Gallagher

RS485 Fiber Transceiver

Installation Note

N11 Single-Mode Transceiver: G28811
N12 Multi-Mode Transceiver: G28812



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1 Introduction

The Gallagher RS485 Fiber Transceiver provides two independent data channels operating over a multi-mode (N12 variant) or single-mode (N11 variant) fiber optic cable. Each data channel is capable of handling 2-Wire Half Duplex RS485 data as per the TIA/EIA standards transparently supporting any data speed up to 1 Mbps.

Plug-and-play design ensures ease of installation requiring no electrical or optical adjustments. The transceiver has a built-in fiber link test feature that allows for the testing of the fiber.

Bi-color (Red/Green) LED indicators are provided for rapidly ascertaining equipment operating status including the location of fiber breaks.

2 Fiber installation

Consideration must be given to the design and installation of your fiber network. A poorly designed and installed network may result in communication failures.

IMPORTANT: The fibre network must be designed and verified by a suitably qualified independent fiber consultant. Use an Optical Time-Domain Reflectometer (OTDR) to measure connector loss and optical reflections at each end of the fiber.

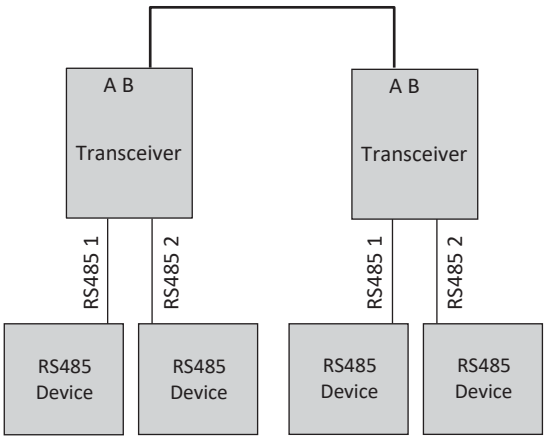
A Fiber loss budget must be done for each optical link between transceiver pairs, the link loss must not exceed the value in the *"Technical Specifications"* section.

Clean all connectors

Handle your fiber with care. The connectors are susceptible to dirt and contamination. Always keep the dust caps on the connectors. Clean all connectors before use. Use a fiber optic cleaning kit and follow the instructions provided.

