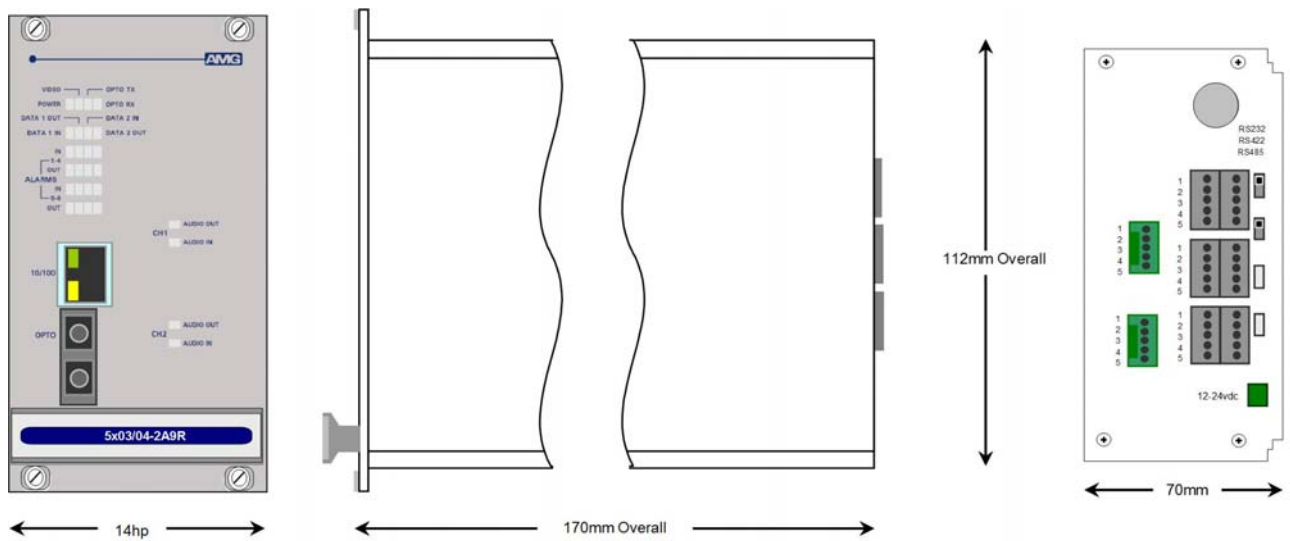




# AMG5804-2A9R-DF Instruction Manual

**Receive Unit with two Bi-directional Data Channels, two Bi-directional Audio Channels, eight Bi-directional Alarms plus Ethernet for a Multimode Dual Fibre Link**



The **AMG5804-2A9R-DF** is a rackmount data/audio receive unit designed to transmit and receive 2 data signals, 2 audio channels plus 8 bi-directional alarms and also provides full duplex 100Base-T Ethernet connectivity over two Multimode optical fibres.

The **AMG5804-2A9R-DF** is designed to plug into an **AMG2009** or **AMG2015** subrack, which in turn fits into a 19" rack system.

The **AMG5804-2A9R-DF** is designed to operate with an **AMG5803-2A9-DF** or **AMG5803-2A9R-DF** data transmit unit in a point to point configuration. The R suffix in the partno. indicates a rackmount configuration.

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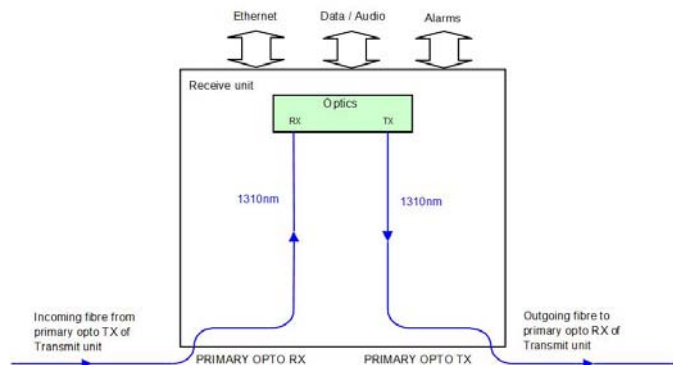
## Introduction

### Unit Functional Schematic

The **AMG5804-2A9R-DF** transmits 2 data channels, 2 bi-directional audio signals and 8 bi-directional alarm signals to the **AMG5803-2A9-DF** transmit unit.

