if the network is selected as the data source. |                                   |
| Decryption            | Data encryption                                                                                                                                      |                                   |
|                       | <input type="checkbox"/>                                                                                                                             | The data was encrypted and saved. |
|                       | <input checked="" type="checkbox"/>                                                                                                                  | The data was saved unencrypted.   |
| Decryption passphrase | Decryption passphrase; the input field only appears if the <b>Decryption</b> box is checked.                                                         |                                   |
| [Restore]             | Start restore operation                                                                                                                              |                                   |

### Note

#### Note the firmware version!

Restoring the operating system ("System" selection) is only permitted and possible if the firmware versions are the same at the time of backup and restore.

If necessary, refrain from restoring the operating system or adjust the firmware version to the firmware version at the time of the backup beforehand.

### Note

#### File size must not exceed the size of the internal drive!

Note that the amount of data in the media/sd/copy/ directory must not exceed the total size of the internal drive.

### Note

#### Restoration only possible from internal memory!

If the product was booted from the memory card, the firmware cannot be restored.

### Note

#### Reset by restore

A reset is performed when the system or settings are restored by CODESYS!

### Note

#### Connection loss through restore!

If the restore changes the parameters of the ETHERNET connection, the WBM may then no longer be able to open a connection to the product.

Call up the WBM again with the correct IP address of the product in the address line.

### **Note**

#### **Account for restore time**

The restore operation takes about 2 ... 3 minutes.

After the restore operation, the controller is restarted and is then ready for use again.

#### **16.2.2.10 “Active System” Page**

This page contains settings for selecting the partition from which the system is to be started.

##### **“Boot Device” Group**

Table 79: WBM “Active System” Page – “Boot Device” Group

| Parameters  | Explanation                                     |
|-------------|-------------------------------------------------|
| Booted from | Storage medium from which the system was booted |

##### **“System <n> (Internal Flash)” Group**

Table 80: WBM “Active System” Page – “System n (Internal Flash)” Group

| Parameters | Explanation                                         |
|------------|-----------------------------------------------------|
| Enabled    | System activity                                     |
| Configured | System activity after the next reboot               |
| State      | System status                                       |
|            | good      Valid system                              |
|            | bad      Invalid system, use for test purposes only |
| [Activate] | Start the system at the next reboot.                |

### **Note**

#### **Provide a bootable system!**

A functional firmware backup must be available on the boot system!

#### **16.2.2.11 “Mass Storage” Page**

The “Mass Storage” page displays information and settings for the storage media.

The group title contains the designation for the storage media (“Memory Card” or “Internal Flash”) and, if this storage medium is also the enabled partition, the text “Active Partition”.

##### **“Devices” Group**

An area with information on the storage medium is displayed for each storage medium found.

Table 81: WBM “Mass Storage” Page – “Devices” Group

| Parameters  | Explanation                                                        |
|-------------|--------------------------------------------------------------------|
| <Device>    | Storage medium                                                     |
| Boot device | This shows whether the device has booted from this storage medium. |
| Volume name | Name of the storage medium                                         |

### “Create new Filesystem on Memory Card” Group

#### **Note**

#### **Data are deleted!**

Any data stored in the storage medium is deleted during formatting.

Table 82: WBM “Mass Storage” Page – “Create new Filesystem on Memory Card” Group

| Parameters | Explanation                                                                 |                                                                                        |
|------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| IP Source  | Select the format to be used to recreate the file system on the memory card |                                                                                        |
|            | Ext4                                                                        | The filesystem is created in Ext4 format.<br>The files are not readable under Windows! |
|            | FAT                                                                         | The filesystem is created in FAT format.                                               |
| Label      | Enter the name that the storage medium should receive when formatting       |                                                                                        |
| [Start]    | Format storage medium                                                       |                                                                                        |

### 16.2.2.12 “Software Uploads” Page

On “Software Upload” page, you can install software packages on the product from your PC.

Table 83: WBM “Software Uploads” Page – “Upload New Software” Group

| Parameters    | Explanation                                                                                                                                                                                                                                                                  |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Software File | File name of the selected software package as long as it has not yet been transferred to the product;<br>If you have not yet selected a package, “Choose ipk file ...” appears.<br>In this case, click the input field and select a file with a software package on your PC. |
| Force install |                                                                                                                                                                                                                                                                              |
| [Install]     | Installed selected package;<br>The file with the software package is deleted from the product again after the installation process. If this is not possible due to a processing error, it is deleted no later than the next time the product restarts.                       |

### 16.2.2.13 WBM “Configuration of Network Services” Page

The settings for various services are shown on the “Configuration of Network Services” page.

#### **Note**

#### **Close any ports and services that you do not need!**

Unauthorized persons may gain access to your automation system through open ports.

1. To reduce the risk of cyber attacks and, thus, enhance your cyber security, close all ports and services in the control components (e.g., port 6626 for WAGO-I/O-CHECK and port 11740 for CODESYS V3) not required by your application.
2. Only open ports and services during commissioning and/or configuration.

### “FTP” Group

Table 84: WBM “Configuration of Network Services” Page – “FTP” Group

| Parameters      | Explanation                                           |                                                 |
|-----------------|-------------------------------------------------------|-------------------------------------------------|
| Service enabled | Enable/disable FTP service;                           |                                                 |
|                 | <input type="checkbox"/>                              | The FTP service is disabled;<br>factory setting |
|                 | <input checked="" type="checkbox"/>                   | The FTP service is enabled.                     |
| [Submit]        | Apply change;<br>The change takes effect immediately. |                                                 |

### “FTPES (explicit FTPS)” Group

Table 85: WBM “Configuration of Network Services” Page – “FTPES (explicit FTPS)” Group

| Parameters      | Explanation                                           |                                                   |
|-----------------|-------------------------------------------------------|---------------------------------------------------|
| Service enabled | Enable/disable FTPES (explicit FTPS) service;         |                                                   |
|                 | <input type="checkbox"/>                              | The FTPES service is disabled;<br>factory setting |
|                 | <input checked="" type="checkbox"/>                   | The FTPES service is enabled.                     |
| [Submit]        | Apply change;<br>The change takes effect immediately. |                                                   |

### “HTTP” Group

Table 86: WBM “Configuration of Network Services” Page – “HTTP” Group

| Parameters      | Explanation                                           |                                                  |
|-----------------|-------------------------------------------------------|--------------------------------------------------|
| Service enabled | Enable/disable HTTP service;                          |                                                  |
|                 | <input type="checkbox"/>                              | The HTTP service is disabled;<br>default setting |
|                 | <input checked="" type="checkbox"/>                   | The HTTP service is enabled.                     |
| [Submit]        | Apply change;<br>The change takes effect immediately. |                                                  |

### Note

#### Disconnection abort on disabling

If the service is disabled, the connection to the product may be interrupted.

- Open the page again.

### “HTTPS” Group

Table 87: WBM “Configuration of Network Services” Page – “HTTPS” Group

| Parameters      | Explanation                         |                                |
|-----------------|-------------------------------------|--------------------------------|
| Service enabled | Status of the HTTPS service         |                                |
|                 | <input type="checkbox"/>            | The HTTPS service is disabled. |
|                 | <input checked="" type="checkbox"/> | The HTTPS service is enabled.  |

**“I/O-CHECK“ Group**

Table 88: WBM “Configuration of Network Services” Page – “I/O-CHECK“ Group

| Parameters      | Explanation                                           |                                                          |
|-----------------|-------------------------------------------------------|----------------------------------------------------------|
| Service enabled | Enable/disable WAGO I/O-CHECK service;                |                                                          |
|                 | <input type="checkbox"/>                              | The WAGO I/O- CHECK service is disabled; factory setting |
|                 | <input checked="" type="checkbox"/>                   | The WAGO I/O-CHECK service is enabled.                   |
| [Submit]        | Apply change;<br>The change takes effect immediately. |                                                          |

**16.2.2.14 “Configuration of NTP Client” Page**

The settings for the NTP service are shown on the “Configuration of NTP Client” page.

**“NTP Client Configuration” Group**

Table 89: WBM “Configuration of NTP Client” Page – “NTP Client Configuration” Group

| Parameters                   | Explanation                                                                                                                                                                           |  |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Service enabled              | Enable/disable time update.                                                                                                                                                           |  |
| Update Interval (sec)        | Specify the update interval of the time server.                                                                                                                                       |  |
| Time Server <n>              | Enter here the IP addresses of up to 4 time servers.<br><br>Time server No. 1 is requested first of all. If no data is accessible via this server, time server No. 2 is queried, etc. |  |
| Additionally assigned (DHCP) | The time servers assigned by DHCP are displayed.<br><br>If no time server has been assigned by DHCP, “no additional servers assigned” is displayed.                                   |  |

1. Click the **[Update Time]** button to update the time.
  2. Click the **[Submit]** button to apply the change.
- ➔ The change applies immediately.

**16.2.2.15 “PLC Runtime Services” Page**

The settings for various services of the runtime system are shown on the “PLC Runtime Services” page.

