OPTICAL FIBER repeaters/ isolators

OPTICAL FIBER Repeaters/ Isolators

FUNCTINALITY AND RELIABILITY'

Optical Fiber converters give the possibilità to extend on Optical Fiber (also at the same time) every type of network/bus (LAN/Ethernet, CAN and/or serial) and they ensure safety and reliability in their functionality.

It will be possible to use all the tipologies of Optical Fiber, from Mono-Modal to Multi-Modal, ensuring a solid, safety and high speed communication.

WHAT IS OPTICAL FIBER?

Optical Fiber is the physical communication mean that allows:

- Immunity to elettromagnetic and electrostatic noise;
- High speed on transmission/reception of data;
- Very long distances walkable;
- Safety and reliability in the time.

The benefit of Optical Fiber, conversely to the physical layers in copper, is the use of the light (and not electrical signals) to transmit data.
This feature makes it totally immune to every type of noise.

Moreover, it will not be necessary separating the data buses from the power buses and the possible accidents (for example a thunderbolt) will not propagate all over the network.

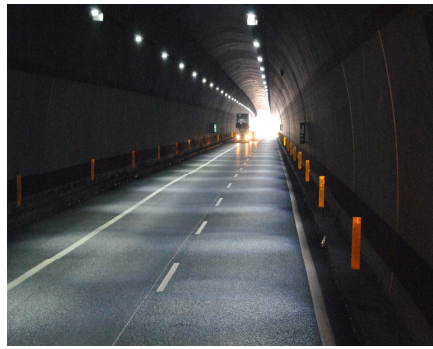**ADFweb.com srl**   2
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OPTICAL FIBER Repeaters/ Isolators
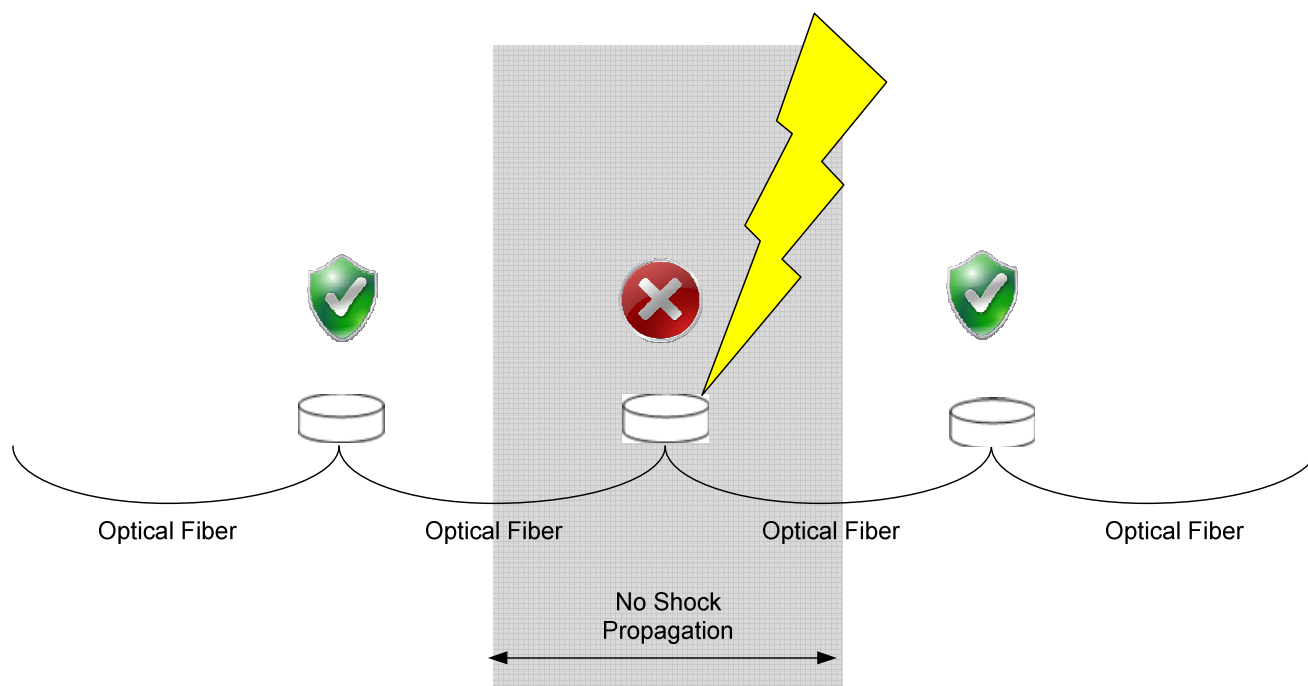
Total protection from electric shocks. All the components of a network in Optical Fiber will be totally isolated between them and the shock will not propagate over the network.

Moreover, the diagnostic of a network in Optical Fiber is much more easy and immediate and it will be possible to find immediately which component or Optical Fiber part is not working.

OPTICAL FIBER Repeaters/ Isolators

WHY AND WHEN USING THE OPTICAL FIBER?

- High speed communication
- Possibility to extend every type of network
- Easy and quickly installation and wiring
- Total electric insulation
- Galvanic insulation
- Total immunity from noise
- Possibility to transmit/receive da over a very long distance
- Solid communication mean
- Real Time communication
- Extension of distances

WHERE USING OPTICAL FIBER?

