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**HART® Communication
With the SharpEye
Flame Detector**

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® SharpEye is a registered trademark of Spectrex inc.

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1. INTRODUCTION

1.1 Scope

Digital communication with the SharpEye Flame Detector allows the operator to monitor the status of the detector, determine factory settings and initiate field tests.

This document provides guidance for establishing HART communication and describe the HART menu structure when using the SharpEye with a HART Handheld Communicator, PC or other process interface device that supports DDL.

1.2 Purpose

This specification is designed to compliment other documentation (e.g., the SharpEye user manual) by providing a complete, unambiguous description of the HART Host Application and Communication.

1.3 Who should use this document?

The specification is designed to be a technical reference for System Integrators and End Users.

1.4 References

HART Field Communications Protocol Specification, HCF_SPEC-12,
Available from the HCF.

*SharpEye Triple IR (IR3) Flame Detector Model 20/20SI User's and
Maintenance Manual*, TM 784100, Available from Spectrex Inc.

2. PRODUCT OVERVIEW

The SharpEye is a family of Flame Detectors, which incorporate advanced optical spectral analysis of flames. SharpEye Flame Detectors operate reliably in the harsh conditions of offshore drilling and production platforms, FPSO vessels, fuel loading facilities, LNG and LPG plants, oil refineries, aircraft hangars, paint spray booths, gas turbine power stations, chemical and petrochemical plants.

These detectors employ the latest UV (Ultra Violet), IR (Infrared), UV/IR (Ultra Violet & Infrared), IR³ (Triple IR patented multi-spectrum detection) and CCTV Flame Detection technologies.

Depending on the specific model, the SharpEye flame detector can include the following interfaces: 4-20mA current output, HART communication (FSK), relays, RS485 ModBus communication, status LEDs.

3. INTERCONNECTING THE HART COMMUNICATOR WITH THE DETECTOR

The host connects to the device via the two-wire 4-to-20mA current loop. Refer to the User's and Maintenance Manual for connection details.

This is the only output from this device, representing the "Fire Detection" channel. This output corresponds to the Primary Variable (PV). HART Communication is supported on this loop.

Point-to-Point Mode.

The HART Communicator can connect to SharpEye at any wiring termination point in the analog output signal loop. Connect the HART communicator in parallel with 500 Ohm load resistor. The HART connections are non-polarized.

Switch on the HART Communicator. If a device is found, the HART Communicator displays the Main Menu. If no device is found, check the connections and verify the presence of a 500 ohms load resistance in series in the loop.

Multidrop Mode

Optical flame detectors are life safety devices and require the 4-20 mA loop for transmitting important detector status data. They should not be used in conjunction with multidrop mode, If multidrop mode required, the alarm and fault relay contacts must be connected directly to the safety system or fire panel for signaling purposes.

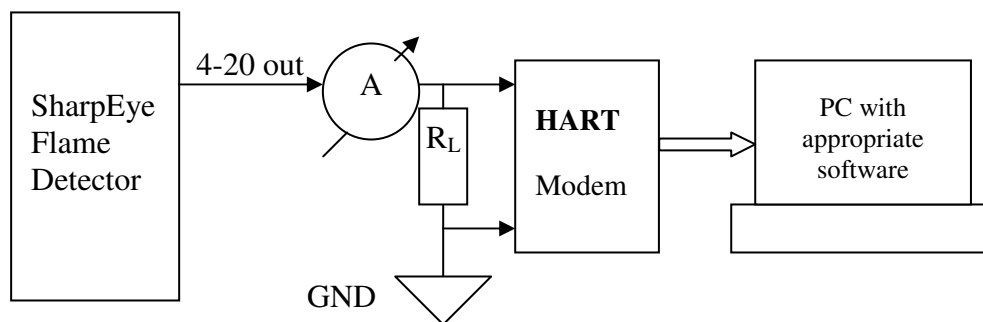


Figure 1: HART Connection block diagram.