**“CODESYS V3” Group**

Table 90: WBM “PLC Runtime Services” Page – “CODESYS V3” Group

| Parameters                          | Explanation                                     |                                                                  |
|-------------------------------------|-------------------------------------------------|------------------------------------------------------------------|
| CODESYS V3 State                    | Status of the runtime system                    |                                                                  |
|                                     | disabled                                        | The runtime system is disabled.                                  |
|                                     | enabled                                         | The runtime system is enabled.                                   |
| Webserver Enabled                   | Enable/disable Webserver for Web visualization. |                                                                  |
|                                     | <input type="checkbox"/>                        | The Webserver is disabled.                                       |
|                                     | <input checked="" type="checkbox"/>             | The Webserver is enabled.                                        |
| Separated WebVisu Ports (8080/8081) | Set CODESYS WebVisu ports for HTTP/HTTPS.       |                                                                  |
|                                     | <input type="checkbox"/>                        | CODESYS WebVisu is provided on ports 80/443 (standard like WBM). |

| Parameters                            | Explanation                                                                          |                                                                                                                                                                   |
|---------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       | <input checked="" type="checkbox"/>                                                  | The CODESYS WebVisu is provided on ports 8080/8081.                                                                                                               |
| Port Authentication Enabled           | Enable/disable log-in for the connection to the device.                              |                                                                                                                                                                   |
|                                       | <input type="checkbox"/>                                                             | No log-in is required for the connection.                                                                                                                         |
|                                       | <input checked="" type="checkbox"/>                                                  | A login is required for the connection.<br>The default user name is admin and the password is the password specified under "General Configuration".               |
| Webserver Port Authentication Enabled | Enable/disable log-in for calling up the web visualization of a CODESYS application. |                                                                                                                                                                   |
|                                       | <input type="checkbox"/>                                                             | No log-in is required to access the web visualization.                                                                                                            |
|                                       | <input checked="" type="checkbox"/>                                                  | A log-in is required to access the web visualization.<br>The default user name is admin and the password is the password specified under "General Configuration". |
| [Submit]                              | Apply change;<br>The change takes effect immediately.                                |                                                                                                                                                                   |

### 16.2.2.16 "SSH Server Settings" Page

The settings for the SSH service are shown on the "SSH Server Settings" page.

#### "SSH Server" Group

Table 91: WBM "SSH Server Settings" Page – "SSH Server" Group

| Parameters           | Explanation                                           |                                     |
|----------------------|-------------------------------------------------------|-------------------------------------|
| Service enabled      | Enable/disable SSH Server service.                    |                                     |
|                      | <input type="checkbox"/>                              | The SSH Server service is disabled. |
|                      | <input checked="" type="checkbox"/>                   | The SSH Server service is enabled.  |
| Port Number          | Enter the port number.                                |                                     |
| Allow root login     | Block or allow root access.                           |                                     |
| Allow password login | Enable or disable password request.                   |                                     |
| [Submit]             | Apply change;<br>The change takes effect immediately. |                                     |

### 16.2.2.17 "Status overview" Page

On the "Status overview" page, you can find information about cloud access.

#### "Connection <n>" Group

A group is displayed for each cloud access.

Table 92: WBM "Overview" Page – "Connection <n>" Group

| Parameters                     | Explanation                                                                            |
|--------------------------------|----------------------------------------------------------------------------------------|
| Operation                      | Status of the Cloud Connectivity Application                                           |
| Data from PLC Runtime          | Number of data collections registered by the IEC application for transfer to the cloud |
| Cloud Connection               | Status of the connection to the cloud service                                          |
| Heartbeat                      | Currently configured heartbeat interval in seconds                                     |
| Telemetry Data Transmission    | Status of the data transmission                                                        |
| Cache fill level (QoS 1 and 2) | Percentage of the storage level for outgoing messages                                  |

### 16.2.2.18 “Configuration of Connection <n>” Page

Settings and information on cloud access are possible on this page.

A page is displayed for each cloud access.

#### “Configuration” Group

The parameters indicated depend on the cloud platform setting and, if applicable, on other settings in this group.

The dependencies are shown in a separate table.

Table 93: WBM “Configuration of Connection <n>” Page – “Configuration” Group

| Parameters          | Explanation                                                                                                                                                                                                      |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enabled             | Enable/disable cloud connectivity functionality                                                                                                                                                                  |
| Cloud platform      | Cloud Platform                                                                                                                                                                                                   |
| Hostname            | Hostname or IP address for the selected cloud platform                                                                                                                                                           |
| ID Scope            | Endpoint for Azure Device Provisioning Service (DPS)                                                                                                                                                             |
| Registration ID     | Registration ID for Azure Device Provisioning Service (DPS)                                                                                                                                                      |
| Port number         | Port number to which a connection should be established<br><br>Typical values:<br><ul style="list-style-type: none"> <li>• 8883 for encrypted connections</li> <li>• 1883 for unencrypted connections</li> </ul> |
| Device ID           | Device ID for the selected cloud platform                                                                                                                                                                        |
| Client ID           | Client ID for the selected cloud platform                                                                                                                                                                        |
| Authentication      | Authentication method, e.g., “Shared Key Access,” “X.509 Certificate”                                                                                                                                            |
| Activation Key      | Activation key for the selected cloud platform                                                                                                                                                                   |
| Clean Session       | Enable clean session when connecting to the cloud service<br><br>Clean session enabled: Information and messages about this connection are not persistently stored by the cloud service                          |
| TLS                 | Enable/disable use of TLS encryption for the connection to the cloud platform<br><br>Amazon Web Services (AWS) uses TLS                                                                                          |
| CA file             | Path to the file encoded in PEM format that contains the trusted CA certificate to use to establish an encrypted connection<br><br>Default: CA certificate /etc/ssl/certs/ca-certificates.crt                    |
| User                | Username                                                                                                                                                                                                         |
| Password            | Password                                                                                                                                                                                                         |
| Certification file  | Path to the file encoded in PEM format that is used for cloud service authentication                                                                                                                             |
| Key file            | Path to the file encoded in PEM format that contains the private key for cloud service authentication                                                                                                            |
| Use websockets      | Enable/disable connection to the cloud platform using the WebSocket protocol via port 443<br><br>If disabled: Establishes a connection to the cloud platform using the MQTT protocol via port 8883               |
| HTTP Proxy Host     | Hostname or IP address of the proxy                                                                                                                                                                              |
| HTTP Proxy Port     | Proxy port number                                                                                                                                                                                                |
| HTTP Proxy User     | Name of the proxy user                                                                                                                                                                                           |
| HTTP Proxy Password | Password of the proxy user                                                                                                                                                                                       |
| Use compression     | Enable/disable data compression via GZIP compression                                                                                                                                                             |
| Data Protocol       | Data protocol                                                                                                                                                                                                    |

| Parameters                    | Explanation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cache mode                    | Cache location for the data telegrams<br>Only enabled if a correctly formatted SD card is inserted<br>Additional Information: Application Note A500920                                                                                                                                                                                                                                                                                                                                                              |
| Last Will                     | Enable/disable last will message<br>After enabled, additional input fields appear below                                                                                                                                                                                                                                                                                                                                                                                                                             |
| (Last Will) Topic             | Topic under which the last will message is to be sent                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| (Last Will) Message           | Message to be sent as last will message                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| (Last Will) QoS               | "Quality of Service" (QoS) of the last will message                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| (Last Will) Retain            | Enable/disable the last will message sent under a topic by the broker as a saved message (retained message)                                                                                                                                                                                                                                                                                                                                                                                                         |
| Device info                   | Enable/disable device info message that informs the cloud service about the basic configuration of the controller<br>Additional Information: Application Note A500920                                                                                                                                                                                                                                                                                                                                               |
| Device status                 | Enable/disable device-status messages that inform the cloud service of changes to the mode selector switch and LEDs<br>Additional Information: Application Note A500920                                                                                                                                                                                                                                                                                                                                             |
| Standard commands             | Enable/disable integrated standard commands<br>Additional Information: Application Note A500920<br>If disabled: Only supported commands defined in the IEC program                                                                                                                                                                                                                                                                                                                                                  |
| Application property template | Create your own property for the individual MQTT messages to the Azure cloud<br>Parameter optional, i.e., if the field is left blank, this property is not sent<br>Placeholder to create: <ul style="list-style-type: none"> <li>• &lt;m&gt;: Message type</li> <li>• &lt;p&gt;: Protocol version</li> <li>• &lt;d&gt;: DeviceId</li> </ul> Examples: <ul style="list-style-type: none"> <li>• MyKey=HelloWorld_&lt;m&gt;</li> <li>• TestKey=&lt;m&gt;/&lt;p&gt;/&lt;d&gt;</li> <li>• DeviceId=&lt;d&gt;</li> </ul> |
| [Submit]                      | Apply change;<br>The change only takes effect after the next restart.                                                                                                                                                                                                                                                                                                                                                                                                                                               |

The following tables show the dependencies of the selection and input fields as well as the possible settings.

Table 94: Displays the selection and input fields depending on the cloud platform selected

| Selection or Input Field | Cloud Platform |       |                |                     |                  |                                         |
|--------------------------|----------------|-------|----------------|---------------------|------------------|-----------------------------------------|
|                          | WAGO Cloud     | Azure | MQTT Any-Cloud | Amazon Web Services | SAP IoT Services | Azure Device Provisioning Service (DPS) |
| Enabled                  | X              | X     | X              | X                   | X                | X                                       |
| Cloud platform           | X              | X     | X              | X                   | X                | X                                       |
| Hostname                 | X              | X     | X              | X                   | X                |                                         |
| Port Number              |                |       | X              | (X)                 | X                |                                         |
| Device ID                | X              | X     |                |                     |                  |                                         |
| Client ID                |                |       | X              | X                   | X                |                                         |
| Authentication           |                | X     |                |                     |                  | X                                       |
| Activation Key           | X              | X2    |                |                     |                  | X2                                      |

