User Manual

Profibus DP Master
to
Crowcon Vortex
12 Ch. Generic

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Document Revision History

Revision & date	Detail of changes	Author	Authorised
1.0 (2007-11-22)	Created.	MJW	
2.0 (2008-07-03)	Adjusted for Vortex system	MJW	
2.1 (2010-03-17)	Updated	MJW	
2.2 (2012-03-22)	Fixed outdated links	MLB	

Overview

This document defines an interface between a Profibus master (PLC) and a Crowcon Vortex system. The Profibus master communicates with the Vortex (Modbus slave) using the HMS AnyBus Profibus-DP Serial Gateway device. The Anybus module acts as a protocol bridge between the Profibus master and the Vortex Modbus slave.

Requirements

HMS equipment:

1 x Profibus slave module (AnyBus Profibus-DP Serial Gateway)
1 x GSD file for the AnyBus module (HMS_1803.GSD).

This file can be downloaded from the following web page:

http://www.anybus.com/support/support.asp?PID=104&ProductType=Anybus%20Communicator

Crowcon equipment:

1 x Vortex Manual
1 x Crowcon Vortex Unit

PLC equipment:

1 x PLC capable of communicating via Profibus
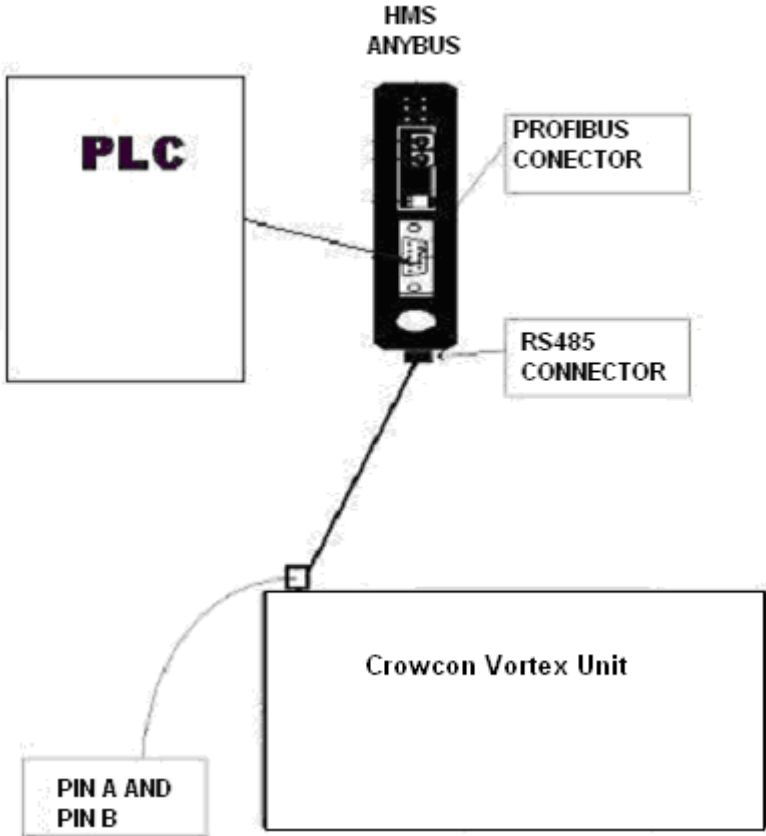
Configuration Layout

The following picture shows how to attach the different components of the system.

AnyBus Layout

The HMS AnyBus device is connected to a **RS485 Modbus channel** using the AnyBus RS485 connector (located at the bottom of the unit).

 The next section explains exactly which PINs should be connected from the HMS AnyBus device to the Crowcon Vortex unit.

Hardware Settings

AnyBus Module

The AnyBus module acts as a protocol converter Profibus/Modbus and vice-versa.
This device has been configured as a **Profibus slave** and as a **Modbus Master**.

Profibus address

In order to change the Profibus slave address open the AnyBus front case (Profibus side) and set the address using the two rotary switches accordingly.