4. HART DEVICE DESCRIPTION LANGUAGE

The HART protocol incorporates a concept called the Device Description Language (DDL) that enables all suppliers of HART instruments to define and document their products in a single consistent format. This format is readable by handheld communicators, PCs and other process interface devices, regardless of manufacturer, allowing full functionality from any HART device.

NOTE

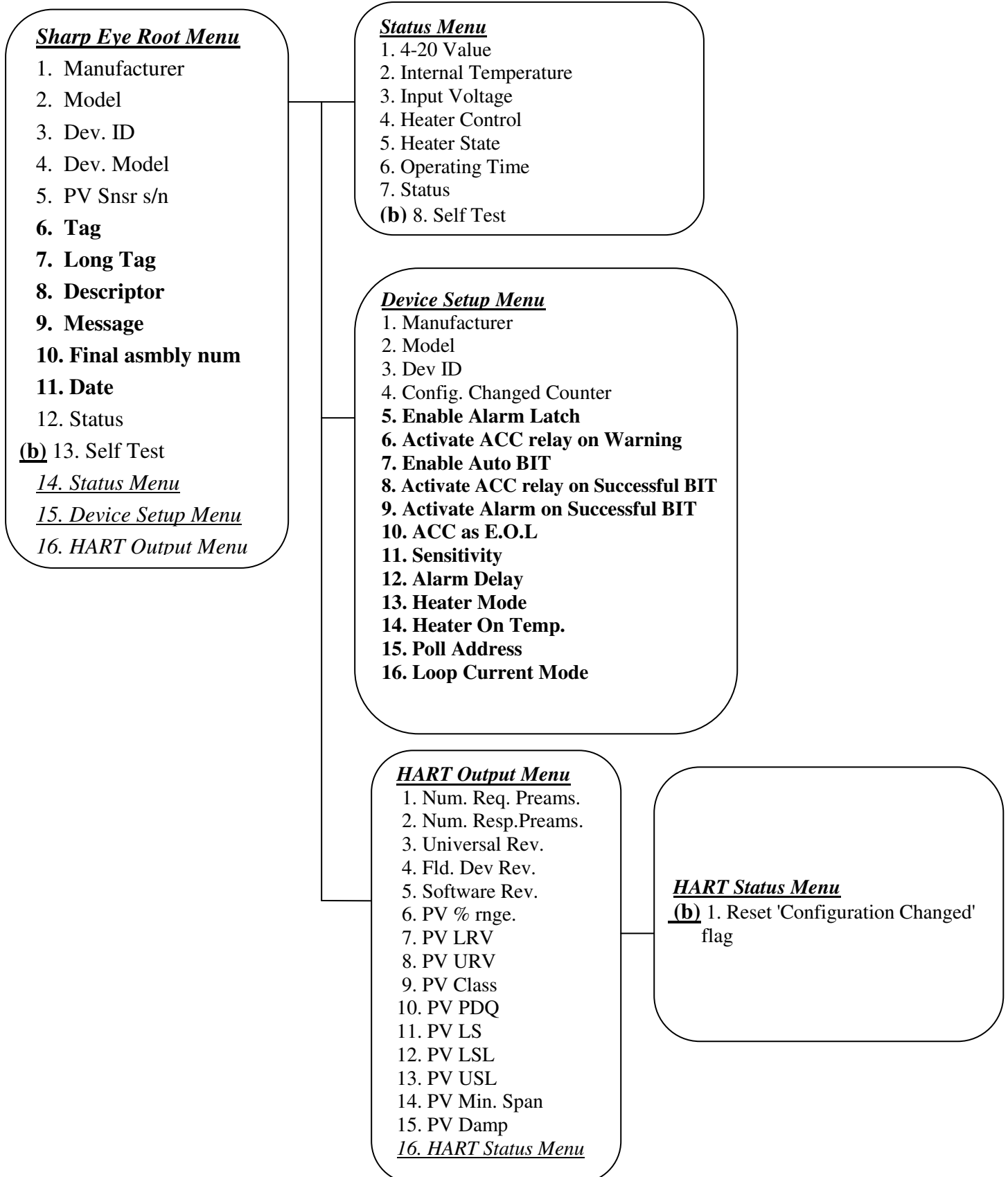
For full compliance of the Flame Detector with the HART Host application a SharpEye Device Description should be installed on your machine.

