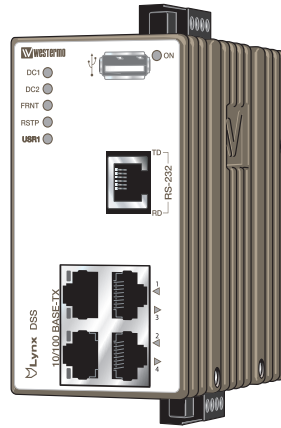


User Guide
6643-2230



Lynx DSS

L105-S1/L205-S1



*Industrial Ethernet
5-port Device Server Switch*

www.westermo.com



Software tools

Related software tools are available in the folder software tools under technical support on the Westermo website.

Legal information

The contents of this document are provided "as is". Except as required by applicable law, no warranties of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, are made in relation to the accuracy and reliability or contents of this document. 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 the following Internet address:

<http://www.westermo.com>

Safety



Before installation:

Read this manual completely and gather all information on the unit. Make sure that you understand it fully. Check that your application does not exceed the safe operating specifications for this unit.

This unit should only be installed by qualified personnel.

This unit 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 manually from all power supply. Ensure compliance to national installation regulations. This unit uses convection cooling. Make sure that the unit is installed such as its ambient temperature is within its specified maximum/minimum temperature.



Before mounting, using or removing this unit:

Prevent access to hazardous voltage by disconnecting the unit from all power supply.

WARNING

Do not open connected unit. Hazardous voltage may occur within this unit when connected to power supply.

Before powering-up, a protective earthing conductor must be connected to the protective earthing terminal and have a cross-sectional area of at least 1.5 mm².

Note that this unit can be connected to two different power sources.

When this unit is operated at an ambient temperature above +55°C (+131°F), the External Surface of Equipment may exceed Touch Temperature Limit according to EN/IEC/UL 60950-1.

To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.

Care recommendations

Follow the care recommendations below to maintain full operation of unit and to fulfill the warranty obligations.

This unit must not be operating with removed covers or lids.

Do not attempt to disassemble the unit. There are not any user serviceable parts inside.

Do not drop, knock or shake the unit. 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 unit.

Do not expose the unit to any kind of liquids (rain, beverages, paint etc), unless all connectors and the ventilation membrane are sufficiently protected.

Do not use or store the unit in dusty or dirty areas, unless all connectors and the ventilation membrane are sufficiently protected.

Do not cover or bring mechanical force to the ventilation membrane on the back of the unit.

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

Maintenance

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

Agency approvals and standards compliance

| Type | Approval / Compliance |
|--------|--|
| EMC | EN 61000-6-1, Immunity residential environments |
| | EN 61000-6-2, Immunity industrial environments |
| | EN 61000-6-3, Emission residential environments |
| | EN 61000-6-4, Emission industrial environments |
| | EN 50121-4, Railway signalling and telecommunications apparatus |
| | IEC 62236-4, Railway signalling and telecommunications apparatus |
| Safety | UL/IEC/EN 60950-1, IT equipment |
| Marine | DNV GL rules for classification – Ships and offshore units . |

FCC Part 15.105

Notice:

This equipment 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 equipment 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 equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment 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 equipment and receiver
- ⌘ Connect the equipment 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.

Corrosive environment

Notice:

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*.

Note! If the product is placed in a corrosive environment, it is important that all un-used connector sockets are protected with a suitable plug in order to avoid corrosion attacks on the gold plated pins in connectors.

