



# FlameGard® 5 UV/IR HART

## HART Communication Manual



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### **Instruction Manual**

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**MAN5UVIRH**  
**0**

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# 1.0 Introduction

## 1.1 Scope

The FlameGard 5 UV/IR Flame Detector complies with HART Protocol Revision 6.0. This document specifies all of the device specific features and documents HART Protocol implementation details. The functionality of this Field Device is described sufficiently to allow its proper application in a process and its complete support in HART capable Host Applications.

## 1.2 Purpose

This specification is designed to complement the FlameGard 5 UV/IR Flame Detector Instruction Manual by providing a complete description of this field device from a HART Communications perspective. This specification is designed to be a technical reference for HART capable host application developers, system integrators, and knowledgeable end users.

## 1.3 References

DOCUMENT NAME	DOCUMENT RELATIONSHIP
HART Communications Protocol Specifications	This is used to insure compliance with the HART Communication Protocol.
FlameGard 5 UV/IR Flame Detector Instruction Manual	This is the MSA FlameGard 5 UV/IR Flame Detector Product Instruction Manual.

## 2.0 Device Identification

The following Table 1 is the Field Device Identification Data for the instrument.

Manufacturer's Name	General Monitors, Inc.	Model Number	FlameGard 5 UV/IR
HART ID Code	223 (DF Hex)	Device Type Code:	144 (90 hex)
HART Protocol Revision	6.0	Device Revision:	1
Number of Device Variables	0		
Physical Layers Supported	1		
Physical Device Category	FSK		

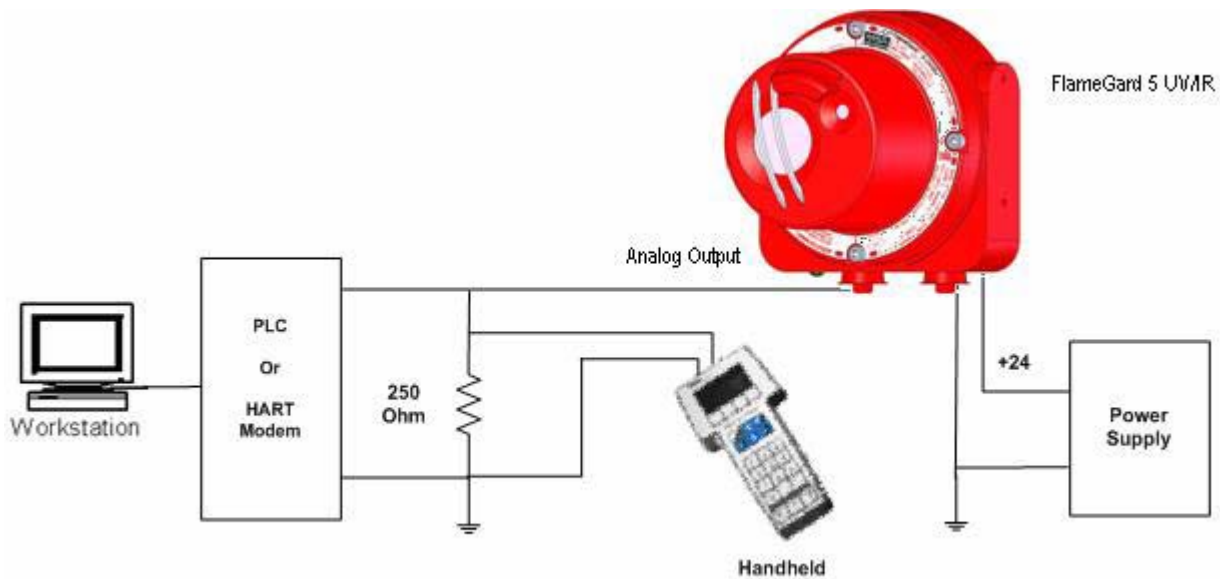
Table 1: Field Device Identification Data

## 3.0 Product Overview

The MSA FlameGard 5 UV/IR Flame Detector is an Ultraviolet/Infrared (UV/IR) Flame Detector. It detects the Ultraviolet and Infrared spectral regions of flame to produce a system which is highly immune to false alarms caused by lightning, arc-welding, hot objects, and other sources of radiation.

