



**LX60**      **WISI Optopus** Optical Redundancy Switch



The LX 60 is part of the Optopus product portfolio.

LX 60 is an optical redundancy switch for protection scenarios in in FTTx and HFC networks. The Optopus platform is a highly flexible and high density platform for all kinds of analog optical networks.

The system is used in any network such as HFC, RF over Glass or RF Overlay in FTTX applications.

**Features:**

- Fullband operation from 1260... 1620 nm
- Wide configurable operation range from -35dBm ... +21dBm
- Different operation modes for every application
- Latching operation mode ensures system stability during electricity fails



## Document Revision Information

Date	Document Rev.	LX60 SW V.	Optopus Commander V.	LX51 V.
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## 1. Safety instructions

### 1.1. Laser Safety

Laser radiation can be hazardous. Please follow the instructions given in this manual, in order to minimize the risk of injuries or damage.



Every potential outlet, whether intended or not, must be treated as a laser source. Therefore, optical fibers and connectors in particular must be handled carefully.

- Make sure that all potentially harmful light sources are switched off before unplugging any optical connector.
- Never look directly at any fiber end.
- Do not use optical instruments like magnifiers or microscopes.
- Always keep your eyes at least 30 cm away from any light-guiding fiber or device.
- Use the provided closing caps for unused fiber connectors.
- Keep in mind that merging multiple light signals will increase the hazard.
- Do not open any housing! Laser hazard might increase.
- Be careful, whenever the system shows any abnormal behavior. If possible, switch off all light sources before troubleshooting.
- Damaged optical fiber cables should be repaired or replaced immediately.
- Do not use specialty fiber, e.g. with enlarged mode field diameter, unless the impact on laser safety is known and handled adequately.

Generally, the operator of a communication system is responsible for its safe operation. Some important points to respect are e.g.

- Assessment of hazard levels at accessible locations,
- Care for the proper installation and maintenance,
- Measures for the safe operation, like access control and adequate staff training.

Reference: European directive 2006/25/EC, IEC 60825-1 (2007-03), IEC 60825-2 (2010-12).



## **1.2. ESD protection**

This product contains electrostatic sensitive devices. These devices can be damaged or effectively destroyed by electrostatic discharge (ESD) during unpacking, installation, removal, storage, or shipment if incorrectly handled. Please note that discharge might go unnoticed by a user. Always take normal static precautions when handling the equipment!

## **1.3. Handling of optical fiber**

In order to avoid damage to equipment or persons, optical fiber should always be handled with special attention.

### **1.3.1. Optical connectors**

Optical connectors are very sensitive to contamination. Impurities of optical mating surfaces can reflect or absorb optical signal power. This leads to poor link performance because of excess loss. Moreover, absorption of optical power can thermally damage optical fiber.

Never leave any connector plug or socket open without a dust cap. This prevents the sensitive connector surface from scratching and keeps particles away. Even without direct contact to a solid body, deposition of particles from air will pollute the connector.

Make sure that connector surfaces are clean before plugging them. In case of doubt, use a fiber microscope to inspect the connectors. For the cleaning of fiber connectors, we recommend special wiping tissues and cleansing rods.

If a connector is irreparably contaminated or damaged, it should be replaced. In addition to the impairment of the link budget, reflection and absorption is known as source for many physical processes of signal degradation.

### **1.3.2. General handling of fiber cables**

The bending radius of any optical fiber should always be larger than 30 mm. Bending losses can cause unwanted signal attenuation.

Replace fiber cables, if their jackets seem defective. Ageing of the light guide will decrease transmission quality, and above all, leaking laser radiation could be harmful.

Always follow the instructions given in the section on laser safety above. Optical communication systems generally involve the hazard of laser radiation.