A complete listing of the HCF DD library is available for download in manufacturer and device type sequence at the HCF home page.

SharpEye Device Description allows presenting the HART menu in a graphical mode, this option is not supported by all hosts manufacturers, for using the graphical mode please refer to HART host literature.

5. HART MENU STRUCTURE

The changeable options of the menu is bolded, the sub menus are underlined and buttons are marked with **(b)**



5.1 SharpEye ROOT MENU

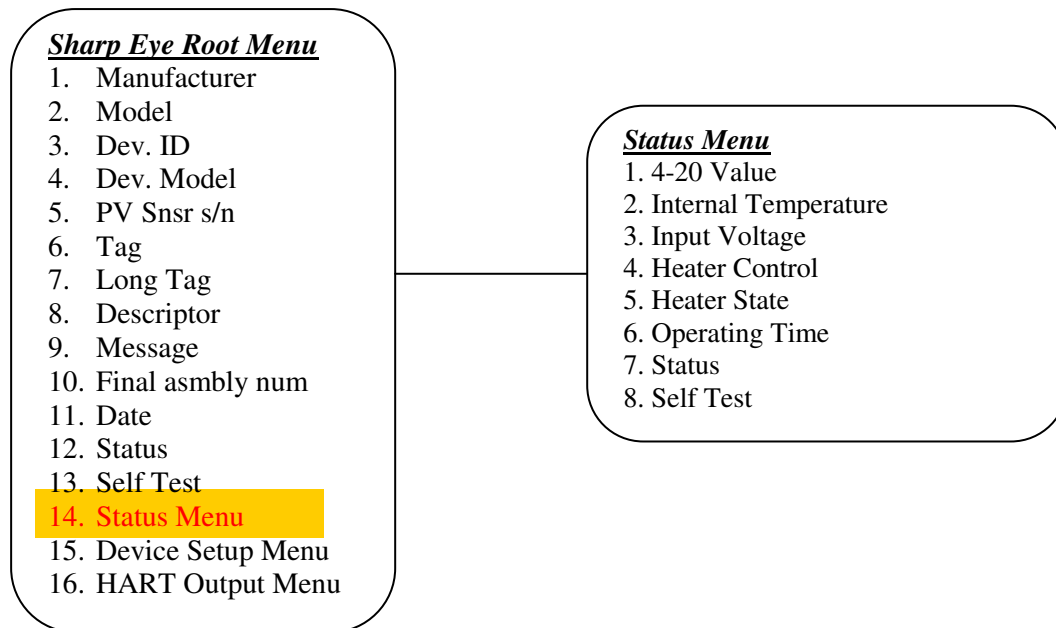
When HART communication is established, the first menu displayed is the Sharp Eye Root Menu.

Sharp Eye Root Menu

1. Manufacturer
2. Model
3. Dev. ID
4. Dev. Model
5. PV Snsr s/n
6. Tag
7. Long Tag
8. Descriptor
9. Message
10. Final assembly num
11. Date
12. Status
13. Self Test
14. Status Menu
15. Device Setup Menu
16. HART Output Menu