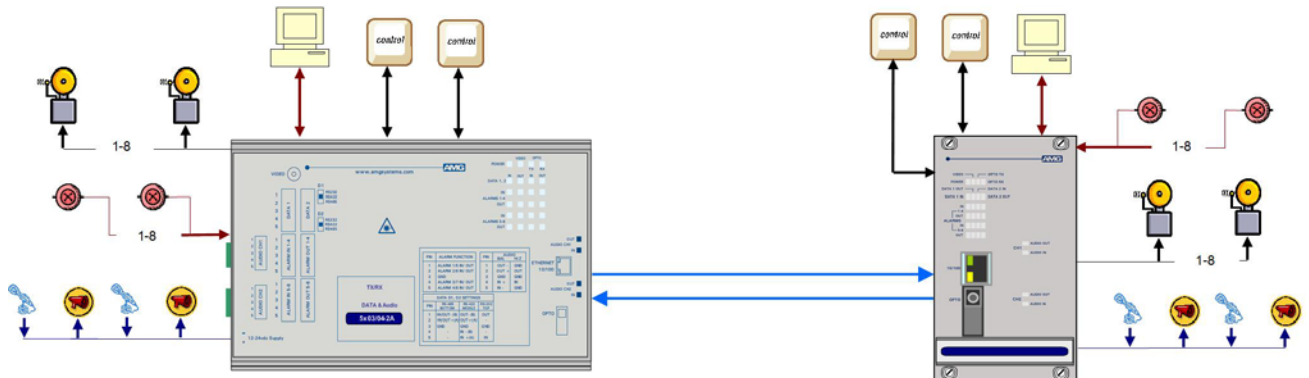
It also receives 2 data channels, 2 bi-directional audio signals and 8 bi-directional alarms transmitted from the **AMG5803-2A9-DF**.

Ethernet connectivity is also provided between the two units.



### Optical Connection

The **AMG5804-2A9R-DF** connections are illustrated in the following example which shows an **AMG5803-2A9-DF** transmit unit together with an **AMG5804-2A9R-DF** rackmount receive unit configured as a single channel 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-through 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.

## Connections

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### Power Connection

Connector Type .....Removable 2-pin, 3.81mm, Screw Terminal  
Connector Partno.....Phoenix 1803578  
Supply Voltage.....+12 to +15 Volts DC  
Maximum Power .....5 Watts

### Optical Connection Multimode

Optical Fibres.....Multimode 50/125 or 62.5/125\*\*  
Connectors .....SC/PC

Minimum Optical Launch Power.....-15dBm  
Transmit Wavelength.....1310nm  
Minimum Optical Sensitivity.....-34dBm  
Receive Wavelength.....1310nm  
Minimum Optical Dynamic Range .....19dB.

\*\*Note : the maximum transmission distance is 2km. This is limited by the bandwidth of the Multimode optical fibres.

### 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.

### Audio Connections

No. of Audio Channels.....2

Connectors .....Removable 5-pin, 2.5mm, Spring Terminal  
Connector Partno.....Phoenix 1881354

Input level .....0dBm  
Input overload level.....+6dBm

Input impedance .....10kΩ / 600Ω  
Output impedance .....600Ω

Frequency response .....10Hz to 20KHz

Audio Input impedance is selected by removable jumper JP1 or JP2 on Audio Expansion board inside enclosure. \*See appropriate section on how to remove the case for access to the data/audio switches.

- 1-2 – High Impedance 10k $\Omega$
- 2-3 – Balanced 600 $\Omega$

***Ethernet Connection***

Ethernet Data Connector .....RJ45  
Interface.....Auto MDI/MDIX 100BASE-TX  
Ethernet Data Rate.....Maximum 100Mb/s full duplex

## Front Panel Indicators

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### Power LED

POWER .....	Green	-	Power is present
	Off	-	Power is not present
VIDEO .....	Off	-	Not used
OPTO TX.....	Green	-	Tx opto. present
	Off	-	Tx opto. is not present
OPTO RX.....	Green	-	Rx opto. sync.
	Off	-	Rx opto. is not sync.

### 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

### Audio LEDs

Audio Present TX ..... Green - audio present > -40dBm  
Red - audio present > 0dBm (overload at +6dBm)  
Off - audio not present or < -40dBm

This represents the audio signals being transmitted on the optical fibre

Audio Present RX ..... Green - audio present > -40dBm  
Red - audio present > 0dBm (overload at +6dBm)  
Off - audio not present or < -40dBm

This represents the audio signals being received from the optical fibre.

## Data and Alarm Channel Configuration

The **AMG5804-2A9R-DF** receive unit sends and receives data to/from an **AMG5803-2A9-DF** or rackmount equivalent **AMG5803-2A9R-DF** 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 **AMG5803-2A9-DF** 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 than 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

