CROWCON	Engineering Report	
	Doc No : GC012	Issue No : 2
	Date : 29/01/2001	Page 1 of 44
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Product Family : Fixed Systems	Part No : Vortex	Security Classification :

Report Title :
Vortex OEM MODBUS Specification

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Change History

Issue	Change	Author	Date
1	First release taken from SIG07 issue 1.1	A.C.Beasley	6/03/2000
2	Simplified version for ease of customers incorporating changes for node controller software version GCNCT1_1i1	L J Mattsson & A Summerfield	29/01/2001

Contents

1. Introduction

1.1 Scope of Document

This document specifies the MODBUS interface for use with Vortex products.

The MODBUS protocol defined in this interface document shall be used for both RS485 and RS232 hardware interfaces.

1.2 Abbreviations and Definitions

Abbreviation	Definition
CRC	Cyclic Redundancy Check – this value is calculated from a string of data values and is used by the recipient of the data string to check the string integrity.
DCS	Distributed Control System
LSB	Least significant byte/bit
ModBus Register Number	This term refers to the ModBus registers as defined in ref.2. A ModBus register can be any physical size measured in words.
MSB	Most significant byte/bit
PLC	Programmable Logic Controller
RTU	Remote Terminal Unit – In the ModBus protocol this refers to 8 bit bytes composed of 2 x 4 bit hex characters.
Word	A measure of data size associated with a particular ModBus register number. A word is equivalent to 2 bytes or 16 bits.

2. Electrical & General Data Format Specification

2.1 Electrical

Communications with Vortex is via a **2 wire, half duplex RS485** link using the **MODBUS** protocol. The format of each data byte transferred is **1 start bit, 8 data bits, 2 stop bits, no parity**. Binary **RTU** (sometimes called ModBus-B) format is used for each byte of data, rather than two ASCII characters. The speed of both transmission and reception is **9600** baud.

The MODBUS protocol defined in this specification is standard MODBUS, thus demands a fixed master / slave relationship between communicating devices. MODBUS PLUS, which allows multiple master configurations is NOT part of this specification.

The master / slave relationship is defined for each device in the table below.

Application	**Master / Slave Role of Device**	**Communicating Partner**	**Master / Slave role of Partner**
Vortex	Slave	VortexPC Windows set up software **OR** DCS	Master

The following rules govern the master / slave relationship.

- Slave devices shall only send any data when requested by a master, with a query packet specifically addressed to the slave.
- There shall be only one master device for each physical bus. This shall be the only device capable of initiating communications.
- Devices, which share the same physical bus, are identified by a unique digital address. The address can be set up at configuration time using VortexPC.

2.2 Packet Format

All MODBUS packets are composed of data bytes and have the following format:

Byte	**Contents**	**Range**
1	Address of slave	1-247
2	Function code	
3 . . N	Variable length data field	
N+ 1	CRC low byte	
N+ 2	CRC high byte	

2.3 Packet Delimiters

The beginning of a packet, and end of a packet are determined by delimiters. The only delimiters in the ModBus protocol are quiet intervals that are defined as follows: -

Quiet Interval Time (character times) as per ref.2	Meaning
3.5	Start of packet
3.5	End of packet and potentially start of next packet.
< 3.5 at the end of packet	Assume the data following on from the shortened quiet interval is a continuation of the message. If this is the wrong assumption then the CRC check will catch it.

MODBUS also defines a 1.5 character time quiet interval, where the incoming message should be flushed from the receiver buffer and assume that the next data byte received after quiet period is the address of a new packet. This 1.5 character interval is NOT part of this Vortex MODBUS specification.

At 9600 baud a character interval is 1.146 mS.

After the "end of packet quiet interval" the next packet can start immediately but in practice this is not common because of the time taken to "turn around" the RS 485 transceiver devices. In Vortex devices the interval between the end of a query packet and the start of an acknowledge packet from the Vortex device shall be in the range 50 to 400 mS.