For example, to set the AnyBus device as a Profibus slave address number 3, the **x 10 rotary switch** must be set to zero and the **x 1 rotary switch** must be set to 3.
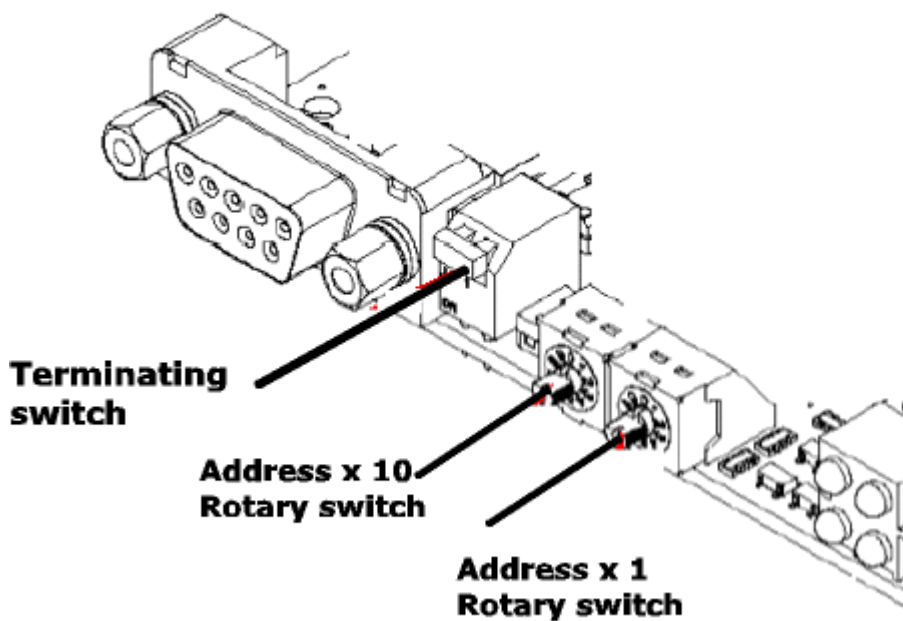
Please consult the HMS documentation for further details (Technical documentation: HMS AnyBus-DP Serial Profibus Gateway section).
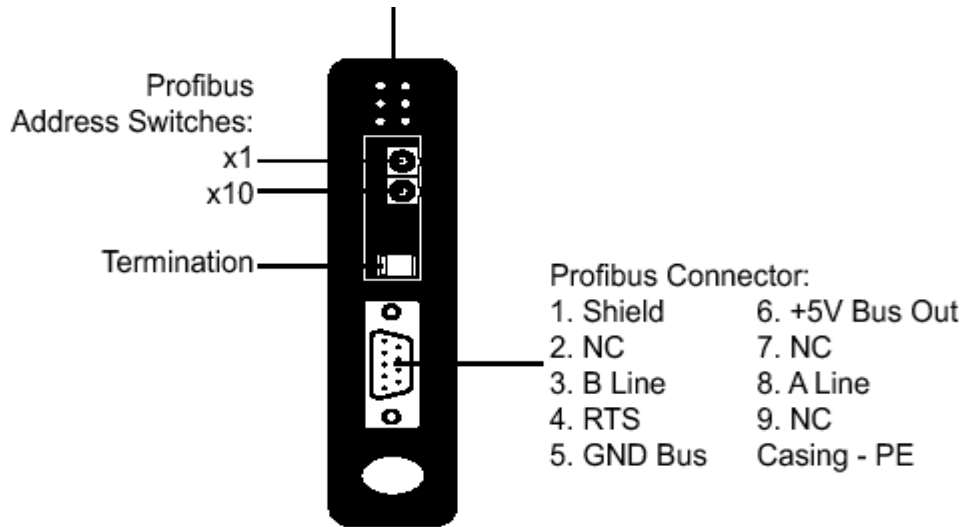
Please note the initial Profibus address has been set to 77