Declaration of Conformity



Westermo Teleindustri AB

Declaration of Conformity

The manufacturer Westermo Teleindustri AB
SE-640 40 Stora Sundby, Sweden

Herewith declares that the product(s)

| Type of product | Model ¹ | |
|---|--------------------|----------|
| Industrial Ethernet 5-port Device Server Switch | Lynx DSS | Lx05-S1y |


is in conformity with the following EU directive(s).

| No | Short name |
|------------|--|
| 2014/30/EU | Electromagnetic Compatibility (EMC) |
| 2014/35/EU | Low Voltage Directive (LVD) |
| 2011/65/EU | Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) |

References of standards applied for this EU declaration of conformity.

| No | Title | Issue |
|--------------|--|---|
| EN 61000-6-1 | Electromagnetic compatibility – Immunity for residential environments | 2007 |
| EN 61000-6-2 | Electromagnetic compatibility – Immunity for industrial environments | 2005 |
| EN 61000-6-3 | Electromagnetic compatibility – Emission for residential environments | 2007 +A1:2011 |
| EN 61000-6-4 | Electromagnetic compatibility – Emission for industrial environments | 2007 +A1:2011 |
| EN 50121-4 | Railway applications - Electromagnetic compatibility Emission and immunity of the signalling and telecommunications apparatus | 2006 |
| EN 60950-1 | Information technology equipment - Safety - Part 1: General requirements | 2006 +A11: 2009 +A1: 2010 +A12: 2011 |
| EN 50581 | Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances | 2012 |

The last two digits of the year in which the CE marking was affixed: 16


Signature

Pierre Öberg
Technical Manager
21st March 2016

¹ Model Differences: x = 1 or 2 and indicates Software Class, y = optional and may indicate customer specific models.

| | | | | | | |
|---------------------------------|-------------------------------|-------------------------------|------------|-----------|----------------------------------|-------------------|
| Postadress/Postal address | Tel. | Telefax | Postgöro | Bankgöro | Org.nr/ Corp. Identity number | Registered office |
| S-640 40 Stora Sundby Sweden | 016-428000 Int+46 16428000 | 016-428001 Int+46 16428001 | 52 72 79-4 | 5671-5550 | 556361-2604 | Eskilstuna |

Type tests and environmental conditions

| Environmental phenomena | Basic standard | Description | Test levels |
|--------------------------------|---|-----------------------------------|--|
| Electrostatic discharge | EN 61000-4-2 | Enclosure | Contact: ± 6 kV Air: ± 8 kV |
| Fast transients | EN 61000-4-4 | Power port | ± 2 kV |
| | | Ethernet | |
| | | Status out/Digital in | |
| | | Serial ports | |
| Surge | EN 61000-4-5 | Power port | L-L: ± 0.5 kV, 2Ω , $18 \mu\text{F}$ L-E: ± 2 kV, 42Ω , $0.5 \mu\text{F}$ L-L: ± 1 kV, 42Ω , $0.5 \mu\text{F}$ L-E: ± 2 kV, 12Ω , $9 \mu\text{F}$ L-L: ± 1 kV, 12Ω , $9 \mu\text{F}$ |
| | | Ethernet | L-E: ± 2 kV, 2Ω , $0.5 \mu\text{F}$ |
| | | Status out/Digital in | L-E: ± 2 kV, 42Ω , $0.5 \mu\text{F}$ L-L: ± 1 kV, 42Ω , $0.5 \mu\text{F}$ |
| | | RS-232 | L-E: ± 2 kV, 2Ω , $0.5 \mu\text{F}$ |
| Power frequency magnetic field | EN 61000-4-8 | Enclosure | 300 A/m; 0, 16.7, 60 Hz 1000 A/m; 50 Hz |
| Pulsed magnetic field | EN 61000-4-9 | Enclosure | 300 A/m |
| Radiated RF immunity | EN 61000-4-3 | Enclosure | 20 V/m @ (80 – 2700) MHz 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 ANSI C63.4 (FCC part 15) | Enclosure | Class B / DNV bridge |
| Conducted RF emission | CISPR 16-2-1 ANSI C63.4 (FCC part 15) | Power port | Class B / DNV bridge |
| | | Ethernet | Class B |
| 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-232 port to all other ports | |