Some packet types have a "number of bytes of data" field, which can be used as a cross check of packet validity but should NOT be used as the delimiters because of the possibility of corruption.

2.4 Packet Types

2.4.1 Query Packet

A query packet is a packet generated by the bus master and addressed to a slave unit.

2.4.2 Acknowledge Packet

If the bus master generates a query packet addressed to a device, the device will generate an acknowledge packet, which contains a response to the query.

The acknowledge packet's contents is specific to each function code and each is defined later.

If the packet from the master is incorrect in some way then the acknowledge packet is replaced by an exception packet see below.

2.4.3 Exception Packet

The following circumstances will cause an exception packet to be generated in response to a query packet. The exception packet contains the exception error code shown in the table.

Exception Error Code	Probable Causes of the Exception
No response	The MODBUS master has sent a data packet with an incorrect MODBUS address to the Vortex unit. The MODBUS master has sent a data packet with an incorrect CRC to the Vortex unit.
Illegal Function	The MODBUS master has sent a data packet to the Vortex unit that contains a function code, which the Vortex unit is not programmed to respond to i.e. anything other than codes 0x03 or 0x10.

Exception Error Code	Probable Causes of the Exception
Illegal Data Address	A MODBUS master has attempted to access register indexes that are beyond the bounds specified for the product. The MODBUS master sends a query packet that attempts to access data that is inaccessible in their current role (either read or write). The MODBUS master has attempted to write to a read only register.
Illegal Data Value	The data associated with a register write operation is incorrectly sized i.e. the MODBUS master sent 5 words when the controller expected only 4. The data supplied with the query packet is out of range.
Slave Device Busy	The packet is correct in every aspect but the slave unit is incapable of acting on the packet at the present time e.g. write to FRAM when FRAM is busy.
Slave Device Failure	The packet sent to the Vortex unit is correct in every aspect but the slave unit has just become faulty.

The associated exception packet is simply a packet echoing back the slave address and the function code of the query packet but with the most-significant bit of the function code set, followed by an error code, followed by the CRC. For example if a query packet with function code 0x03 were received which has an error then the exception packet would take the form of: -

Byte	Contents	Range
1	Address of Slave	1-247
2	Function Code with MSBit set.	0x83 (hex)
3	Exception Error Code	
4	CRC low byte	
5	CRC high byte	

If an exception occurs for any part of a message then the entire message is discarded. Therefore, if a multiple register write raises an exception, none of the message will be processed.

3. Supported Function Codes

In Vortex systems only two function codes are implemented-

Function Code 03 (03 hex)- Read Holding Registers (single or multiple)

Function Code 16 (10 hex)- Preset (Write) Multiple Registers (single or multiple)

The data read from or written to a Vortex system can be any number of MODBUS registers in length (within the constraints of the maximum packet size). A MODBUS register is defined as being 16 bits wide. Register values are sent in the order high byte followed by low byte.

The specific packet formats used in Vortex systems are as follows:

3.1 Read Holding Registers (Function Code 0x03).

Data format from MODBUS Master:

Byte	Contents	Range
1	Address of slave	1-247
2	Function code	3
3	Starting register high byte	
4	Starting register low byte	
5	Number of registers (N) high byte	
6	Number of registers (N) low byte	
7	CRC low byte	
8	CRC high byte	

Response from Vortex Unit:

Byte	Contents	Range
1	Address of slave	1-247
2	Function code	3
3	Byte count (n) of data that follows* (excluding CRC).	
4	First register data high byte	
5	First register data low byte	
	Repeats for number of registers read	
4 + n	CRC low byte	
5 + n	CRC high byte	

* See section 3.3 for notes on maximum size of packets

3.2 Preset Multiple Registers (Function Code 0x10)

Data format from MODBUS Master:

Byte	Contents	Range
1	Address of Slave	1-247
2	Function Code	16 (decimal)
3	Starting Register High Byte	
4	Starting Register Low Byte	
5	Number of Registers High Byte	
6	Number of Registers Low Byte	
7	Byte Count of Data (n) excluding CRC	
8	First Register data High Byte	
9	First Register data Low Byte	
..		
..		
8 + n	CRC Low Byte	
9 + n	CRC High Byte	