- Industrial environments
- Civil/public environments
- Energy Production plans, like photovoltaic and eolic plans
- Nuclear power plants
- Telecommunication plans
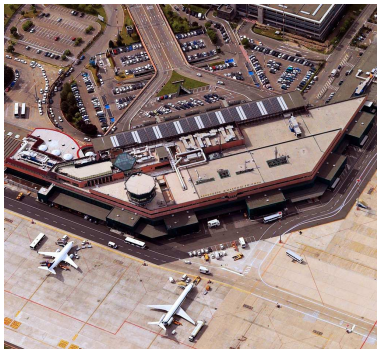- Remote monitoring and control
- Hospital

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OPTICAL FIBER Repeaters/ Isolators

Two series of devices in optical fiber, one more "economic" and one "advanced".

1) Multi-Modal serie

HD67072, HD67074, HD67075 serie

To connect directly to RS232 or RS485 or USB **devices that have a serial output on Multi-Modal optical fiber**.

HD67033, HD67034, HD67035 ed HD67036 serie

They allow the connection of **RS232** and **RS485** on "Multi-Modal optical fiber" using the 4 connection topologies: "**Point to Point**", "**Single Loop**", "**Redundant Loop**" and "**Multi-Drop**".

Advanced serie: Multi-Modal e Single Mode.

HD67701 and HD67702 series

They allows the connection both in "**Multi-Modal** optical fiber" and "**Mono-Modal** Optical Fiber".

They allow also the connection in optical fiber of "**Ethernet**" and "**CAN**" and plus the "**RS232**" and "**RS485**", using the 4 connection topology: "**Point to Point**", "**Single Loop**", "**Redundant Loop**" and "**Multi-Drop**".

Possibility to have distributed I/O over Optical Fiber.
Possibility of Mapping function: one Input to one or more Outputs.
Reading of I/O state through Modbus commends.

Diagnostic registers, readable directly and easely from SCADA and management software.

Modular system that allows the function at the same time of 4 serials channels, 1 Ethernet cannel, 1 CAN cannel and I/O.
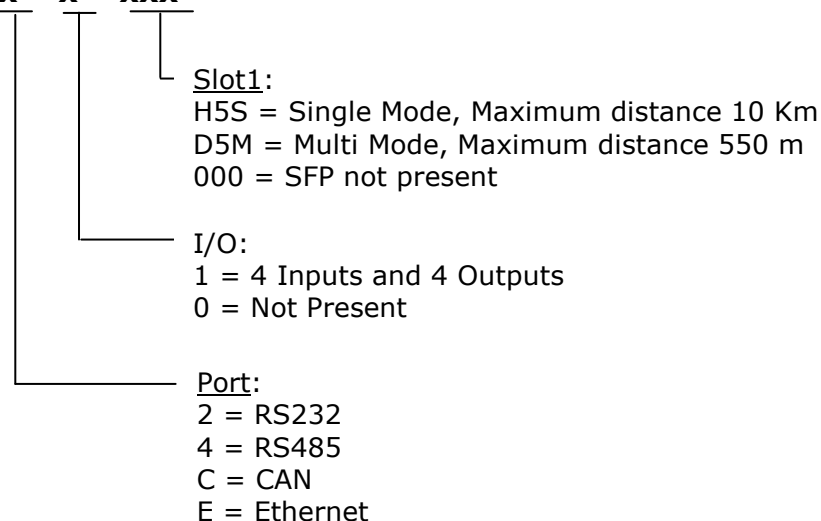
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OPTICAL FIBER Repeaters/ Isolators

ORDER CODES:

HD67701 serie
(Topologies: Single Loop - Point to Point)

HD67701 – x – x – xxx

Slot1:
H5S = Single Mode, Maximum distance 10 Km
D5M = Multi Mode, Maximum distance 550 m
000 = SFP not present

I/O:
1 = 4 Inputs and 4 Outputs
0 = Not Present

Port:
2 = RS232
4 = RS485
C = CAN
E = Ethernet

HD67702 serie:
(Topologies: Double Loop – Multidrop)

HD67702 – x – x – xxx - xxx
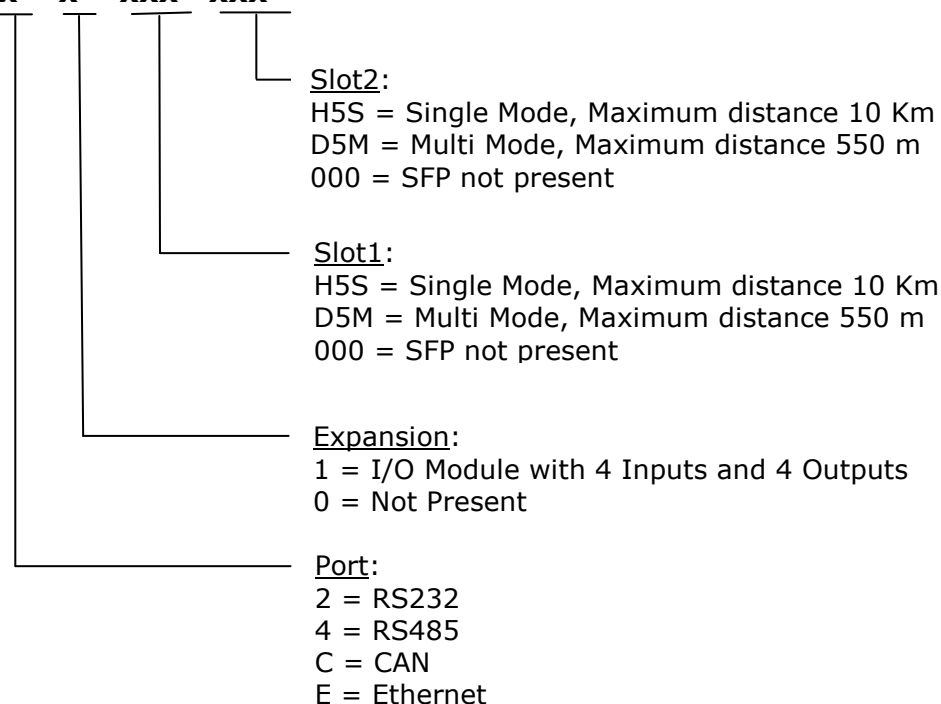
Slot2:
H5S = Single Mode, Maximum distance 10 Km
D5M = Multi Mode, Maximum distance 550 m
000 = SFP not present

