



SEPTEMBER 2004
LHB8050A
LHB8051A
LHB8055A
LHB8056A

User Manual

Intelligent Industrial Fast Ethernet Switch with Fibre Ring Function

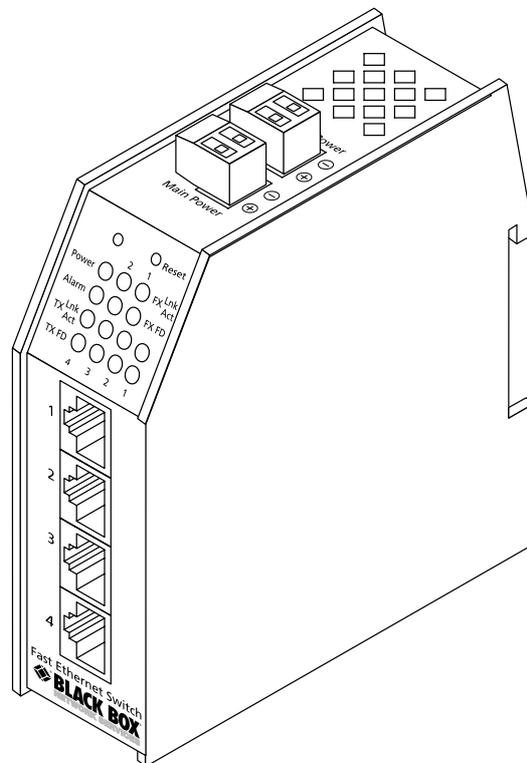


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Introduction

Ethernet has been used in the controlling level of industrial applications for many years. Ethernet is continuing to beat the field bus technologies used to date in coupling equipment controls, sensors and actors. Process error-tolerant network components are absolutely essential because the network availability has a direct effect on production.

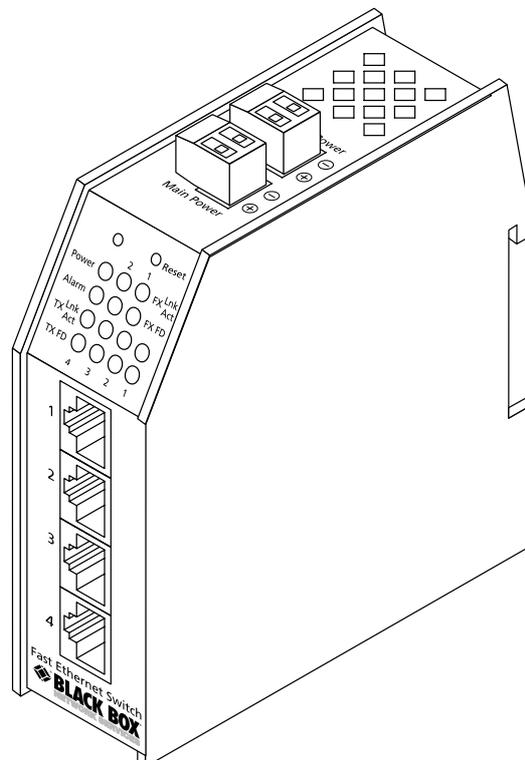
It is precisely to prevent this that BLACK BOX has developed a mechanism for which a patent is pending that enables the Ethernet network to be reconfigured within milliseconds if an error occurs.

The switches can be configured and monitored either by SNMP or a PC-based management tool (Device Manager). In addition to the Device Manager all statuses are displayed web based using an integrated HTTP server.

In addition to the two 100Base-FX fibre connections for chain linking several industrial switches, the BLACK BOX industrial switches also offer four 10/100Base-TX connections for linking such Ethernet terminals as machine controls, network uplinks, consoles and other network participants.

For particularly demanding uses, the industrial switches are designed in a suitably robust construction with an integrated clamping device for direct assembly on 35 mm DIN rails. The devices meet the requirements for IP protection class 20 and are also designed for a larger temperature range.

The power supply of the devices is done by an external, central power supply unit. With the second power input the device can be supplied with redundant power. All electrical ports are either galvanic isolated or equipped with an effective over voltage protection.



Safety Notes

WARNING: Infrared radiation, as used for data transmission within the fibre optic, although invisible to the human eye, can nevertheless cause damage.

