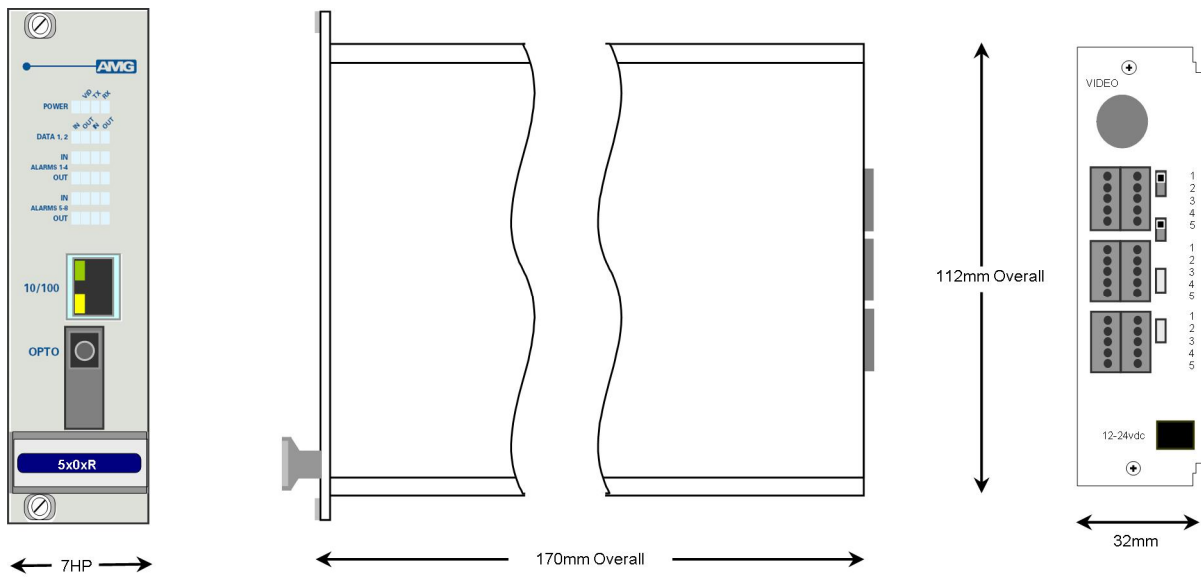# Receive Unit with two Bi-directional Data Channels and eight Bi-directional Alarms plus Ethernet for a Multimode Fibre Link

The **AMG5804R** is a rackmount receive unit designed to transmit and receive 2 data signals plus 8 bi-directional alarms and also provides full duplex 100Base-T Ethernet connectivity over one Multimode optical fibre.

The **AMG5804R** is designed to plug into an **AMG2009** or **AMG2015** subrack, which in turn fits into a 19" rack system.

The **AMG5804R** is designed to operate with an **AMG5803** or **AMG5803R** transmit unit in a point to point configuration. The R suffix in the partno. indicates a rackmount configuration.

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# Contents

# Introduction

## Unit Functional Schematic

The **AMG5804R** transmits and receives 2 data channels and 8 bi-directional alarm signals to/from the **AMG5803** transmit unit.

Ethernet connectivity is also provided between the two units.
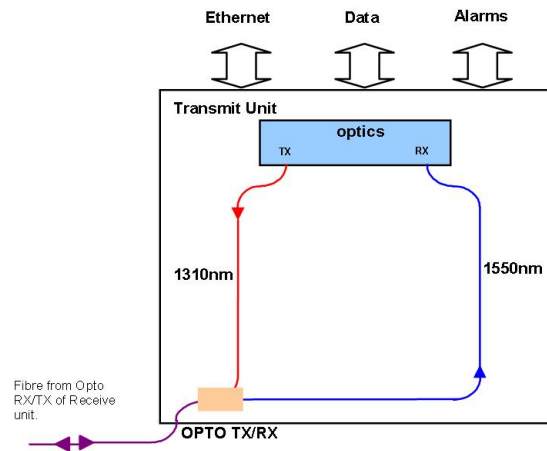