Slot1:
H5S = Single Mode, Maximum distance 10 Km
D5M = Multi Mode, Maximum distance 550 m
000 = SFP not present

Expansion:
1 = I/O Module with 4 Inputs and 4 Outputs
0 = Not Present

Port:
2 = RS232
4 = RS485
C = CAN
E = Ethernet

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OPTICAL FIBER Repeaters/ Isolators

HD67033M - RS232 / Optic Fibres – Converter
(Daisy chain fiber connection, topology possible: Single Loop)

HD67034M - RS232 / Optic Fibres – Converter
(Daisy chain fiber connection, topology possible: Multi-Drop, Double Loop)

HD67035M - RS485 / Optic Fibres – Converter
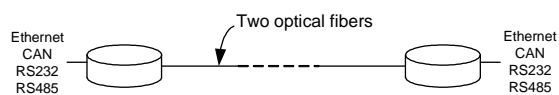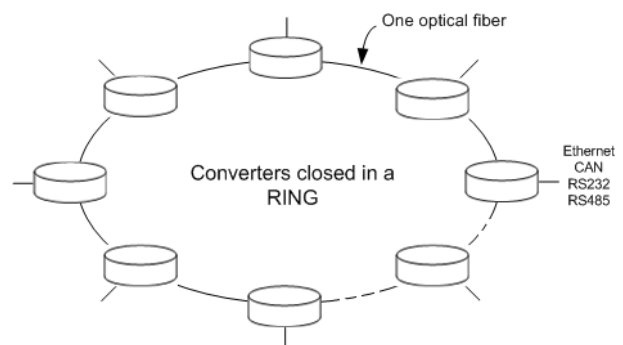(Daisy chain fiber connection, topology possible: Single Loop)

HD67036M - RS485 / Optic Fibres – Converter
(Daisy chain fiber connection, topology possible: Multi-Drop, Double Loop)

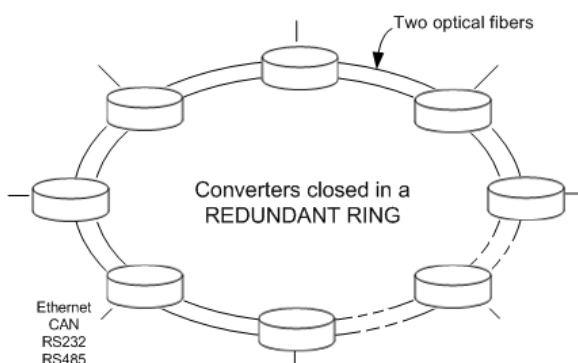**ADFweb.com srl**   7
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OPTICAL FIBER Repeaters/ Isolators

4 CONNECTION TOPOLOGIES

1 - Point To Point (linked directly)
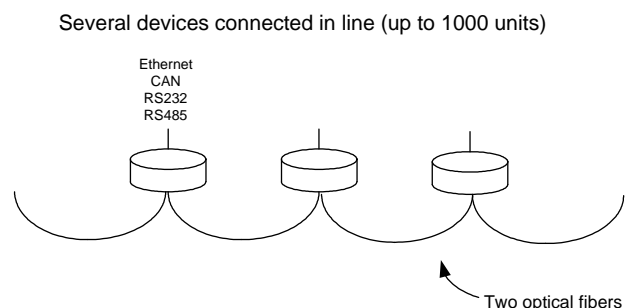
Two optical fibers

Ethernet
CAN
RS232
RS485

Ethernet
CAN
RS232
RS485

2 - Ring (Single Loop)

One optical fiber

Converters closed in a
RING

Ethernet
CAN
RS232
RS485

3 - Redundant Ring (Double Loop)

Two optical fibers

Converters closed in a
REDUNDANT RING

Ethernet
CAN
RS232
RS485

4 - Multi-Drop (In-Line)

Several devices connected in line (up to 1000 units)

Ethernet
CAN
RS232
RS485

Two optical fibers

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OPTICAL FIBER Repeaters/ Isolators

Topologie di collegamento

	Serie HD67701	Serie HD67702	HD67033M	HD67034M	HD67035M	HD67036M	HD67181FSX
Point To Point	X		X		X		X
Single Ring	X		X		X		
Redundant Ring		X		X		X	
Multi-Drop		X		X		X	

Periferiche

	HD67701	HD67702	HD67033M	HD67034M	HD67035M	HD67036M	HD67181FSX
Ethernet	X	X					
RS232	X	X	X	X			
RS485	X	X			X	X	
CAN	X	X					X

OPTICAL FIBER Repeaters/ Isolators

Series:
HD67701 (Single Loop, Point to Point)
HD67702 (Double Loop, Multidrop)

Product Description

The **HD67701** and **HD67702** series allow to extend in Optical Fiber every type of serial network RS232 or RS485, CAN (CAN 2.0A, CAN 2.0B, J1939, CANopen, NMEA 2000) or Ethernet (Modbus TCP, PROFINET, TCP/IP, EtherNet/IP, BACnet).