To avoid damage to the eyes:

- never look straight into the output of fibre optic components – danger of blinding!
- cover all unused optical connections with caps.
- commission the transmission link only after completing all connections.

The active laser components used with this product comply with the provisions of **Laser Class 1**.

DANGER: Conductive components of power and telecommunications networks can carry dangerously high voltage.

To avoid electric shock:

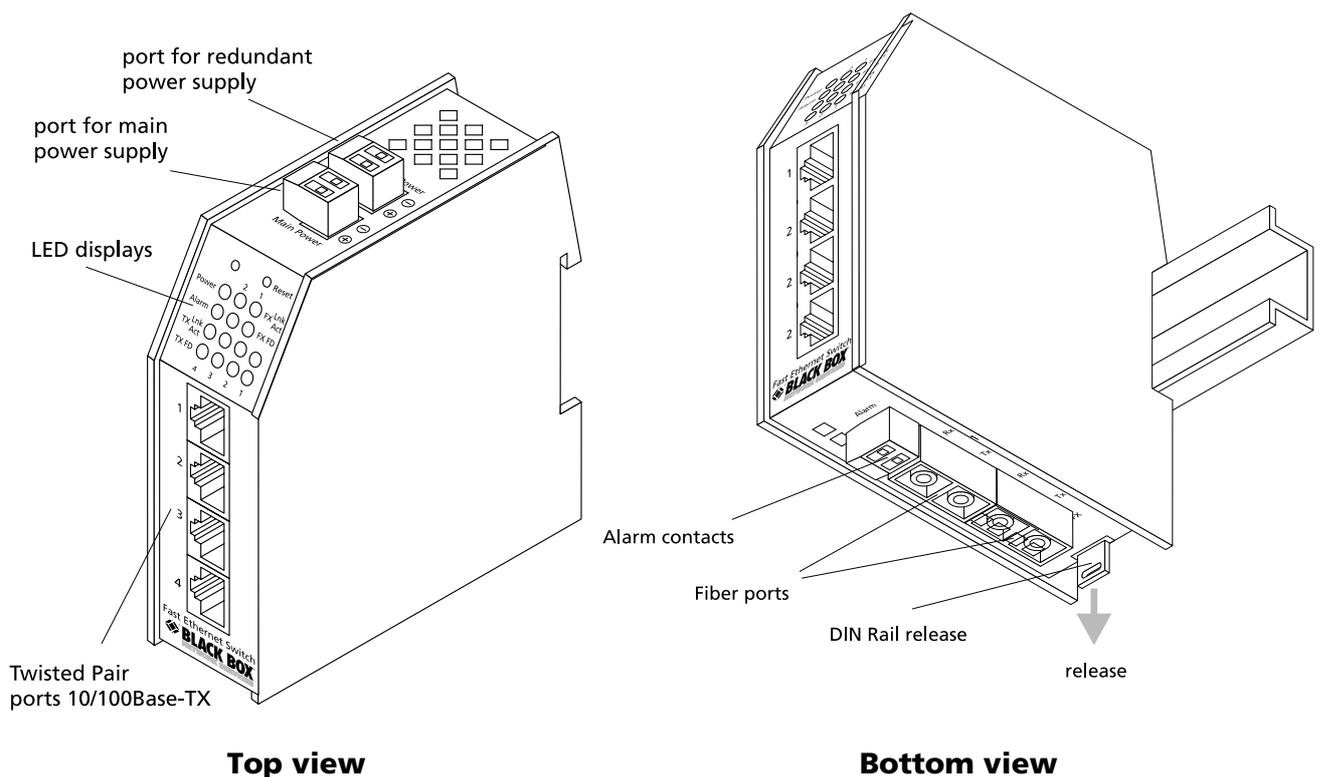
- Do not carry out installation or maintenance work during lightning storms.
- All electric installations must be carried out in accordance with local regulations.

Mounting

The switch is housed in a solid metal box with an integrated fixture for the installation on standard 35 mm DIN EN 50 022 rails.

The fixation of the BLACK BOX switch on the rail is done with a locking latch that can be opened from the bottom side. If multiple devices are mounted in line, a minimum space of 20 mm should be kept between the devices, to ensure a sufficient heat dissipation.