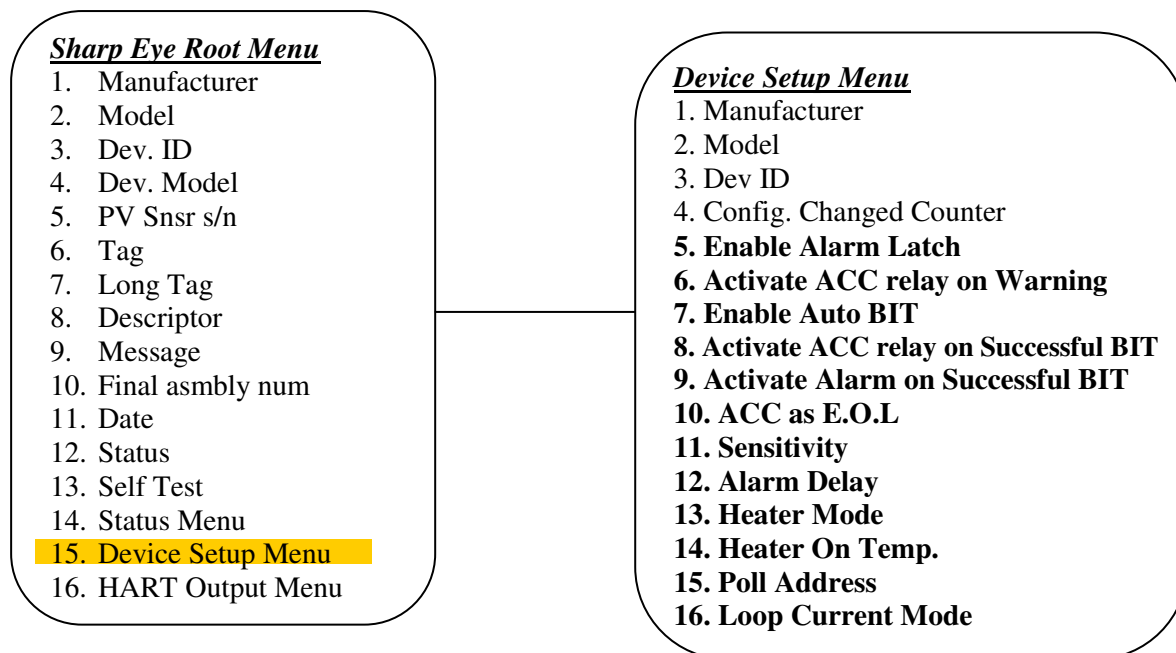
1	Manufacturer	Spectrex Inc.	Read
2	Model	Sharp Eye.	Read
3	Dev ID	Device unique identification number.	Read
4	Dev. Model	Device sensor type (see Annex B, Table B1: Fire Detection Sensor Type Codes).	Read
5	PV Snsr s/n	Serial Number of this device.	Read
6	Tag	Text that is associated with the field device installation (16 chars). This text can be modified and used by the operator any way.	R/W
7	Long Tag	Text that is associated with the field device installation (32 chars). This text can be modified and used by the operator any way.	R/W
8	Descriptor	Text associated with the field device that can be used by the operator in any way.	R/W
9	Message	Text associated with the field device that can be used by the operator in any way.	R/W
10	Final assembly num	A number that is used for identification purposes, and is associated with the overall field device.	R/W
11	Date	Any Date chosen by the operator to be used for any purpose.	R/W
12	Status	Indicates a field device condition see Annex A	Read
13	Self Test	Internal tests are performed and any detected problems are reported in "Status".	Button
14	Status Menu	Current operating status and diagnostic information.	Menu
15	Device Setup Menu	Provides Access to various setup and configurations.	Menu
16	HART Output Menu	HART Specific Variables	Menu

5.2 STATUS MENU



1	4-20 Value	The actual analog output of the Fire Detection Channel.	Read
2	Internal Temperature	Actual integral temperature of the detector (in deg C).	Read
3	Input Voltage	Actual detector's supply voltage.	Read
4	Heater Control	Indicates if the heater control is manual or automatic.	Read
5	Heater State	Indicates the current state of the heater (ON or OFF).	Read
6	Operating Time	Displays the total detector's operating time from last power up.	Read
7	Status	Indicates a field device condition see Annex A	Read
8	Self Test	Internal tests are performed and any detected problems are reported in "Status".	Button