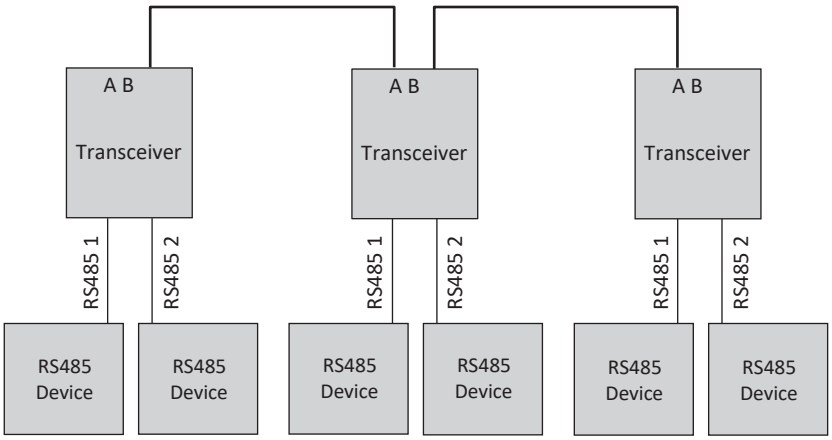
3 Fiber topology

Point-to-point



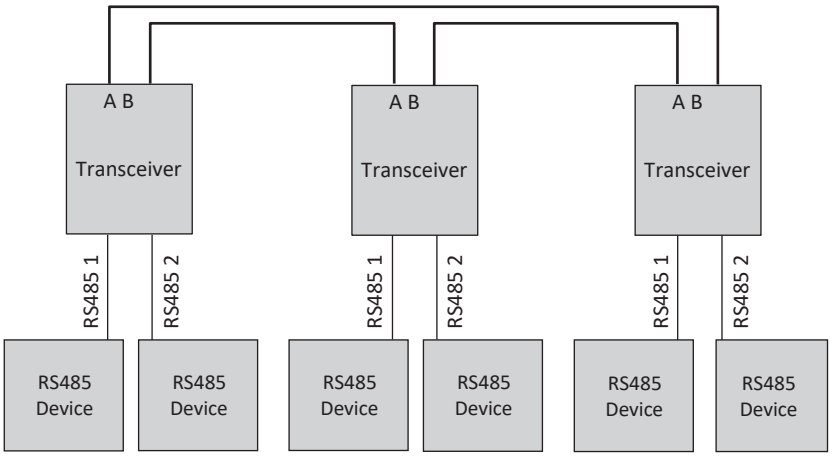
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Linear drop insert and repeat



Self Healing Ring (SHR)

In the event of an optical fiber break, all transceivers on the network maintain communication.



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4 Transceiver installation



ATTENTION: This equipment contains components that can be damaged by electrostatic discharge. Ensure both you and the equipment are earthed before beginning any servicing.

The transceiver should be installed in a dry location, protected from extremes of temperature and humidity. The N11 should not be connected to an N12, (i.e. the N11 and N12 transceivers are not interchangeable). The transceiver must match the type of fiber cable used (single or multi).

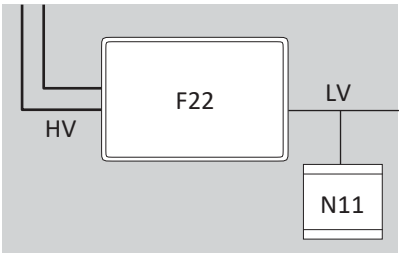
Isolation

When installed, the transceiver must be electronically isolated from earth and all metal surfaces. Use a plastic mounting plate to offset the transceiver from all metal surfaces.

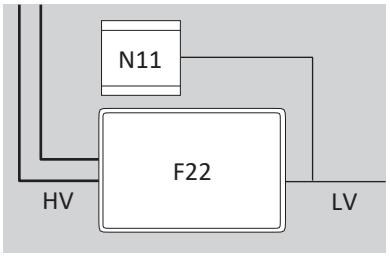
High voltage proximity

High voltage such as that generated by a Gallagher Fence Controller can cause interference. When mounting the transceiver, position the transceiver away from any high voltage within the cabinet.

Correct:



Incorrect:



Important safeguards

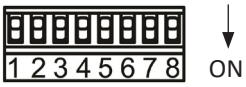
Elevated ambient temperature: If installed in a closed or multi-transceiver rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing other equipment in an environment that has an elevated temperature. Check the temperature rating specified by the manufacturer.

Reduced air flow: Installation of the transceiver in a rack should be such that the amount of air flow required for safe operation of the transceiver is not compromised.

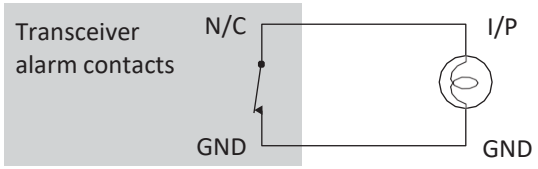
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5 Dipswitch settings

The dipswitches are located on the right hand side of the transceiver. The **default** position for all dipswitches is **OFF**. To turn ON a dipswitch push the dipswitch down. Set your dipswitch settings prior to powering on the transceiver, re-power the transceiver if dipswitch settings are later changed.



<table>
<tr><th>Dipswitch</th><th>Definition</th></tr>
<tr><td>1</td><td>Alarm Relay Mode
When dipswitch 1 is OFF, the alarm relay mode is local. The transceiver's alarm relay will turn on when the fiber between this transceiver and an adjacent one is broken. This mode assists with pin-pointing the fault at the appropriate part of the ring when monitoring the relay for each transceiver.

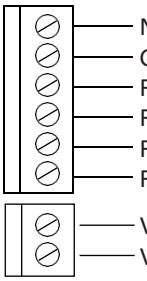
When dipswitch 1 is ON, the alarm relay mode is global. The transceiver's alarm relay will turn on when the fiber between any transceiver on the ring is broken. This mode raises a global alarm and is useful if you can't monitor the relay for each transceiver.