Modbus address

The Modbus address that the AnyBus queries is Modbus address 1, so the Vortex unit has to be configured as slave address number 1.
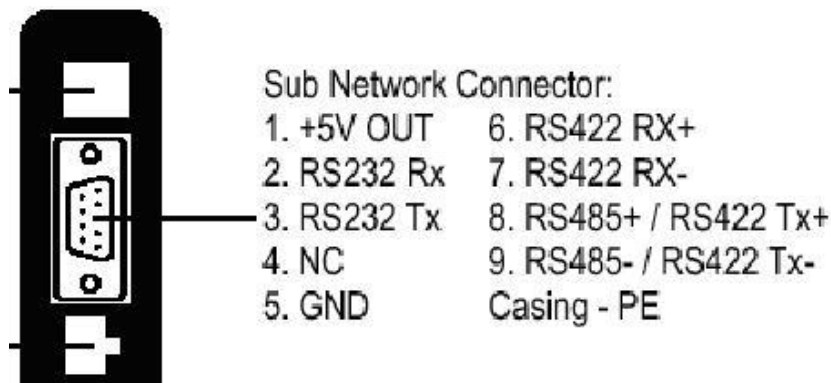
Connecting the AnyBus to the Profibus device

The AnyBus device should be connected to the PLC using a standard Profibus cable (straight serial cable male to male). The location of the Profibus connector is on the front side of the AnyBus module, where the LEDs are located:

```
Profibus
Address Switches:
            x1
           x10

Termination

                          Profibus Connector:
                          1. Shield        6. +5V Bus Out
                          2. NC            7. NC
                          3. B Line        8. A Line
                          4. RTS           9. NC
                          5. GND Bus       Casing - PE
```

Connecting the AnyBus to the Modbus device

The Modbus communication between the AnyBus and the Vortex is the RS485 2-wires physical interface. So we use the pins number 8 and 9 of the Dsub9. The Modbus connector is on the rear side of the AnyBus device.

```
Sub Network Connector:
1. +5V OUT      6. RS422 RX+
2. RS232 Rx     7. RS422 RX-
3. RS232 Tx     8. RS485+ / RS422 Tx+
4. NC           9. RS485- / RS422 Tx-
5. GND          Casing - PE
```

The AnyBus female 9 way cannon "D" connector (Sub Network Connector) shown above should be connected to the Vortex Node Controller Module as follows:

ANYBUS CONNECTOR   Vortex Node Controller Terminals

PIN 8   --   Terminal 1 or 4
PIN 9   --   Terminal 2 & 5

Hardware Configuration

Profibus Configuration

In order to configure the AnyBus Profibus protocol, the PLC must be configured to use the ProfiBus communication (the AnyBus device as a Profibus slave).

Please refer to the PLC documentation in order to install and configure this device (Technical Documentation).

<u>Profibus AnyBus Configuration</u>

Importing the GSD file

Import the file HMS_1803.GSD to the PLC software (PLC configurator tool) in order to include the AnyBus as a Profibus slave in the Profibus network.

Configuring the network

The AnyBus module can be found in the hardware PLC catalogue.

Please consult the HMS documentation for further details in order to connect the AnyBus device to a PLC Profibus bus (Technical documentation: AnyBus installation for PLC).

Modbus Configuration

The Modbus units have to be configured as a slave address number 1 in order to be accessed properly by the AnyBus communicator.

Please consult the Crowcon documentation.

Software Configuration

AnyBus Software Configuration

Overview

Basically, the AnyBus device is a bridge between the Profibus protocol and the Modbus protocol.

The AnyBus has got three memory buffers:

- Input data: data that should be sent to the Profibus device (i.e. PLC).
- Output data: data received from the Profibus device.
- General data: data to perform internal calculations.

In this particular project, only the first buffer is interesting. The PLC will read data from the Vortex unit but it not necessary to send anything from the PLC to the Vortex.

ABC Configuration Manager

The ABC Config Manager is the HMS software that allows the sending of Modbus commands and mapping of the response in the input data buffer.

