# USER GUIDE

# Lynx L108/208-F2G-S2

Industrial Ethernet 8-Port Device Server Switch

**WeOS**

# Table of Contents

# 1. General Information

## 1.1. Legal Information

The contents of this document are provided "as is". Except as required by applicable law, no warranties of any kind are made in relation to the accuracy and reliability or contents of this document, either expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Westermo reserves the right to revise this document or withdraw it at any time without prior notice.

Under no circumstances shall Westermo be responsible for any loss of data or income or any special, incidental, and consequential or indirect damages howsoever caused.

More information about Westermo can be found at www.westermo.com.

## 1.2. About This Guide

This guide is intended for installation engineers and users of the Westermo products.

It includes information on safety and regulations, a product description, installation instructions and technical specifications.

## 1.3. Software Tools

Related software tools are available at www.westermo.com/support/software-tools.

## 1.4. License and Copyright for Included FLOSS

This product includes software developed by third parties, including Free/Libre Open Source Software (FLOSS). The specific license terms and copyright associated with the software are included in each software package respectively. Please visit the product web page for more information.

Upon request, the applicable source code will be provided. A nominal fee may be charged to cover shipping and media. Please direct any source code request to your normal sales or support channel.

## 1.5. WeOS Management Guide

This product runs WeOS (Westermo Operating System). Instructions for quick start, configuration, factory reset and use of USB port are found in the WeOS Management Guide at www.westermo.com.

# 2. Safety and Regulations

## 2.1. Warning Levels

Warning signs are provided to prevent personal injuries and/or damages to the product. The following levels are used:

| Level of warning | Description | Consequence personal injury | Consequence material damage |
|---|---|---|---|
| WARNING | Indicates a potentially hazardous situation | Possible death or major injury | Major damage to the product |
| CAUTION | Indicates a potentially hazardous situation | Minor or moderate injury | Moderate damage to the product |
| NOTICE | Provides information in order to avoid misuse of the product, confusion or misunderstanding | No personal injury | Minor damage to the product |
| NOTE | Used for highlighting general, but important information | No personal injury | Minor damage to the product |

*Table 1. Warning levels*

## 2.2. Safety Information
**Before installation:**

Read this manual completely and gather all information available on the product. Make sure it is fully understood. Check that your application does not exceed the safe operating specifications for the product.

This product should only be installed by qualified personnel.

This product should be built-in to an apparatus cabinet or similar, where access is restricted to service personnel only.

The power supply wiring must be sufficiently fused, and if necessary, it must be possible to disconnect it manually from all power supply. Ensure compliance to national installation regulations.

**WARNING - PREVENT ACCESS TO HAZARDOUS VOLTAGE**
Before mounting, using or removing this product: Prevent access to hazardous voltage by disconnecting the product from all power supply.

**WARNING - HAZARDOUS VOLTAGE**
Do not open the connected product. Hazardous voltage may occur within this product when connected to power supply.

**WARNING - PROTECTIVE EARTHING**
Before powering up, a protective earthing conductor must be connected to the protective earthing terminal and have a cross-sectional area of at least 4 mm$^2$.

**CAUTION - HOT SURFACE**
Be aware of that the surface of this product may become hot. When this product is operated at high temperatures, the external surface of the product may exceed Touch Temperature Limit according to EN/IEC/UL 60950-1.

**NOTICE - REDUCE RISK OF FIRE**
To reduce the risk of fire, use only No. 26 (e.g. 24 AWG) UL listed or CSA certified Telecommunication Line Cord.

## 2.3. Care Recommendations

Follow the care recommendations below to maintain full operation of the product and to fulfill the warranty obligations:

• Do not drop, knock or shake the product. Rough handling above the specification may cause damage to internal circuit boards.
• Do not use harsh chemicals, cleaning solvents or strong detergents to clean the product.
• Do not paint the product. Paint can clog the product and prevent proper operation.

If the product is used in a manner not according to specification, the protection provided by the equipment may be impaired.

If the product is not working properly, contact the place of purchase, nearest Westermo distributor office or Westermo technical support.

## 2.4. Maintenance

No maintenance is required, as long as the product is used as intended within the specified conditions.

## 2.5. Product Disposal

This symbol means that the product shall not be treated as unsorted municipal waste when disposing of it. It needs to be handed over to an applicable collection point for recycling electrical and electronic equipment.

By ensuring the product is disposed of correctly, you will help to reduce hazardous substances and prevent potential negative consequences to both environment and human health, which could be caused by inappropriate disposal.



