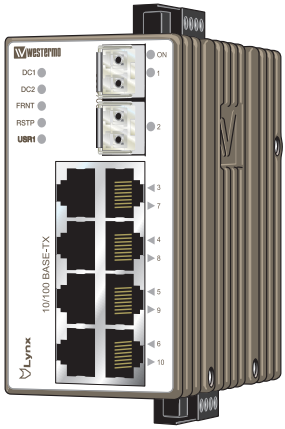
User Guide
6643-2213

WeOS

Lynx

L110 / L210



Industrial Ethernet
10-port Switch

www.westermo.com

Safety

Warning

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

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.

For more information see General safety 100-5001.

Software tools

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

Legal information

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 61000-6-4, 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 A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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]	
Ethernet switch	Lynx	Lx10-F2Gy

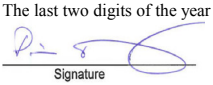
is in conformity with the following EU directive(s).

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 61000-6-4	Electromagnetic compatibility – Emission for industrial environments	2007
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
22nd 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	Postgiro	Bankgiro	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
ESD	EN 61000-4-2	Enclosure	Contact: ±6 kV Air: ±8 kV
Fast transients	EN 61000-4-4	Power port	±2 kV
		Signal ports	±2 kV
		Earth port	±1 kV
Surge	EN 61000-4-5	Power port	L-E: ±0.5 kV, 12 Ω, 9 µF L-L: ±0.5 kV, 2 Ω, 18 µF L-E: ±2 kV, 42 Ω, 0.5 µF L-L: ±2 kV, 42 Ω, 0.5 µF L-E: ±2 kV, 12 Ω, 9 µF L-L: ±1 kV, 12 Ω, 9 µF
		Signal ports	L-E: ±1 kV, 2 Ω L-E: ±2 kV, 42Ω, 0.5 µF
Power frequency magnetic field	EN 61000-4-8	Enclosure	300 A/m; 0, 16.7, 50 Hz
Pulsed magnetic field	EN 61000-4-9	Enclosure	300 A/m
Radiated RF immunity	EN 61000-4-3	Enclosure	10 V/m @ (80 – 800) MHz 20 V/m @ (800 – 1000) MHz 10 V/m @ (1400 – 2100) MHz 5 V/m @ (2100 – 2500) MHz 1 V/m @ (2500 – 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
		Signal ports	10 V, 80% AM, 1 kHz; (0.15 – 80) MHz
		Earth port	10 V, 80% AM, 1 kHz; (0.15 – 80) MHz
Radiated RF emission	CISPR 16-2-3	Enclosure	Class A
	ANSI C63.4 (FCC Part 15)		Class A
Conducted RF emission	CISPR 16-2-1	Power port	Class B
	ANSI C63.4 (FCC part 15b)	Signal ports	Class B
Dielectric strength	EN 60950-1	Power port to all other ports	1.5 kVrms, 50 Hz, 1 min
		Signal ports to all other ports	1.5 kVrms, 50 Hz, 1 min
Environmental			
Temperatures	EN 60068-2-1	Operating	–40 to +70°C (–40 to +158°F)*
	EN 60068-2-2	Storage and transport	–50 to +85°C (–58 to +185°F)
Humidity	EN 60068-2-27	Operating	5 to 95 % relative humidity
		Storage and transport	5 to 95 % relative humidity
Altitude		Operating	2 000 m / 70 kPa
Service life		Operating	10 year
Reliability prediction (MTBF)	MIL-HDBK- 217F	Operating	630 000 hours
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**
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.

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

Description

Lynx is an Industrial switch made for harsh enviroments. The switch can be used in ether 100 Mbit or Gigabit networks due to our multi-rate SFP solution. Lynx can also be used together with our previous Lynx-series of switches. 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 Lynx is used in safety critical applications such as tunnels, traffic signal control and railway systems.

Installations in harsh environments and places with heavy electrical interference require the use of a reliable media. Lynx provides a number of solutions using fibre optic transceivers. Multi- or singlemode transceivers can be used to build point-to-point or redundant ring networks with ranges up to 120 km between each switch. Our BIDI transceiver, which transmits and receives data on a single fibre can be used in applications where the number of fibre cores are limited.