</td></tr>
<tr><td>2 and 3</td><td>Ring Length (for self healing ring use only)*
In Self Healing Ring (SHR) situations, ring length needs to be set to the approximate total fiber length. For every transceiver in the loop add 0.5 km to the fiber ring length, then set the dipswitch based on this total length.
<table>
<tr><th rowspan="2">Total SHR Length</th><th colspan="2">Dipswitch</th></tr>
<tr><th>2</th><th>3</th></tr>
<tr><td><1 km or not SHR</td><td>○</td><td>○</td></tr>
<tr><td>1 km to 2 km</td><td>○</td><td>●</td></tr>
<tr><td>2 km to 5 km</td><td>●</td><td>○</td></tr>
<tr><td>5 km to 50 km</td><td>●</td><td>●</td></tr>
</table>
● = ON
○ = OFF</td></tr>
<tr><td>4</td><td>Master/Slave (for self healing ring use only)*
In SHR applications, one transceiver in the ring must be set to Master (dipswitch 4 OFF), all other transceivers in the ring must be set to Slave (dipswitch 4 ON). The Master transceiver can be any transceiver in the ring.</td></tr>
<tr><td>5</td><td>RS485 680 ohm Bias Channel 1
Dipswitch 5 must be ON when connected RS485 channel 1 devices do not have bias resistors built into their circuitry.</td></tr>
<tr><td>6</td><td>RS485 680 ohm Bias Channel 2
Dipswitch 6 must be ON when connected RS485 channel 2 devices do not have bias resistors built into their circuitry.</td></tr>
<tr><td>7</td><td>RS485 120 ohm Termination Channel 1
The end devices on the RS485 channel 1 must be terminated using 120 ohm resistance. To terminate RS485 channel 1 at the transceiver set dipswitch 7 to ON.</td></tr>
<tr><td>8</td><td>RS485 120 ohm Termination Channel 2
The end devices on the RS485 channel 2 must be terminated using 120 ohm resistance. To terminate RS485 channel 2 at the transceiver set dipswitch 8 to ON.</td></tr>
</table>

* For non-SHR applications dipswitches 2, 3 and 4 should be OFF.

