Addendum

HART® Communication with the X2200 UV Flame Detector

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DET-TRONICS

ADDENDUM

AUTOMATIC

HART Communication with the X2200 UV Flame Detector

HART® COMMUNICATION PROTOCOL

Digital communication with the X2200 allows the operator to monitor the status of the detector, determine factory settings, adjust field settings, and initiate field tests. This addendum provides guidance for establishing HART communication, and describes the HART menu structure when using the X2200 with a HART Handheld Communicator, a PC, or other process interface device that supports Device Description Language (DD).

NOTE

A minimum level of understanding with regard to the operation and navigation of the HART Communicator is required. Refer to the instruction manual supplied with the HART Communicator for basic operating instructions.

INTERCONNECTING THE HART COMMUNICATOR WITH THE DETECTOR

Point-to-Point Mode

The HART Communicator can connect to the X2200 at any wiring termination point in the analog output signal loop. Connect the HART communicator in parallel with the X2200 analog signal or load resistor. The HART connections are non-polarized.

IMPORTANT WIRING NOTE

The HART Communicator does not measure loop current directly, but instead reads a voltage signal across a resistance (250 ohms) in the loop. The recommended connection point is across the input impedance of the signal receiver (PLC), which is a nominal 250 ohms. See Figures 1 to 4. If testing/programming on a bench, a 250 ohm load resistor must be used. See Figure 5.

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 minimum of 250 ohms load resistance in series in the loop.

9	mA +	19	mA –	29	SPARE 1
8	mA + REF	18	mA – REF	28	SPARE 1
7	COM FIRE	17	COM FIRE	27	COM AUX
6	NO FIRE	16	NO FIRE	26	NO AUX
5	NC FIRE	15	NC FIRE	25	NC AUX
4	COM FAULT	14	COM FAULT	24	NOT USED
3	NO FAULT	13	NO FAULT	23	NOT USED
2	+Vin	12	+Vin	22	MAN Oj
1	–Vin	11	–Vin	21	–Vin

E2061

Figure 1—X2200 HART Wiring Terminal Identification

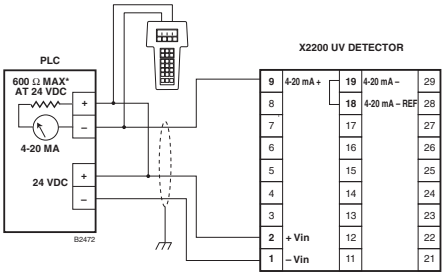


Figure 4—X2200 Detector Wired for Non-Isolated 0 to 20 mA Current Output (Sinking)

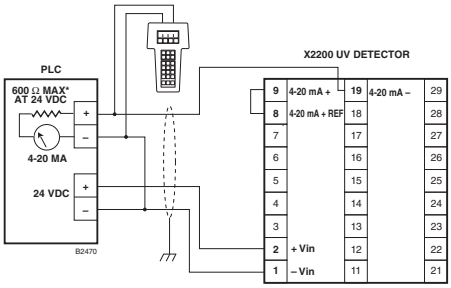


Figure 2—X2200 Detector Wired for Non-Isolated 0 to 20 mA Current Output (Sourcing)

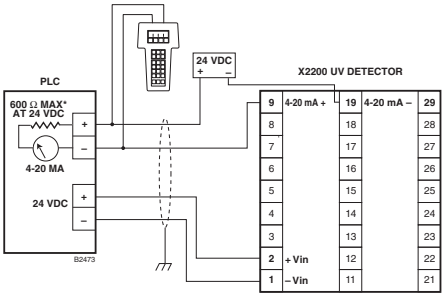


Figure 5—X2200 Detector Wired for Isolated 0 to 20 mA Current Output (Sinking)

*Nominal input impedance of PLC = 250 ohms.
Maximum loop impedance including input impedance of PLC = 600 ohms.