| Selection or Input Field                                                                            | Cloud Platform |       |                |                     |                  |                                         |
|-----------------------------------------------------------------------------------------------------|----------------|-------|----------------|---------------------|------------------|-----------------------------------------|
|                                                                                                     | WAGO Cloud     | Azure | MQTT Any-Cloud | Amazon Web Services | SAP IoT Services | Azure Device Provisioning Service (DPS) |
| Clean Session                                                                                       |                |       | X              | (X)                 | X                |                                         |
| TLS                                                                                                 |                |       | X              | (X)                 | X                |                                         |
| CA file                                                                                             |                |       | X              | X                   | X                | X                                       |
| User                                                                                                |                |       | X              |                     |                  |                                         |
| Password                                                                                            |                |       | X              |                     |                  |                                         |
| Certification file                                                                                  |                | X2    | X              | X                   | X                |                                         |
| Key file                                                                                            |                | X2    | X              | X                   | X                |                                         |
| Use websockets                                                                                      | X              | X1    |                |                     |                  | X                                       |
| Proxy Type                                                                                          | X4             | X4    |                |                     |                  | X4                                      |
| HTTP Proxy Host                                                                                     | X5             | X5    |                |                     |                  | X5                                      |
| HTTP Proxy Port                                                                                     | X5             | X5    |                |                     |                  | X5                                      |
| HTTP Proxy User                                                                                     | X5             | X5    |                |                     |                  | X5                                      |
| HTTP Proxy Password                                                                                 | X5             | X5    |                |                     |                  | X5                                      |
| Data Protocol                                                                                       |                | X     | X              | X                   | (X)              | X                                       |
| Use compression                                                                                     | X              | X1    | X1             |                     |                  | X1                                      |
| Cache mode                                                                                          | X              | X     | X              | X                   | X                | X                                       |
| Last Will                                                                                           |                |       | X              | X                   | X                |                                         |
| Last Will Topic                                                                                     |                |       | X3             | X3                  | X3               |                                         |
| Last Will Message                                                                                   |                |       | X3             | X3                  | X3               |                                         |
| Last Will QoS                                                                                       |                |       | X3             | X3                  | X3               |                                         |
| Last Will Retain                                                                                    |                |       | X3             | (X3)                | X3               |                                         |
| Device info                                                                                         |                | X1    | X1             | X1                  |                  | X1                                      |
| Device status                                                                                       |                | X1    | X1             | X1                  |                  | X1                                      |
| Standard commands                                                                                   |                | X1    | X1             | X1                  |                  | X1                                      |
| Application property template                                                                       |                | X1    |                |                     |                  | X1                                      |
| X: Visible and enabled                                                                              |                |       |                |                     |                  |                                         |
| (X): Visible, but not enabled                                                                       |                |       |                |                     |                  |                                         |
| X1: Visible and enabled, depending on the selected data protocol                                    |                |       |                |                     |                  |                                         |
| X2: Visible and enabled, depending on the selected authentication                                   |                |       |                |                     |                  |                                         |
| X3: Visible and enabled when "Last Will" is switched on                                             |                |       |                |                     |                  |                                         |
| (X3): Visible but not enabled when "Last Will" is switched on                                       |                |       |                |                     |                  |                                         |
| X4: Enabled when "Use websockets" is switched on                                                    |                |       |                |                     |                  |                                         |
| X5: Visible and enabled when "Use websockets" is switched on and when "HTTP" is set as "Proxy Type" |                |       |                |                     |                  |                                         |

Table 95: Option for selecting the data protocol depending on the cloud platform selected

| Data Protocol       | Cloud Platform |       |                |                     |                  |                                         |
|---------------------|----------------|-------|----------------|---------------------|------------------|-----------------------------------------|
|                     | WAGO Cloud     | Azure | MQTT Any-Cloud | Amazon Web Services | SAP IoT Services | Azure Device Provisioning Service (DPS) |
| WAGO Protocol       |                | X     | X              | X                   |                  | X                                       |
| WAGO Protocol 1.5   |                | X     | X              | X                   |                  | X                                       |
| Native MQTT         |                |       | X              | X                   | (X)              |                                         |
| Sparkplug payload B |                | X     | X              | X                   |                  |                                         |

| Data Protocol         | Cloud Platform |       |                |                     |                  |                                         |
|-----------------------|----------------|-------|----------------|---------------------|------------------|-----------------------------------------|
|                       | WAGO Cloud     | Azure | MQTT Any-Cloud | Amazon Web Services | SAP IoT Services | Azure Device Provisioning Service (DPS) |
| X: Selection possible |                |       |                |                     |                  |                                         |
| (X): Fixed setting    |                |       |                |                     |                  |                                         |

Table 96: Displays the selection and input fields depending on the selected data protocol

| Selection or Input Field      | Data Protocol |                   |             |                     |
|-------------------------------|---------------|-------------------|-------------|---------------------|
|                               | WAGO Protocol | WAGO Protocol 1.5 | Native MQTT | Sparkplug payload B |
| Client ID                     | X             | X                 | X           | X                   |
| Use compression               | X             | X                 | X           |                     |
| Device info                   | X             | X                 |             |                     |
| Device status                 | X             | X                 |             |                     |
| Standard commands             | X             | X                 |             |                     |
| Application property template | X             | X                 |             |                     |
| X: Visible and enabled        |               |                   |             |                     |

Table 97: Option for selecting the cache mode depending on the selected data protocol

| Cache mode                                                        | Data Protocol |                   |             |                     |
|-------------------------------------------------------------------|---------------|-------------------|-------------|---------------------|
|                                                                   | WAGO Protocol | WAGO Protocol 1.5 | Native MQTT | Sparkplug payload B |
| RAM                                                               | X             | X                 | X           | (X)                 |
| SD Card                                                           | X1            | X1                | X1          |                     |
| X: Selection possible                                             |               |                   |             |                     |
| X1: Selection only possible when "Compression" is not switched on |               |                   |             |                     |
| (X): Fixed setting                                                |               |                   |             |                     |

Table 98: Display of input fields depending on the selected authentication

| Selection or Input Field | Authentication    |                   |
|--------------------------|-------------------|-------------------|
|                          | Shared Access Key | X.509 Certificate |
| Activation Key           | X                 |                   |
| Certification file       |                   | X                 |
| Key file                 |                   | X                 |
| X: Visible and enabled   |                   |                   |

### 16.2.2.19 "Configuration of general SNMP parameters" Page

Settings for general settings for SNMP are possible on this page.

#### "General SNMP Configuration" Group

Table 99: WBM "Configuration of general SNMP parameters" Page – "General SNMP Configuration" Group

| Parameters      | Explanation                         |                               |
|-----------------|-------------------------------------|-------------------------------|
| Service enabled | Enable/disable SNMP service;        |                               |
|                 | <input type="checkbox"/>            | The SNMP service is disabled. |
|                 | <input checked="" type="checkbox"/> | The SNMP service is enabled.  |
| Name of Device  | Enter product name (sysName).       |                               |

| Parameters        | Explanation                                                           |
|-------------------|-----------------------------------------------------------------------|
| Description       | Enter product description (sysDescription).                           |
| Physical location | Enter the product location (sysLocation).                             |
| Contact           | Enter email contact address (sysContact).                             |
| ObjectID          | Enter Object ID.                                                      |
| [Submit]          | Apply change;<br>The change only takes effect after the next restart. |

#### 16.2.2.20 “Configuration of SNMP v1/v2c Parameters” Page

The settings for SNMP v1/v2c are shown on the “Configuration of SNMP v1/v2c Parameters” page.

##### “Communities” Group

Table 100: WBM “Configuration of SNMP v1/v2c Parameters” Page – “Communities” Group

| Parameters | Explanation                                                                                                                                |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Name       | Community name for the SNMP manager configuration                                                                                          |
| Access     | Access rights for the community;<br>possible values are: <ul style="list-style-type: none"> <li>• ReadOnly</li> <li>• ReadWrite</li> </ul> |
| [Delete]   | Delete selected entry;<br>The button is only displayed if there are entries.                                                               |
| [Add]      | Add new entry.                                                                                                                             |

##### “Trap Receivers” Group

Table 101: WBM “Configuration of SNMP v1/v2cparameters” Page – “Trap Receivers” Group

| Parameters     | Explanation                                                                                                                                    |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Host           | Hostname or IP address of the trap receiver (management station)                                                                               |
| Community Name | Community name for the trap receiver configuration                                                                                             |
| Version        | SNMP version via which the traps are to be sent;<br>possible values are: <ul style="list-style-type: none"> <li>• v1</li> <li>• v2c</li> </ul> |
| [Delete]       | Delete selected entry;<br>The button is only displayed if there are entries.                                                                   |
| [Add]          | Add new entry.                                                                                                                                 |

#### 16.2.2.21 “Configuration of SNMP v3 Parameters” Page

The settings for SNMP v3 are shown on the “Configuration of SNMP v3 Parameters” page.

##### “Users” Group

Table 102: WBM “Configuration of SNMP v3 Parameters” Page – “Users” Group

| Parameters                   | Explanation |
|------------------------------|-------------|
| Security Authentication Name | Username    |

| Parameters          | Explanation                                                                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Authentication Type | Authentication type for the SNMP v3 packets;<br>possible values are: <ul style="list-style-type: none"> <li>No authentication ("None")</li> <li>Message Digest 5 ("MD5")</li> <li>Secure Hash Algorithm ("SHA," "SHA224," "SHA256," "SHA384," "SHA512")</li> </ul>                      |
| Authentication Key  | Password for authentication                                                                                                                                                                                                                                                             |
| Privacy             | Encryption algorithm for the SNMP message;<br>possible values are: <ul style="list-style-type: none"> <li>No encryption ("None")</li> <li>Data Encryption Standard ("DES")</li> <li>Advanced Encryption Standard ("AES," "AES128," "AES192," "AES192C," "AES256," "AES256C")</li> </ul> |
| Privacy Key         | Encryption Code                                                                                                                                                                                                                                                                         |
| Access              | Access rights for the v3 user;<br>possible values are: <ul style="list-style-type: none"> <li>ReadOnly</li> <li>ReadWrite</li> </ul>                                                                                                                                                    |
| [Delete]            | Delete selected entry;<br>The button is only displayed if there are entries.                                                                                                                                                                                                            |
| [Add]               | Add new entry.                                                                                                                                                                                                                                                                          |

### "Trap Receivers" Group

Table 103: WBM "Configuration of SNMP v3 Parameters" Page – "Trap Receivers" Group

| Parameters                   | Explanation                                                                                                                                                                                                                                                                             |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Security Authentication Name | Username                                                                                                                                                                                                                                                                                |
| Authentication Type          | Authentication type for the SNMP v3 packets;<br>possible values are: <ul style="list-style-type: none"> <li>No authentication ("None")</li> <li>Message Digest 5 ("MD5")</li> <li>Secure Hash Algorithm ("SHA," "SHA224," "SHA256," "SHA384," "SHA512")</li> </ul>                      |
| Authentication Key           | Password for authentication                                                                                                                                                                                                                                                             |
| Privacy                      | Encryption algorithm for the SNMP message;<br>possible values are: <ul style="list-style-type: none"> <li>No encryption ("None")</li> <li>Data Encryption Standard ("DES")</li> <li>Advanced Encryption Standard ("AES," "AES128," "AES192," "AES192C," "AES256," "AES256C")</li> </ul> |
| Privacy Key                  | Encryption Code                                                                                                                                                                                                                                                                         |
| Host                         | Hostname or IP address of the v3 trap receiver                                                                                                                                                                                                                                          |
| [Delete]                     | Delete selected entry;<br>The button is only displayed if there are entries.                                                                                                                                                                                                            |
| [Add]                        | Add new entry.                                                                                                                                                                                                                                                                          |

### 16.2.2.22 Docker® Settings Page

The settings for the "Docker®" service are shown on the "Docker Settings" page.