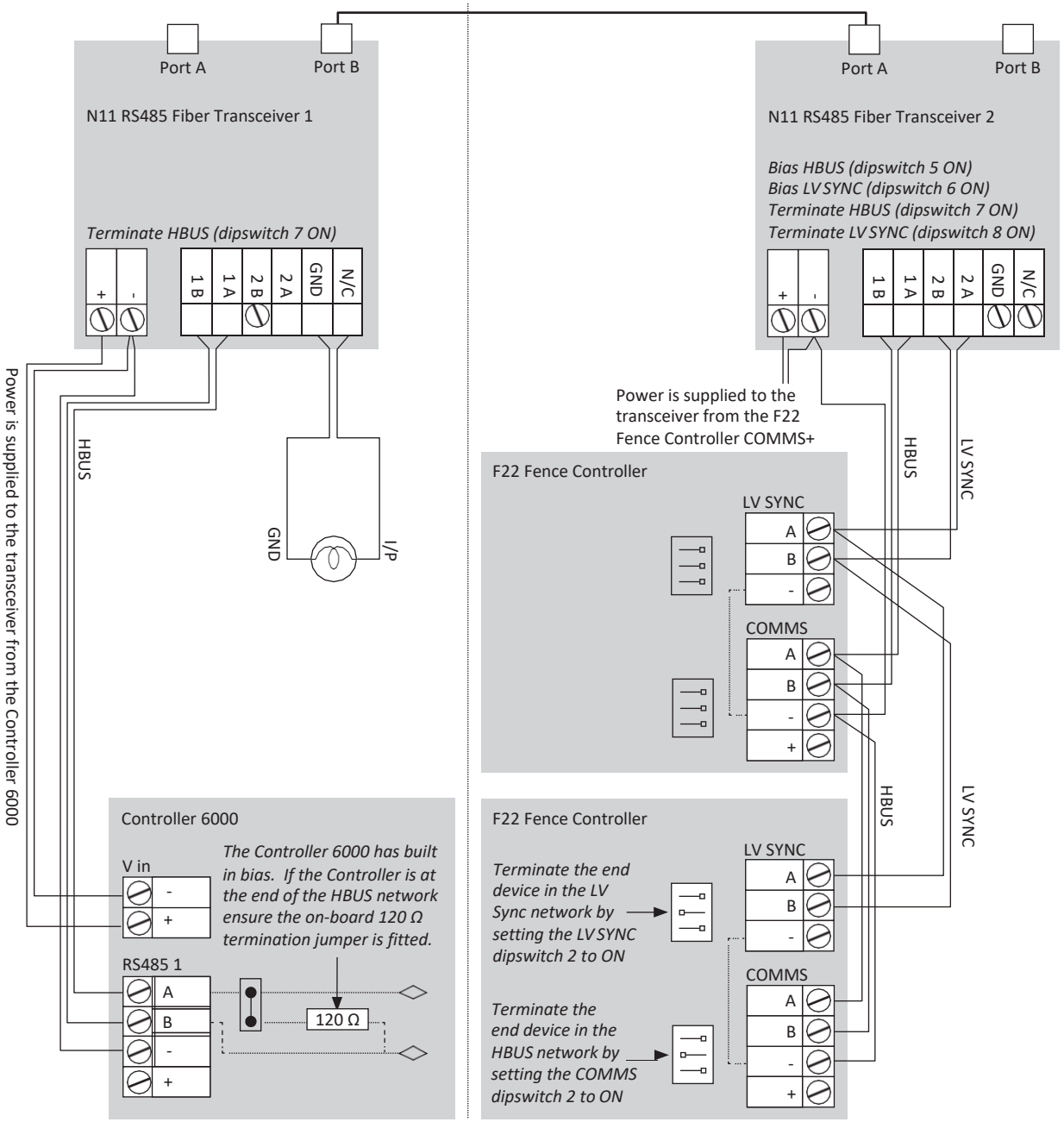
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6 RS485 (copper connections)

The RS485 connections are located on the right hand side of the transceiver.