### 3.1 Getting Started

In order to enable HART communication with the FlameGard 5 UV/IR Flame Detector, users may employ several means including HART handheld communicators or PC-based systems. Using a PC-based software application and a HART interface modem, for example, allow operators to access information from the FlameGard 5 UV/IR Flame Detector. A typical setup is illustrated in Figure 1.



**Figure 1 : Connecting a PC to a HART device**

Once the detector is installed (see FlameGard 5 UV/IR Flame Detector Instruction Manual) and connected to a PC, host application, or handheld terminal, the master will commonly begin communication to the FlameGard 5 UV/IR Flame Detector by using the HART Command #0. The field device will then respond only if its tag matches. The data in the reply to Command #11 is identical to that of Command #0, so the master can then construct the Unique Identifier for use with further commands.

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**NOTE:** The handheld device allows for the retrieval of diagnostic information and input of device settings as needed and should not be used as a permanent part of a safety system.

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## 4.0 Product Interfaces

### 4.1 Process Interface

This section describes all interfaces between the devices and the measured process. See Main Instruction Manual.

### 4.2 Host Interface

The HART interface uses the 4 – 20 mA current loop. Refer to the installation manual for connection details.

Normal Current	Modified Current	Description	Units
3.5	1.5	Fault	mA
3.5	2.0	COPM error	mA
4.0	4.0	Normal(Ready)	mA
8.0	8.0	IR Fire Only detected	mA
12.0	12.0	UV Fire only detected	mA
16.0	16.0	Both UV/IR (warn)	mA
20.0	20.0	Fire after time delay (Alarm)	mA

**Table 2: Analog Output Current Values**

#### 4.2.1 Analog Output: FlameGard 5 UV/IR Flame Detector Mode

The FlameGard 5 UV/IR Flame Detector Mode is output to the user as the primary variable of the HART protocol. Table 6 shows the interpretation of this variable.

### 4.3 Local Interfaces, Jumpers, and Switches

#### 4.3.1 Local Controls and Displays

Refer to the Installation Manual for connection details.

#### 4.3.2 Internal Jumpers and Switches

Refer to the Installation Manual for connection details.



## 5.0 Device Variables

There are no device variables exposed to the user.

## 6.0 Dynamic Variables

There is only one Dynamic Variable exposed to the user.

### 6.1 Primary Variable = FlameGard 5 UV/IR Operating Mode

The device mode is the variable, which corresponds to the Modbus register 0x00.

### 6.2 Secondary, Tertiary, and Quaternary Variables: Not Applicable

There are none defined for the FlameGard 5 UV/IR Flame Detector.

## 7.0 Status Information

The error status, which is returned via Common Practice Command #48, is shown in Table 3 and corresponds to Modbus register 0x02.

Byte	Bit	HEX	Description	Class	Device Status Bits Set
1(upper)	0 (LSB)	0x0100	Not Used	Error	4,7
	1	0x0200	Not Used	Error	4,7
	2	0x0400	Not Used	Error	4,7
	3	0x0800	Current Error	Error	4,7
	4	0x1000	Not Used	Error	4,7
	5	0x2000	Not Used	Error	4,7
	6	0x4000	UV 10 minutes	Error	4,7
	7	0x8000	Reset line shorted	Error	4,7
0	0	0x0001	Internal error 2.5V, 13V	Error	4,7
	1	0x0002	Not Used	Error	4,7
	2	0x0004	IR COPM	Error	4,7
	3	0x0008	UV COPM	Error	4,7
	4	0x0010	Low Line voltage check	Error	4,7
	5	0x0020	RAM Error	Error	4,7
	6	0x0040	EEPROM Checksum	Error	4,7
	7	0x0080	Flash Checksum	Error	4,7

Table 3: Error Status Information

These bits may be set at power up to indicate an instrument failure. They may also be set by a failure detected during continuous background diagnostic testing.