### "Docker® Status" Group

Table 104: WBM "Docker Settings" Page – "Docker Status" Group

| Parameters    | Explanation                              |
|---------------|------------------------------------------|
| Current State | Current status of the "Docker®" service. |

| Parameters      | Explanation                                           |                                   |
|-----------------|-------------------------------------------------------|-----------------------------------|
|                 | stopped                                               | The "Docker®" service is stopped. |
|                 | running                                               | The "Docker®" service is running. |
| Service Enabled | Enable/disable "Docker®" service;                     |                                   |
|                 | <input type="checkbox"/>                              | The "Docker®" is disabled.        |
|                 | <input checked="" type="checkbox"/>                   | The "Docker®" is enabled.         |
| [Submit]        | Apply change;<br>The change takes effect immediately. |                                   |

### 16.2.2.23 "WBM User Configuration" Page

The settings for user administration are displayed on the "WBM User Configuration" page.

#### "Change Passwords" Group

##### **Note**

##### **Change passwords!**

The default passwords are documented in these instructions and therefore do not offer adequate protection.

- Change the passwords to meet your particular needs.

##### **Note**

##### **Valid characters for passwords**

Passwords may contain only the following characters:

lowercase letters (a ... z), uppercase letters (A ... Z), numbers (0 ... 9) and special characters (! " # \$ % & ' ( ) \* + , . / : ; < = > ? @ [ ] ^ \_ ` { } | ~ -).

##### **Note**

##### **Note the permitted characters for WBM passwords!**

If WBM passwords with invalid characters are set outside the WBM system (e.g. via CBM), then accessing the WBM pages is no longer possible.

Table 105: WBM "WBM User Configuration" Page – "Change Passwords" Group

| Parameters       | Explanation                                         |
|------------------|-----------------------------------------------------|
| Old Password     | Enter the current password used for authentication. |
| New Password     | Enter new password.                                 |
| Confirm Password | Enter new password again to check.                  |
| [Set Password]   | Apply new password                                  |

### Note

#### General Rights of WBM Users

The WBM users “admin” and “user” have rights beyond the WBM to configure the system and install software.

### 16.2.3 “Fieldbus” Tab

#### 16.2.3.1 “OPC UA Configuration” Page

The settings for the OPC UA service are shown on the “OPC UA Configuration” page.

#### “OPC UA Server Configuration” Group

Table 106: WBM “OPC UA Configuration” Page – “OPC UA Server Configuration” Group

| Parameters              | Explanation                                                                                                                                                                                                             |                                                                                       |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Enabled                 | Enable or disable OPC UA server.                                                                                                                                                                                        |                                                                                       |
|                         | <input type="checkbox"/>                                                                                                                                                                                                | The OPC UA server is disabled.                                                        |
|                         | <input checked="" type="checkbox"/>                                                                                                                                                                                     | The OPC UA server is enabled.                                                         |
| Log Level               | Select log levels;<br>Selecting the log level affects the response time of the server. Therefore, select only the minimum level required, e.g., “Debug” only for in-depth analyzes.<br>The following values can be set: |                                                                                       |
|                         | Error                                                                                                                                                                                                                   | Only error messages are output.                                                       |
|                         | Warning                                                                                                                                                                                                                 | Error messages and warnings are output.                                               |
|                         | Info                                                                                                                                                                                                                    | Error messages, warning messages and status messages are output.                      |
|                         | Debug                                                                                                                                                                                                                   | Error messages, warning messages, status messages and also debug messages are output. |
| Ctrl Configuration Name | Enter the configuration name that the controller receives within the PLC Open Device Set.                                                                                                                               |                                                                                       |
| [Submit]                | Apply change;<br>The change only takes effect after the next restart.                                                                                                                                                   |                                                                                       |

#### “OPC UA Server Security Settings” Group

Table 107: WBM “OPC UA Configuration” Page – “OPC UA Server Security Settings” Group

| Parameters                   | Explanation                                                                                                                                            |                                                                                                           |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Anonymous Access             | Block/allow anonymous access to the server.                                                                                                            |                                                                                                           |
|                              | <input type="checkbox"/>                                                                                                                               | Anonymous access is not permitted.                                                                        |
|                              | <input checked="" type="checkbox"/>                                                                                                                    | Anonymous access is permitted;<br>this requires that port authentication of the runtime is also disabled. |
| Allow Password In Plain Text | Transfer of password in readable format                                                                                                                |                                                                                                           |
|                              | <input type="checkbox"/>                                                                                                                               |                                                                                                           |
|                              | <input checked="" type="checkbox"/>                                                                                                                    |                                                                                                           |
| Security Modes               | Security mode of the OPC UA server;<br>depending on the operating mode selected, various OPC UA endpoints are available for establishing a connection. |                                                                                                           |

| Parameters        | Explanation                                                                                                                                                                                                |                                                                                                                                                                                                                                                  |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | None                                                                                                                                                                                                       | Only the OPC UA endpoint <b>None</b> is enabled. This allows an unsecured connection to the OPC UA server to be established.                                                                                                                     |
|                   | None + Sign + SignAndEncrypt                                                                                                                                                                               | The endpoints <b>None</b> , <b>Sign</b> and <b>SignAndEncrypt</b> are available.<br><b>Sign</b> provides an endpoint that is password protected.<br><b>SignAndEncrypt</b> provides an endpoint that allows encryption in addition to a password. |
|                   | Sign + SignAndEncrypt                                                                                                                                                                                      | The endpoints <b>Sign</b> and <b>SignAndEncrypt</b> are available.                                                                                                                                                                               |
|                   | SignAndEncrypt                                                                                                                                                                                             | Only the endpoint <b>SignAndEncrypt</b> is available.                                                                                                                                                                                            |
| Security Policies | Selects the security policies; this sets the encryption strength of the OPC UA server. The following options are available: Aes128Sha256RsaOaep and better, Basic256Sha256 and better, Aes256Sha256RsaPss. |                                                                                                                                                                                                                                                  |
| [Submit]          | Apply change;<br>The change only takes effect after the next restart.                                                                                                                                      |                                                                                                                                                                                                                                                  |

### 16.2.3.2 “BACnet Status” Page

The “BACnet Status” page displays specific information about your product for the BACnet fieldbus and the BACnet license.

#### “BACnet Information” Group

Table 108: WBM “BACnet Status” Page – “BACnet Information” Group

| Parameters  | Explanation                         |                             |
|-------------|-------------------------------------|-----------------------------|
| State       | BACnet Fieldbus Status              |                             |
|             | <input type="checkbox"/>            | Fieldbus BACnet is disabled |
|             | <input checked="" type="checkbox"/> | Fieldbus BACnet is enabled  |
| Mode        | BACnet operating mode               |                             |
|             | ip                                  | Communication via BACnet/IP |
|             | sc                                  | Communication via BACnet/SC |
| Version     | Installed BACnet version            |                             |
| Status Info | BACnet Fieldbus Status              |                             |
| Device-ID   | Current product device ID           |                             |

#### “BACnet License” Group

Table 109: WBM “BACnet Status” Page – “BACnet License” Group

| Parameters   | Explanation                                                                    |
|--------------|--------------------------------------------------------------------------------|
| Type         | Display of BACnet licenses                                                     |
| User Objects | Display of the number of existing and possible BACnet objects with the license |

### 16.2.3.3 “BACnet Configuration” Page

You can make special settings for the BACnet fieldbus on this page.

### “BACnet Service” Group

Table 110: WBM “BACnet Configuration” Page – “BACnet Service” Group

| Parameters               | Explanation                                                           |
|--------------------------|-----------------------------------------------------------------------|
| Service enabled          | Enable/disable fieldbus BACnet                                        |
| Runtime <b>[Restart]</b> | Restart the runtime system                                            |
| <b>[Submit]</b>          | Apply change;<br>The change only takes effect after the next restart. |

### “BACnet Settings” Group

Table 111: WBM “BACnet Configuration” Page – “BACnet Settings” Group

| Parameters                        | Explanation                                                                                                   |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------|
| Port Number                       | Setting the Port for BACnet Communication                                                                     |
| Who-Is online interval time (sec) | Set the time interval after which the controller queries which other subscribers are online (minimum: 60 sec) |
| <b>[Submit]</b>                   | Apply change;<br>The change only takes effect after the next restart.                                         |

### “BACnet Data Reset” Group

Table 112: WBM “BACnet Configuration” Page – “BACnet Data” Group

| Parameters                                    | Explanation                                                                 |
|-----------------------------------------------|-----------------------------------------------------------------------------|
| Delete Persistence Data                       | Delete persistent BACnet data on the next restart                           |
| Reset all BACnet Data and Settings to Default | Reset BACnet-specific settings and data to factory settings on next restart |
| <b>[Submit]</b>                               | Apply change;<br>The change only takes effect after the next restart.       |

## 16.2.3.4 “BACnet Storage Location” Page

You can make settings for saving the BACnet-specific parameters on the “BACnet Storage Location” page.