*Figure 1. WEEE symbol for treatment of product disposal*

## 2.6. Compliance Information

### 2.6.1. Agency Approvals and Standards Compliance

| Type | Approval/Compliance |
|------|---------------------|
| EMC | • EN 61000-6-1, Immunity residential environments<br>• EN 61000-6-2, Immunity industrial environments<br>• EN 61000-6-4, Emission industrial environments<br>• EN 50121-3-2/IEC 62236-3-2 Railway applications – Rolling stock – apparatus |
| Safety | • EN/IEC/UL 60950-1, IT equipment |
| Marine[a] | • DNV GL rules for classification - Ships and offshore units |

[a]Only valid for Lx08-F2G-S2

*Table 2. Agency approvals and standards compliance*

### 2.6.2. FCC Part 15.105 Notice

This product has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This product generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this product does cause harmful interference to radio or television reception, which can be determined by turning the product off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna
• Increase the separation between the unit and receiver
• Connect the product into an outlet on a circuit different from that to which the receiver is connected
• Consult the dealer or an experienced radio/TV technician for help

### 2.6.3. AREMA

L108-F2G-S2-12VDC has been tested according to AREMA Part 11.3.3, 11.5.1 and 11.5.2.

| Port | Test | Remark |
|------|------|--------|
| DC Power | 3 x Un, 80 ms | Un (max)=12 VDC when powered from a vital signal battery |

*Table 3. AREMA Part 11.3.3 C.4. - Signal equipment surge withstand capability for DC input port*

| | Class C | Class D | Class E | Remarks |
|---|---|---|---|---|
| Temperature | ✕ | ✕ | ✕ | |
| Relative humidity | ✕ | ✕ | ✕ | |
| Vibration | ✕ | ✕ | ✕ | |
| Mechanical shock | ✕ | ✕ | ✕ | |
| Dielectric strength | | | ✕ | Tested with 1.5 kVAC rms |

*Table 4. AREMA Part 11.5.1. - Environmental Class*

| | External | Internal |
|---|---|---|
| **Enclosure port** | | |
| Radiated RF immunity | ✕ | ✕ |
| Power Frequency Magnetic Field | ✕ | ✕ |
| Pulse Magnetic Field | ✕ | ✕ |
| **DC power port** | | |
| EFT/Burst | ✕ | ✕ |
| Surge (1.2/50µs) | - | ✕ |
| Conducted RF | ✕ | ✕ |
| **DI-, DO-port** | | |
| EFT/Burst | ✕ | ✕ |
| Surge (1.2/50µs) | - | ✕ |
| Conducted RF | ✕ | ✕ |
| **Ethernet ports** | | |
| EFT/Burst | ✕ | ✕ |
| Surge (1.2/50µs) | ✕ | ✕ |
| Conducted RF | ✕ | ✕ |
| **Serial ports** | | |
| EFT/Burst | ✕ | ✕ |
| Surge (1.2/50µs) | ✕ | ✕ |
| Conducted RF | ✕ | ✕ |

*Table 5. AREMA Part 11.5.2. - Exposure Class*

AREMA Part 11.3.3.E. - Equipment surge withstand documentation DC power port

1. Maximum normal circuit voltage when powered from a vital signal battery is 12VDC otherwise 24 VDC
2. Surge protection clamping voltage is 58.1 VDC
3. Maximum energy handling cabability is 2 J, 1ms

## 2.6.4. Corrosive Environment
This product has been successfully tested in a corrosion test according to IEC 60068- 2-60, method 3. This means that the product meets the requirements to be placed in an environment classified as ISA-S71.04 class G3.

> ⚠️ **CAUTION - CORROSIVE GASES**
> If the product is placed in a corrosive environment, it is important that all unused connector sockets are protected with a suitable plug, in order to avoid corrosion attacks on the gold plated connector pins.

### 2.6.5. Simplified Declaration of Conformity

Hereby, Westermo declares that this product is in compliance with applicable EU directives. The full EU declaration of conformity and other detailed information is available at www.westermo.com/support/product-support.

$C\epsilon$

*Figure 2. The European conformity marking*

# 3. Product Description

## 3.1. Product Description

Lynx DSS is designed for simple use in industrial applications, from the robust DIN rail clip solution to the configurable fault contact and the industrial level of dual power inputs.

Only industrial grade components are used which gives Lynx DSS an MTBF of 517,000 hours and ensures a long service life. A wide operating temperature range of -40 to +70°C (-40 to +158°F) can be achieved with no moving parts or cooling holes in the case. Lynx DSS has been tested both by Westermo and external test institutes to meet many EMC, isolation, vibration and shock standards, all to the highest levels suitable for heavy industrial environments and rail trackside applications.

WeOS has been developed by Westermo to offer cross platform and future proof solutions. For more WeOS functionality, please see the WeOS datasheet.