The HD67701 and HD67702 series include a loto of features that make them much more performant than the others optical fiber repeaters:

- ➢ Extend six independent networks in the same optical fiber;
- ➢ Different connection topologies (Point To Point, Single Loop, Multi-Drop, Double Loop);
- ➢ Possibility to transmit I/O over long distance;
- ➢ Integrated auto-diagnostic system;
- ➢ Possibility to extend the network over long distances;
- ➢ Interchangeable optical fiber connectors (different distances and different optical fiber tipologies);
- ➢ High speed communication;
- ➢ No voltage drop;
- ➢ Big Temperature Range (-40° C - +85° C);
- ➢ Total electric insulation.

Communication channels

One of the main characteristics of the series HD67701 and HD67702 is that they can extend up to 6 independent networks on the same optical fiber.
Different channels of communication in the same fiber will be created without having to divide the system into several branches.
In particular, it will be possible to extend in the same optical fiber up to:

- ➢ 4 serial communication systems;
- ➢ 4 CAN communication systems;
- ➢ 1 Ethernet communication system.

In other words, at the same time and by the same optical fiber network, it will be possible to extend up to 9 already existing communication networks, including 4 serial (eg 4 Modbus RTU networks), 4 CAN (such as 4 CANopen networks or J1939 a networks

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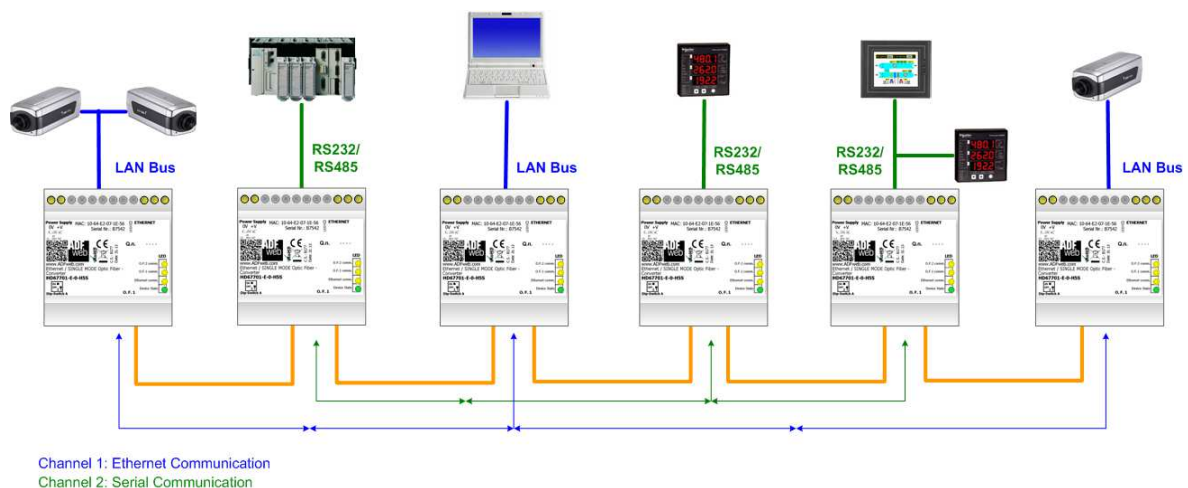
OPTICAL FIBER Repeaters/ Isolators

or any other physical layer protocol based on CAN) and one Ethernet (eg a PROFINET network or Modbus TCP or any other protocol based on Ethernet).

Example: extend on optical fiber an Ethernet network, a serial network and a CAN network, using the same physical support.

Channel 1: Ethernet Communication
Channel 2: Serial Communication
Channel 3: CAN Communication
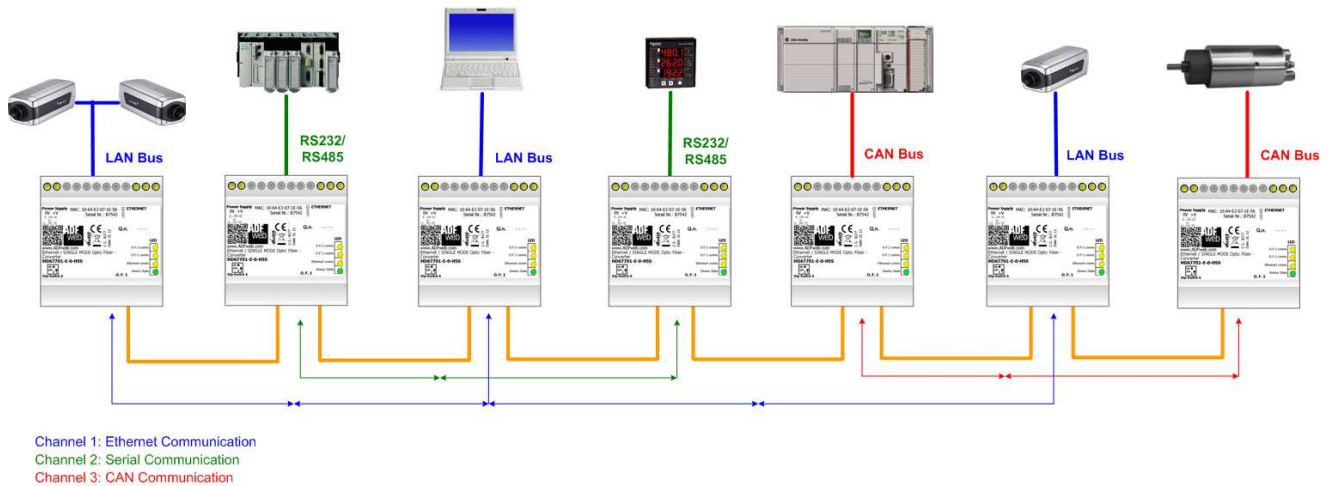
In this type of configuration three independent communication channels will be created in the optical fiber side, the first for the information of the Ethernet network, the second for the information of the serial type and the third for those of CAN network.