### “BACnet Persistence” Group

Table 113: WBM “BACnet Storage Location” Page – “BACnet Persistence” Group

| Parameters       | Explanation                                                                                                                                                                                            |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Storage Location | Select the storage location for the persistence data; selection is only possible if both storage locations are available.                                                                              |
|                  | Internal Flash      Data will be stored in the controller's internal memory.                                                                                                                           |
|                  | SD Card      The data is saved to the memory card.<br>If “SD card” is selected, but the memory card is no longer inserted, this option is no longer enabled and only “Internal Flash” can be selected. |
| <b>[Submit]</b>  | Apply change;<br>The change takes effect immediately.                                                                                                                                                  |

### “BACnet Trendlog” Group

Table 114: WBM “BACnet Storage Location” Page – “BACnet Trendlog” Group

| Parameters       | Explanation                                                                                                             |
|------------------|-------------------------------------------------------------------------------------------------------------------------|
| Storage Location | Select the storage location for the trend log data; selection is only possible if both storage locations are available. |
|                  | Internal Flash      Data will be stored in the controller's internal memory.                                            |

| Parameters | Explanation                                           |                                                                                                                                                                                           |
|------------|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            | SD Card                                               | The data is saved to the memory card.<br>If "SD card" is selected, but the memory card is no longer inserted, this option is no longer enabled and only "Internal Flash" can be selected. |
| [Submit]   | Apply change;<br>The change takes effect immediately. |                                                                                                                                                                                           |

### "BACnet Eventlog" Group

Table 115: WBM "BACnet Storage Location" Page – "BACnet Eventlog" Group

| Parameters       | Explanation                                                                                                                |                                                                                                                                                                                           |
|------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Storage Location | Select the storage location for the event log data;<br>selection is only possible if both storage locations are available. |                                                                                                                                                                                           |
|                  | Internal Flash                                                                                                             | Data will be stored in the controller's internal memory.                                                                                                                                  |
|                  | SD Card                                                                                                                    | The data is saved to the memory card.<br>If "SD card" is selected, but the memory card is no longer inserted, this option is no longer enabled and only "Internal Flash" can be selected. |
| [Submit]         | Apply change;<br>The change takes effect immediately.                                                                      |                                                                                                                                                                                           |

### 16.2.3.5 "BACnet Files" Page

Table 116: WBM "BACnet Files" Page – "BACnet override.xml" Group

| Parameters      | Explanation                               |
|-----------------|-------------------------------------------|
| Choose file ... | Select the required file on the PC        |
| [Upload]        | Transfer selected file from PC to product |

## 16.2.4 "Security" Tab

### 16.2.4.1 "OpenVPN / IPsec" Page

The "OpenVPN / IPsec" page displays the settings for OpenVPN and IPsec.

#### "OpenVPN" Group

Table 117: WBM "OpenVPN / IPsec" Page – "OpenVPN" Group

| Parameters      | Explanation                                                                                      |                          |
|-----------------|--------------------------------------------------------------------------------------------------|--------------------------|
| Current State   | Current status of the OpenVPN service                                                            |                          |
|                 | stopped                                                                                          | The service is disabled. |
|                 | running                                                                                          | The service is enabled.  |
| OpenVPN enabled | Enable/disable OpenVPN service                                                                   |                          |
| openvpn.conf    | Select the OpenVPN configuration file to be transferred from the PC to the product or vice versa |                          |
| [Submit]        | Apply change;<br>The change only takes effect after the next restart.                            |                          |
| Choose file ... | Select file on product or PC                                                                     |                          |
| [Upload]        | Transfer selected file from PC to product                                                        |                          |
| [Download]      | Transfer selected file from product to PC                                                        |                          |

### “IPsec” Group

Table 118: WBM “OpenVPN / IPsec” Page – “IPsec” Group

| Parameters      | Explanation                                                                                    |
|-----------------|------------------------------------------------------------------------------------------------|
| Current State   | Current status of the IPsec service                                                            |
|                 | stopped      The service is disabled.                                                          |
|                 | running      The service is enabled.                                                           |
| IPsec enabled   | Enable/disable IPsec service                                                                   |
| ipsec.conf      | Select the IPsec configuration file to be transferred from the PC to the product or vice versa |
| ipsec.secrets   | Select the IPsec secrets file to be transferred from the PC to the product or vice versa       |
| [Submit]        | Apply change;<br>The change only takes effect after the next restart.                          |
| Choose file ... | Select file on product or PC                                                                   |
| [Upload]        | Transfer selected file from PC to product                                                      |
| [Download]      | Transfer selected file from product to PC                                                      |

#### 16.2.4.2 “General Firewall Configuration” Page

The “General Firewall Configuration” page displays the global firewall settings.

### “Global Firewall Parameter” Group

Table 119: WBM “General Firewall Configuration” Page – “Global Firewall Parameter” Group

| Parameters                      | Explanation                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Firewall enabled entirely       | Enable/disable all firewall functionality<br>This setting is the highest priority. If the firewall is disabled, all other settings have no direct effect. It is still possible to configure the other parameters so that the firewall parameters can be set correctly before the firewall is enabled. This setting is independent of the “Filter enabled” setting in the “MAC address filter state bridge <n>” group on the “MAC address filter state bridge <n>” page. |
| ICMP echo broadcast protection  | Enable/disable “ICMP echo broadcast” protection                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Max. UDP connections per second | Enter the maximum number of UDP connections per second                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Max. TCP connections per second | Enter the maximum number of TCP connections per second                                                                                                                                                                                                                                                                                                                                                                                                                  |
| [Submit]                        | Apply change;<br>The change takes effect immediately.                                                                                                                                                                                                                                                                                                                                                                                                                   |

#### 16.2.4.3 “Interface Configuration” Page

The individual interfaces for the firewall settings are displayed on the “Interface Configuration” page.

### “Firewall Configuration Bridge <n> / VPN” Group

A separate group is displayed for each configured bridge.

The settings in this group are based on the firewall configuration on the IP level.

Table 120: WBM “Interface Configuration” Page – “Firewall Configuration Bridge &lt;n&gt; / VPN / WAN” Group

| Parameters                     | Explanation                                                        |
|--------------------------------|--------------------------------------------------------------------|
| Firewall enabled for Interface | Enable/disable firewall for the respective interface               |
| ICMP echo protection           | Enable/disable “ICMP echo” protection for the respective interface |

| Parameters                    | Explanation                                                                                                                                                          |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ICMP echo limit per second    | Enter the maximum number of "ICMP pings" per second.<br>"0" = "Disabled"                                                                                             |
| ICMP burst limit (0=disabled) | Enter the maximum number of "ICMP echo burst" per second                                                                                                             |
| Service Configuration         | Enable/disable firewall for the respective service                                                                                                                   |
| FTP/FTPS                      | Not every service shown here is available for every product.<br><br>The services themselves must be enabled or disabled separately on the "Ports and Services" page. |
| FTPS (implicit)               |                                                                                                                                                                      |
| HTTP                          |                                                                                                                                                                      |
| HTTPS                         |                                                                                                                                                                      |
| I/O Check                     |                                                                                                                                                                      |
| PLC Runtime                   |                                                                                                                                                                      |
| WebVisu - HTTP (port 8080)    |                                                                                                                                                                      |
| WebVisu - HTTPS (port 8081)   |                                                                                                                                                                      |
| SSH                           |                                                                                                                                                                      |
| SNMP                          |                                                                                                                                                                      |
| OPC UA (port 4840)            |                                                                                                                                                                      |
| BACnet (port 47808)           |                                                                                                                                                                      |
| PROFINET IO                   |                                                                                                                                                                      |
| DNP3 (port 20000)             |                                                                                                                                                                      |
| IEC60870-5-104 (port 2404)    |                                                                                                                                                                      |
| IEC61850 (port 102)           |                                                                                                                                                                      |
| [Submit]                      | Apply change;<br>The change takes effect immediately.                                                                                                                |

The firewall ports listed in the following table are open by default on controllers with telecontrol functionality. The corresponding telecontrol services can be executed via these ports without the firewall blocking their communication.

Table 121: Ports for Telecontrol Functionality

| Protocol       | Port  |
|----------------|-------|
| DNP3           | 20000 |
| IEC60870-5-104 | 2404  |
| IEC61850       | 102   |

#### 16.2.4.4 "Configuration of MAC address filter" Page

You set the firewall configuration at ETHERNET level on this page.

The "MAC Address Filter Whitelist" contains two default entries with the following values:

- Description: All WAGO devices  
MAC address: 00:30:DE:00:00:00  
MAC mask: ff:ff:ff:00:00:00
- Description: Enable docker bridges  
MAC address: 02:42:00:00:00:00  
MAC mask: ff:ff:00:00:00:00

If you enable the first default entry, this already allows communication between different WAGO products in the network.

### Note

#### Enable the MAC address filter before activation!

Before activating the MAC address filter, you must enter and activate your own MAC address in the “MAC Address Filter Whitelist.” Otherwise you cannot access the product via the ETHERNET. This also applies to other services used by your product, e.g., IP configuration via DHCP.

If the MAC address of your DHCP server is not included in the “MAC Address Filter Whitelist”, your product will lose its IP settings after the next update cycle and will then also no longer be accessible.