This software can be downloaded from the following location:

http://www.anybus.com/upload/Anybus%20Communicator-5572-ACM%20Communicator%20RS232-422-485.zip

Once the software has been installed, it is possible to communicate to the AnyBus device using the programming cable. Two things have to be configured: the Profibus protocol and the Modbus Protocol.

Profibus Configuration

The AnyBus device will be automatically detected once the PLC software has imported the GSD file. Obviously, the AnyBus configuration switches for setting the Profibus address have to be set previously (see the Hardware Configuration section in this document).

Modbus Configuration

Using the ABC Config Tool it is possible to send standard Modbus commands or to specify new ones. For clarity, this document describes only the Read Holding Registers.

To send a Modbus command is as easy as to create a new Read Holding Register object, which consists of a fully configurable Modbus query and a response.

The following picture shows a Read Holding Register object into the ABC Config Tool. The picture highlights the starting address of the Modbus packet in the Vortex unit, which is 0x0BB7.
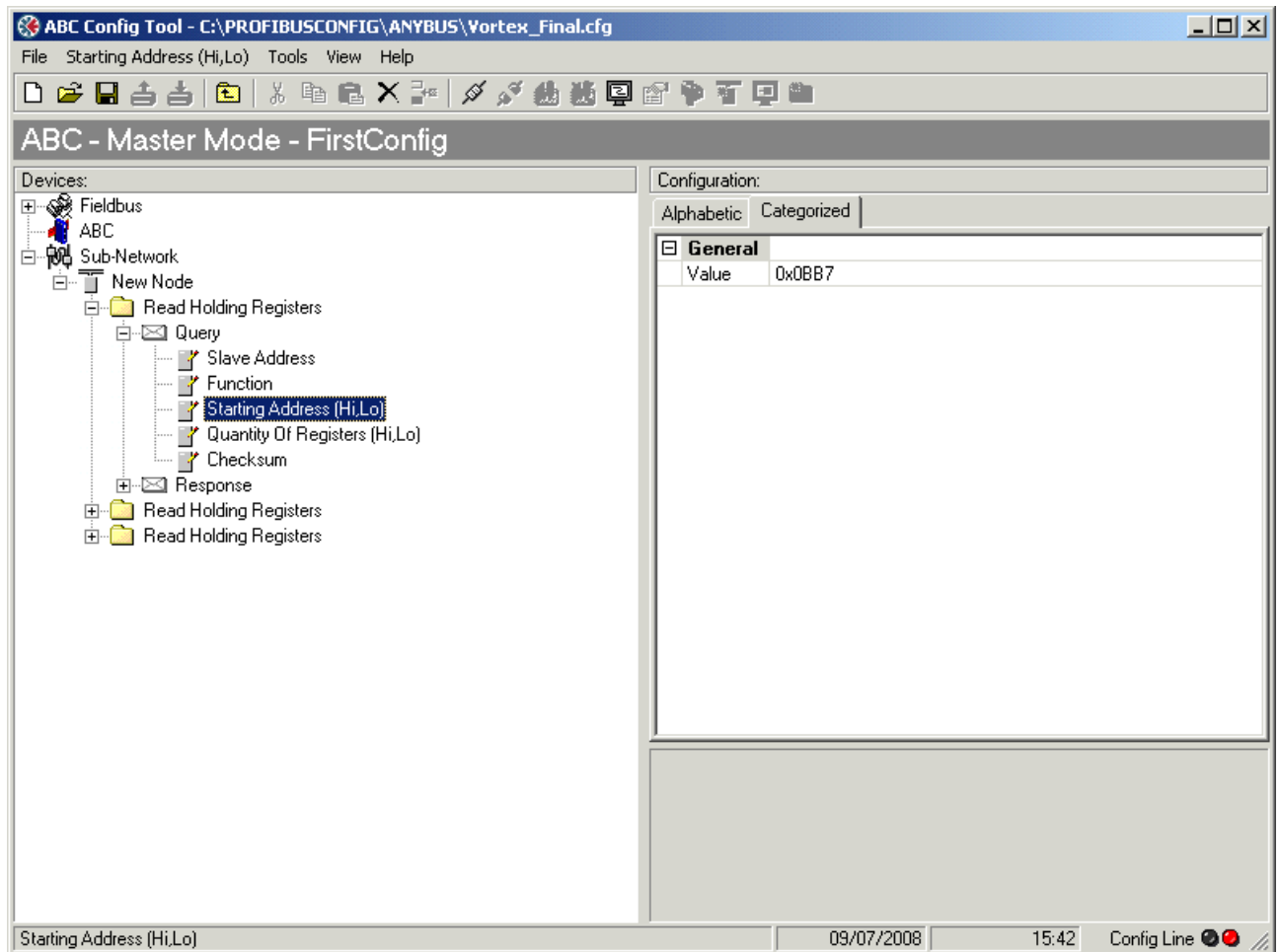