| Environmental | | | |
|--|------------------------------|-------------------------------|---|
| Temperatures | EN 60068-2-1 EN 60068-2-2 | Operating | -40 to +70°C (-40 to +158°F)* |
| | | Storage and transport | -50 to +85°C (-58 to +185°F) |
| Humidity | EN 60068-2-30 | Operating | 5 to 95 % relative humidity |
| | | Storage and transport | 5 to 95 % relative humidity |
| Altitude | | Operating | 2 000 m / 70 kPa |
| MTBF | MIL-C217F2, Parts count | Ground Benign, 25°C (77°F) | 677 000 hours |
| Service life | | Operating | 10 year |
| Vibration | IEC 60068-2-6 (sine) | Operating | 3 – 13.2 Hz: 1mm 13.2 – 100 Hz: 0.7 g 5.5 – 30 Hz: 1.5 g 30 – 50 Hz: 0.42 mm 50 – 500 Hz: 4.2 g** |
| | IEC 60068-2-64 (random) | | 5 – 20 Hz: 2 m ² /s ³ , 20 – 2000 Hz: – 3 dB/oct |
| Shock | IEC 60068-2-27 | Operating | 30 g, 11 ms 100 g, 6 ms** |
| Bump | IEC 60068-2-27 | Operating | 10 g, 11 ms |
| Packaging | | | |
| Enclosure | EN 60950-1 | Zinc | Fire enclosure |
| Dimension W x H x D With connectors | | | 52.5 x 100 x 101 mm 52.5 x 119 x 101 mm |
| Weight | | | 0.7 kg |
| Degree of protection | EN 60529 | Enclosure | IP 40 |
| Cooling | | | Convection |

* Refer to “Safety” section in User Guide.

** Might require Ethernet cables to be fastened close to the unit.

Description

L105-S1/L205-S1 is an Industrial switch and device server made for harsh environments. WeOS is the operating system of L105-S1/L205-S1 enabling the unit to operate in two functional levels. The switch can be used in either 10 or 100 Mbit networks. Lynx DSS L105-S1/L205-S1 has one serial port that supports RS-232.

Our unique FRNT (Fast Recovery of Network Topology) technology is the fastest protocol on the market to re-configure a network in the event of any link or hardware failure. That is why our products are used in safety critical applications such as tunnels, traffic signal control and railway systems.

Interface specifications

| Power | |
|----------------------------------|---|
| Operating voltage | Rated: 24 to 48 VDC Operating: 19 to 60 VDC |
| Rated current | 140 mA (290 mA) @ 24VDC (with 500 mA USB load) 70 mA (140 mA) @ 48VDC (with 500 mA USB load) |
| Rated frequency | DC |
| Inrush current, I ² t | 22.7·10 ⁻³ A ² s @ 48 VDC |
| Startup current* | 2 x Rated current |
| Polarity | Reverse polarity protected |
| Redundant power input | Yes |
| Isolation to | All other |
| Connection | Detachable screw terminal |
| Connector size | 0.2 – 2.5 mm ² (AWG 24 – 12) |
| Shielded cable | Not required |

* External supply current capability for proper start-up

| Ethernet TX | |
|--------------------------|---|
| Electrical specification | IEEE std 802.3. 2005 Edition |
| 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 to | All other |
| Connection | RJ-45, auto MDI/MDI-X |
| Cabling | Shielded CAT5e or better is recommended |
| Conductive housing | Yes |
| Number of ports | 4 |

* Refer to Safety section.

| RS-232 | |
|--------------------------|--|
| Electrical specification | EIA RS-232 |
| Data rate | 50 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 |
| Connection | RJ-45 according to EIA-561 |
| Shielded cable | Recommended |
| Conductive housing | Yes |
| Number of ports | 1 |

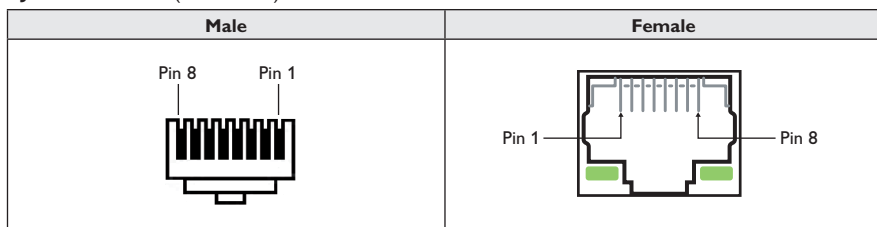
| I/O / Relay output | |
|---------------------------|---|
| Maximum voltage/current | 60 VDC / 80 mA |
| Contact resistance | Max 30 Ω |
| Isolation to | All other |
| Connection | Detachable screw terminal |
| Connector size | 0.2 – 2.5 mm ² (AWG 24 – 12) |