As long as there is no entry in the “MAC Address Filter Whitelist”, switching on the filter is prevented.

If at least one enabled address is active, you will receive a corresponding warning before activation, which you have to confirm.

The check described above is only carried out in the WBM, not in the CBM!

#### “Global MAC address filter state” Group

Table 122: WBM “Configuration of MAC address filter” Page – “Global MAC address filter state” Group

| Parameters     | Explanation                                           |
|----------------|-------------------------------------------------------|
| Filter enabled | Enable/disable global MAC address filter              |
| [Submit]       | Apply change;<br>The change takes effect immediately. |

#### “MAC address filter state Bridge <n>” Group

A separate group is displayed for each configured bridge.

Table 123: WBM “Configuration of MAC address filter” Page – “MAC address filter state Bridge <n>” Group

| Parameters     | Explanation                                                                                                                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Filter enabled | Enable/disable MAC address filter for the respective bridge;<br>This setting is independent of the “Firewall enabled entirely” setting in the “Global Firewall Parameters” group on the “General Firewall Configuration” page. |
| [Submit]       | Apply change;<br>The change takes effect immediately.                                                                                                                                                                          |

#### “MAC address filter whitelist” Group

Table 124: WBM “Configuration of MAC address filter” Page – “MAC address filter whitelist” Group

| Parameters     | Explanation                                                                                                                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description    | Description of the devices or areas that can be enabled by enabling the filter when the firewall is generally enabled.<br>The description is only displayed for entries initially available in the factory default settings. |
| MAC address    | MAC address of the list entry                                                                                                                                                                                                |
| MAC mask       | MAC mask of the list entry                                                                                                                                                                                                   |
| Filter enabled | Enable/disable filter for the list entry                                                                                                                                                                                     |
| [Submit]       | Apply change;<br>The change takes effect immediately.                                                                                                                                                                        |
| [Delete]       | Delete selected entry;<br>The button is only displayed if there are entries.                                                                                                                                                 |
| [Add]          | Add new entry.                                                                                                                                                                                                               |

### 16.2.4.5 “Configuration of User Filter” Page

The “Configuration of User Filter” page displays the settings for custom firewall filters.

#### “User filter” Group

Each configured filter has its own area in the display.

Table 125: WBM “Configuration of User Filter” Page – “User Filter” Group

| Parameters             | Explanation                                           |                                                                                                    |
|------------------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Policy                 | Allow/exclude network subscribers through the filter  |                                                                                                    |
|                        | Allow                                                 | The network device is permitted.                                                                   |
|                        | Drop                                                  | The network device is excluded.                                                                    |
| Source IP address      | Source IP address for the filter                      |                                                                                                    |
| Source Netmask         | Source network mask for the filter                    |                                                                                                    |
| Source Port            | Source port number for the filter                     |                                                                                                    |
| Destination IP address | Destination IP address for the filter                 |                                                                                                    |
| Destination Netmask    | Target network mask for the filter                    |                                                                                                    |
| Destination Port       | Destination port number for the filter                |                                                                                                    |
| Protocol               | Protocols for the filter                              |                                                                                                    |
|                        | TCP/UDP                                               | The TCP service and UDP service are filtered.                                                      |
|                        | TCP                                                   | The TCP service is filtered.                                                                       |
|                        | UDP                                                   | The UDP service is filtered.                                                                       |
| Input Interface        | Interfaces for the filter                             |                                                                                                    |
|                        | Any                                                   | All interfaces are filtered.                                                                       |
|                        | Bridge <n>                                            | The interfaces assigned for bridge <n> are filtered.<br>Only the configured bridges are displayed. |
|                        | VPN                                                   | The VPN interface is filtered.                                                                     |
| [Submit]               | Apply change;<br>The change takes effect immediately. |                                                                                                    |

### 16.2.4.6 “Certificates” Page

You find certificate settings on this page.

#### “Installed Certificates” Group

Table 126: WBM “Certificates” Page – “Installed Certificates” Group

| Parameters         | Explanation                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------|
| <certificate name> | Loaded certificates;<br>If no certificate has been loaded, “No certificates existing” is displayed. |
| [Delete]           | Delete selected entry;<br>The button is only displayed if there are entries.                        |
| Choose file ...    | Select file on the PC                                                                               |
| [Upload]           | Transfer selected file from PC to product                                                           |

The certificates are stored in the “/etc/certificates/” directory.

#### “Installed Private Keys” Group

Table 127: WBM “Certificates” Page – “Installed Private Keys” Group

| Parameters         | Explanation                                                                        |
|--------------------|------------------------------------------------------------------------------------|
| <private key name> | Loaded key;<br>If no key has been loaded, “No private keys existing” is displayed. |

| Parameters      | Explanation                                                                  |
|-----------------|------------------------------------------------------------------------------|
| [Delete]        | Delete selected entry;<br>The button is only displayed if there are entries. |
| Choose file ... | Select file on the PC                                                        |
| [Upload]        | Transfer selected file from PC to product                                    |

The keys are stored in the “/etc/certificates/keys/” directory.

#### 16.2.4.7 “Boot Mode Configuration” Page

See the “Boot mode configuration” page for boot option settings.

#### Note

**If you force booting from the internal flash, the device can no longer be booted from the memory card!**

If a connection via ETHERNET is no longer possible due to problems or incorrect configuration, you have the option of making the product accessible again via the service interface and “WAGO Ethernet Settings”.

#### “Force internal boot” Group

Table 128: WBM “Boot Mode Configuration” Page – “Force Internal Boot” Group

| Parameters | Explanation                                                                                      |
|------------|--------------------------------------------------------------------------------------------------|
| Boot mode  | Set the boot option for the product                                                              |
|            | Memory card or internal flash      You can boot from the internal flash or from the memory card. |
|            | Internal flash only      You can only boot from the internal flash.                              |
| [Submit]   | Apply change;<br>The change takes effect immediately.                                            |

#### 16.2.4.8 “Security Settings” Page

This page displays the network security settings.

#### “TLS Configuration” Group

Table 129: WBM “Security Settings” Page – “TLS Configuration” Group

| Parameters        | Explanation                                                                                                                                 |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| TLS Configuration | Set permitted TLS versions and cryptographic procedures for HTTPS                                                                           |
|                   | Standard      The Webserver allows TLS 1.0, TLS 1.1, TLS 1.2, TLS 1.3 and other cryptographic methods that are no longer considered secure. |
|                   | Strong      The Webserver only allows TLS 1.2, TLS 1.3 and strong algorithms.                                                               |
| [Submit]          | Apply change;<br>The change takes effect immediately.                                                                                       |

### Note

#### BSI TR-02102 Technical Guidelines

The rules for the “Strong” setting are based on the TR-02102 technical guidelines of the German Federal Office for Information Security (BSI). The policy is available at:

 [www.bsi.bund.de](https://www.bsi.bund.de).

#### 16.2.4.9 “Advanced Intrusion Detection Environment (AIDE)” Page

The network security settings are available on the “Advanced Intrusion Detection Environment (AIDE)” page.

##### “Run AIDE check at startup” Group

Table 130: WBM “Advanced Intrusion Detection Environment (AIDE)” Page – “Run AIDE check at startup” Group

| Parameters      | Explanation                                               |                                         |
|-----------------|-----------------------------------------------------------|-----------------------------------------|
| Service enabled | Enable/disable “AIDE check” when starting the controller. |                                         |
|                 | <input type="checkbox"/>                                  | “AIDE check” is not enabled at startup. |
|                 | <input checked="" type="checkbox"/>                       | “AIDE check” is enabled at startup.     |
| [Submit]        | Apply change;<br>The change takes effect immediately.     |                                         |

##### “Control AIDE and show log” Group

Table 131: WBM “Advanced Intrusion Detection Environment (AIDE)” Page – “Control AIDE and show log” Group

| Parameters                       | Explanation                                                                                                                                                                               |                                                                                                       |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Select Action                    | Select the action to be executed.                                                                                                                                                         |                                                                                                       |
|                                  | readlog                                                                                                                                                                                   | The log data are displayed.                                                                           |
|                                  | init                                                                                                                                                                                      | The database is initialized and filled with the current values.                                       |
|                                  | check                                                                                                                                                                                     | The current values are compared against the values stored in the database.                            |
|                                  | update                                                                                                                                                                                    | The current values are compared with the values stored in the database and the database then updated. |
| Read only the last n             | Switch display of the last n messages on/off;<br>enter the number of messages displayed.                                                                                                  |                                                                                                       |
| Automatic refresh interval (sec) | Switch cyclic refresh on/off;<br>Enter the cycle time in seconds at which a cyclic refresh is performed;<br>Depending on the status, the button label changes (“Refresh”/“Start”/“Stop”). |                                                                                                       |
| [Refresh]                        | Refresh display;<br>The button is only displayed if cyclic refresh is not enabled.                                                                                                        |                                                                                                       |
| [Start]                          | Start cyclic refresh;<br>The button is only displayed if cyclic refresh is enabled and has not yet started.                                                                               |                                                                                                       |
| [Stop]                           | Stop cyclical update;<br>The button is only displayed if cyclic update is enabled.                                                                                                        |                                                                                                       |

The cyclical refresh is performed for as long as the “Advanced Intrusion Detection Environment (AIDE)” page is open. If you change the WBM page, the refresh is stopped until you call up the “Advanced Intrusion Detection Environment (AIDE)” page again.

The messages are displayed below the settings.

#### 16.2.4.10 “WAGO Device Access” Page

On the “WAGO Device Access” page you will find settings for authentication when scanning the node.

#### Note

##### Beta Status

In the present firmware version, the “WAGO Device Access” functionality is still in beta status!