## 3.2. Available Models

| Art. no. | Model | 100 Mbit TX ports | Gbit SFP ports | Serial ports | Software | Rated voltage |
|---|---|---|---|---|---|---|
| 3643-0200 | L108-F2G-S2 | 4 | 2 | 2 | L2 | 24-48 VDC |
| 3643-0240 | L108-F2G-S2-12VDC | 4 | 2 | 2 | L2 | 12-24 VDC |
| 3643-0205 | L208-F2G-S2 | 4 | 2 | 2 | L3 | 24-48 VDC |

## 3.3. Hardware Overview
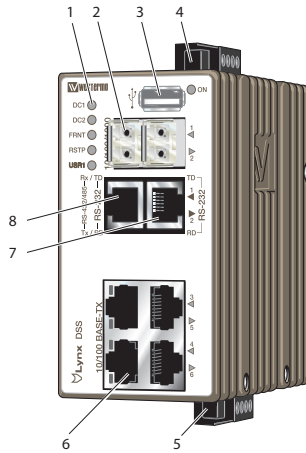


| No. | Description | No. | Description |
|-----|-------------|-----|-------------|
| 1 | LED indicators | 2 | SFP transceivers |
| 3 | USB connection | 4 | Power connection |
| 5 | I/O connection | 6 | Ethernet connection |
| 7 | RS-232 connection | 8 | RS-232 and RS-422/485 connection |

*Figure 3. Location of interface ports and LED indicators*
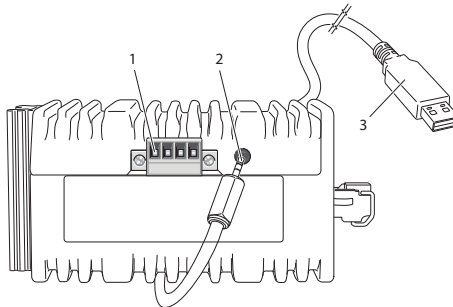


| No. | Description | No. | Description |
|-----|-------------|-----|-------------|
| 1 | I/O connection | 2 | Console port |
| 3 | Accessorie cable, art. no. 1211-2027 | | |

*Figure 4. Location of interface ports, bottom view*

## 3.4. Connector Information

### 3.4.1. Ethernet Connection TX

| Illustration | Pin no. | Signal | Direction | Description |
|---|---|---|---|---|
|  | 1 | TD+ | In/Out | Transmitted/Received data |
| | 2 | TD- | In/Out | Transmitted/Received data |
| | 3 | RD+ | In/Out | Transmitted/Received data |
| | 4 | - | - | Not connected |
| | 5 | - | - | Not connected |
| | 6 | RD- | In/Out | Transmitted/Received data |
| | 7 | - | - | Not connected |
| | 8 | - | - | Not connected |
| | Shield | | | Connected to PE |

*Table 6. Ethernet connection TX*

### 3.4.2. Power Input
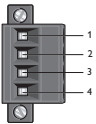
| Illustration | Position | Product marking | Direction | Description |
|---|---|---|---|---|
|  | 1 | +DC1 | Input | Supply voltage |
| | 2 | +DC2 | Input | Supply voltage |
| | 3 | -COM | Input | Common |
| | 4 | -COM | Input | Common |

*Table 7. Power input*

Lynx supports redundant power connection. The positive inputs are +DC1 and +DC2, the negative input for both supplies are -COM. Connect the primary voltage (e.g. +24 VDC) to the +DC1 pin and return to one of the -COM pins on the power input.

### 3.4.3. I/O Connection
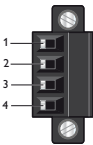
| Illustration | Pin no. | Product marking | Direction | Description |
|---|---|---|---|---|
|  | 1 | Status + | Output | Alarm relay (status) contact |
| | 2 | Status - | Output | Alarm relay (status) contact |
| | 3 | Digital in + | Input | Digital in + |
| | 4 | Digital in - | Input | Digital in - |

*Table 8. I/O connection*

The Status output is a potential free, opto-isolated, normally closed, solit-state relay. This can be configured to monitor various alarm events within the unit, see *WeOS Management Guide*. An external load in series with an external voltage source is required for proper functionality. For voltage/current, see Interface Specification section.

The Digital in is an opto-isolated digital input, which can be used to monitor external events. For voltage/current, see Interface Specification section.
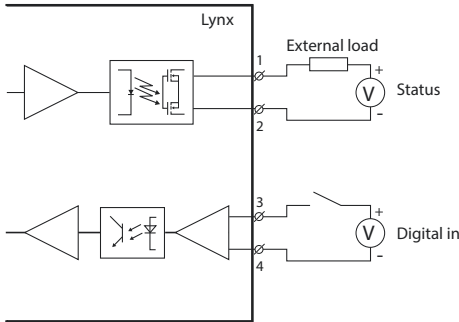


Figure 5. Digital in

### 3.4.4. RS-232 Connection (DCE)

| Illustration | Pin no. | Signal | Direction | Description |
|---|---|---|---|---|
| | 1 | DSR | Out | Data Set Ready |
| | 2 | DCD | Out | Data Carrier Detect |
| | 3 | DTR | In | Data Terminal Ready |
| | 4 | SG | - | Signal Ground, not chassis ground |
| | 5 | RD | Out | Receive Data |
| | 6 | TD | In | Transmit Data |
| | 7 | CTS | Out | Clear To Send |
| | 8 | RTS | In | Request To Send |