| I/O / Digital input | |
|------------------------------|---|
| Maximum voltage/load current | 60 VDC / 2 mA |
| Voltage levels | Logic one: >12V Logic zero: <1V |
| Isolation to | All other |
| Connection | Detachable screw terminal |
| Connector size | 0.2 – 2.5 mm ² (AWG 24 – 12) |

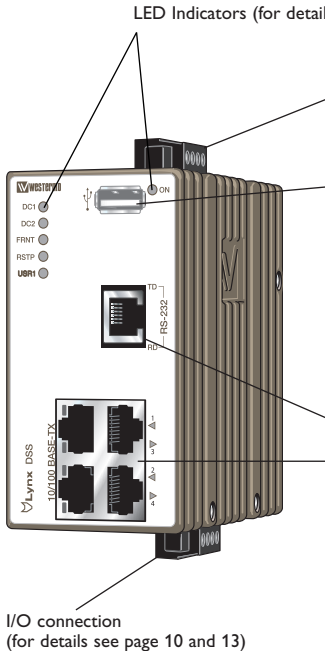
| USB | |
|--------------------------|-----------------------------------|
| Electrical specification | USB 2.0 host interface |
| Data rate | Up to 12 Mbit/s (full-speed mode) |
| Circuit type | SELV |
| Maximum supply current | 500 mA |
| Connection | USB receptacle connector type A |

| Console | |
|--------------------------|---|
| Electrical specification | LVTTTL/LVCMOS-level |
| Data rate | 115.2 kbit/s |
| Data format | 8 data bits, no parity, 1 stop bit, no flow control |
| Circuit type | SELV |
| Connection | 2.5 mm jack, use only Westermo cable 1211-2027 |

RJ-45 connector (Front view)



Location of interface ports and LED's



LED Indicators (for details see page 14)

Power connection (for details see page 9 and 13)

USB

| Position | Direction | Description |
|----------|-----------|-------------------------------|
| No. 1 | Out | VBUS |
| No. 2 | In/Out | D- |
| No. 3 | In/Out | D+ |
| No. 4 | Out | GND |
| Shield | In/Out | Connected to protective earth |

RS-232

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

I/O connection (for details see page 10 and 13)

Ethernet connection TX (4 ports)

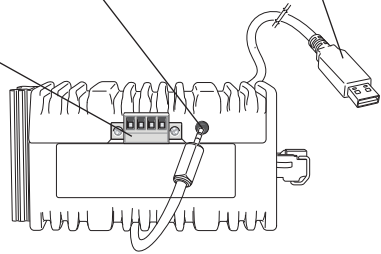
| Position | Signal | Direction | Description |
|----------|--------|-----------|---------------------------|
| No.1 | TD+ | In/Out | Transmitted/Received data |
| No. 2 | TD- | In/Out | Transmitted/Received data |
| No. 3 | RD+ | In/Out | Transmitted/Received data |
| No. 4 | - | | Not Connected |
|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

I/O connection (for details see page 10)

Console port
(for details see page 10)

Cable 1211-2027

Bottom view



Connection to console port

The console port can be used to connect to the CLI (Command Line Interface).

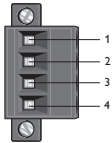
The following steps needs to be taken

1. Connect the serial diagnostic cable to the console port (use only Westermo cable 1211-2027).
2. Connect cable to your computer (USB port, if drivers are needed they can be downloaded from our Web page).
3. Use a terminal emulator and connect with correct speed and format (115200, 8N1) to the assigned port.

For more information about the CLI, see the WeOS management guide.