## 8.0 Universal Commands

Command 3 returns the current loop variable and the primary variable for a total of 9 bytes returned. Command 9 returns the PV only.

## 9.0 Common Practice Commands

The following common practice commands are implemented.

### 9.1 Supported Commands

The following common-practice commands shown in Table 4 are implemented:

Command Number	Byte Number	Meaning
Command 38	N/A	Reset Configuration Changed Flag
Command 48	0	Returns Priority Fault, High Byte
Command 48	1	Returns Priority Fault, Low Byte
Command 48	2	Returns error status (same as Modbus register x02), High Byte
Command 48	3	Returns error status (same as Modbus register x02), Low Byte
Command 48	4	Returns Power Cycled Flag
Command 48	5	Returns Event Happened Flag
Command 48	6	Returns 0x01 = "Maintenance Required" or 0x02 = Alarm or Warning
Command 48	7	Returns 0

**Table 4: FlameGard 5 UV/IR Flame Detector – Common Practice Commands**

### 9.2 Burst Mode

The FlameGard 5 UV/IR Flame Detector does not support Burst Mode.

### 9.3 Catch Device Variable

This FlameGard 5 UV/IR Flame Detector does not support Catch Device Variable.

## 10.0 Device Specific Commands

The Device Specific commands are used strictly for the unique features of the FlameGard 5 UV/IR Flame Detector and at the discretion of MSA. They are described here in Section 10.0 and are summarized in Table 5.

### 10.1 Command #131: Abort Alarm Test

This sends the unit to run mode.

Request Data Bytes

Byte	Format	Description
0	N/A	N/A

Response Data Bytes

Byte	Format	Description
0	N/A	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 15		Undefined
16	Error	Access Restricted
17 - 127		Undefined

### 10.2 Command #132: Set Alarm test

This turns the Alarm test mode on/off.

Request Data Bytes

Byte	Format	Description
0	Unsigned 8	0 – off, 1 - on

Response Data Bytes

Byte	Format	Description
0	Unsigned 8	0 – off, 1 - on

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 15		Undefined
16	Error	Access Restricted

Code	Class	Description
17 - 127		Undefined

### 10.3 Command #139: Reset Alarm

This command will reset the latching warn and alarm relay.

#### Request Data Bytes

Byte	Format	Description
None	N/A	N/A

#### Response Data Bytes

Byte	Format	Description
None	N/A	N/A

#### Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 15		Undefined
16	Error	Access Restricted
17 - 127		Undefined

### 10.4 Command #141: Set Relay (Alarm) Configuration

This command will configure the relay settings.

#### Request Data Bytes

Byte	Format	Description
0	Unsigned-8	Alarm Hi Relay La/nL: 0 – nL, 1 – LA
1	Unsigned-8	Alarm Hi Relay En/dE: 0 – dE, 1 – En
2	Unsigned-8	Alarm Lo Relay La/nL: 0 – nL, 1 – LA
3	Unsigned-8	Alarm Lo Relay En/dE: 0 – dE, 1 – En
4	Unsigned-8	Not used
5	Unsigned-8	Not used

#### Response Data Bytes

Byte	Format	Description
0	Unsigned-8	Alarm Hi Relay La/nL: 0 – nL, 1 – LA
1	Unsigned-8	Alarm Hi Relay En/dE: 0 – dE, 1 – En
2	Unsigned-8	Alarm Lo Relay La/nL: 0 – nL, 1 – LA

3	Unsigned-8	Alarm Lo Relay En/dE: 0 – dE, 1 – En
4	Unsigned-8	zero
5	Unsigned-8	zero

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 2		Undefined
3	Error	Passed Parameter too large
4		Undefined
5	Error	Too Few Data Bytes Received
16	Error	Access restricted
17– 127		Undefined

### 10.5 Command #142: Reset Event Happened flag

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
None	N/A	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 15		Undefined
16	Error	Access Restricted
17 – 127		Undefined