#### “Unauthenticated Requests” Group

Table 132: WBM “Boot Mode Configuration” Page – “Force Internal Boot” Group

| Parameters                        | Explanation                                                                                                                                                                                                                                                                                                |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Allow unauthenticated Device Scan | Specify whether the node can be scanned without authentication. In the default setting, authentication is switched off. To increase the security level, you can enforce authentication for node scanning. In the current beta status, only head stations, but no I/O modules are detected during scanning! |
| [Submit]                          | Apply change;<br>The change takes effect immediately.                                                                                                                                                                                                                                                      |

#### 16.2.5 “Diagnostic” Tab

##### 16.2.5.1 “Log Message Viewer” Page

The settings for displaying the diagnostic messages are shown on the “Log Message Viewer” page.

Table 133: WBM “Log Message Viewer” Page – “Refresh Options” Group

| Parameters                       | Explanation                                                                                                                                                                               |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Read only the last               | Switch display of the last n messages on/off;<br>enter the number of messages displayed.                                                                                                  |
| Automatic refresh interval (sec) | Switch cyclic refresh on/off;<br>Enter the cycle time in seconds at which a cyclic refresh is performed;<br>Depending on the status, the button label changes (“Refresh”/“Start”/“Stop”). |
| Source                           | Select the source of the diagnostic messages;<br>The drop-down list depends on the user logged in.                                                                                        |
|                                  | user<br>Only standard diagnostic messages                                                                                                                                                 |
|                                  | admin<br>Standard diagnostic messages and all log files in the folder <code>/var/log/*</code>                                                                                             |
| [Refresh]                        | Refresh display;<br>The button is only displayed if cyclic refresh is not enabled.                                                                                                        |
| [Start]                          | Start cyclic refresh;<br>The button is only displayed if cyclic refresh is enabled and has not yet started.                                                                               |
| [Stop]                           | Stop cyclical update;<br>The button is only displayed if cyclic update is enabled.                                                                                                        |

The cyclical refresh is performed for as long as the “Diagnostic Information” page is open. If you change the WBM page, the update is stopped until you call up the “Diagnostic” page again.

The messages are displayed below the settings.

#### 16.2.5.2 “Download” Page

On the “Download” page, you have the option of downloading diagnostic data from the product.

Table 134: WBM “Download” Page – “Diagnostic Information” Group

| Parameters | Explanation                                 |
|------------|---------------------------------------------|
| [Download] | Download diagnostic information from device |

The archive file created contains the log messages, the firmware version and a list of the installed packages.

#### 16.2.5.3 “Network Capture” Page

All the settings required for logging the network traffic on the device and downloading these logs are available on the “Network Capture” page. The current status of the network logging is displayed.

##### “State” Group

Table 135: WBM “Network Capture” Page – “State” Group

| Parameters                  | Explanation                                                                  |
|-----------------------------|------------------------------------------------------------------------------|
| Current State               | Current status of network logging                                            |
| Last Captured Package Count | Network packets already logged                                               |
| Last Refresh Time           | Time of the last update of “Current State” and “Last Captured Package Count” |

##### “Configuration” Group

Table 136: WBM “Network Capture” Page – “Configuration” Group

| Parameters                 | Explanation                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enable                     | Switch logging on/off                                                                                                                                                                                                                                                                                                                                                                                      |
| Rotate Log Files           | Switch rotary logging on/off;<br>If this option is enabled, the network traffic is stored in up to three files with the set maximum file size.<br>When the maximum file size for the first file is reached, the data is logged in a second file and then to a third file when the second file is full. When the maximum size of the third file is reached, the data in the first file is then overwritten. |
| Max. File Size             | Enter maximum file size for data logging                                                                                                                                                                                                                                                                                                                                                                   |
| Storage Location           | Select the storage location for the logged data                                                                                                                                                                                                                                                                                                                                                            |
|                            | Internal Flash      The data is stored in the internal memory.                                                                                                                                                                                                                                                                                                                                             |
|                            | SD Card              The data is saved to the memory card.<br>If “SD card” is selected, but the memory card is no longer inserted, this option is no longer enabled and only “Internal Flash” can be selected.                                                                                                                                                                                             |
| Lists On Network Interface | Select the network interface from which network traffic is to be logged;<br>The available network interfaces of the device area available for selection.                                                                                                                                                                                                                                                   |

| Parameters | Explanation                                           |
|------------|-------------------------------------------------------|
| [Submit]   | Apply change;<br>The change takes effect immediately. |

### “Filter Configuration” Group

Table 137: WBM “Network Capture” Page – “Filter Configuration” Group

| Parameters     | Explanation                                                                                                                                                                                                                                                                                                                                              |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capture Filter | Logging filters are entered;<br>These are used to log only the relevant or required data traffic.<br>For example, it is possible to log the communication of only one port or from a specific IP address.<br>More information on the possible filter settings is available in the explanations of the “Capture Filter” in the “Wireshark” documentation. |
| [Check]        | Check entered “Capture Filter” for correctness                                                                                                                                                                                                                                                                                                           |
| [Submit]       | Apply change;<br>The change takes effect immediately.                                                                                                                                                                                                                                                                                                    |

### “Log Download” Group

Table 138: WBM “Network Capture” Page – “Log Download” Group

| Parameters      | Explanation                                             |
|-----------------|---------------------------------------------------------|
| Select Log File | Select the recording to be downloaded from the product. |
| [Download]      | Download selected recording from the product            |
| [Download All]  | Download all available recordings from the product      |

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## 16.4 Technical Data, Approvals, Guidelines and Standards

### Note

#### Subject to changes!

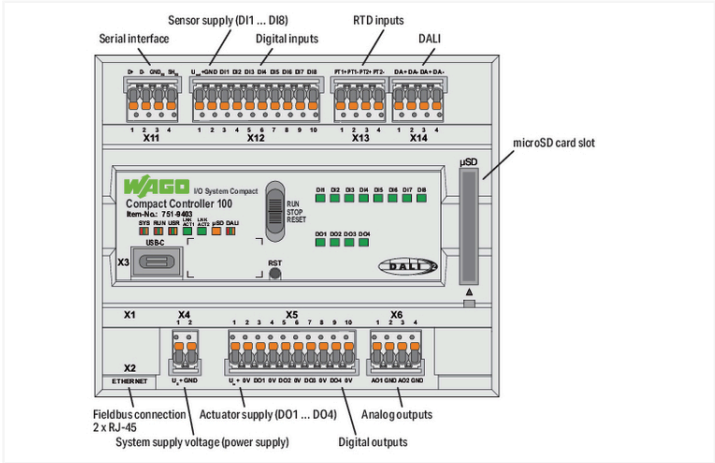
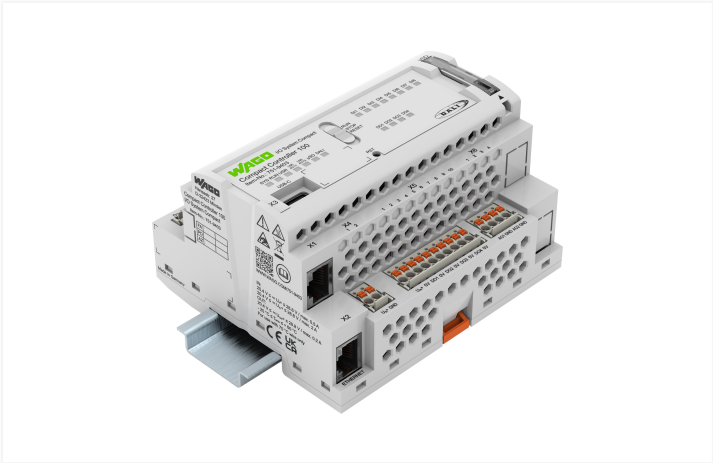
Please also observe the further product documentation! You can generate the current datasheet at any time at:  [www.wago.com](https://www.wago.com) /<item number>.

#### See also

 Data Sheet 751-9403 [► 132]

Data Sheet | Item Number: 751-9403  
Compact Controller 100; 8DI 4DO 2AO 2NI1K/PT1K 1RS485 1DALI; 2 x  
ETHERNET; SD

<https://www.wago.com/751-9403>



| Technical data                               |                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Communications                               | Modbus (TCP, UDP)<br>EtherCAT® Master<br>EtherNet/IP™ Adapter (slave)<br>EtherNet/IP™ Scanner<br>Modbus RTU<br>OPC UA Server/Client<br>OPC UA Pub/Sub (can be installed later)<br>MQTT<br>RS-485 interface<br>BACnet/IP, requires an additional license<br>Telecontrol protocols, requires an additional license<br>DALI-2 |
| ETHERNET protocols                           | DHCP<br>DNS<br>NTP<br>FTP<br>FTPS<br>SNMP<br>HTTP<br>HTTPS<br>SSH                                                                                                                                                                                                                                                          |
| Visualization                                | Web-Visu                                                                                                                                                                                                                                                                                                                   |
| Operating system                             | Real-time Linux (with PREEMPT_RT patch)                                                                                                                                                                                                                                                                                    |
| CPU                                          | 2 x Cortex A7; 650 MHz                                                                                                                                                                                                                                                                                                     |
| Programming languages per IEC 61131-3        | Instruction List (IL)<br>Ladder Diagram (LD)<br>Function Block Diagram (FBD)<br>Continuous Function Chart (CFC)<br>Structured Text (ST)<br>Sequential Function Chart (SFC)                                                                                                                                                 |
| Programming environment                      | CODESYS V3.5<br>Node RED                                                                                                                                                                                                                                                                                                   |
| Configuration options                        | CODESYS V3.5<br>Ethernet Settings<br>Web-Based Management<br>WAGOupload<br>WAGO Solution Builder                                                                                                                                                                                                                           |
| Transmission rate                            | 10/100 Mbit/s                                                                                                                                                                                                                                                                                                              |
| Transmission medium (communication/fieldbus) | Twisted pair S-UTP; 100 Ω; Cat. 5; 100 m maximum cable length                                                                                                                                                                                                                                                              |
| Main memory (RAM)                            | 512 MB                                                                                                                                                                                                                                                                                                                     |
| Internal memory (flash)                      | 4096 MB                                                                                                                                                                                                                                                                                                                    |
| Non-volatile hardware memory                 | 128 KB                                                                                                                                                                                                                                                                                                                     |
| Program memory                               | 32 MB                                                                                                                                                                                                                                                                                                                      |
| Data memory                                  | 128 MB                                                                                                                                                                                                                                                                                                                     |
| Non-volatile software memory                 | 128 KB                                                                                                                                                                                                                                                                                                                     |