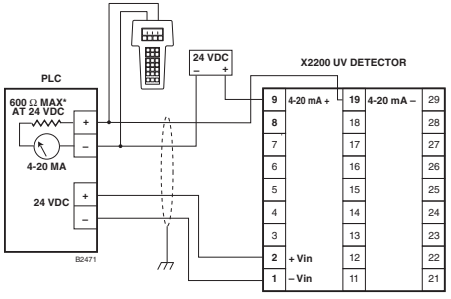


Figure 3—X2200 Detector Wired for Isolated 0 to 20 mA Current Output (Sourcing)

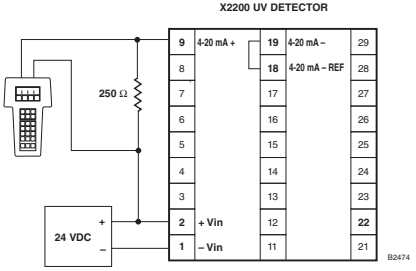


Figure 6—Wiring the X2200 for Benchtop Testing/ Programming Using HART Protocol

Multidrop Mode

Optical flame detectors are life safety devices and require the 0–20 mA loop for transmitting important detector status data. They should not be used in conjunction with multidrop mode. If multidrop mode is a requirement, the alarm and fault relay contacts must be connected directly to the safety system or fire panel for signalling purposes.

NOTE

RS-485 Modbus communication is not available on HART equipped models.

NOTE

This addendum covers HART wiring only. Refer to the device instruction manual for NFPA-72 compliant releasing wiring diagrams.

HART DEVICE DESCRIPTION LANGUAGE

The HART protocol incorporates a concept called the Device Description Language (DD) 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 that support DD. DD enables full interoperability of devices, regardless of manufacturer, allowing full functionality from any HART device.

In the event that your Communicator does not establish communications with the X2200, ensure that the appropriate DDs for the X2200 have been programmed into your Communicator. To review the DDs programmed into your HART Communicator:

1. From the Main menu, access the Offline menu.
2. From the Offline menu, select New Configuration to access the list of device descriptions programmed into the HART Communicator.
3. Select Det-Tronics and review the list of models to determine if the X2200 DDs are installed in your Communicator.

If the X2200 DDs have not been programmed into the Memory Module, you must use the generic interface built into your HART Communicator.

The HART Communication Foundation manages a library of Manufacturer Device Descriptions, which are distributed to programming sites for inclusion in master devices. A complete listing of the HCF DD Library is available for download in manufacturer and device type sequence at en.hartcomm.org.

DETECTOR WIRING

Refer to the X2200 instruction manual (form number 95-8549) for complete instructions regarding detector installation and wiring.

NOTE

X2200 detectors with HART do not support RS485 communication.

NOTE

Power consumption specifications for the HART model are different than the standard model.