Example: extend on optical fiber an Ethernet network and a serial network, using the same physical support.

Channel 1: Ethernet Communication
Channel 2: Serial Communication

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In this type of configuration two independent communication channels will be created in the optical fiber side, the first for the information of the Ethernet network and the second for the information of the serial network.

Example: extend on optical fiber an Ethernet network and a CAN network, using the same physical support.
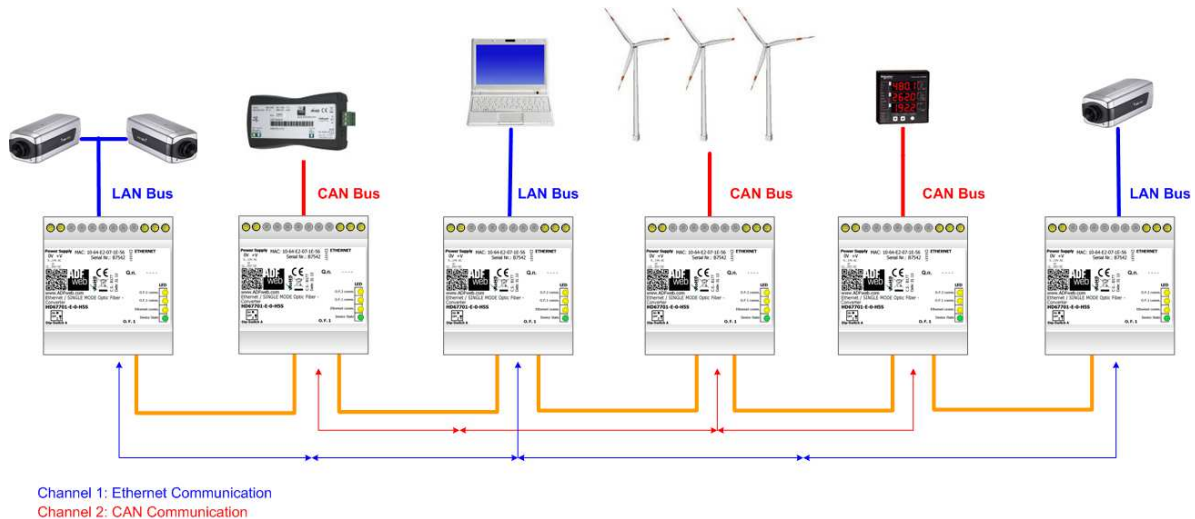
Channel 1: Ethernet Communication
Channel 2: CAN Communication

In this type of configuration two independent communication channels will be created in the optical fiber side, the first for the information of the Ethernet network and the second for the information of the CAN network.

Example: extend on optical fiber a serial network and a CAN network, using the same physical support.

Channel 1: Serial Communication
Channel 2: CAN Communication

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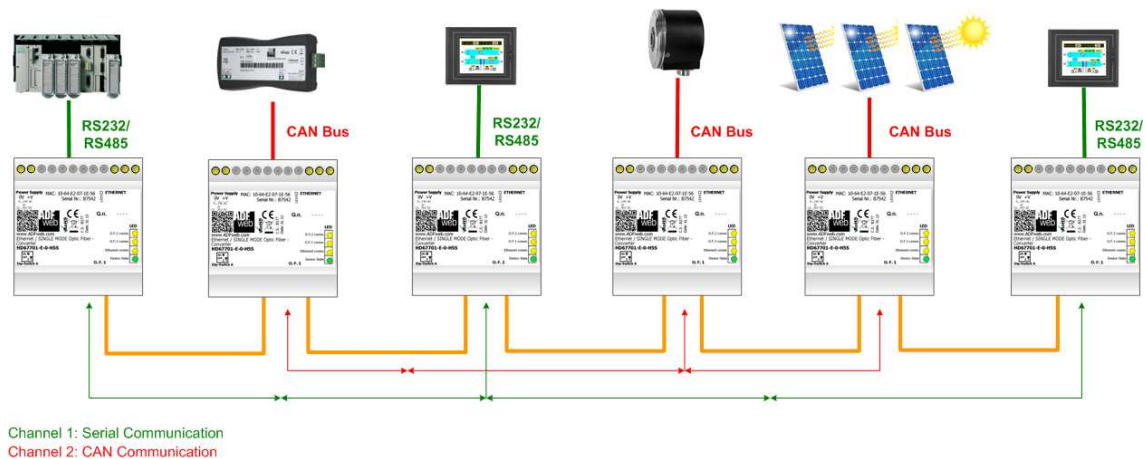# OPTICAL FIBER Repeaters/ Isolators

In this type of configuration two independent communication channels will be created in the optical fiber side, the first for the information of the serial network and the second for the information of the CAN network.

Example: extend on optical fiber two different serial networks (for example, two Modbus networks, each one with its master and Slaves), using the same physical support.