* See section 3.3 for notes on maximum size of packets

Response from Vortex Unit:

Byte	Contents	Range
1	Address of Slave	1-247
2	Function Code	16
3	Starting Register High Byte	
4	Starting Register Low Byte	
5	Number of Registers Preset High Byte	
6	Number of Registers Preset Low Byte	
7	CRC Low Byte	
8	CRC High Byte	

3.3 Maximum Size of Packets

In order to maintain compatibility with the maximum number of PLCs the maximum number of words that can be transferred in a single ModBus transaction is limited to 100.

4. Register Definitions

4.1 Register Groups

The data presented in the register address table is arranged in groups, according to the object to which the data relates and its storage medium. The groups are as follows:-

System

Detector – Normal

Detector – Configuration

4.2 Key for Access Rights

The following access rights are defined for each register and are stated in the last column of the MODBUS register map table:

Key:	User Access Rights:
R	**R** ead only access
B	**B** oth read and write access
W	**W** rite only access (zero when read)

4.3 Key for Fundamental Data Types

The storage size of a register location for simple, i.e. non-structured data types, is indicated as follows in the register maps:

Key:	Location Storage Size:	Variable Format on MODBUS:
BOOL	8 bit integer, 0 = false, any other value = true	Sign extended to 16 bits
INT8	Signed 8-bit integer	Sign extended to 16 bits
INT16	Signed 16-bit integer	No change
INT32	Signed 32-bit integer	Occupies register pair, least significant 16 bits in the 2nd word.
UINT8	Unsigned 8-bit integer	Extended with leading 0s to 16 bits
UINT16	Unsigned 16-bit integer	No change
UINT32	Unsigned integer ()	Occupies register pair, least significant 16 bits in the 2nd word.
STRING xx	Text string of fixed length xx bytes.	There is no null terminator; null padded to fit defined length.

4.4 Boolean Settings

Booleans – flags which can take only values of TRUE and FALSE

Are defined to have the following numeric value; FALSE = 0000 Hex, TRUE = FFFF Hex.

4.5 MODBUS Register Map

The following table defines the register address, the data type for that register and the access rights.

4.5.1 System

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
1. Unit Type	"Vortex"	N/A	N/A	8	String 16	R
9. Accept / Reset	N/A	N/A	N/A	1	A dummy MODBUS word has to be supplied but is scrapped by the MODBUS slave.	W
12. System Status	N/A	N/A	N/A	1	UINT16 see SYSTEM_STATUS (5.1)	R
13. Power Status	OK	OK = 0 | Main supply OK, battery low = 1 | Main supply fail, battery good = 2 | Main supply OK, battery disconnected = 3 | Main supply fail, battery low = 4 | No Comms to Power Card = 5	N/A	1	UINT8	R
17. System Fault Inhibit	False	True = Inhibited | False = Not Inhibited	N/A	1	BOOL see system inhibits (5.1.2)	B
18. System Sounder Inhibit	False	True = Inhibited | False = Not Inhibited	N/A	1	BOOL see system inhibits (5.1.2)	B
33. Serial Number	"012345"	N/A	N/A	8	String 16	R
34. System Name	"Didcot B V1"	N/A	N/A	8	String 16	R
39. Number of installed Detector Inputs	12	1..12	N/A	1	UINT8	R
40. Number of installed Digital Outputs	16	1..32	N/A	1	UNIT8	R