Connectors



Switch Features

The integrated switch has a store-and-forward architecture and can transmit all packets non-blocking between the five ports at full wire speed. For data buffering the switch incorporates 1MB of memory.

Up to 4096 different MAC addresses can be stored simultaneously in the internal switch address tables. An automatic aging mechanism updates the tables max. 10 min. after the last reception of data.

Twisted Pair Connections

The integrated auto-crossing function of all Twisted-Pair ports makes the use of crossed patch cables unnecessary. The switch automatically detects the pin-out of the connected cable and adapts the port accordingly. For all connections standard Twisted Pair cables can be used.

The Auto-negotiation mechanism automatically detects the speed and transmission mode (full or half duplex) of all connected ports. Manual configuration is not required.

Power Supply

The power supply is done by an external power supply with an output voltage of 24 V DC. This power supply is not included at delivery, but can be ordered separately (LHB8000-PS). The connection is done by the pluggable screw terminals on the top of the device. The connection of a redundant power supply can be done by the second screw terminal.

Management

The integrated http server offers to show status information by using a standard internet browser. Special configuration is not necessary. Additional to the web based management the switch offers a MIB to be used in all standardized Network Management Systems (NMS) supporting SNMPv1 protocol. You need the optional Extended Firmware Package (LHB8200-FW11) to have SNMP support.

With the PC based management tool Device Manager it is possible to configure all ports of the switch manually. Please refer to the online manual for the Device manager on the CD-ROM.

With this tool it is also possible to do the initial TCP/IP setting (IP address, Gateway etc.) and make changes afterwards.

Attention: The description for the initial settings can be found in the online manual!

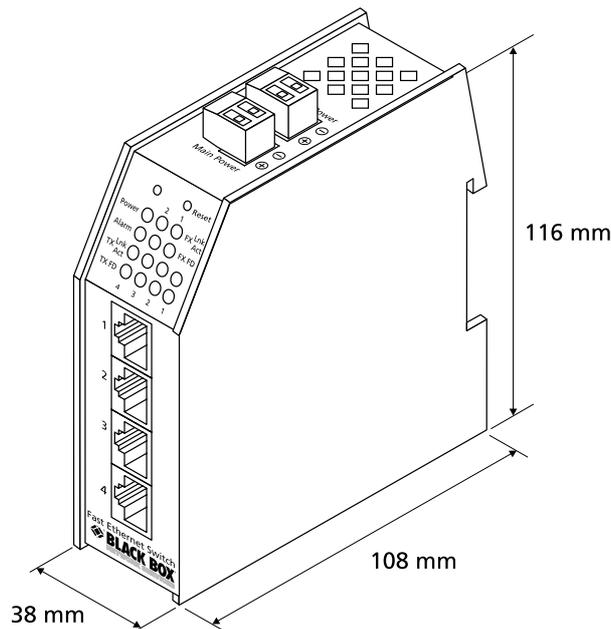
The management information is available inside the network (in-band management). A separate connection is not necessary, so all four twisted pair ports are available to connect other devices.

With the deactivation of the auto-negotiation function of the twisted pair ports the configuration of the speed to 10 or 100 Mbps and full or half duplex mode is done manually.