Table 9. RS-232 connection

### 3.4.5. RS-422/485 Connection

| Illustration | Pin no. | Signal | | Direction | Description |
|---|---|---|---|---|---|
| | | RS-422 (4-wire) | RS-485 (2-wire) | | |
|  | 1 | T+ | T+/R+ | Out/In | RS-422: Transmit RS-485: Transmit/Receive |
| | 2 | T- | T-/R- | Out/In | RS-422: Transmit RS-485: Transmit/Receive |
| | 3 | R- | - | In | RS-422: Receive |
| | 4 | - | - | - | Not used |
| | 5 | - | - | - | Not used |
| | 6 | R+ | - | In | RS-422: Receive |
| | 7 | - | - | - | Not used |
| | 8 | - | - | - | Not used |

Table 10. RS-422/485 connection

Lynx is equipped with with an internal termination that is configurable through software in RS-422/485 mode. The following termination schemes are supported:
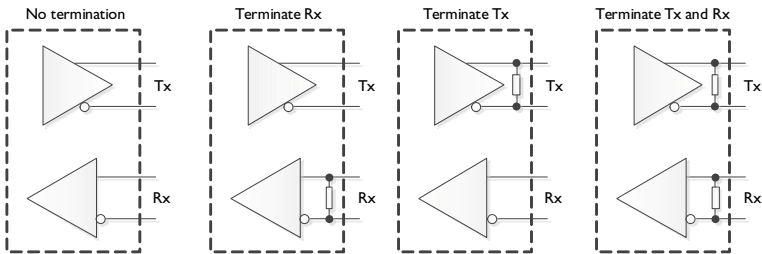


Figure 6. RS-422 termination scheme
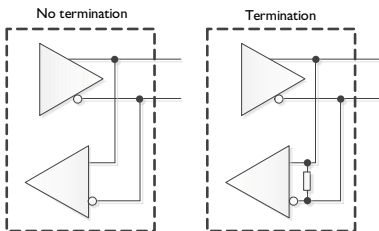


Figure 7. RS-485 termination scheme

When the unit is powered off or during reboot, any internal termination will be disconnected from the signal lines.

> **NOTE**
> NOTE - The port is configurable for both RS-232 and RS-422/485, hence no fail-safe biasing is available for RS-422/485 signals.

### 3.4.6. USB Connection

| Illustration | Pin no. | Direction | Description |
|---|---|---|---|
| | 1 | Out | VBUS |
| | 2 | In/Out | D- |
| | 3 | In/Out | D+ |
| | 4 | Out | GND |
| | 5 | In/Out | Connected to protective earth |

*Table 11. USB connection*

## 3.5. LED Indicators

| LED | Status | Description |
|---|---|---|
| ON | OFF | Product has no power |
| | GREEN | All OK, no alarm condition |
| | RED | Alarm condition, or until product has started up. (Alarm conditions are configurable, see *WeOS Management Guide*) |
| | BLINK | Location indicator ("Here I am!"). Activated when connected to WeConfig tool, or upon request from web or/and CLI. RED BLINK during boot indicates pending cable factory reset. |
| DC1 | OFF | Product has no power |
| | GREEN | Voltage present on DC1[a] |
| | RED | Power failure on +DC1 |
| DC2 | OFF | Product has no power |
| | GREEN | Voltage present on DC2[a] |
| | RED | Power failure on +DC2 |
| FRNT | OFF | FRNT disabled |
| | GREEN | FRNT OK |
| | RED | FRNT error |
| | BLINK | Product configured as FRNT focal point |
| RSTP | OFF | RSTP disabled |
| | GREEN | RSTP enabled |
| | BLINK | Product selected as RSTP/STP root switch |
| USR1 | Configurable, see *WeOS Management Guide* | |
| Rx/TD, TD | OFF | No serial data received |
| | GREEN FLASH | Serial data received |
| Tx/RD, RD | OFF | No serial data transmitted |
| | GREEN FLASH | Serial data transmitted |
| 1 to 6 | OFF | No link |
| | GREEN | Link established |
| | GREEN FLASH | Data traffic indication |

| LED | Status | Description |
|---|---|---|
|  | YELLOW | Port alarm and no link. Or if FRNT or RSTP mode, port is blocked. |

[a]Supply voltage levels must be ensured externally. A green LED indicator may not guarantee a valid operating voltage level

*Table 12. LED indicators*

## 3.6. SFP Transceivers

### 3.6.1. Supported Transceivers
Firmware prior to 4.4.0 accepts Westermo branded transceivers only. From 4.5.0 other transceivers are accepted with a notice and the product will no longer be UL approved. Temperature specifications are also depending on the used transceivers.