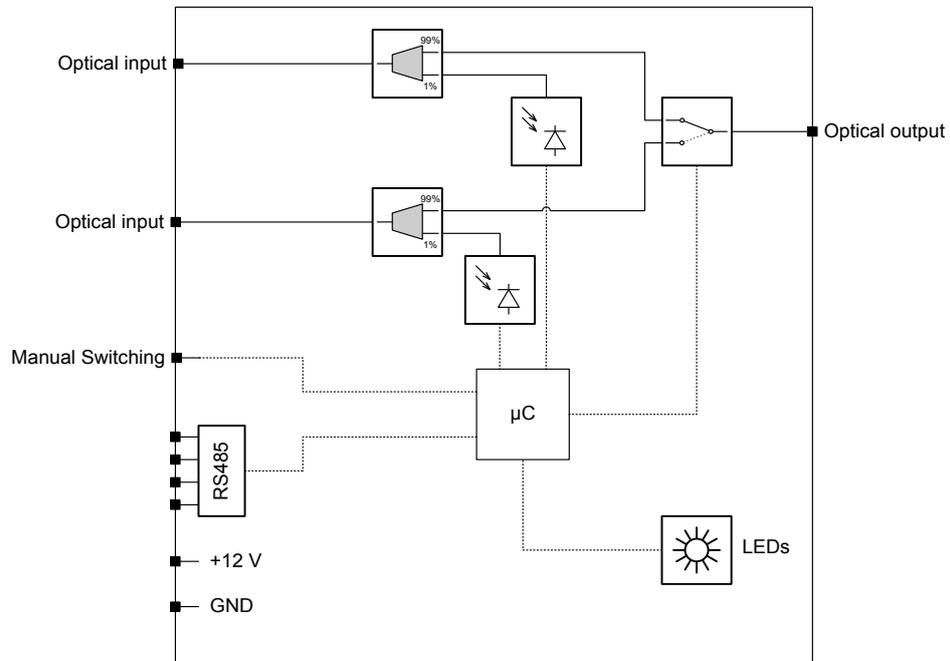


## 2. Technical data

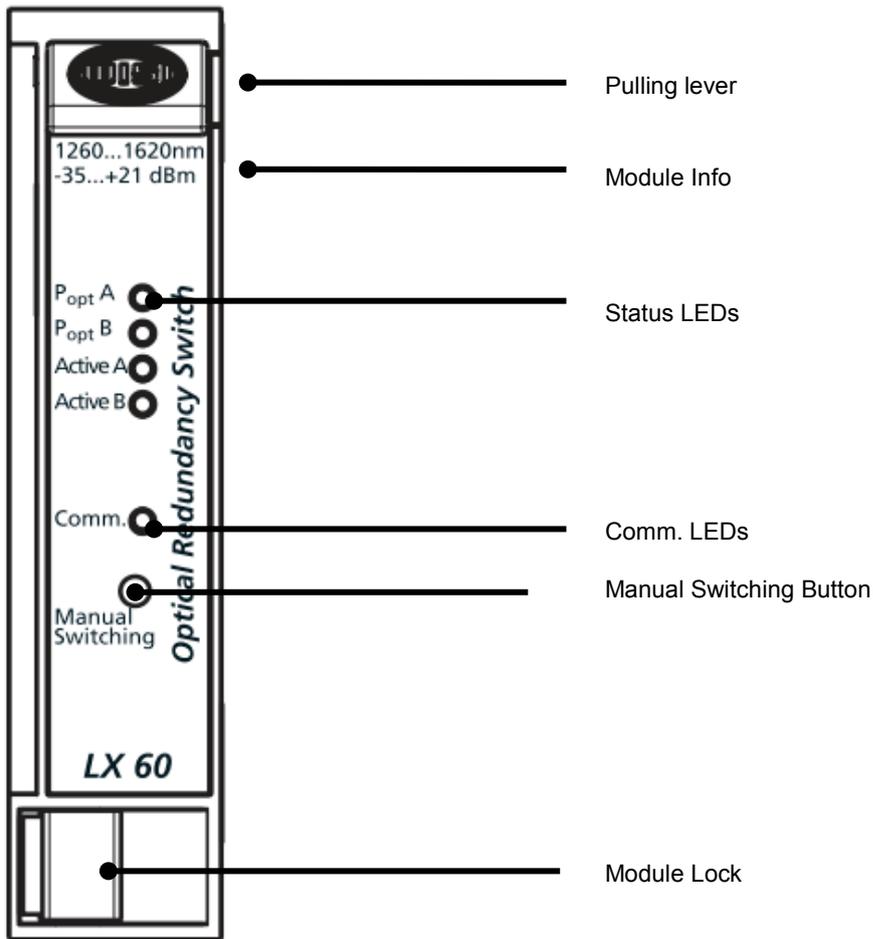
Operating wavelength	1260 ... 1620 nm
Optical input ports	2
Optical output port	1
Optical power range	-30 ... +21 dBm
Optical insertion loss	$\leq 1.5$ dB
Optical crosstalk isolation	$\geq 60$ dB
Optical return loss	$\geq 45$ dB
Operation mode	Automatic revertive / Automatic non-revertive / Manual
Chassis	WISI LX – Module
Dimension (W x H x D)	30 mm x 133 mm x 320 mm
Connector type	Optical SC/APC, F-Connector
Supply voltage	12 VDC
Power consumption	2 W
Operating temperature range	-5 °C ... +45 °C (ETSI EN 300 019 -1-3 Class 3.2)