BLACK BOX Device Manager

Dimensions

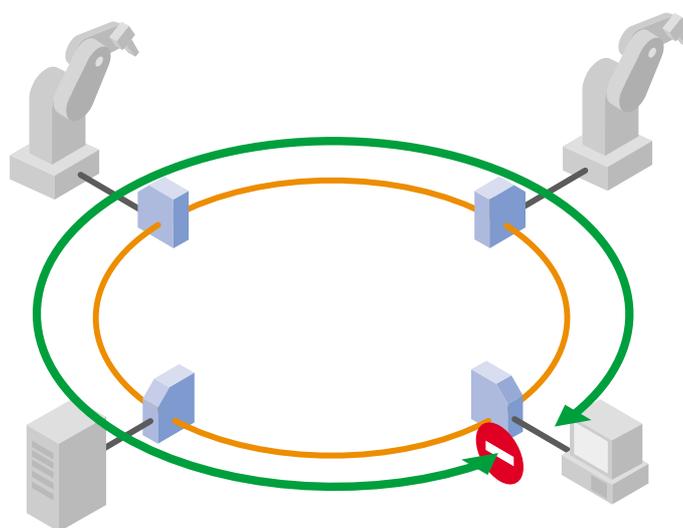


Ring Function

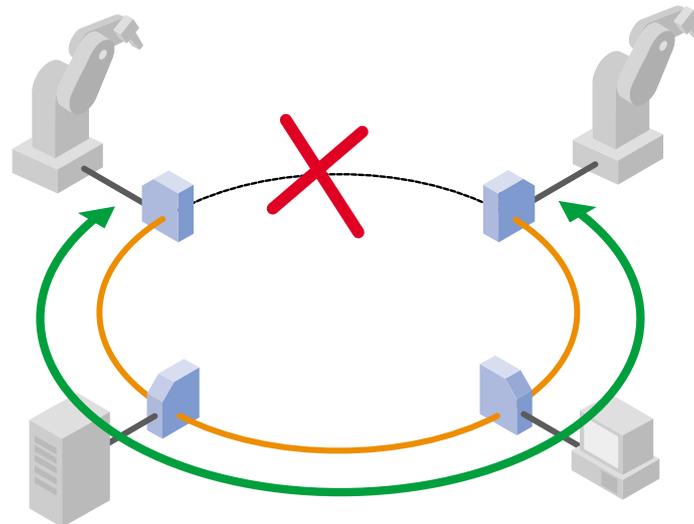
The two fibre ports of the device can be used to build up a ring structure. Ring structures are commonly used in industrial and telecommunication environments as they give redundant protection against failures at minimum cabling expense.

In normal operation the ring connection is logically interrupted by monitoring device (switch configured for Ring Master mode). In case of failure (broken connection or switch damage) the logically interrupted connection is activated by the Ring Master.

A big advantage of this solution is, that no additional central device is necessary for the redundancy feature. Even if the ring master itself fails, the network will stay alive.



Normal operation



Data transmission in failure status

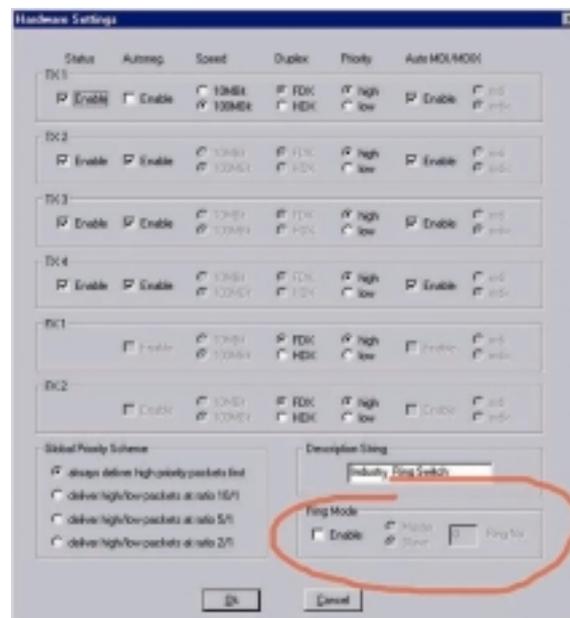
Ring Mechanism

This patented protection mechanism supports the fast reconfiguration of the data transmission in case of failure of one fibre segment. This function is a fixed feature of the industrial switch. During this operation one switch is having the manager function, all other switches are normal ring switches.

Each switch is monitoring the status of the connected fibre segment. In case of failure the connected switch forwards this information to the ring manager. The ring manager terminates the interruption of the ring immediately. The data is transmitted in all directions. This fast signalling will detect a failure within a few milliseconds (depending on the ring size).

Ring Configuration

The configuration of the operating mode for the ring application is done with the network management.



At the menu point Hardware Setting it is possible to select the two modes master or slave. The switch which is configured in master mode is doing the ring manager functions to avoid the multiplication of the data.

If one connection or one device fails this information is forwarded to the ring manager (master) by a special protocol. The ring manager keeps the operation of the complete segment up.

Advantage of this solution is that the ring manager itself has not to be redundant, because if the manager fails the data can not be multiplied. The segments stays under operation.