> **NOTICE - SUPPORTED TRANSCEIVERS**
> To comply with UL60950-1, only UL recognised SFP transceivers should be used.

### 3.6.2. Deviations
With copper transceiver 1100-0148, the specified operating temperature of the product is 0 to 50°C. FRNT reconfiguration times can not be guaranteed with copper transceivers.

## 3.7. Dimensions

Dimensions are stated in mm and are regardless of Lynx model.
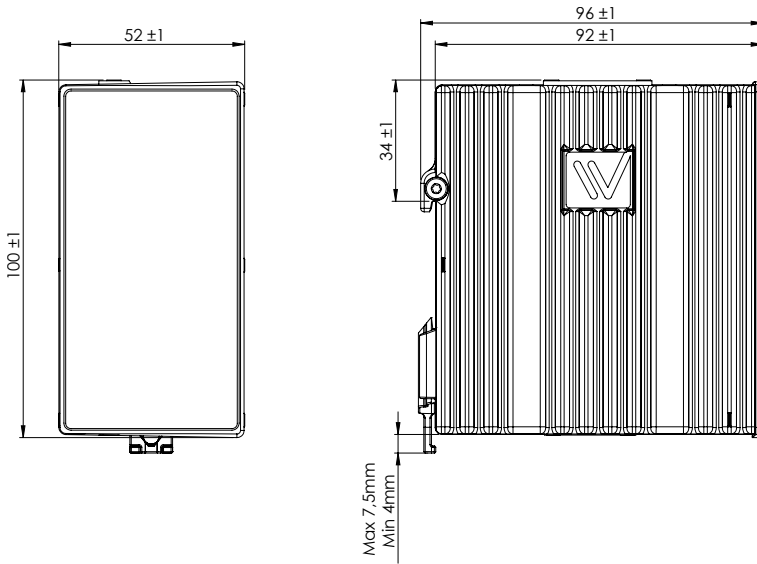


*Figure 8. Dimensional drawing*

# 4. Installation

## 4.1. Mounting

This product should be mounted on a 35 mm DIN-rail, which is horizontally mounted inside an apparatus cabinet or similar. It is recommended that the DIN-rail is connected to ground. Snap on the product to the DIN-rail according to the figure.



*Figure 9. Mounting of product*

## 4.2. Removal of Product

To remove the product that has an integrated DIN-clip, press down the support at the back with a screwdriver.



*Figure 10. Removal of product*

## 4.3. Cooling

This product uses convection cooling. Spacing is recommended for the use of the product in full operating temperature range and service life. To avoid obstructing the airflow around the product, use the following spacing rules.

Minimum spacing of 25 mm (1 inch) above/below and 10 mm (0.4 inches) left/right of the productis recommended.



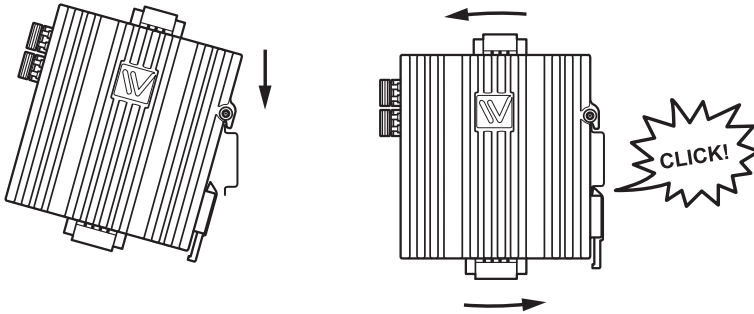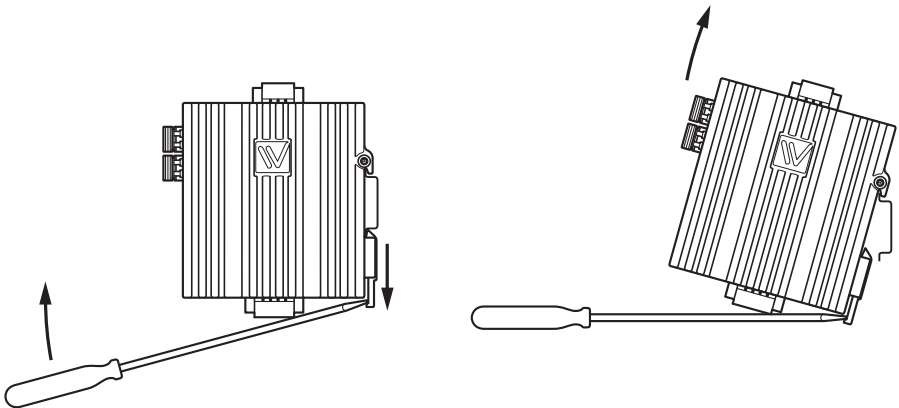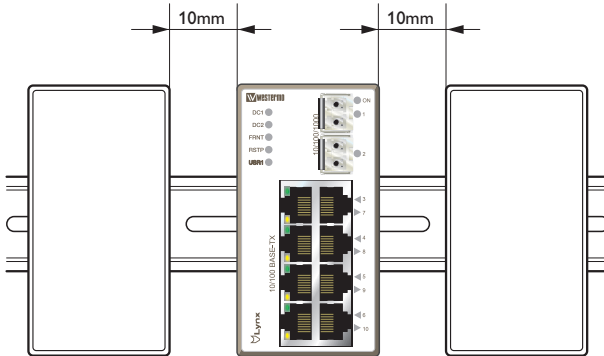*Figure 11. Miminum spacing of product*