### 3. Mechanical overview

#### 3.1. Block diagram

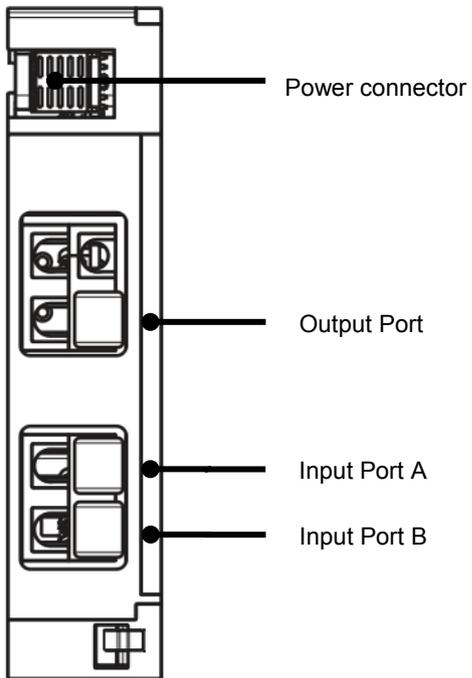


### 3.2. Front view



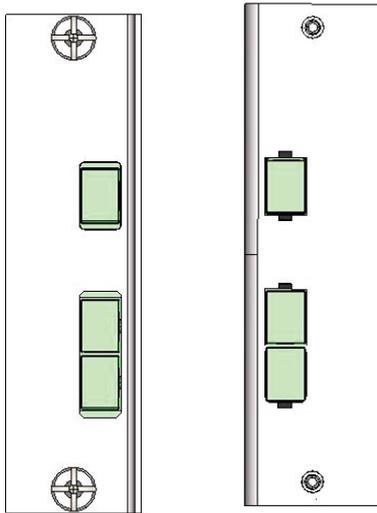


### 3.3. Back view



### 3.4. Backplate

Shown are the backplate modules of the LX60.

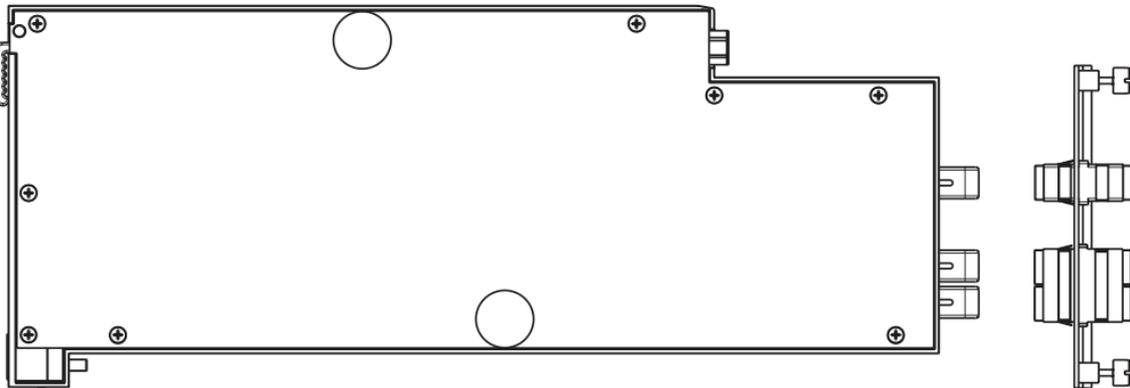


## 4. Installation, configuration and maintenance

### 4.1. Module installation

The LX60 is a single slot module. The module is hot-swappable and can be installed or removed from the LX 5x chassis during operation. The module is plugged into the chassis from the front; the corresponding back plate is plugged in from the rear.