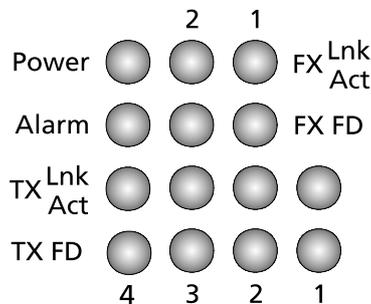
To avoid that the signalling in case of failure has no affect on other rings, it is possible to define different rings with numbers from 0 to 255 by the network management.

All switches with ring functionality are having the management features included and are offering the detection and signalling of any failure.

With this concept a limitation in regards to the maximum ring length is not given.

Transmission Speed

The twisted pair ports of the switch are adapting automatically to the highest possible speed using the auto-negotiation protocol. The LED displays are showing the selected speed. If necessary this configuration can be also done by the network management.



The transmission in full duplex mode is indicated by the related LED (on). If the connection is working in half duplex mode, this LED indicates collisions for the connected segment (flashing).

The transmission mode of the fibre uplinks are selected by the network management. Important is that distances longer than 412 m can be realized only in full duplex mode. The duplex settings are independent from the mode of the ring feature.

Optical Parameters

Multimode	<i>min. distance:</i>	2 km (full duplex)
	<i>Output power:</i>	-19 dBm
	<i>Sensitivity:</i>	-31 dBm
	<i>Wavelength:</i>	1300 nm
Single mode	<i>min. distance:</i>	15 km (full duplex)
	<i>Output power:</i>	- 15 dBm
	<i>Sensitivity:</i>	- 31 dBm
	<i>Wavelength:</i>	1300 nm

Order Information

Art.-No.	Description	Connectors
LHB8050A	Fast Ethernet Switch with ring function 4x 10/100Base-TX, 2x 100Base-FX ST multimode 1300 nm	4x ST 4x RJ45 2x power input
LHB8051A	Fast Ethernet Switch with ring function 4x 10/100Base-TX, 2x 100Base-FX SC multimode 1300 nm	2x SC duplex 4x RJ45 2x power input
LHB8055A	Fast Ethernet Switch with ring function 4x 10/100Base-TX, 2x 100Base-FX ST single mode 1300 nm	4x ST 4x RJ45 2x power input
LHB8056A	Fast Ethernet Switch with ring function 4x 10/100Base-TX, 2x 100Base-FX SC single mode 1300 nm	2x SC duplex 4x RJ45 2x power input
LHB8200-FW11	Extended Firmware Package for SNMP & Telnet Support	n/a
LHB8000-PS	Power Supply Unit for up to 6 devices; 100-240VAC 50/60Hz input/1Amp, -24VDC output/2,1Amp	1x 5-position Terminal Block 1x 3-position Terminal Block

Technical Specifications

Type	Intelligent Industrial Ethernet Switch with (4) 10/100Base-T/TX and (2) 100Base-FX uplink ports for Fibre Ring	
Fibre type	Multimode 62,5/125 or 50/125µm, Single mode 9/125µm, duplex	
Cable type	Twisted Pair cable, 100 Ohm, Category 5 or higher	
Data rate	10/100 Mbps	
LED displays	<i>Power</i>	Ready for operation
	<i>Link</i>	Link status each port
	<i>Act</i>	Data traffic each port
	<i>FDX/HDX</i>	Half or full duplex transmission each port
	<i>Alarm</i>	Fibre link interrupted
Mounting	35 mm DIN rail, according DIN EN 50 022	
Power	18 - 36 V DC / max. 250 mA by external power supply connections with screw terminals, redundant ports	
Dimensions	11,6H x 3,8W x 10,8D cm	
Operating temperature	-20°C to 60°C	
Storage temperature	-20°C to 80°C	
Relative humidity	5% to 90% non condensing	
Management	<ul style="list-style-type: none">- Configuration via a PC based management tool (Device Manager)- Status information via web based management (http-Server)- TELNET and SNMPv1 support with optional Extended Firmware Package (LHB8200-FW11)	

Black Box reserves the right to make any changes without further notice to any product to improve reliability, function or design. Black Box does not assume any liability arising out of the application or use of any product. 09/04

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