## 4.4. Getting Started

This product runs the Westermo Operating System (WeOS) which provides several management tools that can be used for configuration of the unit.

- **WeConfig tool**
  This is a custom Westermo tool used for discovery of attached Westermo product.
- **Web**
  Configuration of the product using the web browser.
- **CLI**
  Configuration of the product via the Command Line Interface.
  Username: *admin*
  Password: *westermo*

If the computer is located in the same subnet as the switch you can easily use a web browser to configure the product. Within the web you can configure most of the available functions. If you are not sure about the subnet – consult your network administrator.

For advanced network settings and more diagnostic information, please use the CLI. Detailed documentation is available in the chapter *"The Command Line Management Tool"* in the *WeOS Management Guide*.

Factory default:

IP address: *192.168.2.200*
Netmask: *255.255.255.0*
Gateway: *disabled*

## 4.5. Configuration Via a Web Browser

The product can easily be configured via a web browser. Open the link http://192.168.2.200 in your web browser, and you will be prompted with a login screen, where the default settings are:

Username: *admin*
Password: *westermo*

Once logged in, use the extensive integrated help function describing all configuration options.

Two common task when configuring a new switch is to assign appropriate IP settings, and to change the password of the admin account. The password can be up to 64 characters long, and should consist of printable ASCII characters (ASCII 33-126); 'Space' is not a valid password character.

**NOTE**
Note! Version of WeConfig tool must be **10.3.0** or higher.

## 4.6. Factory Default

It is possible to set the product to factory default settings by using two straight standard Ethernet RJ-45 cables.

1. Power off the product and disconnect all Ethernet cables (copper and fibre).
2. Connect one Ethernet cable between Ethernet ports 3 and 6, and the other between Ethernet ports 4 and5. The ports need to be connected directly by an Ethernet cable, i.e., not via a hub or switch. Use a straight cable – not a cross-over cable – when connecting the ports.
3. Power on the product.
4. Wait for the product to start up. Control that the ON LED is flashing red. The product is now ready to be either reset to factory default or to boot as normal.

To go ahead with factory reset:

**NOTE**
Do not power off the product while the factory reset process is in progress.

- Acknowledge that you wish to conduct the factory reset by unplugging the Ethernet cables. The ON LED will stop flashing. This initiates the factory reset process, and after approximately 1 minute the product will restart with factory default settings. When the product has booted up, the ON LED will show a green light, and is now ready to use.

To boot as normal:

- To skip the factory reset process, just wait for approximately 30 seconds (after the ON LED starts flashing RED) without unplugging the Ethernet cables. The product will conduct a normal boot with the existing settings.

# 5. Specifications

## 5.1. Interface Specifications

| DC, Power port | | |
|---|---|---|
| | **L108-F2G-S2-12VDC:** | **Lx08-F2G-S2:** |
| **Rated voltage** | 12 - 24 VDC | 24 - 48 VDC |
| **Operating voltage** | 9.8 - 36 VDC | 19 - 60 VDC |
| **Rated current** | 470 mA (820 mA) at 12 VDC (with 500 mA USB load)<br>230 mA (390 mA) at 24 VDC (with 500 mA USB load) | 250 mA (380 mA) at 24 VDC (with 500 mA USB load)<br>120 mA (188 mA) at 48 VDC (with 500 mA USB load) |
| **Rated frequency** | DC | |
| **Inrush current, I²t** | 102 mA$^2$s at 12 VDC<br>71,2 mA$^2$s at 24 VDC | 22.7 mA$^2$s at 48 VDC |
| **Startup current**[a] | 2 x rated current | |
| **Polarity** | Reverse polarity protected | |
| **Redundant power input** | Yes | |
| **Isolation** | All other ports | |
| **Connector** | Detachable screw terminal | |
| **Conductor cross section** | 0.2-2.5 mm² (AWG 24-12) | |
| **Stripping length cable** | 7 mm | |
| **Tightening torque, terminal screw** | 0.5 - 0.6 Nm | |
| **Tightening torque, screw flange** | 0.3 Nm | |
| **Shielded cable** | Not required | |