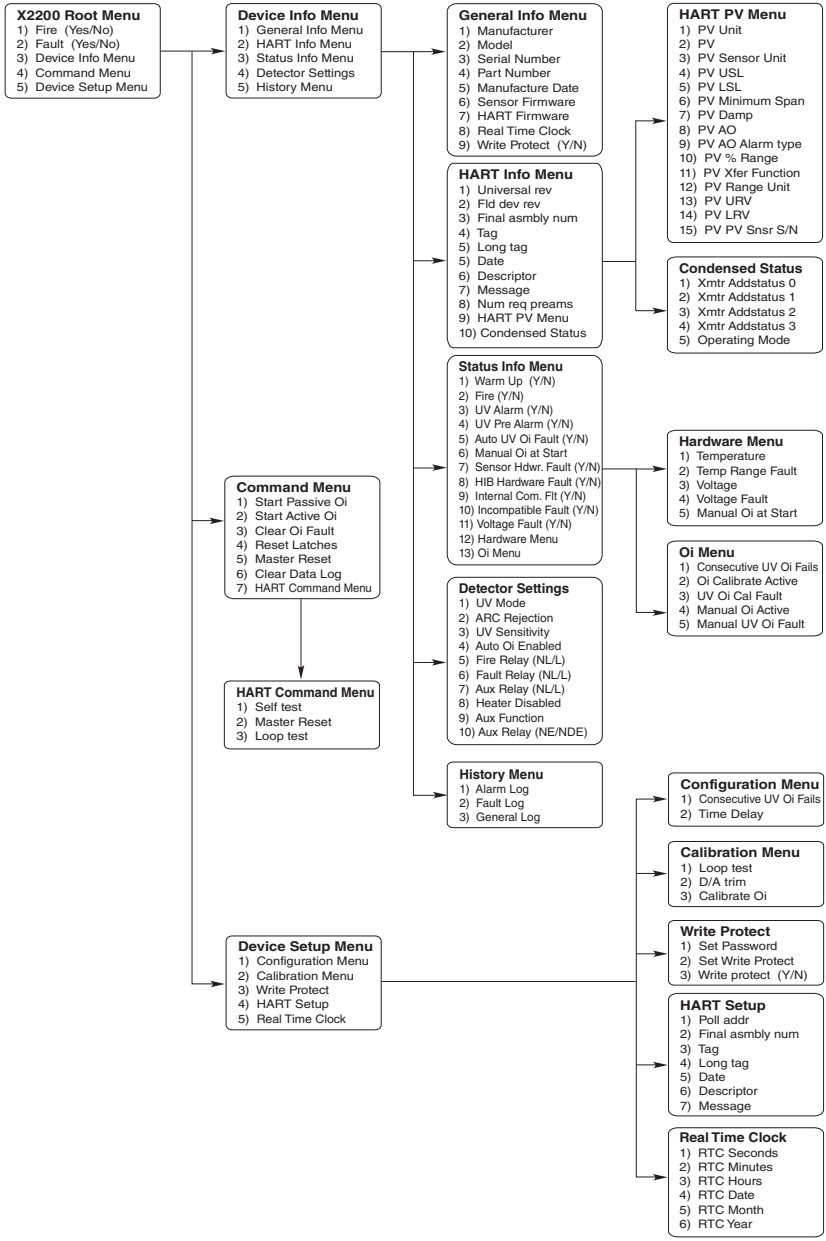
Power Consumption Specifications of X2200 Detector with HART Communication

Without heater: 2.5 watts at 24 Vdc nominal;
4.5 watts at 24 Vdc in alarm.
2.8 watts at 30 Vdc nominal;
5.1 watts at 30 Vdc in alarm.

Total power: 7.6 watts at 30 Vdc with EOL resistor installed.

EOL resistor must be ceramic, wirewound type, rated 5 watts minimum, with actual power dissipation not to exceed 2.5 watts.

HART MENU STRUCTURE



X2200 ROOT MENU

When HART communication is established, the first menu displayed is the X2200 Root menu:

X2200 Root Menu
1) Fire (Yes/No)
2) Fault (Yes/No)
3) Device Info Menu
4) Command Menu
5) Device Setup Menu

1) Fire (Yes/No) Indicates "Y" if the device is in a fire alarm status — analog output is at 20 mA, fire alarm relay is actuated, and LED is red.

2) Fault (Yes/No) Indicates "Y" if a fault condition exists. Go to "Device Info" and select "Status Info" to determine the nature of the fault.

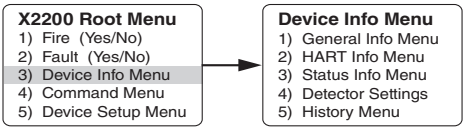
3) Device Info Menu Provides access to manufacturer and HART information, current device status, factory settings, and history logs.

4) Command Menu This menu allows the operator to initiate a manual oi test and to perform various reset/clear functions.

5) Device Setup Menu This menu allows various setup, configuration, and calibration functions.

DEVICE INFO MENU

This menu allows access to a variety of "read-only" information.



1) General Info Menu Factory information.

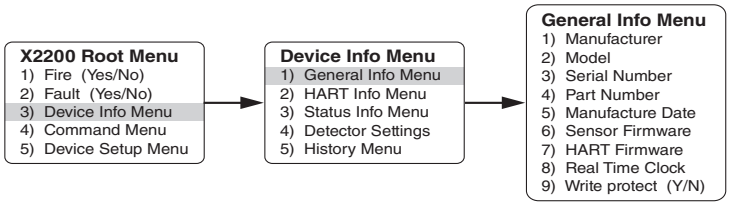
2) HART Info Menu HART Specific Variables.

3) Status Info Menu Current operating status and/or diagnostic information.