## Optical Connection

The **AMG5804R** connections are illustrated in the following example which shows an **AMG5803** single channel transmit unit together with a **AMG5804R** configured as a point to point system.
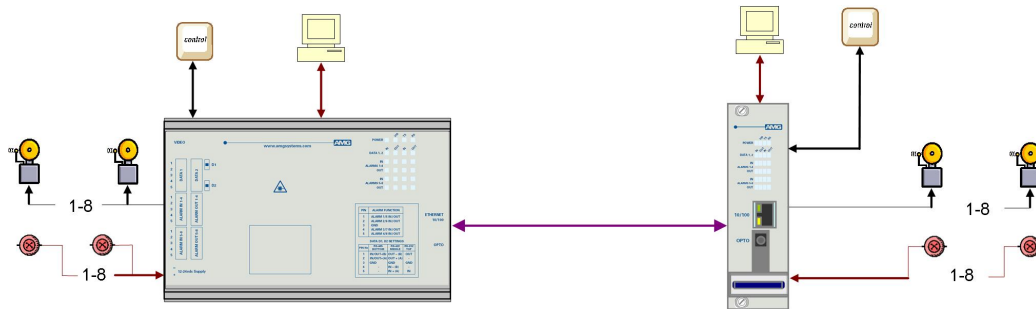


## Ethernet Operation

The Ethernet interface supports 100Mbit/s full duplex operation only. Data is transmitted from one port the other port with minimum delay or buffering.

The port implements "Auto MDI/MDIX" i.e. it may be connected with either a straight-though or cross-over cable to an appropriate device such as external switch, PC or other DCE/DTE.

Two LED indicators are provided adjacent to the RJ-45 port: Green indicates Link / Data transfer and Yellow indicates no Ethernet connection.

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# *Connections*

## *Optical Connection Multimode*

Optical Fibre ......................................Multimode 50/125 or 62.5/125**
Connector ..........................................SC/PC

Minimum Optical Launch Power..........-10dBm
Transmit Wavelength...........................1550nm
Minimum Optical Sensitivity.................-30dBm
Receive Wavelength............................1310nm
Minimum Optical Dynamic Range .......20dB.

**Note: the transmission distance is limited by the bandwidth of the Multimode optical fibre. The optical data rate is 155Mbits/s, which may restrict operation to a maximum fibre length of 7km, although in most cases the units will operate successfully over longer fibre lengths. It is advisable however for distances greater than 7km, to have the optical fibre tested.

## *Power Connection*

Power supply ......................................From plug in connection on the AMG2009 or AMG2015 subrack
Power consumption .............................2.5 Watts max.

## *Data and Alarm Channel Connections*

No. of Data Channels ..........................2
No. of Alarms .....................................8

Connectors .........................................Removable 5-pin, 3.5mm, Spring Terminal
Connector Partnos..............................Phoenix 1952296

Data Interfaces ...................................RS-232 / 422 / 485. Selected by external slide switches D1-D2
        RS-232 – Switch Position - Top
        RS-422 – Switch Position - Middle
        RS-485 – Switch Position - Bottom
Internal 120Ω termination resistors may be applied to RS-422 or RS-485 inputs as required by internal DIL switches inside the enclosure. *See appropriate section on how to remove the case for access to the DIL switches.

Alarm inputs.......................................Input is via a series 10k resister with 47kΩ pull-up to +3V3.
Alarm outputs.....................................Output is NPN open collector, maximum load 500mA @ 24Vdc.

## *Ethernet Connection*

Ethernet Data Connector ....................RJ45
Interface.............................................Auto-negotiation up to 100BASE-TX full duplex
Ethernet Data Rate .............................Maximum 100Mb/s total Ethernet traffic on fibre

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## Front Panel Indicators

### Power / Opto LED

Power / Opto.......................................Green   -     Unit powered, Opto sync.
Red   -     Unit powered, no Opto sync.
Off   -     No power applied to unit

### Low Speed Data LEDs

Data Present IN (RS485 or RS422) .... Green   -     logic zero (+V, -V) present on IN+, IN-
Red   -     logic one (-V,V+) present on IN+, IN-
Off   -     tri-state off or no connection on IN+, IN-

Data Present IN (RS232) ....................Green   -     logic zero (+V) present on input IN+
Red   -     logic transitions present on input IN+
Off   -     logic one (-V) present on input IN+

IN corresponds to the data signals being transmitted onto the optical fibre.

Data Present OUT (RS485 or RS422) Green   -     logic zero (+V,-V) present on OUT+, OUT-
Red   -     logic one (-V,+V) present on OUT+, OUT-
Off   -     tri-state off or no connection on OUT+, OUT-

Data Present OUT (RS232) ................Green   -     logic zero (+V) present on OUT+
Red   -     logic transitions present on OUT+
Off   -     logic one (-V) present on OUT+

OUT corresponds to the data signals being received from the optical fibre.

### Alarm LEDs

**Channels 1-8**
ALARM IN..........................................Green   -     Alarm ON / Contacts closed.
Off   -     Alarm OFF / Contacts open.

ALARM OUT.......................................Green   -     Alarm ON / Contacts closed.
Off   -     Alarm OFF / Contacts open.