[a]Recommended external supply current capability for proper startup

| Ethernet TX | |
| --- | --- |
| Electrical specification | IEEE std 802.3 |
| Data rate | 10 Mbit/s, 100 Mbit/s, manual or auto |
| Duplex | Full or half, manual or auto |
| Circuit type | TNV-1 |
| Transmission range | Up to 150 m with CAT5e cable or better |
| Isolation | All other ports |
| Connection | RJ-45, auto MDI/MDI-X |
| Cabling | Shielded CAT5e or better is recommended |
| Conductive chassis | Yes |
| Number of ports | 4 |

| Ethernet SFP pluggable connections (FX or TX) | |
| --- | --- |
| Electrical specification | IEEE std 802.3 |
| Data rate | 100 Mbit/s, 1000 Mbit/s, transceivers supported |
| Duplex | Full or Auto, depending on transceiver |
| Transmission range | Depending on transceiver, see datasheet for SFP transceivers |
| Connection | SFP slot holding fibre transceiver or copper transceiver |
| Number of ports | 1 or 2 |

| RS-232 | |
| --- | --- |
| Electrical specification | EIA RS-232 |
| Data rate | 300 bit/s - 115.2 kbit/s |
| Data format | 7 or 8 data bits, odd, even or none parity, 1 or 2 stop bits |
| Protocol | Transparent, optimised by packing algorithm |
| Circuit type | SELV |
| Transmission range | 15 m/49 ft |
| Isolation | To all other ports |
| Connection | RJ-45 according to EIA-561 |
| Shielded cable | Recommended |
| Conductive chassis | Yes |
| Number of ports | 1 |

| RS-422/485 | |
|---|---|
| Electrical specification | Configurable for EIA RS-232 or EIA RS-422/485 |
| Data rate | 50 bit/s - 2 Mbit/s |
| Data format | 7 or 8 data bits, odd, even or none parity, 1 or 2 stop bits (2 stop bits only when no parity is set)V |
| Circuit type | TNV-1 |
| Transmission range | Up to 1200 m/0.74 mi, depending on data rate and cable type |
| Isolation | To all other ports |
| Connection | RJ-45 according to EIA-561 |
| Shielded cable | Shielded cable not required, except when installed in Railway application as signalling and telecommunications apparatus and located close to rails[a] |
| Conductive chassis | Yes |
| Number of ports | 1 |

[a]To minimise the risk of interference, a shielded cable is recommended when the cable is located inside 3 m boundary or the cable is longer than 30 m and inside 10 m boundary to the rails and connected to this port.

| I/O connection, Relay output | |
|---|---|
| Maximum voltage/current | 60 VDC/80 mA |
| Connect resistance | Maximum 30 Ω |
| Isolation | To all other ports |
| Connector | Detachable screw terminal |
| Conductor cross section | 0.14 - 1.5 mm² (AWG 28 - 16) |
| Stripping length cable | 7 mm |
| Tightening torque, terminal screw | 0.22 - 0.25 Nm |
| Tightening torque, screw flange | 0.3 Nm |

| I/O connection, Digital input | |
|---|---|
| Maximum voltage/current | 60 VDC/2mA |
| Voltage levels | Logic one: >12 V<br>Logic zero: <1 V |
| Isolation | To all other ports |
| Connector | Detachable screw terminal |
| Conductor cross section | 0.14 - 1.5 mm² (AWG 28 - 16) |
| Stripping length cable | 7 mm |
| Tightening torque, terminal screw | 0.22 - 0.25 Nm |
| Tightening torque, screw flange | 0.3 Nm |

| USB | |
|---|---|
| Electrical specification | USB 2.0 hose interface |
| Data rate | Up to 12 Mbit/s (full speed mode) |
| Circuit type | SELV |
| Maximum supply current | 400 mA |
| Connection | USB receptable connector type A |

| Console port | |
|---|---|
| Electrical specification | LVTTL-level (service port, shall not be connected during normal operation. Only to be used during maintenance.) |
| Data rate | 115.2 kbit/s |
| Circuit type | SELV |
| Data format | 8 data bits, no parity, 1 stop bit, no flow control |
| Connection | 2.5 mm jack, use only Westermo cable 1211-2027 |