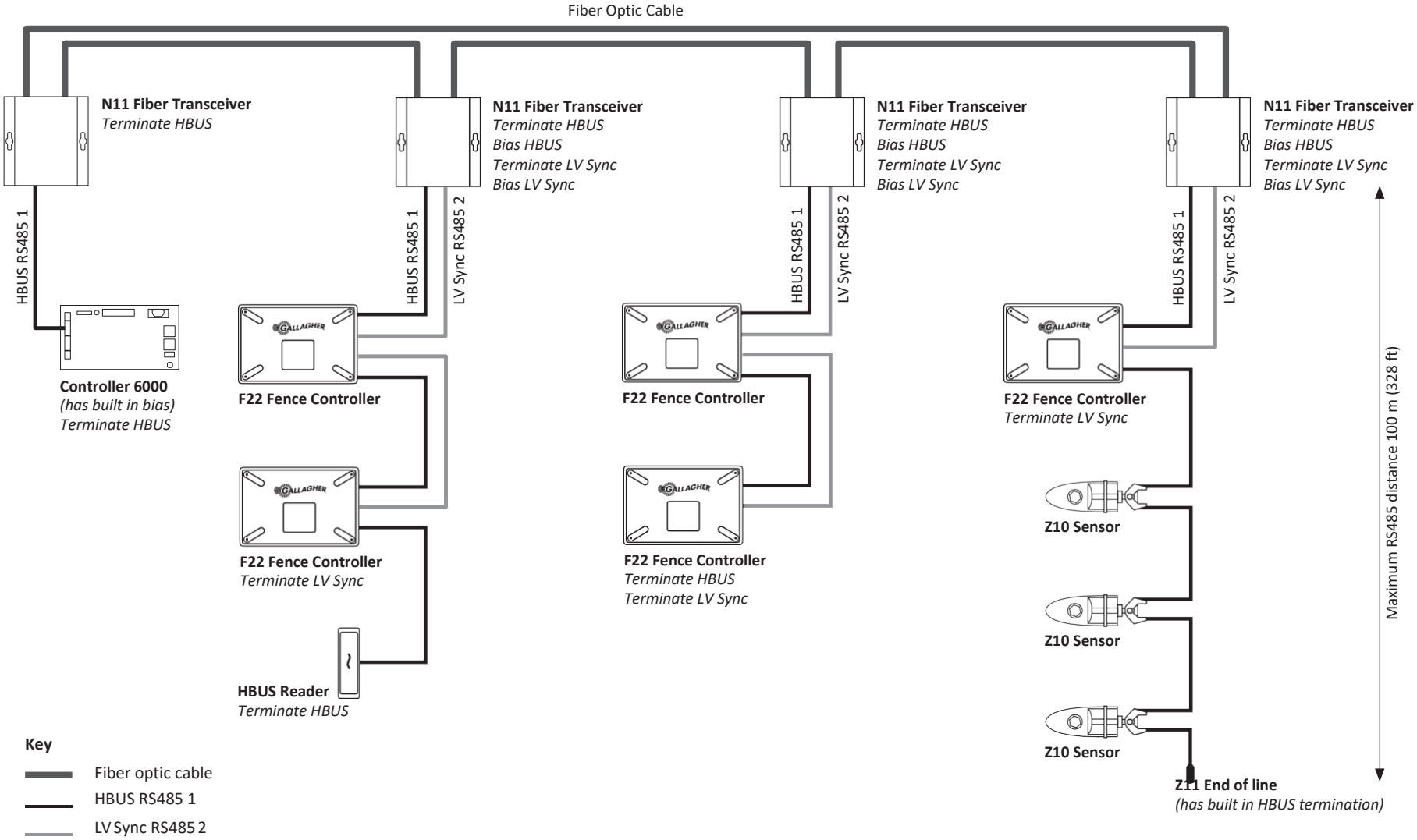
In the wiring example below, RS485 1 has been used for the HBUS network and RS485 2 has been used for LV Sync network. The RS485 channels can be used for any network but are not interchangeable.



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7 HBUS & LV Sync distribution example