4) Detector Settings Factory settings relating to relay operation, detector sensitivity, and response.

5) History Menu Display log files: Alarm, Fault, General.

GENERAL INFO MENU



1) Manufacturer Det-Tronics.

2) Model X2200.

3) Serial Number Serial number of device.

4) Part Number Manufacturer's part number for this device.

5) Manufacture Date Date of manufacture shown as XX/XX/XX (month/day/year).

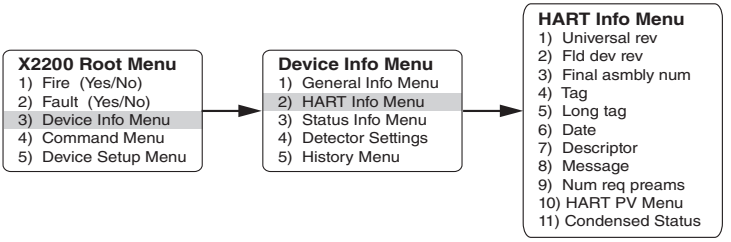
6) Sensor Firmware Firmware revision level of sensor module.

7) HART Firmware Firmware revision level of HART Interface Board (HIB).

8) Real Time Clock Current time and date settings of real time clock.

9) Write protect (Y/N) This indicates whether variables can be written to the device or whether commands that cause actions to be performed in the device can or cannot occur.

HART INFO MENU



1) Universal rev HART universal revision.

2) Fld dev rev HART field device revision.

3) Final asmbly num A number that is used for identification purposes and is associated with the overall field device.

4) Tag Text that is associated with the field device installation. This text can be used by the operator in any way. Max of eight character input.

5) Long tag Text that is associated with the field device installation. This text can be used by the operator in any way. Max of 32 character input.

6) Date Any date chosen by the operator to be used for any purpose. XX/XX/XXXX (month/day/year).

7) Descriptor Text associated with the field device that can be used by the operator in any way.

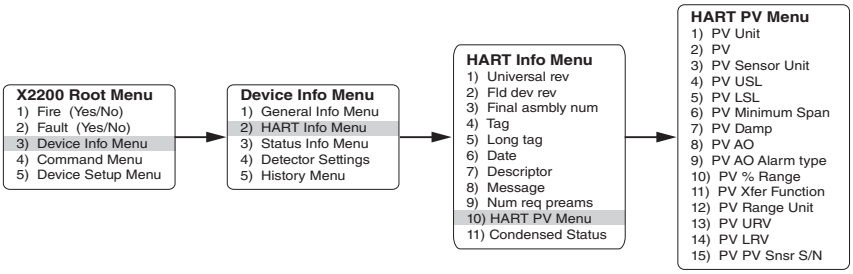
8) Message Text associated with the field device that can be used by the operator in any way.

9) Num req preams HART specific synchronization messages.

10) HART PV Menu Display HART specific primary variable (PV) items.

11) Condensed Status Device status condensed for HART handheld display.

HART PV MENU



1) PV Unit Not implemented for X2200.

2) PV Not implemented for X2200.

3) PV Sensor Unit Not implemented for X2200.

4) PV USL Not implemented for X2200.

5) PV LSL Not implemented for X2200.

6) PV Minimum Span Not implemented for X2200.

7) PV Damp Not implemented for X2200.

8) PV AO Analog Output. The value that tracks the Digital Value representation, under normal operating modes.

9) PV AO Alarm type Not implemented for X2200.

10) PV % Range Percent of Range. The variable that tracks the Digital Value representation with respect to the range defined by the Lower Range Value and Upper Range Value, for normal operating modes. The units of this variable are always in percent.

11) PV Xfer Function Not implemented for X2200.

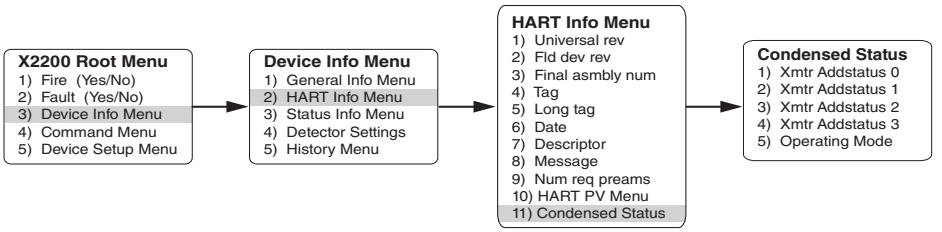
12) PV Range Unit Not implemented for X2200.

