



AA4106 Rack mounted AARO Speed Sensitive Trip Unit

User Manual

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AA4106 - 19" Rack mount ARRO + Modbus Communications



The rack mounted AARO has the same specification as the AA4406 housed in a 19" eurocard rack. It has an optional Modbus communication module for use with distributed control systems and SCADA packages. It also has the capability to incorporate other fieldbus communication protocols such as Profibus and DeviceNet.

Communications Option

A small daughter board can be fitted to the main circuit board providing a standard MODBUS RTU serial interface. Other options are available to special order.

The Modbus interface utilises RS485 full duplex (4 wire) interface operating at 9600 baud, 8 data bits , 1 stop bit and no parity.

Each unit is addressed through switches on the serial interface board with an address range of 1 to 126. Data is exchanged between the AARO and the host via separate polled messages

RTU Request Framing

START	ADDRESS	FUNCTION	CRC CHECK	END
T1-T2-T3-T4	1-126	1	XX-XX	T1-T2-T3-T4
Four character time delay	1 Byte	1 = request data all others N/A	2 Byte CRC	Four character time delay

RTU Response Framing

START	ADDRESS	FUNCTION	DATA LENGTH	BYTE 1
T1-T2-T3-T4	1-126	1 or 129	1 or 8	0-255
Four character time delay	1 Byte	See note 1	See note 1	Input speed low byte
BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 5
0-255	0-255	0-255	0-255	0-255
Input speed high byte	Trip point low byte	Trip point high byte	Range selection	Timer settings In seconds
BYTE 6	BYTE 7	CRC CHECK	END	
0-255	0-255	XX-XX	T1-T2-T3-T4	
Timer mode options	Status flag	2 Byte CRC	Four character time delay	

Note 1 : Following a normal poll request the ARRO slave will respond with 8 bytes of data as described in the table above. However, if an error occurs in the requested data the following response will be made. The function byte will contain the original function value (1) + (128) and this value (129) will indicate that an error has occurred. The data length byte will also contain an error code.

ERROR CODE	DESCRIPTION
1	Bad CRC Received
2	Illegal Function Request
3	No Communication with Main Processor
4	Unit failure
5	(Reserved)

Data format of a typical error response.

START	ADDRESS	FUNCTION	LENGTH	CRC	END
T1-T2-T3-T4	1-126	129	1,2,3,4	XX-XX	T1-T2-T3-T4
4 Character time delay	1 byte	Error Detected	Error Code	2 byte CRC	4 Character time delay

Data contained in a normal response to a polled message.

Data Byte	Description		
1	Current Scaled Input Speed – Low Byte		
2	Current Scaled Input Speed – High Byte		
3	Speed Trip Point – Low Byte		
4	Speed Trip Point – High Byte		
5	Setting	Speed @ 2 pulses/Rev	Speed @ 1 pulse/Rev
	0	5 - 55 rpm	10 - 110 rpm
	1	50 - 550 rpm	100 - 1100 rpm
	2	500 - 2000 rpm	1000 - 4000 rpm
	4	Reserved	Reserved
6	Trip timer setting (0 – 30 Seconds)		
7	Timer Mode Options: 0 = T4 Option 1 = T5 Option 2 = T14 Option 4 = T15 Option		
8	Status Bits 0 = Severe Underspeed 1 = Severe Overspeed 2 = Start-up delay timed out 3 = Relay State : 0 = OFF, 1 = ON 4 = Relay LED Indicator : 0 = OFF 1 = ON 5 = Test Mode : 0 = Run, 1 = Test 6 = Unit Disabled by External Signal 7 = Pulses Lost. (No signal at the Input connections)		

The unit address is set by SW2 and SW3 located on the communications option board. Any address between 1 and 126 may be used for multi unit operation.

Normal Addresses

Addresses 1 – 126 (7Eh) are used in normal addressing modes. The response to the poll meets the RTU format, however, units requesting data can if they wish ignore any parts of the message and they do not need to implement the CRC, if they do then the transmitted data must be the same implementation as Modbus RTU. Each legal poll will cause the TX/RX led to flash green.

Reserved Addresses

Address 0 (normally used by Modbus RTU as a broadcast command) sets the communications interface to a permanent OFF state. The option board effectively goes to sleep and only monitors the address switches to detect a change. In this mode the TX/RX LED will be illuminated steady amber.

Address 127 (7Fh) causes the unit to transmit continuously without being polled. This operates as a communications test mode and is useful when connecting a single AARO-RM to a simple serial communications device. In this mode the transmitted data is identical to that required by the Modbus RTU. The TX/RX LED will flash red during this mode.

Self Test

When the AARO-RM has power first applied it enters a self test mode. Please refer to the setting up instructions for a description of the self test. The communications board will indicate the self test by cycling the TX/RX LED from green to red to amber. The LED will then change to the colour appropriate for the selected addressing mode