5.3 DEVICE SETUP MENU



Manufacturer	Spectrex Inc.	Read
Model	Sharp Eye.	Read
Dev ID	Device unique identification number.	Read
Config. Changed Counter	The number of Device Configuration changes since the manufacture.	Read
Enable Alarm Latch	Enable alarm relay to stay energized after exiting the Alarm Mode.	R/W
Activate ACC relay on Warning	Activates ACC relay during Warning status.	R/W
Enable Auto BIT	Enables automatic self test.	R/W
Activate ACC relay on Successful BIT	Activates ACC Relay after successful self test.	R/W
Activate Alarm on Successful BIT	Activates Alarm after successful self test	R/W
ACC as E.O.L	Accessory Relay is Activated at Power on continuously.	R/W
Sensitivity	Detectors Sensitivity setting.	R/W
Alarm Delay	Defines delay between Fire Detection and Alarm.	R/W
Heater Mode	3 Heater Modes available- Auto, On, Off.	R/W
Heater on Temp.	This option is active in Heater Auto mode – it allows the operator to set the temperature at which the optics heater begins operating.	R/W
Poll Address	Address used by the host to identify a field device.	R/W
Loop Current Mode	Enables to choose between fixed or not fixed current mode.	R/W

5.4 HART OUTPUT MENU

Sharp Eye Root Menu

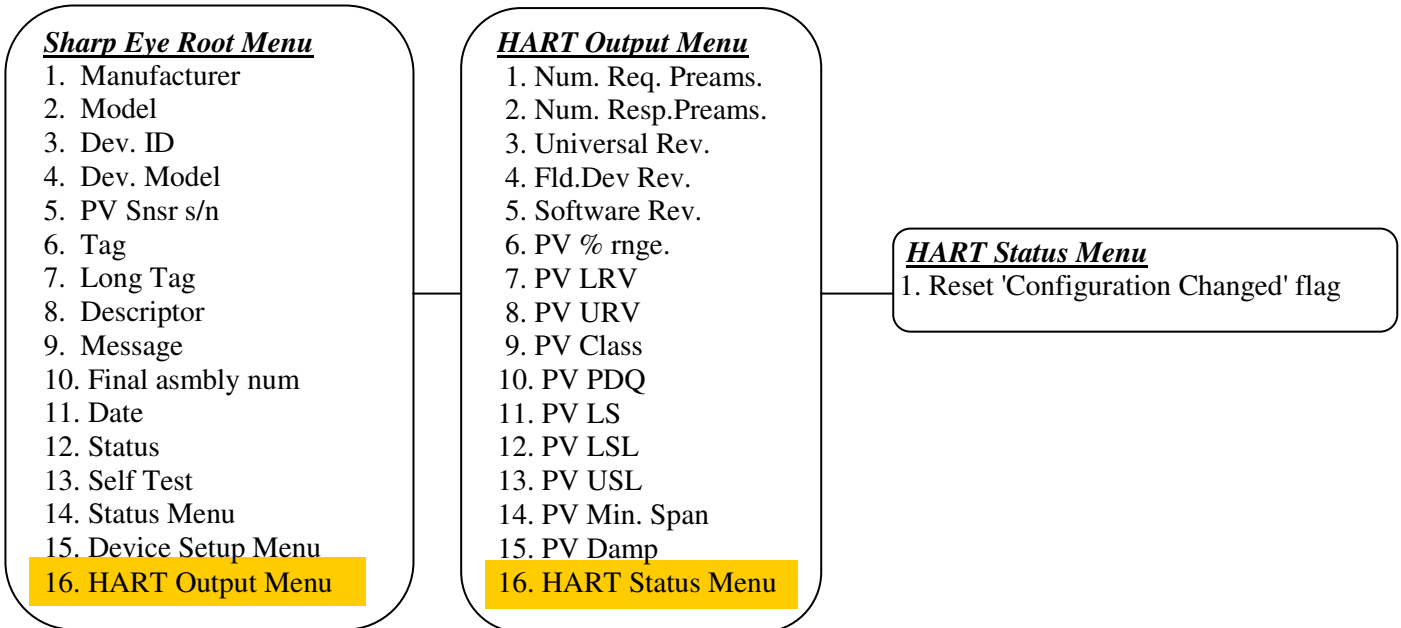
1. Manufacturer
2. Model
3. Dev. ID
4. Dev. Model
5. PV Snsr s/n
6. Tag
7. Long Tag
8. Descriptor
9. Message
10. Final asmbly num
11. Date
12. Status
13. Self Test
14. Status Menu
15. Device Setup Menu
16. HART Output Menu