13) PV URV Not implemented for X2200.

14) PV LRV Not implemented for X2200.

15) PV PV Snsr S/N Not implemented for X2200.

CONDENSED STATUS



1) Xmtr Addstatus 0
Fire Alarm
UV Alarm
o_i Cal Alarm
Manual o_i Active
Warmup

2) Xmtr Addstatus 1
UV Pre Alarm

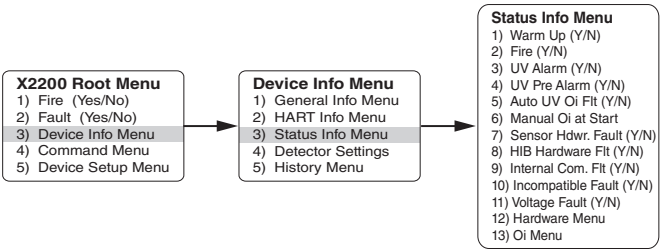
3) Xmtr Addstatus 2
Fault
Manual UV o_i Fault
Auto UV o_i Fault
UV o_i Cal Fault
Temperature Out of Range

4) Xmtr Addstatus 3
Voltage Out of Range Fault
Manual o_i at Start
Hardware Fault
HART Fault
Modbus Communication Fault
Incompatible Version

5) Operating mode
Fault
Fire Alarm

STATUS INFO MENU

This menu (read-only) shows extensive status information about the detector.



1) Warm Up (Y/N) Device is in the power-up time delay (warm-up) mode.

2) Fire (Y/N) Indicates “Y” if the device is in a fire alarm status — analog output is at 20 mA, fire alarm relay is actuated, and LED is red.

3) UV Alarm (Y/N) Indicates "Y" if the UV detector is signaling an alarm.

4) UV Pre Alarm (Y/N) Indicates "Y" if the UV detector is in a pre-alarm state. .

5) Auto UV oi Flt (Y/N) Automatic UV oi Fault. Check viewing window and oi reflector plate for cleanliness.

6) Manual oi at Start (Y/N) Manual oi at start. On power-up a manual oi was started. Check the external input wiring.

7) Sensor Hdwr. Fault (Y/N) Sensor hardware fault.

8) HIB Hardware Flt (Y/N) HART Interface Board hardware fault.

9) Internal Com. Flt (Y/N) Internal communication fault.

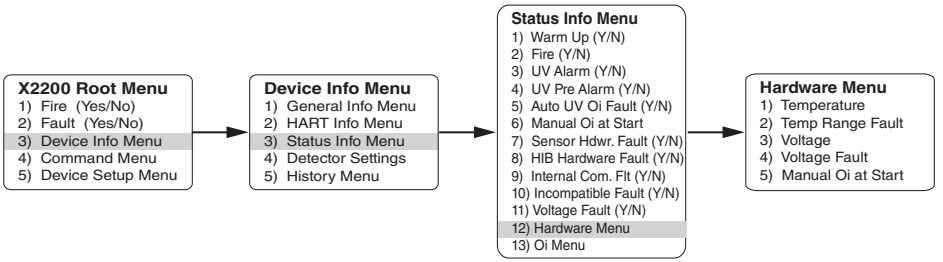
10) Incompatible Fault (Y/N) Sensor module firmware version is not compatible with HART Interface Board.

11) Voltage Fault (Y/N) Detector operating voltage is out of tolerance.

12) Hardware Menu Refer to sub-menu.

13) oi Menu Refer to sub-menu.

HARDWARE MENU



1) Temperature Actual integral temperature of detector.