Real-time properties are implemented in the switch in order to achieve determinism for real time critical applications. Lynx supports QoS (Quality of Service) with four priority queues and strict priority scheduling as well as HoL (Head of Line Blocking Prevention). All to assure that the data network is deterministic.

Interface specifications

Power	
Operating voltage	Rated: 24 to 48 VDC Operating: 19 to 60 VDC
Rated current	240 mA @ 24 VDC 120 mA @ 48 VDC
Rated frequency	DC
Inrush current, I^2t	$22.7 \cdot 10^{-3}$ A^2s @ 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
Shielded cable	Not required, except when installed in Railway applications as signalling and telecommunications apparatus and located close to rails.**
Conductive housing	Yes
Number of ports	8

* Refer to Safety section.

** 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.

Ethernet SFP pluggable connections (FX or TX)	
Electrical specification	IEEE std 802.3. 2005 Edition
Data rate	100 Mbit/s or 1000 Mbit/s transceivers supported
Duplex	Full or Auto, depending on transceiver
Transmission range	Depending on tranceiver
Connection	SFP slot holding fibre transceiver or copper transceiver
Number of ports	1 or 2

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 mm² (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 mm² (AWG 24 – 12)

Console	
Electrical specification	TTL-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

SFP Transceivers

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 unit will no longer be UL approved. Temp.specifications are also depending on the used transeivers.

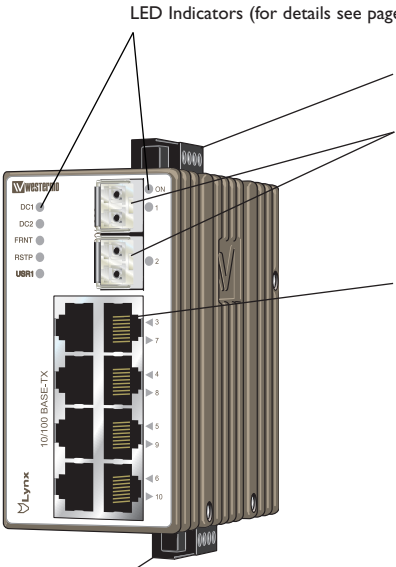
Note: To comply with UL60950-1 only UL recognized SFP transceivers should be used.

Deviations

With copper transceiver 1100-0148 the specified operating temperature on Lynx is 0 to +50°C (32 to +122°F).

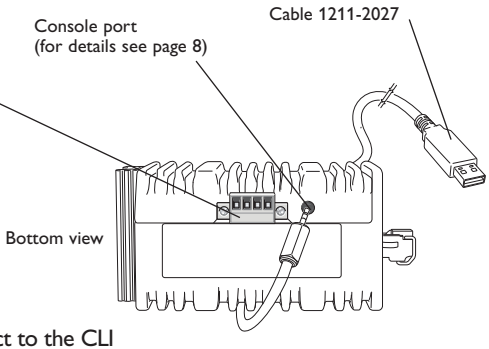
FRNT reconfiguration times can not be guaranteed with copper transceivers.

Location of interface ports and LED's



Ethernet connection TX (8 ports)

Position	Signale	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



Connection to console port

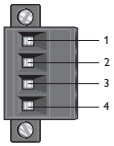
The console port can be used to connect to the CLI (Command Line Interface).

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.

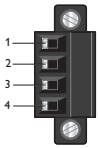
Power connection



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

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.

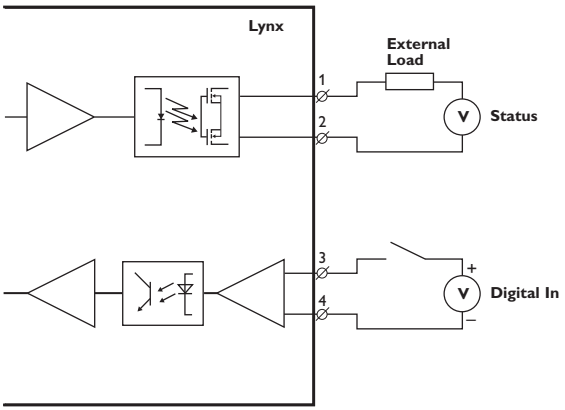
I/O connection



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

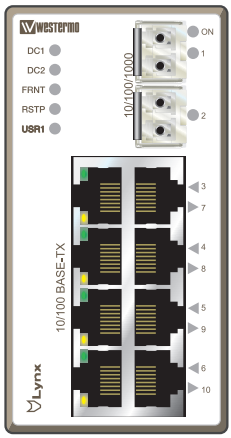
The Status output is a potential free, opto-isolated normally closed solid-state relay.
This can be configured to monitor various alarm events within the Lynx unit, see WeOS Management Guide.
An external load in series with an external voltage source is required for proper functionality.
For voltage/current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