Channel 1: Serial Communication 1
Channel 2: Serial Communication 2

In this type of configuration two independent communication channels will be created in the optical fiber side, the first for the information of the serial network 1 and the second for the information of the serial network 2.
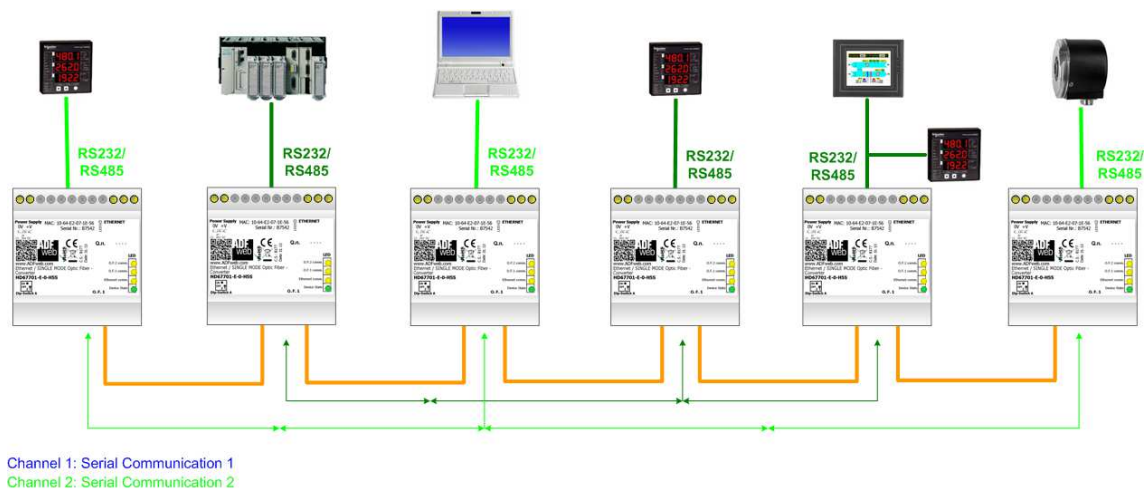
In others words, the Master of the network 1 will communicate with the slaves of the network 1 and the Master of the network 2 will communicate with the slaves of the network 2.

It will be possible to create up to 4 serial communication channels (RS232 and/or RS485).

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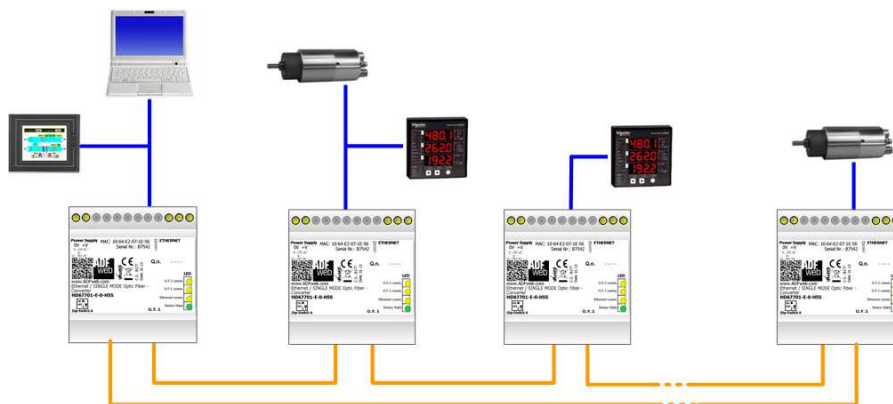
Connection topologies

In relazione alla serie utilizzata, saranno possibili diverse topologie di collegamento.

Serie HD67701

1) <u>Point To Point</u>: a device will be connected to the other directly, using optical fiber.

2) <u>Single Loop</u>: more devices will be connected serially using Optical Fiber, closing the network in a Ring.
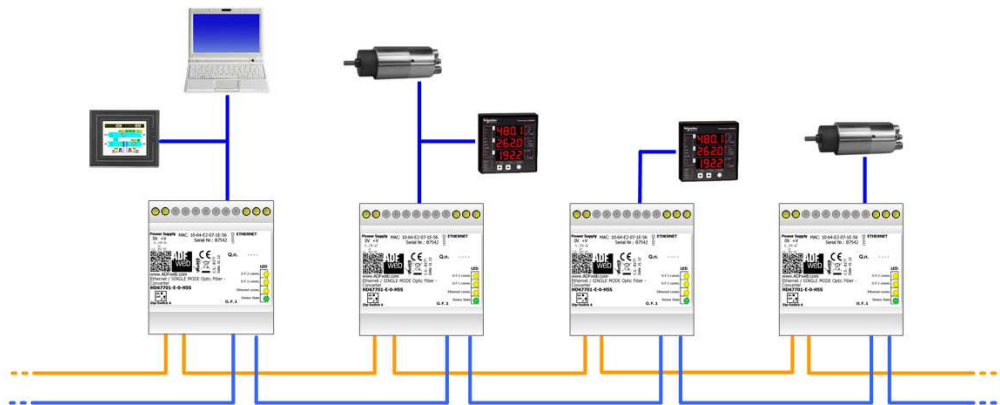
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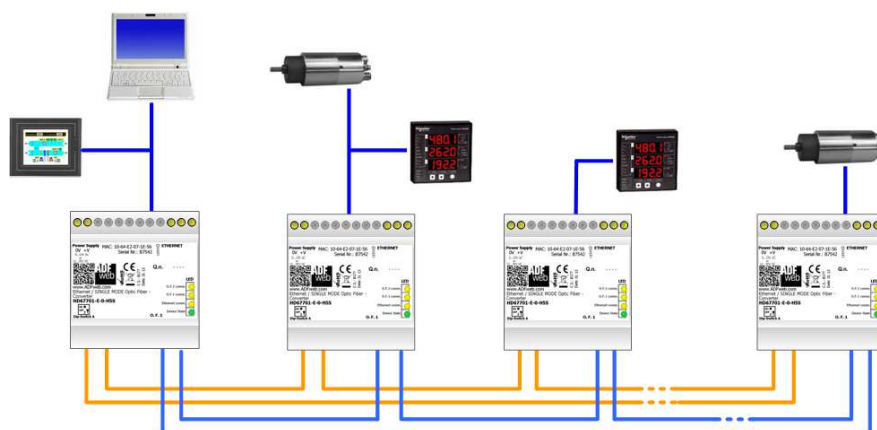mail: info@adfweb.com - web site: www.adfweb.com

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Serie HD67702

1) <u>Multi-Drop</u>: more devices will be connected serially using Optical Fiber. In this topology, it is not necessary to close the network in a ring.