### 10.6 Command #143: Read Event Logging Counters

This reads the five event logging counters.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 1	Unsigned-16	Warning Event Counter
2 – 3	Unsigned-16	Alarm Event Counter

4 – 5	Unsigned-16	Fault Event Counter
6 – 7	Unsigned-16	Maintenance Event Counter
8 – 9	Unsigned-16	Calibrate Event Counter

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

## 10.7 Command #144: Clear Event Logging Counters

This resets the 5 event logging counters to zero.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
None	N/A	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

## 10.8 Command #145: Read Warning Event Log

This reads the Warning Event Log as specified by the event log number. Event 0 is the most recent event. Event 1 is the one just before that and so forth.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Event Running Time (in Seconds)
4– 6	Date	Event Date: Day, Month, Year – 1900
7	Unsigned-8	Event Hour
8	Unsigned-8	Event Minute
9	Unsigned-8	Event Second

10-13	Unsigned-8	Reserved = 0
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Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

## 10.9 Command #146: Read Alarm Event Log

This reads the Alarm Event Log as specified by the event log number. Event 0 is the most recent event. Event 1 is the one just before that and so forth.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Event Running Time (in Seconds)
4– 6	Date	Event Date: Day, Month, Year – 1900
7	Unsigned-8	Event Hour
8	Unsigned-8	Event Minute
9	Unsigned-8	Event Second
10-13	Unsigned-8	Reserved = 0

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

## 10.10 Command #147: Read Fault Event Log

This reads the Fault Event Log as specified by the event log number. Event 0 is the most recent event. Event 1 is the one just before that and so forth.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Event Running Time (in Seconds)
4– 6	Date	Event Date: Day, Month, Year – 1900
7	Unsigned-8	Event Hour
8	Unsigned-8	Event Minute
9	Unsigned-8	Event Second
10-11	Unsigned-16	Event Cause – See device specific table

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

## 10.11 Command #148: Read Maintenance Event Log

This reads the Maintenance Event Log as specified by the event log number. Event 0 is the most recent event. Event 1 is the one just before that and so forth.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Event Running Time (in Seconds)
4– 6	Date	Event Date: Day, Month, Year – 1900
7	Unsigned-8	Event Hour
8	Unsigned-8	Event Minute
9	Unsigned-8	Event Second
10-11	Unsigned-8	Reserved = 0

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined



## 10.12 Command #149: Set Clock

This sets the internal real-time clock.

### Request Data Bytes

Byte	Format	Description
0 – 2	Date	Date: Day, Month, Year-1900
3	Unsigned-8	Hours
4	Unsigned-8	Minutes
5	Unsigned-8	Seconds

### Response Data Bytes

Byte	Format	Description
0 – 2	Date	Date: Day, Month, Year-1900
3	Unsigned-8	Hours
4	Unsigned-8	Minutes
5	Unsigned-8	Seconds

### Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 4		Undefined
5	Error	Too Few Data Bytes Received
6 – 127		Undefined

## 10.13 Command #150: Read Clock

This reads the internal real-time clock setting.

### Request Data Bytes

Byte	Format	Description
0	N/A	N/A

### Response Data Bytes

Byte	Format	Description
0 – 2	Date	Date: Day, Month, Year-1900
3	Unsigned-8	Hours
4	Unsigned-8	Minutes
5	Unsigned-8	Seconds

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

### 10.14 Command #151: Set Run Time Meter

This sets the internal run time meter.

Request Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Run Time Meter Value

Response Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Run Time Meter Value

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 4		Undefined
5	Error	Too Few Data Bytes Received
6 – 127		Undefined

### 10.15 Command #152: Read Run Time Meter

This reads the internal run time meter.

Request Data Bytes

Byte	Format	Description
0	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Run Time Meter Value

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

## 10.16 Command #154: Set Event Index

This sets the index of logged event to read from 0 to the latest event.

### Request Data Bytes

Byte	Format	Description
0	Unsigned – 8	Sets index of logged event to read using commands 143 – 146. Range 0 – 9.