To change any other value, select the appropriate field and change the value accordingly.

<u>AnyBus Mapping</u>

The last thing to do is to map the Modbus data into the AnyBus input buffer in order to be consumed by the Profibus device. The Response Data property allows indicating where to map the value/values read from the Modbus response.

The following picture shows an example of values associated with a Data property. In this case, the Modbus payload has 0x0078 bytes and will be mapped in the input buffer starting at the 0x0004 address. So 0x0078 bytes will be available to be consumed by the PLC via the Profibus interface.
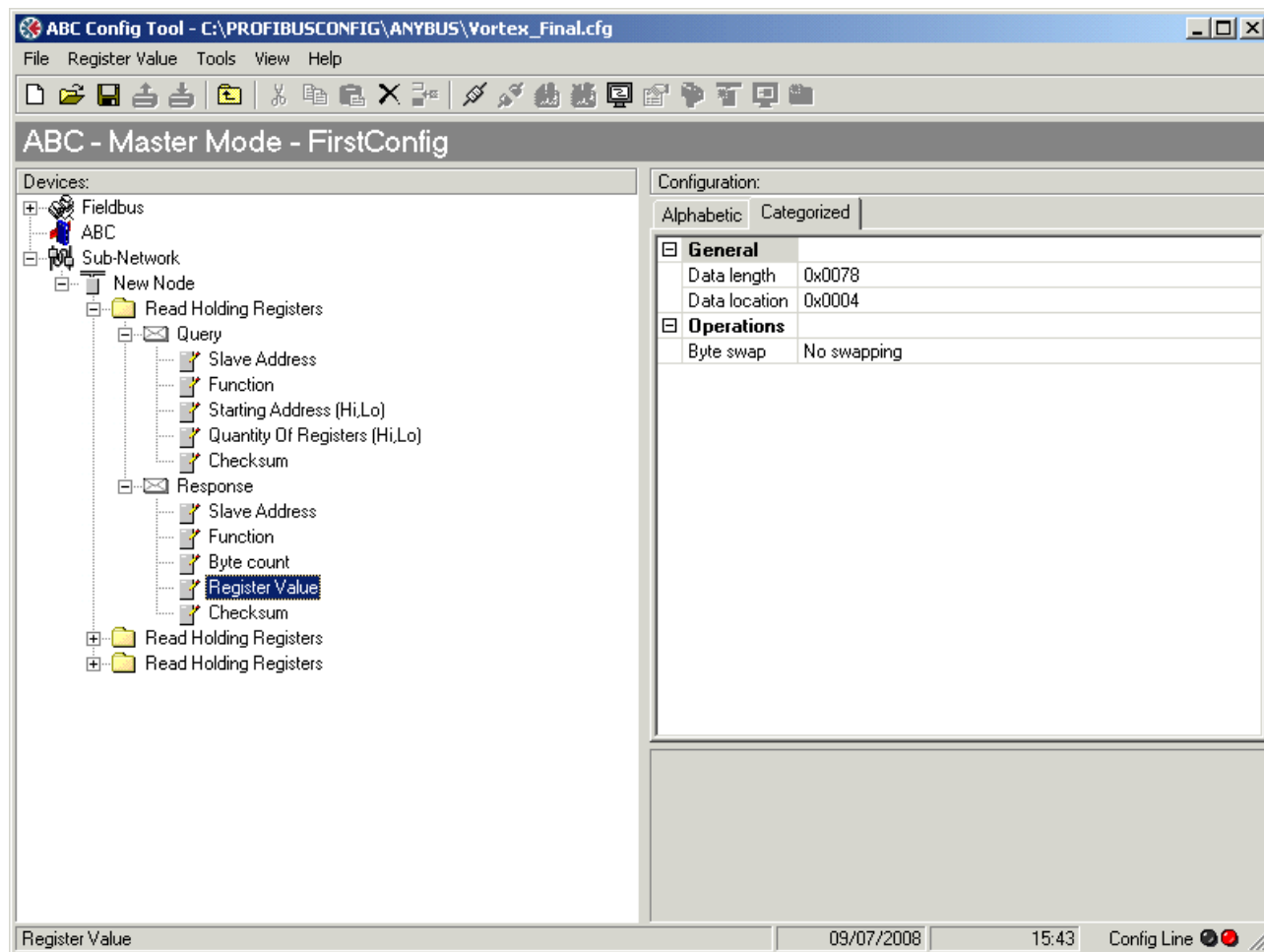
Other Read Holding Registers requests read the alarm data from later registers in the Vortex unit and store them directly after the channel analogues data in its internal registers. This makes it easier for the Profibus to read this data as a single block.