The graphic below shows the LX60 with its corresponding backplate.



The installation of LX60 shall be done according to the following steps:

1. Inspect the LX60 module and the corresponding backplate module for any obvious damage. If the module or backplate appears to have been damaged, contact your WISI representative.
2. Remove the dust caps from the SC/APC connectors of the backplate.
3. Install the backplate on rear side of the LX 5x chassis at the desired slot. Fasten the screws of the backplate.
4. Connect the optical cables to the input and output ports of the backplate.
5. Remove dust caps from the SC/APC connectors on the LX60.
6. Carefully insert the LX60 module into the slot with the installed corresponding backplate. Ensure that the module does thoroughly connect with the backplate.

### 4.2. Module removal

The removal of LX60 shall be done according to the following steps:

1. Pull the module from the front using the pulling lever (1) and (2). Lever (2) needs to be pushed slightly to the left.
2. Remove the module carefully.
3. Attach dust caps to the SC/APC connectors.
4. If necessary, remove cabling and backplate.



### 4.3. Configuration using the LX 5x web interface

The configuration of the LX60 modules is done using the web interface embedded on the LX 5x chassis. For connecting to the system, please refer to the manual of the LX 5x.

#### 4.3.1. Tab “Info“

LX60S OPT.REDUNDANCY SWITCH	
Bootloader Version	1.0.0.2
Software Version	1.0.0.0
ID	WISI Communications LX60S OPT.REDUNDANCY SWITCH
Article Number	073101
Year of Manufacture	2013
Serial Number	000000000000
Device State	G00
Revision Code	Ä00
User Code	
Additional Info	

[EDIT](#)

RESET MODULE	
Reset LX60	<a href="#">RESET MODULE</a>
Factory Reset LX60	<a href="#">FACTORY RESET</a>

On this tab various device-related inventory and manufacturer information is displayed:

- Bootloader Version
- Software Version
- Device ID
- Material Number
- Article Number



- Year of Manufacture
- Serial Number
- Device State
- Revision Code
- User Code
- Additional Info

***Reset***

Performs a reboot of the LX60 unit, with last operational settings

***Factory Reset***

Performs a LX60 unit reboot and sets the configuration to the factory presets.

**NOTE: FACTORY RESET MIGHT BE TRAFFIC AFFECTING**



### 4.3.2. Tab “Settings“

The screenshot shows the 'SETTINGS' tab of the LX 60 device. It is divided into three main sections:

- LX 60 SETTINGS:**
  - Module Status: OK (green button)
  - Operation Mode: Radio buttons for Auto revertive (selected), Auto non revertive, Manual Input A, and Manual Input B.
  - Current Switch Position: Radio buttons for Path A (selected) and Path B.
  - Fallback Waittime: 0 s
  - Testtime: 0 s
- INPUT POWER A:**
  - Input Power A: no input power
  - Input Power A LOLO Value: -5 dBm
  - Input Power A LO Value: -3 dBm
  - Input Power A HI Value: 13 dBm
  - Input Power A HIHI Value: 15 dBm
  - Input Power A Deadband Value: 0.1 dBm
  - Input Power A Alarm Mask: Checkboxes for LOLO (unchecked), LO (unchecked), HI (checked), and HIHI (checked).
  - Input Power A Alarm State: OK (green button)
- INPUT POWER B:**
  - Input Power B: no input power
  - Input Power B LOLO Value: -5 dBm
  - Input Power B LO Value: -3 dBm
  - Input Power B HI Value: 13 dBm
  - Input Power B HIHI Value: 15 dBm
  - Input Power B Deadband Value: 0.1 dBm
  - Input Power B Alarm Mask: Checkboxes for LOLO (unchecked), LO (unchecked), HI (checked), and HIHI (checked).
  - Input Power B Alarm State: OK (green button)

An 'EDIT' button is located at the bottom of the INPUT POWER B section.