### Ethernet Data LEDs

Link not Present .................................Yellow   -     Link not present
Off   -     Link is present

Link Integrity .....................................Green   -     Link integrity is good, Idle state
GBlink   -     Data transfer
Off   -     Link not present

# Data and Alarm Channel Configuration

The **AMG5804R** receive unit sends and receives data to/from an **AMG5803** or rackmount equivalent **AMG5803R** transmit unit. The 2 physical data interfaces RS-485, RS-422 or RS-232 are individually selectable by the user with the slide switch mounted from the rear panel.

There are also 8 bi-directional alarm inputs provided, each alarm input is typically connected to a contact closure switch. Each alarm output can receive an on/off signal from an **AMG5803** and is typically used to convey contact closure status.

## Data Channel Configuration

Each low speed data channel provides an RS-232, RS-422 (full duplex, four wire) or RS-485 (half duplex, two wire) interface defined by the corresponding mode switch inside the enclosure. Every data channel as shipped from the factory is set up for RS-485 operation unless otherwise requested.

The data input for both the RS-485 and the RS-422 modes detects a tri-state input condition by monitoring the differential voltage level across the input. A differential level below 600mV positive or negative will be detected as a tri-state condition. A level above 600mV positive or negative will be detected as a logic 1 or logic 0 respectively. It is important therefore to terminate the RS-485 bus or the RS-422 input bus using 120Ω if a pre-bias is present on the RS-485 or RS-422 bus.

A large number of third party equipment manufacturers apply a pre-bias on their RS-485 bus. This pre-bias is applied by pulling one arm of the RS-485 bus high (+5 volts) and the other arm low (0 volts) using high value resistors within the third party equipment. In order to ensure that the AMG equipment detects a tri-state condition, then these resistors should have a value above 5kΩ. If the third party bias resistors are less the 750Ω the bus can be multiple terminated as required to ensure that a tri-state level is detected.

The system detects a tri-state input condition on the data channel bus when in RS-485 or RS-422 mode.

## Data Interface Connections

| Connector Pin No. | Data Channel | | |
|:---:|:---:|:---:|:---:|
| | **RS-485 [switch bottom]** | **RS-422 [switch middle]** | **RS-232 [switch top]** |
| 1 | IN/OUT - (B) | OUT - (B) | OUT |
| 2 | IN/OUT + (A) | OUT + (A) | |
| 3 | GND | GND | GND |
| 4 | | IN - (B) | |
| 5 | | IN + (A) | IN |

Note: (A) or (B) in brackets in the above table refers to RS-485 / RS-422 data specification.

## Data Channel Termination

The interface mode RS-232, RS-422 or RS-485 of each data port Data 1-4, is selected with the corresponding external slide switch D1-D4. The actual number of data channels provided on the unit depends upon the AMG model.

Internal 120Ω termination resistors across IN+ and IN- inputs may also be applied when in RS-422 or RS-485 mode using internal DIP switches P0-P3 on the main PCB inside the enclosure. P0-P3 may

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be accessed by removing the 2 fixing screws in the rear panel and sliding the PCB out of the enclosure.

For clarity, in the 3 examples shown below all 4 data ports D1-D4 are terminated the same, but each data channel may be configured & terminated independently as required. The 3 examples shown are RS-232 (no termination), RS-422 (120Ω) or RS-485 (120Ω).

**RS-232**
**P0-P3 (a, b) OFF**

**RS-422**
**P0-P3 (b) ON**

**RS-485**
**P0-P3 (a) ON**

P0 (a) OFF

P0 (b) ON

P0 (a) ON

P0 (b) OFF



P0, P1    P2, P3

| Data 1-4 |
| Switch Location |
| |
| Data 1    P0 |
| Data 2    P1 |
| Data 3    P2 |
| Data 4    P3 |