The application downloaded into the AnyBus can be modified importing the source code called 'Vortex_Final.cfg' via the File → Open menu.

PLC Configuration

The AnyBus device sends 228 bytes from the Modbus device (Vortex) to the Profibus bus. The following table shows the starting address and description of the Profibus set of data that the PLC must read:

PROFIBUS MAPPING

WORD	BYTE	INFORMATION
0	0	SYSTEM STATUS
1	2	POWER STATUS
2	4	CHANNEL 1 ANALOGUE
3	6	CHANNEL 1 ALARMS
12	24	CHANNEL 2 ANALOGUE
13	26	CHANNEL 2 ALARMS
22	44	CHANNEL 3 ANALOGUE
23	46	CHANNEL 3 ALARMS
32	64	CHANNEL 4 ANALOGUE
33	66	CHANNEL 4 ALARMS
42	84	CHANNEL 5 ANALOGUE
43	86	CHANNEL 5 ALARMS
52	104	CHANNEL 6 ANALOGUE
53	106	CHANNEL 6 ALARMS
62	124	CHANNEL 7 ANALOGUE
63	126	CHANNEL 7 ALARMS
72	144	CHANNEL 8 ANALOGUE
73	146	CHANNEL 8 ALARMS
82	164	CHANNEL 9 ANALOGUE
83	166	CHANNEL 9 ALARMS
92	184	CHANNEL 10 ANALOGUE
93	186	CHANNEL 10 ALARMS
102	204	CHANNEL 11 ANALOGUE
103	206	CHANNEL 11 ALARMS
112	224	CHANNEL 12 ANALOGUE
113	226	CHANNEL 12 ALARMS

The structure of each of the words is as follows:

Channel analogue and channel status

The channel analogue contains the current value of the transducer.

There is one channel analogue word for each of the different channels.

The box below indicates in detail the value represented by the channel analogue word.

Channel analogue 1 word (2 bytes)	Integer between 0 and 1000. The current reading on the detector.
Channel status 1 word (2 bytes)	Integer. The current status of the detector.

Technical documentation

In order to know in more detail how to configure the different modules of this project please refer to the following documentation:

HMS AnyBus Profibus-DP Serial Gateway

<u>GSD-File</u>

GSD-File for AnyBus Profibus Serial Gateway, HMS Industrial networks

This file can be downloaded from the following web page:

http://www.anybus.com/support/support.asp?PID=104&ProductType=Anybus%20Communicator

<u>Installation Leaflet</u>

Installation Guide, HMS Industrial Networks

This leaflet can be downloaded from the following web page:

http://www.anybus.com/support/support.asp?PID=104&ProductType=Anybus%20Communicator