### Response Data Bytes

Byte	Format	Description
0	Unsigned – 8	Event Index

### Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 2		Undefined
3	Error	Passed Parameter Too Large
4		Undefined
5	Error	Too Few Data Bytes Received
6 – 127		Undefined

## 10.17 Command #155: Get Event Index

This reads event logged index.

### Request Data Bytes

Byte	Format	Description
None	N/A	N/A

### Response Data Bytes

Byte	Format	Description
0	Unsigned – 8	Event index

### Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

## 10.18 Command #163: Get Fast Changing Information

### Request Data Bytes

Byte	Format	Description
None	N/A	N/A

### Response Data Bytes

Byte	Format	Description
0 – 1	Unsigned-16	Mode – depends on instrument (see table 5)
2 – 3	Unsigned-16	Sub Mode – depends on instrument
4 – 7	Float	Analog Output
8 – 9	Unsigned-16	Priority fault
10 – 11	Bit map	Error status
12	Unsigned-8	Alarm hi status : 0 – off, 1 – on , 2 – accepted
13	Unsigned-8	Alarm lo status : 0 – off, 1 – on , 2 – accepted
14	Unsigned-8	Alarm mid status : 0 – off, 1 – on , 2 – accepted
15	Unsigned-8	Power cycled flag
16	Unsigned-8	Event happened flag
17	Integer-8	0
18-21	Integer-32	0

### Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

## 10.19 Command #164: Get Slow Changing Information

### Request Data Bytes

Byte	Format	Description
None	N/A	N/A

### Response Data Bytes

Byte	Format	Description
0 – 1	signed-16	Reserved = 0
2 – 5	float	Supply Voltage
6 – 7	signed-16	0

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

## 10.20 Command #165: Get Set Up Information

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	FlameGard 5 UV/IR Flame Detector TYPE: Standard 01, Long range 02, Hydrogen 03
1	Enumerated	Measured Units - FlameGard 5 UV/IR Flame Detector Operating Mode
2- 5	Unsigned-32	0
6	Unsigned-8	0
7	Unsigned-8	Alarm Hi Relay La/nL: 0 – nL, 1 – LA
8	Unsigned-8	Alarm Hi Relay En/dE: 0 – dE, 1 – En
9	Unsigned-8	0
10	Unsigned-8	Alarm Lo Relay La/nL: 0 – nL, 1 – LA (WARN)
11	Unsigned-8	Alarm Lo Relay En/dE: 0 – dE, 1 – En (WARN)
12	Unsigned-8	0
13	Unsigned-8	0
14	Unsigned-8	0
15	Unsigned-8	Alarm delay 3 10 sec 1 8 sec 0 4 sec 2 2 sec
16	Unsigned-8	Sensitivity 0 100% 1 75% 2 50%
17	Unsigned-8	0
18	Unsigned-8	0
19	Unsigned-8	0
20	Unsigned-8	DIP Switch override (0 – Setting from Switch, 1 – Override Switch)
21	Unsigned-8	0
22	Unsigned-8	0
23	Unsigned-8	0

24	Unsigned-8	Current Range: 0= 3.5 – 20, 1=1.25 – 20
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Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

### 10.21 Command #166: Get Device Constants

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	System Firmware Revision. ASCII code

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

### 10.22 Command #170: Set Current Range

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	0 – Range 3.5mA – 20mA, 1 – Range 1.25 – 20mA

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	0 – Range 3.5mA – 20mA, 1 – Range 1.25 – 20mA

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 2		Undefined
3	Error	Passed Parameter Too Large
4		Undefined
5	Error	Too Few Data Bytes Received
6 – 127		Undefined

### 10.23 Command #200: Set Sensitivity

This sets the sensitivity parameter on flame detectors to increase the range of their view.