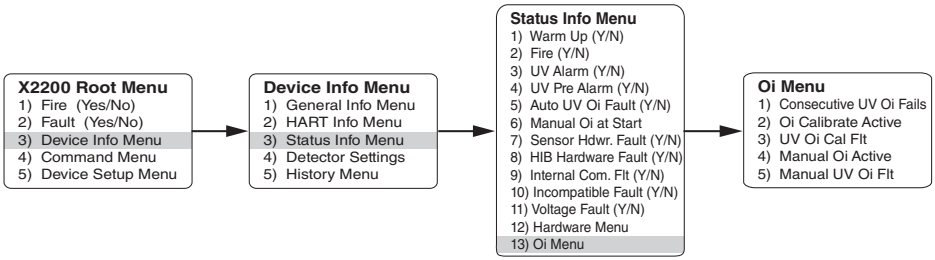
2) Temp Range Fault Detector integral temperature out of range — Operating range: –40°F to +167°F (–40°C to +75°C).

3) Voltage Actual detector supply voltage must be 18 to 30 Vdc.

4) Voltage Fault Supply voltage is out of range. Operating voltage must be 18 to 30 Vdc.

5) Manual oi at Start Manual oi at start. On power-up a manual oi was started. Check the external input wiring.

Oi MENU



1) Consecutive UV oi Fails Allowable number of consecutive UV oi failures to produce a fault. Factory set to three (minutes). This is the time between fault occurrence and annunciation

2) oi Calibrate Active oi calibration is in progress.

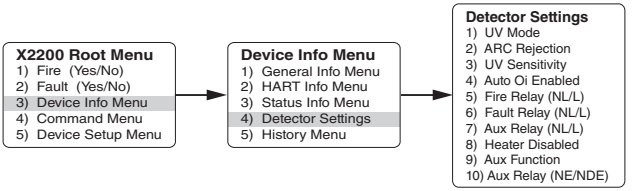
3) UV oi Cal Flt UV oi calibration has detected a fault condition.

4) Manual oi Active A manual oi test is in progress.

5) Manual UV oi Flt Manual UV oi fault. Check UV viewing window and oi reflector plate cleanliness.

DETECTOR SETTINGS

This menu shows factory settings relating to relay operation, detector sensitivity, and response.



1) UV Mode — UV Mode: Standard or Arc.

2) Arc Rejection — Detector ARC Rejection setting: Low, Medium, High, or Very High.

3) UV Sensitivity — Detector UV sensitivity setting: Low, Medium, High, or Very High.

4) Auto oi Enabled — Auto oi enabled. If (Y) an oi test will be conducted periodically without manual input.

5) Fire Relay (NL/L) — Fire Relay: Latching (L) or Non-Latching (NL).

6) Fault Relay (NL/L) — Fault Relay: Latching (L) or Non-Latching (NL).

7) Aux Relay (NL/L) — Aux Relay: Latching (L) or Non-Latching (NL).

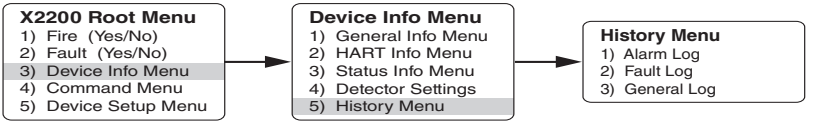
8) Heater Disabled — Heater disabled. If (Y) the optics heater is not enabled to prevent condensation and icing.

9) Aux Function — Aux function: Pre Alarm or UV Alarm.

10) Aux Relay (NE/NDE) — Aux Relay: Normally Energized (NE) or Normally De-Energized (NDE)

HISTORY MENU

This menu provides historical information about the detector. Up to 32 events in each of the three categories will be kept in non-volatile memory. When the log is full, the oldest event will be overwritten. The most recent event will be displayed first.



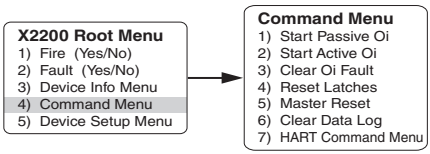
1) Alarm Log — Scroll through 32 Alarm Logs with time, date, and temperature stamp.

2) Fault Log — Scroll through 32 Fault Logs with time, date, and temperature stamp.

3) General Log — Scroll through 32 General Logs with time, date, and temperature stamp.

COMMAND MENU

The Command Menu allows the operator to initiate a manual oi test and also to perform various reset/clear functions.