## 5.2. Type Tests and Environmental Conditions

| Environmental phenomena | Basic standard | Description | Test levels |
|---|---|---|---|
| ESD | EN 61000-4-2 | Enclosure | Contact: ±6 kV<br>Air: ±8 kV |
| Fast transients | EN 61000-4-4 | Power port | ± 2 kV |
| | | Ethernet | |
| | | Status out/Digital in | |
| | | Serial ports | |
| | | Enclosure | |
| Surge | EN 61000-4-5 | Power port | L-L: ± 0.5 kV, 2 Ω, 18 µF<br>L-E: ± 2 kV, 42 Ω, 0.5 µF<br>L-L: ± 1 kV, 42 Ω, 0,5 µF<br>L-E: ± 2 kV, 12 Ω, 9 µF<br>L-L: ± 1 kV, 12 Ω, 9 µF |
| | | Ethernet | L-E: ± 2 kV, 2 Ω, 0.5 µF |
| | | Status out/Digital in | L-E: ± 2 kV, 42 Ω, 0.5 µF<br>L-L: ± 1 kV, 42 Ω, 0,5 µF |
| | | RS-232 | L-E: ± 2 kV, 2 Ω, 0,5 µF |
| | | RS-422/485 | L-E: ± 2 kV, 42 Ω, 0,5 µF |
| Power frequency magnetic field | EN 61000-4-8 | Enclosure | 300 A/m; 0, 16.7, 60 Hz<br>1000 A/m; 50 Hz |
| Pulsed magnetic field | EN 61000-4-9 | Enclosure | 300 A/m |
| Radiated RF immunity | EN 61000-4-3 | Enclosure | 10 V/m at (80 - 800) MHz)<br>20 V/m at (800 - 1000) MHz<br>10 V/m at (1.4 - 2.1) GHz<br>5 V/m at (2.1 - 2.5) GHz<br>1 V/m at (2.5 - 2.7) GHz<br>1 kHz sine, 80% AM |
| Conducted RF immunity | EN 61000-4-6 | Power port | 10 V, 80% AM, 1 kHz; (0.15-80) MHz |
| | | Ethernet | |
| | | Status out/Digital in | |
| | | Serial ports | |
| | | Earth port | |
| Radiated RF emission | CISPR 16-2-3<br>ANSI C63,4<br>(FCC Part 15) | Enclosure | Class B/DNV bridge |
| Conducted RF emission | CISPR 16-2-3<br>ANSI C63,4<br>(FCC Part 15b) | Power port | Class B/DNV bridge |
| | | Ethernet | Class B |

| Environmental phenomena | Basic standard | Description | Test levels |
|---|---|---|---|
| Compass safe distance | DNV | Enclosure | Standard compass (5.4°/H deviation) = 15 cm Steering/standby steering / emergency compass (18°/H deviation) = 10 cm |
| Dielectric strength | EN 60950-1 | Power port to all other ports | 1.5 kVrms, 50 Hz, 1 min |
| | | Ethernet ports to all other ports | |
| | | RS-322 port to all other ports | |
| | | RS-422/485 port to all other ports | |

*Table 13. EMC and electrical conditions*

| Environmental phenomena | Basic standard | Description | Test levels |
|---|---|---|---|
| Temperatures | EN 60068-2-1 EN 60068-2-2 | Operating | -40 to +70°C (-40 to +158°F)[a] |
| | | Storage and transport | -50 to +85°C (-58 to +185°F) |
| Humidity | EN 60068-2-30 | Operating | 5-95% relative humidity |
| | | Storage and transport | |
| Altitude | | Operating | 2000 m/70 kPa |
| Service life | | Operating | 10 years |
| MTBF | MIL-C217F2, Parts count | | 517,000 hours |
| Vibration | IEC 60068-2-6 (sine) | Operating | 3 - 13.2 Hz: 1 mm 13.2 - 100 Hz 0.7 g<br><br>5.5 - 30 Hz: 1.5 g 30 - 50 Hz: 0.42 mm 50 - 500 Hz: 4.2 g[b] |
| | IEC 60068-2-64 (random) | Operating | 5 - 20 Hz: 2 $m^2/s^2$ 20 - 2000 Hz - 3 dB/oct |
| Shock | IEC 60068-2-27 | Operating | 30 g, 11 ms 100 g, 6 ms[b] |
| Bump | IEC 60068-2-27 | Operating | 10 g, 11 ms |
| Enclosure | EN 60950-1 | Zinc | Fire enclosure |
| Weight | | | 0.7 kg |
| Degree of protection | EN 60529 | Enclosure | IP40 |
| Cooling | | | Convection |

[a]Refer to "Safety and Regulations" chapter regarding touch temperature

[b]Might require Ethernet cables to be fastened close to the unit.

*Table 14. Environmental and mechanical conditions*

# 6. Revision Notes

| Revision | Date | Change description |
|---|---|---|
| Rev M | 2019-09 | 2.6.1 Agency Approvals and Standards Compliance updated, 2.6.3 New chapter, 3.1 Product Description updated, 5.1 Interface specifications updated (USB), 5.2 Type Tests and Environmental Conditions updated (temperature) |
| Rev. L | 2019-04 | Added product L108-F2G-S2-12VDC and references to it - frontpage, 2.6.1 Agency approvals and Standards Compliance, 3.1 Product Description, 5.1 Interface Specifications, 5.2 Type Tests and Environmental Conditions |