#### Request Data Bytes

Byte	Format	Description
0	Unsigned 8	Sensitivity: 0- 100% hi, 1- 75% mid, 2 -50% low

#### Response Data Bytes

Byte	Format	Description
0	Unsigned 8	Sensitivity: hi, mid, low

#### Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 2		Undefined
3	Error	Passed Parameter Too Large
4		Undefined
5	Error	Too Few Data Bytes Received
6 - 127		Undefined

### 10.24 Command #201: Set Alarm Delay

This sets the delay in seconds from the warning time until the alarm is triggered.

#### Request Data Bytes

Byte	Format	Description
0	Unsigned 8	Alarm delay, 3 10 sec, 1 8 sec, 0 4 sec, 0 2 sec

#### Response Data Bytes

Byte	Format	Description
0	Unsigned 8	Alarm delay

#### Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 2		Undefined
3	Error	Passed Parameter Too Large
4		Undefined

Code	Class	Description
5	Error	Too Few Data Bytes Received
6 - 127		Undefined

## 10.25 Command #203: Set DIP Switch Override

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	0 – Setting from Switch, 1 – Override Switch

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	0 – Switch, 1 – Override

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 2		Undefined
3	Error	Passed Parameter Too Large
4		Undefined
5	Error	Too Few Data Bytes Received
6 – 127		Undefined

## 10.26 Command #204: Reset COPM Fault

This command will reset the COPM fault and counters.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
None	N/A	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 15		Undefined
16	Error	Access Restricted
17 - 127		Undefined



## 10.27 Command #205: Get Flame Device Info

### Request Data Bytes

Byte	Format	Description
None	N/A	N/A

### Response Data Bytes

Byte	Format	Description
0 – 1	Unsigned-16	UV signal counts
2 – 3	Unsigned -16	UV COPM Fault count
4 – 5	Unsigned -16	IR1 signal count
6 – 7	Unsigned -16	IR1 COPM Fault count
8 – 9	Unsigned -16	IR2 signal count
10 – 11	Unsigned -16	IR2 COPM Fault count
12 – 13	Unsigned -16	IR3 signal count
14 – 15	Unsigned -16	IR3 COPM Fault count
16 – 17	Unsigned -16	IR4 signal count
18 – 19	Unsigned -16	IR4 COPM Fault count
20 – 21	Unsigned -16	Reserved
22 - 23	Unsigned -16	Reserved

### Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

## 11.0 Table

### 11.1 FlameGard 5 UV/IR-HART – Device Specific Commands Summary

The following Table 5 is a summary of the FlameGard 5 UV/IR Device Specific Commands.

Command Number	Byte Number	Meaning
131		Abort Alarm Test
132		Alarm Test
139		Reset Alarms
141		Set Relay State
142		Reset Event Happening Flag
143		Read Event Logging Counters
144		Clear Event Logging Counters
145		Read Warning Event Log
146		Read Alarm Event Log
147		Read Fault Event Log
148		Read Maintenance Log
149		Set Time Clock
150		Read Time Clock
151		Set Running Time
152		Read Running Time
154		Set Event Index
155		Read Event Index
163		Get Fast Changing Information
164		Get Slow Changing Information
165		Get Setup Information
166		Get Device Constants
170		Set Current range
200		Set Sensitivity
201		Set Delay
203		Set DIP Switch Override
204		Reset COPM Fault
205		Get Flame Device Info

Table 5: FlameGard 5 UV/IR – Device Specific Commands

### 11.2 FlameGard 5 UV/IR – Operating Mode Values

The following table is a summary of the FlameGard 5 UV/IR Operating Mode Values:

Mode	Decimal Value
Power-up Delay	1
Warn Non-latching Only	2
Warn & Alarm Non-Latching	3
Warn Latching Only	4
Alarm Latching Only	5
Warn & Alarm Latching	6

Mode	Decimal Value
Ready State (No Fire)	7
UV Only Fire	8
IR Only Fire)	9
Alarm Test	10
COPM Fault Detected	11

Table 6: FlameGard 5 UV/IR - Operating Mode Values

### 11.3 Fault Event Log – Cause Description

The following describes the cause as reported by the read event log commands:

Byte	Bit		Description
1(upper)	0 (LSB)	0x0100	Not Used
	1	0x0200	Not Used
	2	0x0400	Not Used
	3	0x0800	Current Error
	4	0x1000	Not Used
	5	0x2000	Not Used
	6	0x4000	UV 10 minutes
	7	0x8000	Reset line shorted
0(lower)	0	0x0001	Internal error (2.5,13V)
	1	0x0002	Not Used
	2	0x0004	IR COPM
	3	0x0008	UV COPM
	4	0x0010	Low Line voltage check
	5	0x0020	RAM Error
	6	0x0040	EEPROM Checksum
	7	0x0080	Flash Checksum

Table 7: Fault Event Log – Cause Description

## 12.0 Performance

### 12.1 Sampling Rates

The FlameGard 5 UV/IR Flame Detector responds to interrupts from the sensors. Other items are sampled at a 35 or multiple of 35 ms.

### 12.2 Power-up

On power up, the FlameGard 5 UV/IR Flame Detector executes a self-test procedure, which requires approximately 30 seconds. During this time, the analog output is set to 1.25mA or 3.5mA depending on the current selection. After the self-test is satisfactorily completed, the unit sets the PV to a value representing the mode of the instrument.

Two light emitting diodes (LED's) are visible through the UV window (the larger window on UV/IR units). Immediately upon powering up the detector, both LED's will start blinking alternately for 10 seconds. The unit will then enter the "Ready" mode. During the "Ready" mode, the green LED will flash off 1 second, every 10 seconds

### 12.3 Device Reset

The FlameGard 5 UV/IR Flame Detector cannot be reset by any command. The unit only resets when power is cycled.

### 12.4 Self-Test

The FlameGard 5 UV/IR Flame Detector goes through a self-test upon power cycle. Should any of the tests fail, the unit immediately reports a fault condition.

### 12.5 Command Response Delay

The FlameGard 5 UV/IR Flame Detector responds as follows:

Response Type	Response Time
Minimum	20ms
Typical	50ms
Maximum	100ms

Table 8: Command Response Times

### 12.6 Busy and Delayed-Response

The FlameGard 5 UV/IR Flame Detector does not use delayed-response times.

### 12.7 Long Messages

The largest data field used by FlameGard 5 UV/IR Flame Detector is in response to Command 20 & 22 (Read/Write Long Tag): 34 bytes including the two status bytes.

### 12.8 Non-Volatile Memory

The FlameGard 5 UV/IR Flame Detector uses EEPROM to hold the device's configuration parameters. New data is written to this memory immediately on execution of a write command.

## 12.9 Operating Modes

The FlameGard 5 UV/IR Flame Detector reports No Fire in ready state. Various other modes are used to indicate wither UV and/or IR is detected. Other modes are used to show special states.

## 12.10 Write Protection

The FlameGard 5 UV/IR Flame Detector does not support any write protection mode.

## 12.11 Reset Polling address

User can reset the polling address to 0 by shorting the Reset line to ground for 10-20 seconds during power on reset.