4.5.2 Detector 1 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
110. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
111. Type	Gas	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
114. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
115. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
116. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
117. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
118. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
119. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
122. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
123. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
126. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.3 Detector 2 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
130.. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
131. Type	Gas	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
134. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
135. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
136. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
137. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
138. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
139. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
142. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
143. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
146. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.4 Detector 3 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
150.. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
151. Type	Gas	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
154. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
155. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
156. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
157. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
158. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
159. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
162. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
163. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
166. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.5 Detector 4 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
170.. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
171. Type	Gas	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
174. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)and see section 5.1.5	R
175. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
176. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
177. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
178. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
179. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
182. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
183. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
186. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.6 Detector 5 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
190.. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
191. Type	SCM – Common Ground	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
194. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
195. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
196. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
197. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
198. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
199. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
202. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
203. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
206. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.7 Detector 6 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
210 Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
211 Type	Gas	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
214. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
215. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
216. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
217. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
218. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
219. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
222. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
223. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
226. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.8 Detector 7 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
230.. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
231. Type	Gas	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
234. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
235. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
236. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
237. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
238. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
239. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
242. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
243. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
246. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.9 Detector 8 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
250.. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
251. Type	Gas	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
254. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
255. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
256. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
257. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
258. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
259. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
262. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
263. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
266. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.10 Detector 9 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
270.. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
271. Type	Gas	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
274. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
275. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
276. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
277. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
278. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
279. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
282. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
283. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
286. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.11 Detector 10 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
290.. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
291. Type	SCM – Common Ground	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
294. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
295. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
296. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
297. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
298. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
299. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
302. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
303. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
306. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.12 Detector 11 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
310. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
311. Type	SCM – Common Ground	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
314. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
315. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
316. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
317. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
318. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
319. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
322. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
323. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
326. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.13 Detector 12 Configuration Map

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
330. Enable	True	True | False	N/A	1	BOOL see DETECTOR_ENABLE (5.1.3)	R
331. Type	Gas	Not Configured = 0 | Gas = 6 | Fire = 8	N/A	1	UINT8 see DETECTOR_TYPE (5.1.4)	R
334. Alarm 1 Level	450	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
335. Alarm 1 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
336. Alarm 2 Level	550	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
337. Alarm 2 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
338. Alarm 3 Level	650	0 to 1000 where 1000 represents full scale.	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6) and see section 5.1.5	R
339. Alarm 3 Transition	Rising	Rising = True | Falling = False	N/A	1	BOOL and see section 5.1.5	R
342. Units	%VOL	| %LEL = 0 | %VOL = 1 | PPM = 2 | Fire = 3	N/A	1	UINT8	R

MODBUS Register: **Number. Identity**	**Typical Setting:**	**Valid Range:**	**Units:**	**Number of Registers:**	**Location Storage Size:**	**Access**
343. Range	0 to 10	| 0 to 1 = 9 | 0 to 2 = 10 | 0 to 2.5 = 11 | 0 to 5 = 12 | 0 to 10 = 13 | 0 to 20 = 14 | 0 to 25 = 15 | 0 to 50 = 16 | 0 to 100 = 17 | 0 to 200 = 18 | 0 to 250 = 19 | 0 to 500 = 20 | 0 to 1,000 = 21 | 0 to 2,000 = 22 | 0 to 2,500 = 23 | 0 to 5,000 = 24 | 0 to 10,000 = 25	N/A	1	UINT8	R
346. Identity	"T 1BYP-DCT"	ASCII characters	N/A	4	String 8	R

4.5.14 Detector 1 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3000. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3001. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3004. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.15 Detector 2 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3010. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3011. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3014. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.16 Detector 3 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access Rights
3020. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3021. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3024. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.17 Detector 4 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3030. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3031. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3034. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.18 Detector 5 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3040. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3041. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3044. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.19 Detector 6 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3050. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3051. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3054. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.20 Detector 7 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3060. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3061. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3064. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.21 Detector 8 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3070. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3071. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3074. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.22 Detector 9 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3080. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3081. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3084. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.23 Detector 10 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3090. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3091. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3094. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.24 Detector 11 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3100. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3101. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3104. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

4.5.25 Detector 12 Normal Map

MODBUS Register: Number. Identity	Typical Setting:	Valid Range:	Units:	Number of Registers:	Location Storage Size:	Access
3110. Detector Level	450	0 to 1000	FS/1000	1	INT16 DETECTOR_LEVEL (5.1.6)	R
3111. Detector Status	N/A	N/A	N/A	1	UINT16 DETECTOR_STATUS(5.1.7)	R
3114. Inhibit	True	Inhibited = True |Not Inhibited = False	N/A	1	BOOL DETECTOR INHIBIT (5.1.8)	W