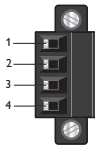
| Accessories | |
|------------------------|-----------|
| Description | Art no |
| Westermo console cable | 1211-2027 |
| RJ45 to terminal block | 1200-2490 |
| RJ45 to DB9 cable | 1211-2210 |

Power connection

|  | 4-position | Product marking | Direction | Description |
|---|------------|-----------------|-----------|--------------------------|
| 1 | No. 1 | +DC1 | Input | Supply voltage input DC1 |
| 2 | No. 2 | +DC2 | Input | Supply voltage input DC2 |
| 3 | No. 3 | -COM | Input | Common |
| 4 | No. 4 | -COM | Input | Common |

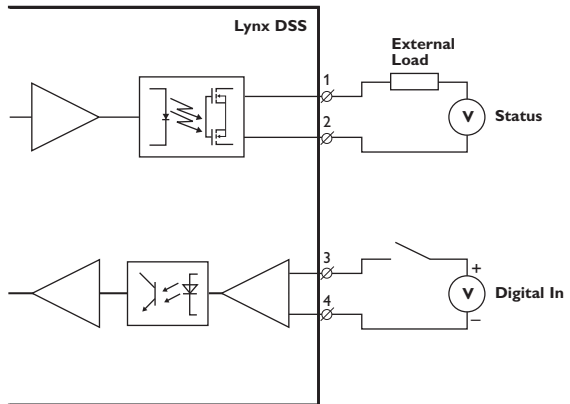
LynxDSS supports redundant power connection. The positive inputs are +DC1 and +DC2, the negative input for both supplies are -COM. Connect the primary voltage (e.g. +24VDC) to the +DC1 pin and return to one of the -COM pins on the power input.

I/O connection

|  | 4-position | Product marking | Direction | Description |
|---|------------|-----------------|-----------|------------------------------|
| 1 | No. 1 | Status + | Output | Alarm relay (status) contact |
| 2 | No. 2 | Status - | Output | Alarm relay (status) contact |
| 3 | No. 3 | Digital in + | Input | Digital in + |
| 4 | No. 4 | Digital in - | Input | Digital in - |

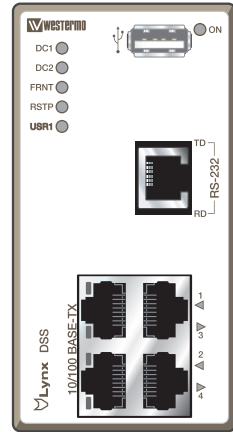
The Status output is a potential free, opto-isolated normally closed solid-state relay. This can be configured to monitor various alarm events within the Lynx DSS unit, see WeOS Management Guide. An external load in series with an external voltage source is required for proper functionality. For voltage/current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

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



LED indicators

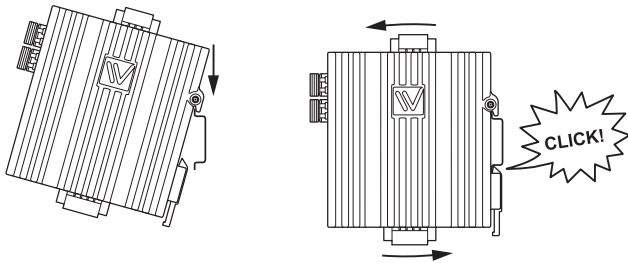
| LED | Status | Description |
|-----------|-------------|--|
| ON | OFF | Unit has no power. |
| | GREEN | All OK, no alarm condition. |
| | RED | Alarm condition, or until unit has started up. (Alarm conditions are configurable, see "WeOS Management Guide"). |
| | BLINK | Location indicator ("Here I am!"). Activated when connected to IPConfig Tool, or upon request from Web or CLI. |
| DC1 | OFF | Unit has no power. |
| | GREEN | Power OK on DC1. |
| | RED | Power failure on +DC1. |
| DC2 | OFF | Unit has no power. |
| | GREEN | Power OK on DC2. |
| | RED | Power failure on +DC2. |
| FRNT | OFF | FRNT disabled. |
| | GREEN | FRNT OK. |
| | RED | FRNT Error. |
| | BLINK | Unit configured as FRNT Focal Point. |
| RSTP | OFF | RSTP disabled. |
| | GREEN | RSTP enabled. |
| | BLINK | Unit elected as RSTP/STP root switch. |
| USR1 | OFF | Configurable, see WeOS Management Guide. |
| | GREEN | |
| | RED | |
| 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 4 | OFF | No Link. |
| | GREEN | Link established. |
| | GREEN FLASH | Data traffic indication. |
| | YELLOW | Port alarm and no link. Or if FRNT or RSTP mode, port is blocked. |



Mounting

This unit should be mounted on 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 mounting, see figure.