# 13.0 Annex A. Capability Checklist

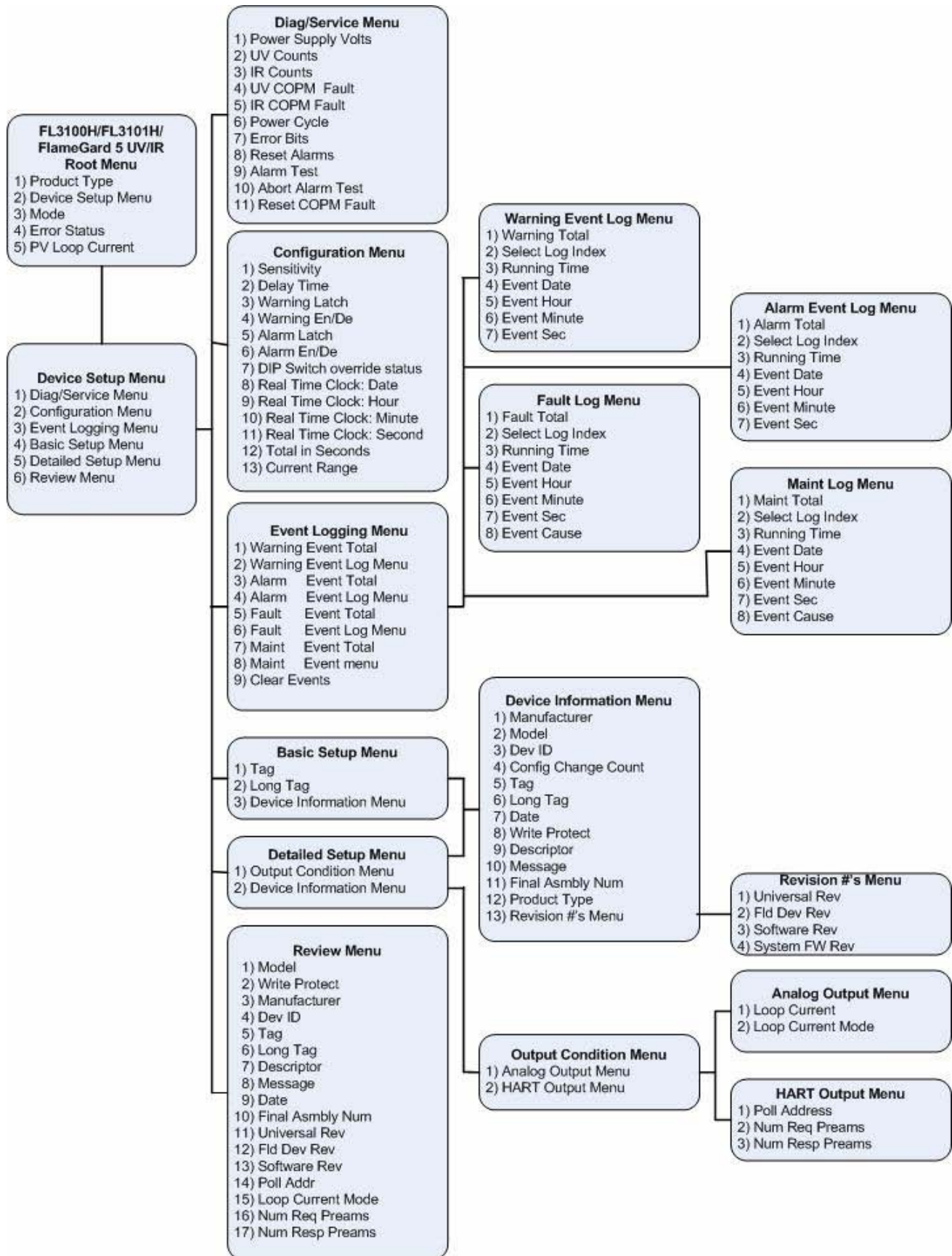
Manufacturer, model, and revision	General Monitors, Inc. FlameGard 5 UV/IR Flame Detector, Revision 1
Device type	FlameGard 5 UV/IR Flame Detector
HART revision	6.0
Device Description available	Yes
Number and type of sensors	FlameGard 5 UV/IR Flame Detector: 1 UV sensor 1 IR sensor
Number and type of actuators	0
Number and type of host side signals	1: 4 - 20mA analog
Number of Device Variables	0
Number of Dynamic Variables	1
Map able Dynamic Variables?	No
Number of common-practice commands	2
Number of device-specific commands	27
Bits of additional device status	8
Alternative operating modes?	No
Burst mode?	No
Write-protection?	Mfg Only

**Table 9: Capability Checklist**

## 14.0 Annex B. Default Configuration

Parameter	Default value
Lower Range Value	0
Upper Range Value	65535
PV Units	FlameGard 5 UV/IR Flame Detector Operating Mode
Sensor type	UV/IR
Number of wires	3
Damping time constant	N/A
Fault-indication jumper	N/A
Write-protect jumper	N/A
Number of response preambles	5

**Table 10: Default Configuration**





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