2) <u>Double Loop</u>: more devices are connected serially using two pairs of Optical Fiber. The network will be closed in a redundant ring (double ring).
With this connection topology, thank to the redundancy of the signal, if one optical fiber is broken, the communication will not be interrupted.

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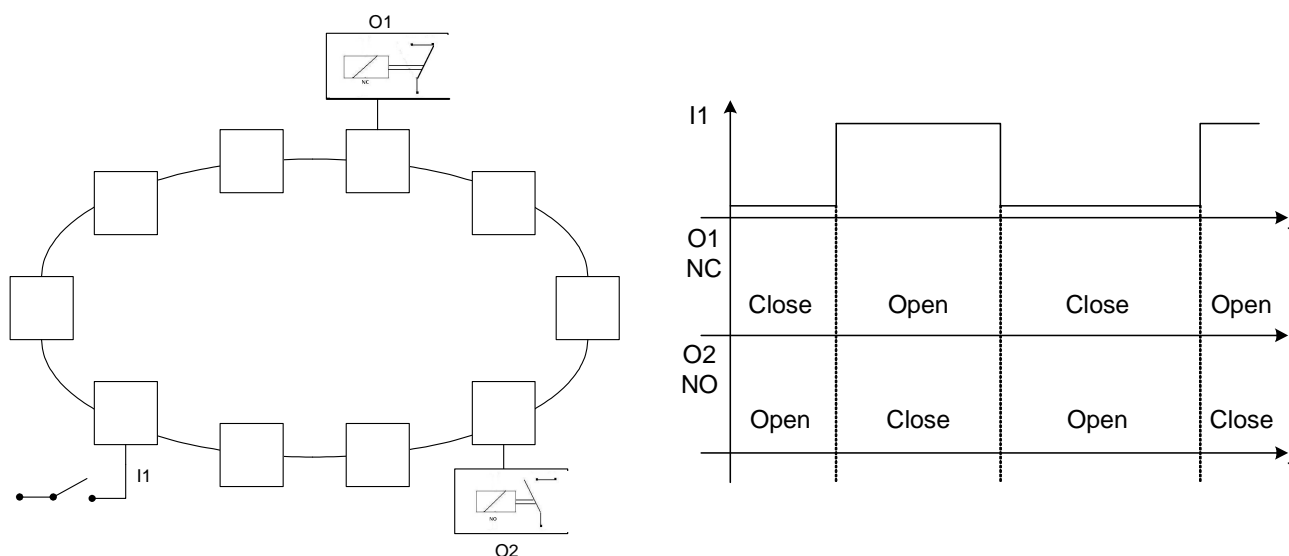
OPTICAL FIBER Repeaters/ Isolators

I/O Module

It is possible to integrate devices of the series HD67701 and HD67702 with I/O modules
This module can be equipped with up to 4 digital inputs and 4 digital outputs.
Thanks to this innovation, it will be possible to transmit over long distances one or more digital inputs and enable one or more digital outputs.

I/O Mapping

The HD67701 and HD67702 series, used in pairs with the I/O modules, allow to transmit over long distances the state of a digital input to enable/disable digital output.

The innovation of this series is to create a mapping of I/O: you can enable/disable multiple digital outputs through the same inputs.
This functionality will be available using all types of connection topology.

Example

Through a single digital input, two different outputs will be piloted, reducing the number of wiring and simplifying the system.

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OPTICAL FIBER Repeaters/ Isolators

I/O details

- Input

Maximum Voltage = 24 VDC

The voltage can be applied intwo different ways:

- Common external power supply
- Externally

- Output

Maximum Current = 100 mA

- Maximum consumption of I/O module= 40 mA

- Insulation

The ports are totally isolated if the external power supplì is used.

- Connectors

Screw connectors.

Maximum section of the wire = 1,5 mmq

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OPTICAL FIBER Repeaters/ Isolators

Auto-diagnostic System

To monitor the status of the optical fiber network, the devices are equipped with a self-diagnostic system that allows you to monitor the network status and to identify any faults.
Through a simple software, you can identify all the devices on the network and rebuild a simple scheme, identifying what connections are made.

It will be possible to connect to the network via Ethernet or USB.

- Informations about the converter;
- Communication Status;
- Present devices in the network;
- Scheme of the structure of the network;
- Information about the configuration of the converters.