5. Supplementary Definitions Supporting MODBUS Register Map

5.1 System Registers

5.1.1 SYSTEM_STATUS Type

This is a bit packed status word, which allows the MODBUS master to access to determine the state of the Vortex system. The register is formatted as follows:-

BIT	MEANING
0	Set to one if Vortex system is in channel test
1	Set to one if Vortex system is in jump hold
2	Set to one if Vortex system has a system fault.
3	Set to one if system fault is a battery fault.
4	Set to one if system fault is a FRAM data integrity fault
5	Set to one if system fault is an internal I2C bus fault.
6	Set to one if system fault is a display access fault.
7	Set to one if system fault is a power monitor access fault.
8	Set to one if system fault is an external I2C bus fault.
9	Set to one if system fault is a relay board fault.
10 to 15	Undefined – set to zero.

5.1.2 System Inhibits

System Fault Inhibit and System Sounder Inhibit prevent system faults or system sounder events from reaching the relay outputs. This is used when the system is being maintained to prevent the triggering of external alarm equipment.

NOTE when using these inhibit registers there is no warning on the front panel so care must be exercised not to leave an inhibit flag set unintentionally.

Detector Registers

5.1.3 DETECTOR_ENABLE Type

Enabled detectors are scanned for alarm and fault levels on their inputs and participate in the setting of relays.

On the transition from enabled to disabled all the alarm and fault flags associated with a detector are cleared.

Disabled detectors are not scanned and do not generate faults or alarms, also they are not displayed on the front panel.

5.1.4 DETECTOR_TYPE

For Vortex the detector types are Gas and Fire or Not Configured. Not Configured types do not participate in the system and all configuration data is considered invalid.

5.1.5 Detector Alarm Settings

NOTE : For gas detectors, each alarm may be individually set rising or falling.

NOTE : For fire detectors, all alarms will be set to 'rising' and scaled such that a value of 1000 implies a current reading of 60 mA. Also for fire detectors, the meaning of each alarm level will be as follows

Alarm Level 1 ≡ Open Circuit Detection Level

Alarm Level 2 ≡ Alarm Level (i.e. 'Fire')

Alarm Level 3 ≡ Short Circuit Detection Level

5.1.6 DETECTOR_LEVEL Type

Bit(s)	Purpose
15-0	2's complement Detector Level The nominal range, for gas level readings, is -100 to 1000, which corresponds to –10% to 100% of Full Scale (set in the gas detector's configuration data). The range, for fire detector readings, is -100 to 1000, where 1000 corresponds to 60mA. The range for alarm thresholds which use the same data format is limited to 0 to 1000 (i.e. 0 to 100% Full Scale).

5.1.7 DETECTOR_STATUS Type

This shows the current status of the detector channel. A bit set to logic 1 indicates that the defined condition is present.

Bit(s)	Purpose
15-10	Unused
9	Detector Inhibit from controller (inhibit button pushed or inhibited from comms link).
8	Detector I2C fault
7	High End Fault
6	Low End Fault
5	Detector level interpreted as High Info
4	Detector level interpreted as Low Info
3	Detector level interpreted as Inhibit

2	Alarm level 3 present
1	Alarm level 2 present
0	Alarm level 1 present

5.1.8 DETECTOR INHIBIT Type

"Detector Inhibit" can be set using these registers.

The "inhibit" lamp on the front panel will be lit if any of the 4 inputs are inhibited. Pressing the front panel button with any input inhibited will remove the "inhibit". Pressing the "inhibit" button with no inhibits present will inhibit all 4 channels (subject to them being configured and enabled).

The inhibit status of any input can be read from the detector status word see section 5.1.7.

NOTE that input inhibit states are NOT stored in NVM, thus are volatile.