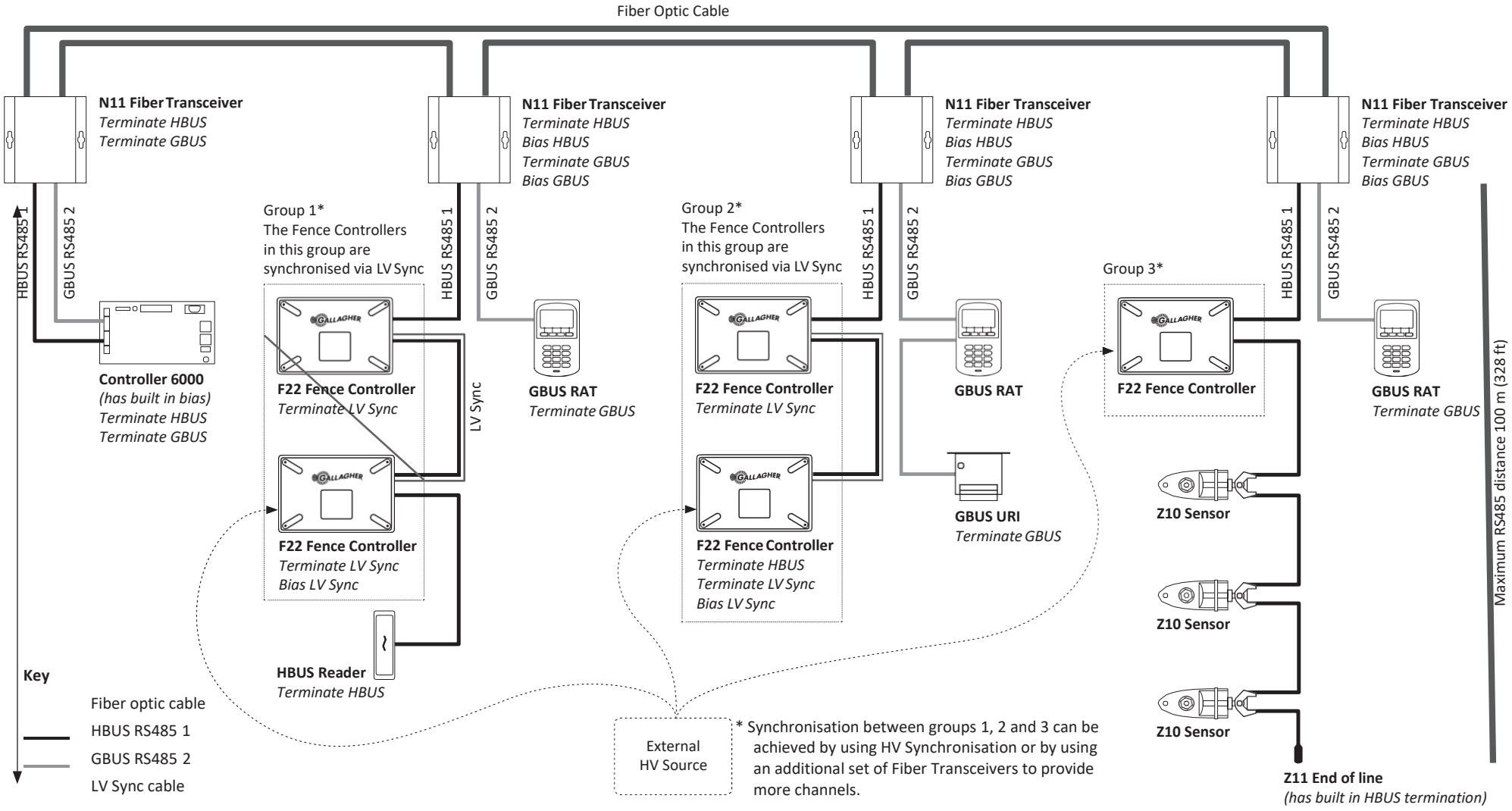
This example uses a self healing ring topology, (i.e. in the event of an optical fiber break, all devices on the network maintain communication).



8 HBUS & GBUS distribution example

This example uses a self healing ring topology, (i.e. in the event of an optical fiber break, all devices on the network maintain communication).

GBUS: For short GBUS cable runs terminating each end could have a detrimental effect. If you are having issues with GBUS devices coming online on a short cable run then try without terminating each end. Biasing maybe required for GBUS devices to improve the signal. By web browsing the Controller you can determine the best setting for biasing. Gallagher Security Technical Support can assist with web browsing the Controller and monitoring the RS485 communications.



9 Optical fault conditions

A fault condition is when the transceiver system loses power or optical link. The transceiver provides two indicators to help identify when and where fault conditions occur in a system:

1. ALARM relay output
2. LINK A and LINK B LEDs

When a fault occurs and dipswitch 1 is OFF (local), the alarm relay on this transceiver goes from closed to open.

When a fault occurs and dipswitch 1 is ON (global), the alarm relay on every transceiver in the system goes from closed to open.

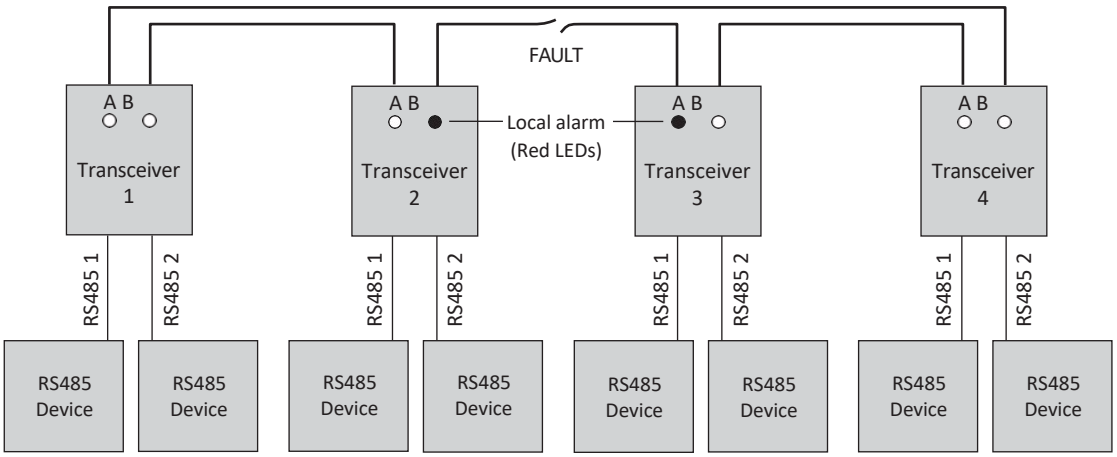
In addition, the LINK LED may change to solid red which indicates the optical signal over that local port/ link has been lost. The LINK LED may also be green for a period of time, and then flash red some number of times which indicates that a fault is present elsewhere on the ring. The LINK A and LINK B LEDs can then be used to identify the actual location of the fault based on their color and pattern:

LINK LEDs	Status
Solid Green	**Optical link has been established between this optical port and the adjacent transceiver over fiber.** Furthermore, every other transceiver in the system is also reporting that link has been established. There are no faults in the system.
Solid Red	**Optical link over this port has been lost.** This could be due to a broken fiber, a bad connection, or loss of power at the adjacent transceiver.
Blinking Green/Red	**Optical link has been established between this optical port and the adjacent transceiver over fiber.** However, a fault condition has been detected somewhere in the system. The LINK LED will be green for a period of time, and then flash red some number of times. The number of red flashes indicates the location of the fault by "hops" around the ring. If the LED flashes red three times, then the location of the fault is three hops away (i.e. three transceivers away). For larger systems with faults greater than 9 hops away, the LED will use a combination of long and short red flashes. Each long flash indicates 10 hops. Each short flash indicates 1 hop. For example, a fault 47 hops away would be encoded as 4 long red flashes, followed immediately by 7 short red flashes. The pattern repeats indefinitely until the fault is resolved. **Note:** This feature is disabled when ring length is set to 1 km (point-to-point).

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Fault condition example

The diagram below shows how the system (a SHR) will respond to an optical fiber break.



The LINK A and LINK B LEDs on each transceiver will indicate the number of hops, (i.e. the number of transceivers away) to the fault location:

Transceiver 1	The LINK A LED will be green for a time, then flash red 2 times. The LINK B LED will be green for a time, then flash red 1 time.
Transceiver 2	The LINK A LED will be green for a time, then flash red 3 times. The LINK B LED will be solid red.
Transceiver 3	The LINK A LED will be solid red. The LINK B LED will be green for a time, then flash red 3 times.
Transceiver 4	The LINK A LED will be green for a time, then flash red 1 time. The LINK B LED will be green for a time, then flash red 2 times.

10 LED indications

	Optical Link A (upper LED)	**Optical Link B (lower LED)**
Green	Transceiver in sync	Transceiver in sync
Red	Transceiver not in sync	Transceiver not in sync
Blink	Remote fault*	Remote fault*
Off	Optic not installed	Optic not installed

* Indicates the number of hops, (i.e. the number of transceivers away) to the fault location.

	RS485 Data In (Rx) (upper LED)	**RS485 Data Out (Tx) (lower LED)**
Green	Possible fault	Possible fault
Green Blink	Data activity	Data activity
Off	No data activity	No data activity

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11 Technical specifications

Data	
Channels	2 Half-Duplex
Data Rate	Transparent Up To 1 Mbps Max (including support for following speeds) 9600 bps, 19K2 bps, 1 Mbps
Data Format	2-Wire RS485
Bit Error Rate	<10-12 @ Maximum Optical Loss Budget
Termination	DIP Switch Selectable 120 Ω Termination Per Channel
Bias	DIP Switch Selectable 680 Ω Bias Per Channel
Connector	6-Way Screw Terminal Block
Maximum RS485 Cable Length	100 Meters
HBUS Devices	A maximum of 60 HBUS devices per RS485 channel
GBUS Devices	A maximum of 14 GBUS devices per RS485 channel