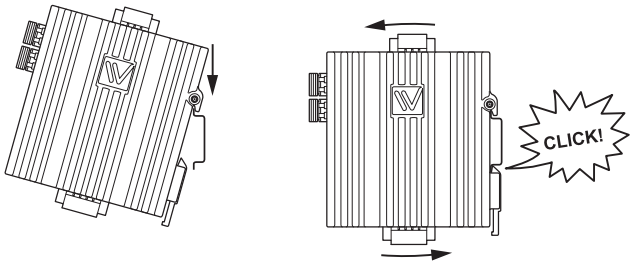
LED	Status	Description
ON	OFF	Unit has no power.
	GREEN	All OK, no alarm condition.
	RED	Alarm condition, or until unit has started up. (Alarm conditions are configurable, see "WeOS Management Guide").
	BLINK	Location indicator ("Here I am!"). Activated when connected to IPConfig Tool, or upon request 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	
1 to 10	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

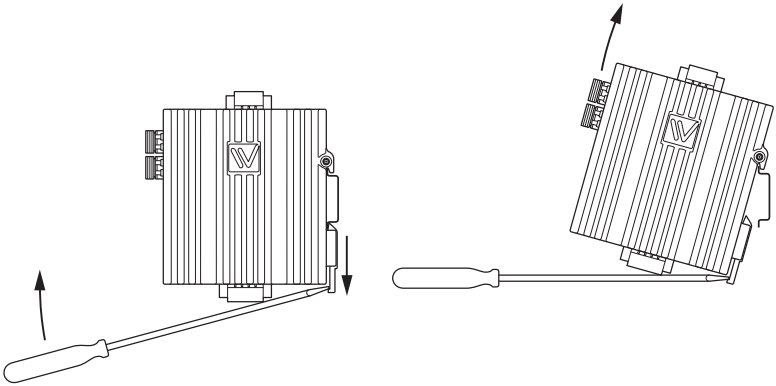
This unit should be mounted on 35 mm DIN-rail, which is horizontally mounted inside an apparatus cabinet or similar. It is recommended that the DIN-rail is connected to ground. Snap on mounting, see figure.

Mounting Lynx with integrated DIN-clip:



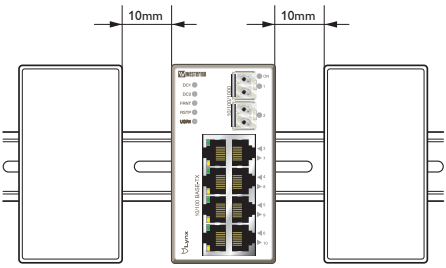
Removal

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.
- **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.

Note! Version of IP Config tool must be 10.3.0 or higher.

Referring documents

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

Factory default on Lynx

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 3 and 10, and the other between Ethernet ports 6 and 7.
   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 after approximately 1 minute 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.

Westermo • SE-640 40 Stora Sundby, Sweden
Tel +46 16 42 80 00 Fax +46 16 42 80 01
E-mail: info@westermo.com
www.westermo.com

Sales Units

Westermo Data Communications

China
sales.cn@westermo.com
www.cn.westermo.com

France
infos@westermo.fr
www.westermo.fr

Germany
info@westermo.de
www.westermo.de

North America
info@westermo.com
www.westermo.com

Singapore
sales@westermo.com.sg
www.westermo.com

Sweden
info.sverige@westermo.se
www.westermo.se

United Kingdom
sales@westermo.co.uk
www.westermo.co.uk

Other Offices

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

REV.J 6643-2213 2016-05 Westermo Teleindustri AB, Sweden