D1
D2
D3
D4

| D1-D4 |
| Switch Position |
| |
| RS-232    Top |
| RS-422    Middle |
| RS-485    Bottom |
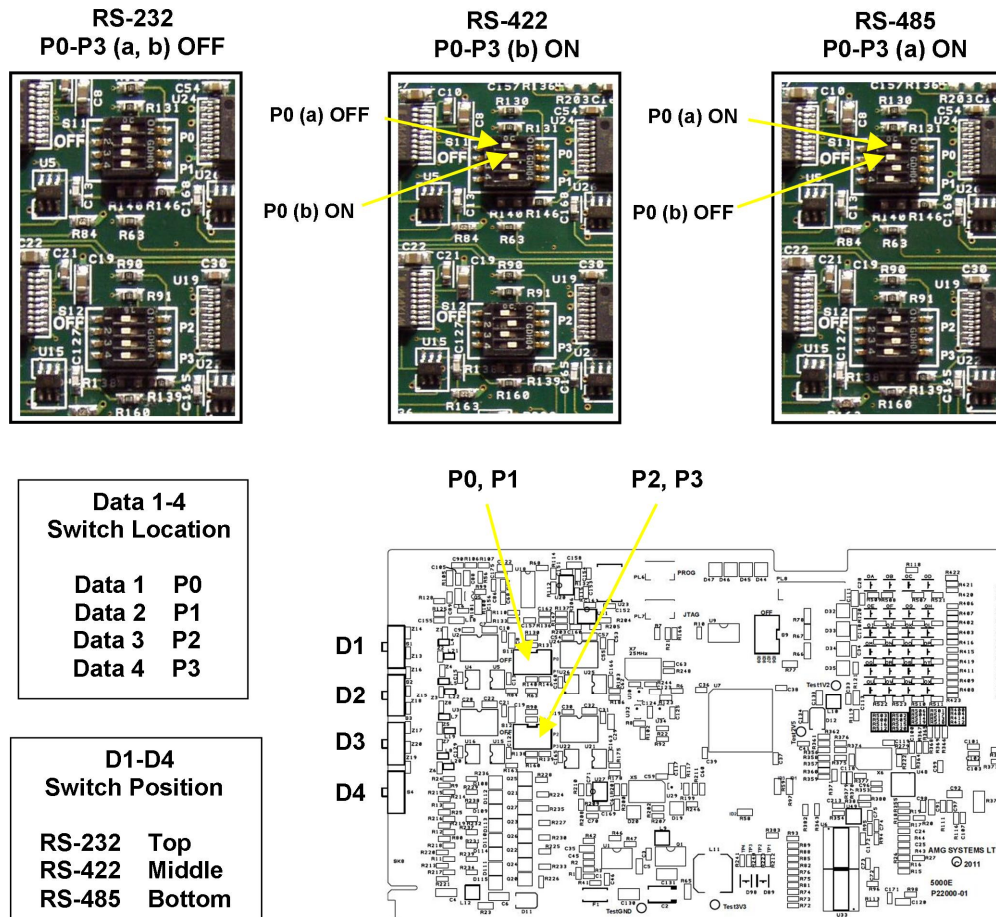
### Alarm Channel Configuration

The **AMG5804R** provides 8 bi-directional contact closure inputs / alarm outputs. Each ALARM IN input is via an internal 10kΩ series resistor with a 47kΩ pull-up resistor to the internal +3V3 supply.

Each ALARM OUT output can receive an on/off signal from an **AMG5803** and is typically used to convey contact closure status. Each alarm output is NPN open collector, maximum load 50mA / 24Vdc.

## Alarm Interface Connections

| Connector Pin No. | Alarm Interfaces | |
| :---: | :---: | :---: |
| | Alarm IN 1-4, 5-8 | Alarm OUT 1-4 , 5-8 |
| 1 | ALARM 1/5 IN | ALARM 1/5 OUT |

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| | | |
|---|---|---|
| 2 | ALARM 2/6 IN | ALARM 2/6 OUT |
| 3 | GND | GND |
| 4 | ALARM 3/7 IN | ALARM 3/7 OUT |
| 5 | ALARM 4/8 IN | ALARM 4/8 OUT |

## *Physical Information*

### *Dimensions*

Height....................................................3U Plug-in
Width.....................................................7HP
Depth ...................................................170mm excluding connectors
Weight..................................................200grams

### *Mounting Details*

The unit is designed to be mounted within an AMG2009 or AMG2015 Subrack on standard card guides.

## *Safety*

AMG Optical Fibre Products use Class 1 laser systems in accordance with EN 60825-2:2000.

It is always advisable to follow good practice when working with optical fibre systems. This includes:

- Do not stare with unprotected eyes or with any unapproved collimating device at fibre ends or connector faces, or point them at other people.
- Use only approved filtered or attenuating viewing aids

For other safety issues and advice on good practice associated with optical fibre systems, please see EN 60825-2:2000 or your local safety officer.

## *Maintenance and Repair*

There are no user serviceable parts within AMG products. See unit data sheet for full specification.

In case of problem or failure, please call your local support centre or contact: **AMG Systems Ltd.** at 3 The Omega Centre, Stratton Business Park, Biggleswade, Beds., SG18 8QB, UK.

| | |
|---|---|
| Phone | +44 (0) 1767 600 777 |
| Technical Support | +44 (0) 1767 604 491 |
| Email | techsupport@amgsystems.com |

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