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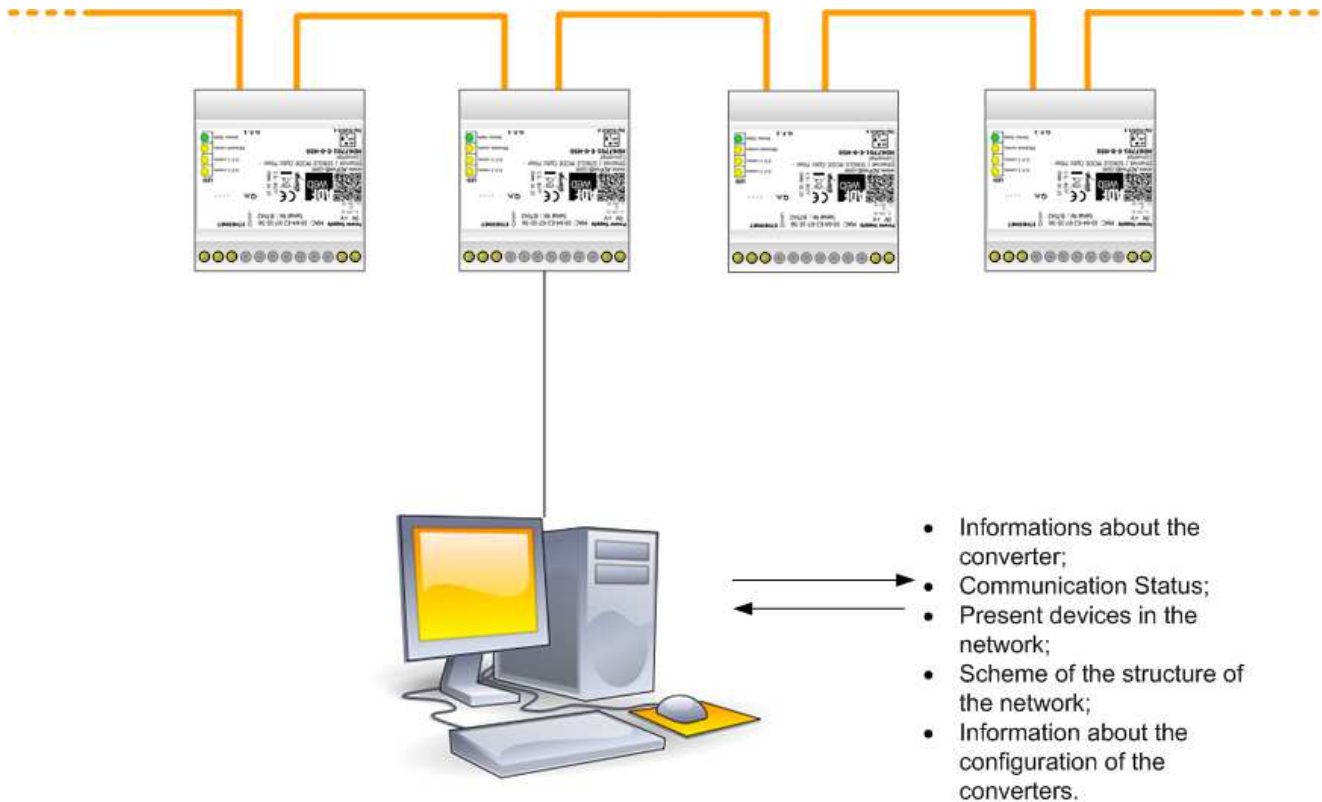mail: info@adfweb.com - web site: www.adfweb.com

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OPTICAL FIBER Repeaters/ Isolators

Device details

SFP (Small Factor Pluggable)

On optical fiber side, the SFP (Small Factor Plauggable) are mounted: They are interchangeable modules through which you can choose the type of transmission medium and the maximum distance to be traveled.

Nota: The HD67701 and HD67702 series can be bought with or without SFPs.

Transmission support

In relation to the SFP module installed, you can use different transmission supports:

➢ Fiber Optic Mono-modal: in this type of optical fiber, the light signal is generated by a laser;
➢ Optical Fiber Multi-Modal: in this type of optical fiber, the light signal is generated by a LED

Walkable Distance

With the HD67701 and HD67702 series it is possible to cover up to a maximum of 160 Km optical fiber is, putting in communication devices located at long distances without the need to use intermediate devices.
In relation to the SFP module used, it will be possible to determine the maximum distance traveled by optical fiber, by relying on a range of distances between 2 and 160 km.

You can then choose the SFP module best suited to your application, adding different SFP in the same optical network network in relation to the length of each branch to travel.
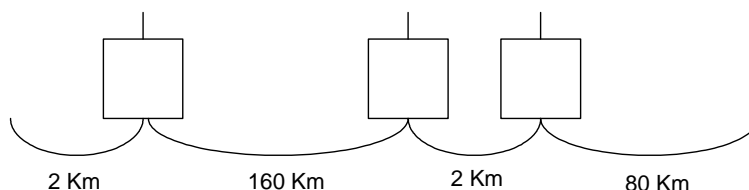
| 2 Km | 160 Km | 2 Km | 80 Km |

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OPTICAL FIBER Repeaters/ Isolators

Temperature range

These devices can operate in industrial environments thanks to their extended temperature range, between -40 ° C - +85 ° C.

Insulation between the ports

The ports in the converter are electrically isolated from each other and from the CPU. In particular, the insulation of the devices are the following:

- ➢ LAN / Power Supply = 1,5 KV
- ➢ (RS232, RS485, CAN) / Power Supply = 2,5 KV

Power Supply

The converters of the HD67701 and HD67702 series can be powered by direct current (VDC) or alternating current (VAC).
The range of voltages are very wide and include all the voltage values normally used in the industrial field.

VAC	∿	VDC	▬▬
Vmin	Vmax	Vmin	Vmax
9V	19V	12V	35V

The maximum power consumption (at 24 VDC) depends on the type of mounted devices and the number of SFP connectors used:

Device	Consumption [W/VA]
HD67701-2/4/C-x-xxx	2.8
HD67702-2/4/C-x-xxx-xxx	3.4
HD67701-E-x-xxx	2.4
HD67702-E-x-xxx-xxx	3.2

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OPTICAL FIBER Repeaters/ Isolators

Data Rate

The maximum data rate that the converter can use depends on the type of bus used. In particular:

- ➢ CAN: 5 kHz to 1 MHz
- ➢ Serial: 1200 baud to 115200 baud
- ➢ LAN: 10/100 MHz