Optical	
Number Of Fibers	1 or 1in/1out
Wavelength	1310/1550 nm (Multi-Mode & Single-Mode Variants)
Optical Budget	Multi-Mode (50/125 µm or 62.5/125 µm) = 14 dB @ 1310 nm (4 km Between Units Max) Single-Mode (9/125 µm) = 17 dB @ 1310 nm (40 km Between Units Max)
Optical Emitter	Laser Diode
Optical Connector Type	ST Type

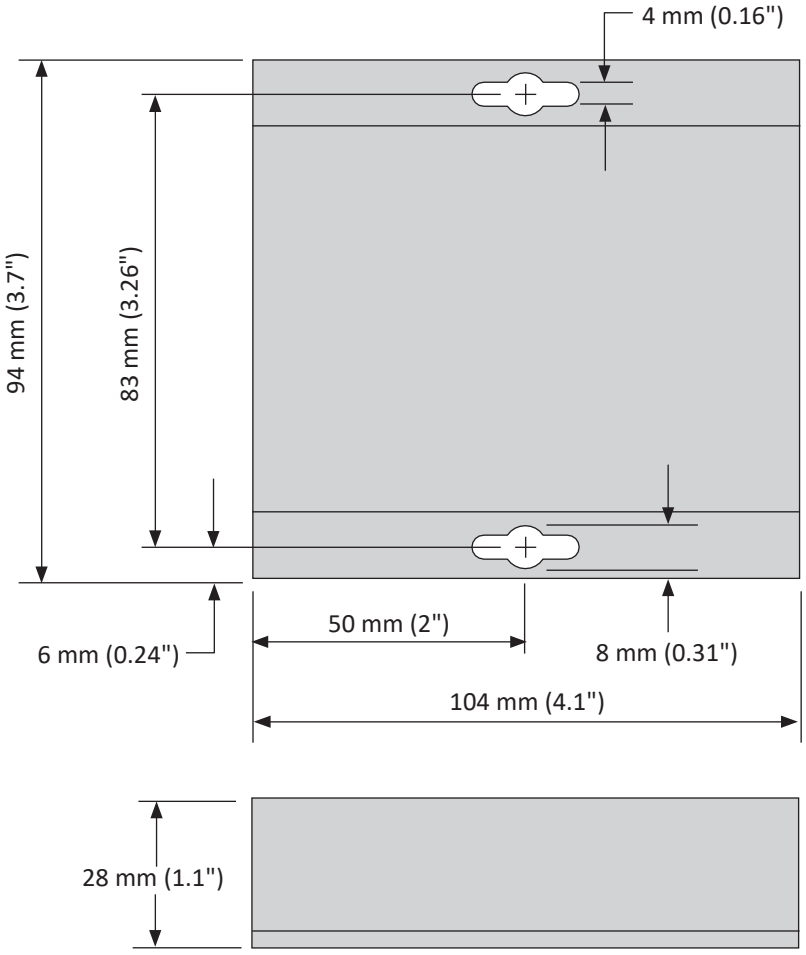
Relay	
Number of Relays	1
Type	Normally Closed: Solid State Relay Contacts
Load	0.5 mA Resistive Load

Electrical and mechanical	
Power	9-36 Vdc @ 3 W
Connector	2-Way Screw Terminal Block
Current Protection	Automatic Resettable Solid-State Current Limiters
Reverse Polarity Protection	Present
Circuit Board	Meets IPC Standard
Size	10.4 cm x 9.4 cm x 2.8 cm (L x W x H) (Excluding Connectors) (4.1 in x 3.7 in x 1.1 in)
Weight	0.2 kg (0.35 kg including packaging) 2.44 lb (0.77 lb including packaging)

Environmental	
MTBF	>100,000 Hours
Operating Temperature	-40 ^{o}C to +75 ^{o}C (-40 ^{o}F to +167 ^{o}F)
Storage Temperature	-40 ^{o}C to +85 ^{o}C (-40 ^{o}F to +185 ^{o}F)
Relative Humidity	0% to 95% (non-condensing)

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12 Mounting dimensions



This picture is not to scale, therefore use the measurements provided.

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