HART Output Menu

1. Num. Req. Preams.
2. Num. Resp.Preams.
3. Universal Rev.
4. Fld. Dev Rev.
5. Software Rev.
6. PV % rnge.
7. PV LRV
8. PV URV
9. PV Class
10. PV PDQ
11. PV LS
12. PV LSL
13. PV USL
14. PV Min. Span
15. PV Damp
16. HART Status Menu

1	Num. Req. Preams	HART specific synchronization messages.	Read
2	Num. Resp. Preams.	HART specific synchronization messages.	Read
3	Universal Rev.	HART protocol revision.	Read
4	Fld. Dev Rev.	Field Device hardware revision.	Read
5	Software Rev.	Field Device software revision.	Read
6	PV % rnge.	Percent of Range. The variable that tracks the Digital Value representation with respect to the range defined by the Lower Range and Upper Range Value, for normal operating modes. The units of this variable are always in percent.	Read
7	PV LRV	PV Upper Range Value.	Read
8	PV URV	PV Lower Range Value.	Read
9	PV Class	Not Classified	Read
10	PV PDQ	Indicates the status of the Primary Variable	Read
11	PV LS	Indicates if the Primary Variable is limited.	Read
12	PV LSL	"Good" Status Lower Range Value.	Read
13	PV USL	"Good" Status Upper Range Value.	Read
14	PV Min Span	PV Upper Range Value - PV Lower Range Value.	Read
15	PV Damp.	The time takes to PV to change his value.	Read

5.4.1 HART STATUS MENU



1	Reset 'Configuration Changed' flag	Clears the "Configuration Changed" bit.	Button
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ANNEX A: FIELD DEVICE STATUS

Field Device Status

N

B

BIT FAULT

IR

UV

W

A

F

Explanation

Normal State

Self test is performed

Self test failed

Infra Red Detection

Ultraviolet Detection

Fire Warning

Fire Alarm

General Fault

ANNEX B: Fire Detection Sensor Type Codes

B1. Fire Detection Sensor Type Codes

Code	Definition
0x0066	20/20SI
0x0067	20/20CTIN
0x0068	20/20CTIP
0x0166	20/20XI-1
0x0190	40/40I-1
0x0191	40/40R-1
0x0192	40/40LB-1
0x0193	40/40L-1
0x0194	40/40U-1
0x0195	40/40M-1
0x0196	40/40UB-1
0x0197	40/40L4-1
0x0198	40/40L4B-1
0x0290	40/40I-2
0x0291	40/40R-2
0x0292	40/40LB-2
0x0293	40/40L-2
0x0294	40/40U-2
0x0295	40/40M-2
0x0296	40/40UB-2
0x0297	40/40L4-2
0x0298	40/40L4B-2
0x0366	20/20XI-3
0x0390	40/40I-3
0x0391	40/40R-3
0x0392	40/40LB-3
0x0393	40/40L-3
0x0394	40/40U-3
0x0395	40/40M-3
0x0396	40/40UB-3
0x0397	40/40L4-3
0x0398	40/40L4B-3
0x0466	20/20SH

ANNEX C: REVISION HISTORY

C1. Revision 1.0

Initial Revision.

C2. Revision B

Updated to comply with the third release of the DD. The changes made to stand along with 375 demands.

1. Device Setup Menu -> Configuration Changed y/n was canceled
2. In HART status menu, everything besides “Reset ‘Configuration Changed’ Flag” was canceled.