On this tab, general setting of the optical switch are configured:

#### **Module Status**

green (functionality OK) | red (error detected)

#### **Operation mode:**            **Auto-Revertive | Auto-Non-Revertive | Manual Input X**

Toggles the operation mode

Default: Auto-Revertive

#### **Auto-Revertive:**

Main-Path is Input A, Backup-Path is Input B. In case the optical input signal at the main-path is below the configured LOLO level, automatically switch to the backup-path input, if there is enough optical input power (Input power in normal range). Automatically fallback to main-path if the optical input power is again in normal range. The exact criterias of switching back can be defined by “Fallback Waittime and “Testtime”.



*Auto-Non-Revertive:*

In case of the optical input signal at the main-path is below the configured LOLO level, automatically switch to the other path, if there is enough optical input power (Input power in normal range). No automatic return, if the optical power returns.

*Manual Input A / B:*

Ignoring optical input power and switch immediately to the chosen path. All automatic functions are deactivated.

This can also be done at the front panel by pressing the “manual switching” button.

- *Briefly pressing the button (< 4s)* forces an immediate switching to the other path and enables the “Manuel-Mode”, where all automatic functions are deactivated.

- *Holding the button (> 4s)* forces returning to the last “Automatic-Mode”.

**Current switch position**

Current position of the optical switch.

**Fallback Waittime**

(Only active in Auto-Revertive-Mode)

0 ...300s, step 1s

Default: 0s

This parameter defines how often the optical input power at the Main-Path is measured. If the optical input power at the time of measuring is in normal range, the unit switches to the Main-Path.

**Testtime**

(Only active in Auto-Revertive-Mode)

0 ...30s, step 1s

Default: 0s

This parameter defines the time frame, how long the optical input power at the Main-Path must be present. The unit switches to the Main-Path only if the optical input power is continuously in normal range.

When combined with “Fallback Waittime”, the “Testtime” starts after the defined “Fallback Waittime”.

**Input power A**

Current optical input power at input A. If the optical is lower than -34dBm, “no input power” is displayed.



***Input power A LOLO / LO / HI / HIHI Value***

-30.0...+21.0 dBm, step 0.1 dB

Adjustable alarm thresholds

***Input power A Hysteresis Value***

0.0...+5.0 dBm, step 0.1 dB

Adjustable hysteresis.

***Input power A Alarm Mask***

Adjustable alarm mask.

***Input Power A Alarm State***

green (power OK) | yellow (Hi / Lo) | red (HiHi / LoLo)

***Input power B***

Current optical input power at input B. If the optical is lower than -34dBm, "no input power" is displayed.

***Input power B LOLO / LO / HI / HIHI Value***

-30.0...+21.0 dBm, step 0.1 dB

Adjustable alarm thresholds

***Input power B Hysteresis Value***

0.0...+5.0 dBm, step 0.1 dB

Adjustable hysteresis.

***Input power B Alarm Mask***

Adjustable alarm mask.

***Input Power B Alarm State***

green (power OK) | yellow (Hi / Lo) | red (HiHi / LoLo)



#### 4.4. LED signalization

##### **LED “Input A / Input B”**

Corresponding parameters:

- Optical input power of port A and B

LED Color	Description
Green	Input power OK
Yellow	Hi-/Lo-Threshold reached
Red	<ul style="list-style-type: none"><li>▪ HiHi/LoLo-threshold reached</li><li>▪ Loss of input detected</li></ul>

##### **LED “Active A / Active B”**

Corresponding parameters:

- Operation mode
- Switched path
- System status

LED Color	Description
Off	Path not active
Flashing	Switching to path
Green	<ul style="list-style-type: none"><li>▪ Path active</li><li>▪ Revertive mode</li></ul>
Yellow	<ul style="list-style-type: none"><li>▪ Path active</li><li>▪ Non-Revertive mode</li></ul>
Red	<ul style="list-style-type: none"><li>▪ Path active</li><li>▪ Manual mode</li></ul>
Synchronous red flashing	Functional error

##### **LED “Comm“**

Corresponding parameters:

- Communication with Chassis

LED Color	Description
Yellow	Communication active







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