| Technical data                                                        |                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type of memory card                                                   | microSD up to 32 GB (all guaranteed properties only valid with WAGO's memory card)                                                                                                                                                                                                                                                        |
| Memory Card Slot                                                      | Push-push mechanism                                                                                                                                                                                                                                                                                                                       |
| Indicators                                                            | LED (SYS, RUN), red/green: Status of system;<br>LED (USR) red/green: User programmable status (can be used via CODESYS library);<br>LED (μSD) orange: Status of microSD;<br>LED (LNK/ACT) green: Network connection via ports 1 ... 2;<br>LED (DI1 ... 8) green: Status of inputs;<br>LED (DO1 ... 8) green: Status of inputs and outputs |
| Control Elements                                                      | Operating mode switch (RUN, STOP, RESET); reset button                                                                                                                                                                                                                                                                                    |
| Supply voltage (system)                                               | 24 VDC (-15 ... +20 %); via pluggable connector ( <i>picoMAX</i> ® 3.5; Push-in CAGE CLAMP® connection)                                                                                                                                                                                                                                   |
| Current consumption (system) max.                                     | 500 mA                                                                                                                                                                                                                                                                                                                                    |
| Supply voltage (field)                                                | 24 VDC (-15 ... +20 %); via pluggable connector ( <i>picoMAX</i> ® 3.5; Push-in CAGE CLAMP® connection)                                                                                                                                                                                                                                   |
| Current consumption (field) max. (digital outputs, U <sub>IN</sub> +) | 2000 mA                                                                                                                                                                                                                                                                                                                                   |
| Isolation                                                             | 1250 V (DC 1 min., between system and field level (digital outputs))                                                                                                                                                                                                                                                                      |

| DALI Interface       |                                                                                                     |
|----------------------|-----------------------------------------------------------------------------------------------------|
| Device specification | DALI-2-Spezifikation: DIN IEC 62386                                                                 |
| Device-specific      | Current consumption from DALI bus: 10 mA                                                            |
| Supply voltage       | extern                                                                                              |
| Topology             | Number of control gears/control devices (DALI): 64 control gears + 64 control devices (addressable) |
| Transmission channel | 1                                                                                                   |

| Technical data (inputs/outputs) |                         |                              |                                |
|---------------------------------|-------------------------|------------------------------|--------------------------------|
| Digital inputs                  |                         | Digital outputs              |                                |
| Number of digital inputs        | 8                       | Number of digital outputs    | 4                              |
| Input characteristic            | Type 3 (per EN 61131-2) | Output current (per channel) | 500 mA (DC)                    |
|                                 |                         | Output current               | short-circuit-protected        |
| Analog outputs                  |                         | RTD inputs                   |                                |
| Number of analog outputs        | 2                       | Number of measurement inputs | 2                              |
| Resolution of analog outputs    | 12 bits                 | Temperature range            | -60 ... 350 °C, Pt1000, Ni1000 |
| Load impedance (voltage output) | ≥ 5 kΩ                  |                              |                                |

| Connection data                               |                                                                                                   |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------|
| Connection technology: communication/fieldbus | Modbus (TCP, UDP): 2 x RJ-45; RS-485 interface: 1 x Female connector, 4-pole; Push-in CAGE CLAMP® |
| Connection technology: system supply          | 1 x Female connector, 2-pole; Push-in CAGE CLAMP®                                                 |
| Connection technology: field supply           | 2 x Female connector, 10-pole; Push-in CAGE CLAMP®                                                |
| Connectable conductor materials               | Copper                                                                                            |
| Solid conductor                               | 0.2 ... 1.5 mm² / 24 ... 14 AWG                                                                   |
| Fine-stranded conductor                       | 0.2 ... 1.5 mm² / 24 ... 14 AWG                                                                   |
| Strip length                                  | 8 ... 9 mm / 0.31 ... 0.35 inches                                                                 |

| Physical data |                       |
|---------------|-----------------------|
| Width         | 108 mm / 4.252 inches |

**Physical data**

|                                   |                      |
|-----------------------------------|----------------------|
| Height                            | 90 mm / 3.543 inches |
| Depth from upper-edge of DIN-rail | 55 mm / 2.165 inches |

**Mechanical data**

|               |             |
|---------------|-------------|
| Mounting type | DIN-35 rail |
|---------------|-------------|

**Material data**

|                    |                         |
|--------------------|-------------------------|
| Housing material   | Polycarbonate, polyamid |
| Fire load          | 0 MJ                    |
| Weight             | 270 g                   |
| Conformity marking | CE; UKCA                |

**Environmental requirements**

|                                          |                              |
|------------------------------------------|------------------------------|
| Ambient temperature (operation)          | -25 ... +60 °C               |
| Ambient temperature (storage)            | -25 ... +85 °C               |
| Protection type                          | IP20                         |
| Pollution degree                         | 2 per IEC 61131-2            |
| Operating altitude                       | 0 ... 2000 m / 0 ... 6562 ft |
| Mounting position                        | any                          |
| Relative humidity (without condensation) | 95 %                         |
| Vibration resistance                     | 1g per IEC 60068-2-6         |
| Shock resistance                         | 15g per IEC 60068-2-27       |
| EMC immunity to interference             | per EN 61000-6-2             |
| EMC emission of interference             | per EN 61000-6-3             |

**Commercial data**

|                       |               |
|-----------------------|---------------|
| PU (SPU)              | 1 pcs         |
| Packaging type        | Box           |
| Country of origin     | DE            |
| GTIN                  | 4066966687873 |
| Customs tariff number | 85371091990   |

**Product classification**

|          |                      |
|----------|----------------------|
| UNSPSC   | 32151705             |
| ETIM 9.0 | EC000236             |
| ECCN     | NO US CLASSIFICATION |

**Environmental Product Compliance**

|                        |                         |
|------------------------|-------------------------|
| RoHS Compliance Status | Compliant, No Exemption |
|------------------------|-------------------------|

# Glossary

---

**Auto-replace function**

In the event that exactly one device is defective and is replaced by an unaddressed device, the "Replace" function automatically assigns the old short address of the previous device to the new device and subsequently restores the settings for the device using the data stored in the I/O module database.

---

**Control Device**

German designation for "Control Device"

---

**Control Device**

"Control Device" is the IEC designation for a control device and includes both DALI (Multi)-Master and active sensors.

---

**Control Gear**

"Control Gear" is the abbreviation for the English name: "Electronic Control Gear", or "ECG" for short. The German term is "elektronisches Vorschaltgerät" (EVG).

---

**Control Gear**

Control gears are found in DALI networks as one or more components between the power supply and one or more lamps. They are used to supply power to the lighting and for their DALI communication. The control gears provide the switch-on voltage and warm-up current for the lamps to prevent a cold start, thus enhancing the power factor and reducing electromagnetic interference.

---

**DALI**

DALI (Digital Addressable Lighting Interface) is a protocol for control of lighting control gears in building automation, such as power supplies ("electronic transformers"), electronic control gears (ECGs) and electronic dimmers. The individual specifications are described in the IEC 62386 series of standards.

---

**DALI short address**

Each device with a DALI interface is addressed in the network using a DALI short address. For some multifunction devices, such as the multi-sensors, each individual function (brightness, presence, remote control) can be assigned a dedicated DALI short address, enabling the function to be addressed individually.

---

**DALI-2**

DALI-2 (Digital Addressable Lighting Interface Edition 2) DALI-2 is a further development of the IEC 62386 series of standards that adapts the structure of the individual parts of the standards, distinguishes between the electrical and functional requirements on the control gears and sets the requirements on the sensors in order to achieve a higher level of interoperability for backwards compatibility with existing DALI installations.

---

**ECG**

Electronic control gear; see also "Control Gear"

---

**IEC 62386**

"IEC 62386" ("Digitally addressable interface for lighting"; German version DIN EN 62386: "Digital adressierbare Schnittstelle für die Beleuchtung") is a series of standards that defines details specific to DALI. The series of standards is processed by the IEC subcommittee SC 34C and consists of different sections.

---

**Multi-Master**

In a "Multi-Master," control of the intelligent measuring and automation devices on the fieldbus is performed locally, in contrast to a master/slave system. The WAGO Compact Controller CC100 DALI (751-9403) is a "Multi-Master" that supports the DALI interface and can use it together with other masters.

---

**Random address**

The "Random address" (also "Search address") is a 24-bit address generated by an ECG during initialization.

---

**Settling Time**

"Settling Time" is the minimum time period between two frames.

---

**Single Master**

In contrast to a "Multi-Master," a "Single Master" does not support collision detection and is not suitable for connection at the same interface with other masters.

---

**Virtual Group**

A DALI group is a logical combination of devices to which a common group address is assigned so that these devices execute a common function synchronously. These devices do not necessarily have to be physically linked (e.g., the group for all emergency lighting systems, all hallway lights, etc.). In case the 16 available group addresses (0 ... 15) are not sufficient because further groups are required, an additional 16 virtual groups can be created (with group addresses 17 ... 31). However, these cannot be addressed via a DALI group command, but only sequentially via individual commands from the WAGO Compact Controller CC100 DALI (751-9403). A maximum of eight devices may be assigned to each virtual group in order not to slow down or impede DALI data exchange on the bus.

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