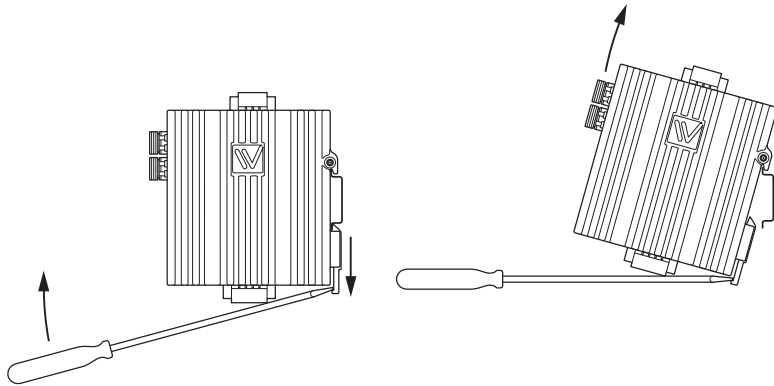
Mounting Lynx with integrated DIN-clip:



Removal

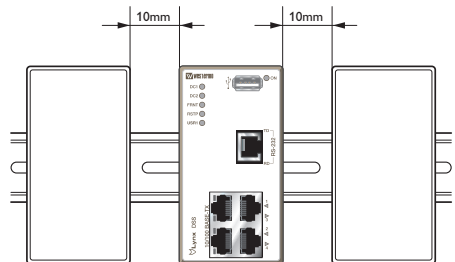
Removing Lynx with integrated DIN-clip:

Press down the support at the back of the unit using a screwdriver. See figure.



Cooling

This unit uses convection cooling. To avoid obstructing the airflow around the unit, use the following spacing rules. Minimum spacing 25 mm (1.0 inch) above / below and 10 mm (0.4 inches) left / right the unit. Spacing is recommended for the use of unit in full operating temperature range and service life.



Getting Started

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

- **IPConfig tool**

This is a custom Westermo tool used for discovery of attached Westermo units.
Note! Version of IP Config tool must be 10.4.0 or higher.

- **Web**

Configuration of the unit using the web browser.

- **CLI**

Configuration of the unit 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 unit. Within the web you can configure most of the available functions.

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

Note! If you are not sure about the subnet – consult your network administrator.

Configuration

Configure the unit via Web browser

The unit 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 for Username and Password are:

Username: admin

Password: westermo

Once you have logged in, you can 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.

Referring documents

| Type | Description | Document number |
|------------------|------------------------------|-----------------|
| Management Guide | Westermo OS management guide | 6101-3201 |

Factory default on Lynx L105-S1 and L205-S1

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

1. Power off the switch and disconnect all Ethernet cables (copper and fibre).
 2. Connect one Ethernet cable between Ethernet ports 1 and 4, and the other between Ethernet ports 2 and 3.
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 unit.
 4. Wait for the unit to start up. Control that the ON LED is flashing red.
The ON LED flashing indicates that the unit is now ready to be reset to factory default. You now have the choice to go ahead with the factory reset, or to skip factory reset and boot as normal.
 - Go ahead with factory reset:
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 the unit will restart with factory default settings. When the switch has booted up, the ON LED will show a green light, and is now ready to use.
 - Skip the factory reset:
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 switch will conduct a normal boot with the existing settings.
- * **Note** Do not power off the unit while the factory reset process is in progress.



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For complete contact information, please visit our website at www.westermo.com/contact or scan the QR code