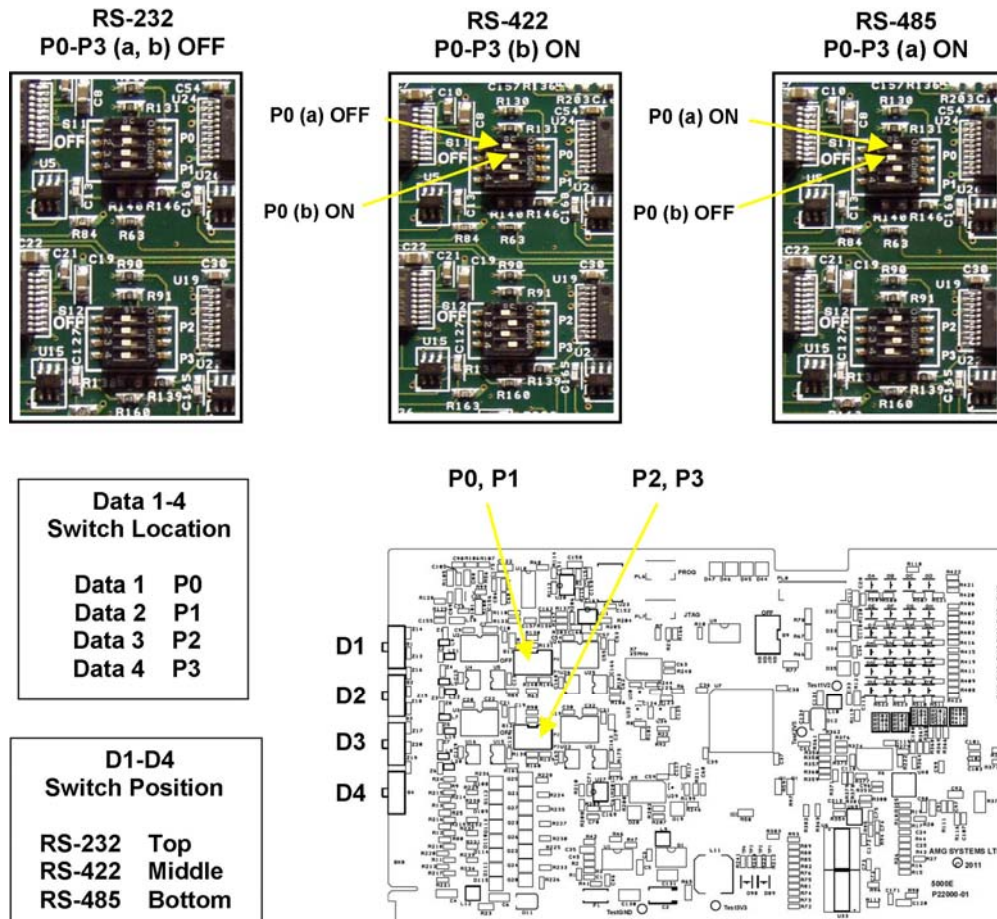
The interface mode RS-232, RS-422 or RS-485 of each data port Data 1-4, is selected with the corresponding external slide switch D1-D4. The actual number of data channels provided on the unit depends upon the AMG model.

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



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).



### Alarm Channel Configuration

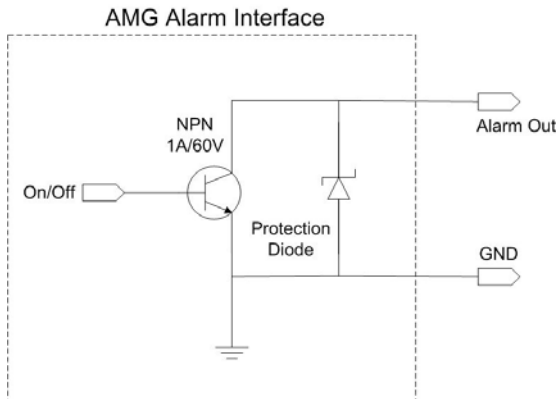
The **AMG5804-2A9R-DF** provides 8 bi-directional contact closure inputs / alarm outputs.

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 **AMG5803-2A9-DF** and is typically used to convey contact closure status. Each alarm output is NPN open collector, maximum load 500mA / 24Vdc.

### Alarm Channel Circuit

The output of each alarm channel is an NPN open collector transistor circuit, with an absolute maximum rating of 1A / 60V. There is a common GND for all alarm channels.



The alarm output circuit is designed for low dc voltage / low current operation and has minimal internal protection. If an alarm output is used to drive an external relay circuit, the external circuit **MUST** include a protection (flyback) diode connected across the relay to prevent the high voltage generated from a back EMF causing damage due to the AMG output transistor.

**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
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

## Audio Channel Configuration

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### Audio Channel Configuration

The **AMG5804-2A9R-DF** provides two bi-directional audio channels.

Each audio channel input can be configured as a single-ended high impedance 10k $\Omega$  input with GND reference or alternatively as a balanced 600 $\Omega$  input pair. The input impedance is selected using jumpers on the audio expansion board JP1 (Channel 1) or JP2 (Channel 2), the default setting is balanced 600 $\Omega$ .

JP1/JP2            1-2 – High Impedance 10k $\Omega$   
JP1/JP2            2-3 – Balanced 600 $\Omega$

### Audio Interface Connections Ch1 & Ch2

Connector Pin No.	Balanced Input 600 $\Omega$	High Z input 10k $\Omega$
1	OUT -	OUT -
2	OUT +	OUT +
3	GND	GND
4	IN +	IN
5	IN -	GND

## **Physical Information**

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### **Mounting Details**

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

### **Dimensions**

Height .....3U Plug-in  
Width ..... 14HP  
Depth ..... 170mm excluding connectors  
Weight.....750grams

## **Safety**

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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**

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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.

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