1) Start Passive oi

A passive oi test command checks the cleanliness of the detector's optical surfaces. This calibrated oi test confirms the ability of the detector to respond correctly to an IR signal. Fire and fault relays as well as 0–20 mA current loop output are unaffected by this test. A red LED signals a successful test, and an amber LED signals a failed test. The general log will indicate either "Man oi Pass" or "Man oi Flt."

2) Start Active oi

⚠CAUTION

An active oi *test generates an actual Fire Alarm Output. All fire response equipment must be bypassed/disabled prior to testing to prevent unwanted output actuation.*

An active oi test performs an oi test with all detector outputs fully operational. Fire and fault relays as well as the 0–20 mA loop are "live."

If the test is successful:
Fire relay = Alarm
Fault relay = no fault
Current output is 20 mA
LED turns red
General log indicates "Man oi Pass"
Alarm log indicates "Fire Alarm"

If the test is unsuccessful:
Fire relay = No Alarm
Fault relay = Fault
Current output is 2 mA
LED turns yellow
Fault log indicates "Man oi Flt"

3) Clear oi Fault

If the cause of the fault has not been corrected, subsequent oi faults will occur.

4) Reset Latches

Latching relays are reset and LED turns green.

5) Master Reset

This function re-initializes the microprocessor, resets the operating software, and initiates a hardware reset for both the sensor and the HART interface. Latched relays are reset.

6) Clear Data Log

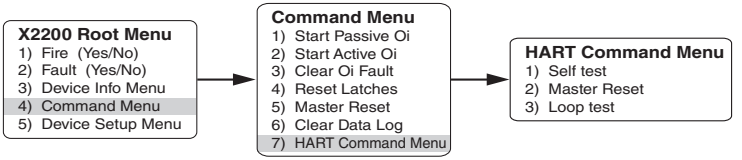
This function resets the HART data log history. To view the logs, go to "Device Info Menu" and select "History Menu."

7) HART Command Menu

This menu performs various diagnostic and/or service functions.

HART COMMAND MENU

The HART Command Menu allows the operator to perform diagnostic and service functions as follows:



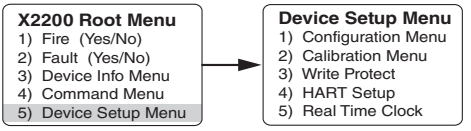
1) Self test Internal tests are performed and any detected problems are reported in “Status Info.” If successful, indication will be "No Device Info on Self Test."

2) Master Reset This function re-initializes the microprocessor, resets the operating software, and initiates a hardware reset for both the sensor and the HART interface. Latched relays are reset.

3) Loop test This test allows the operator to manually set the analog signal output at 1, 2, 3, or between 4 and 20 mA in increments of 2 (4, 6, 8, etc.). When the loop test is completed, ensure that the current loop is returned to automatic operation.

DEVICE SETUP MENU

This menu allows various setup, configuration, and calibration functions. When Write Protect is off, these menus allow the operator to reconfigure or write new variables to the device.



1) Configuration Menu

2) Calibration Menu

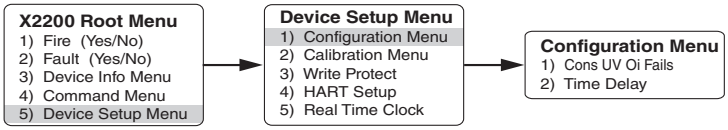
3) Write Protect

4) HART Setup

5) Real Time Clock

Refer to the appropriate sub-menus for details.

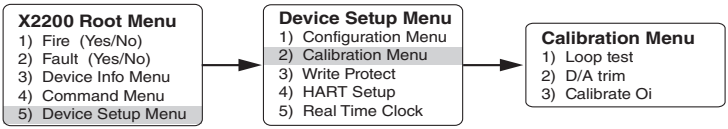
CONFIGURATION MENU



1) Cons UV o_i Fails Allowable number of consecutive UV o_i failures to produce a fault. Factory set to three (minutes). This is the time between fault occurrence and annunciation.

2) Time Delay Time Delay before alarm is indicated (0 to 15 seconds). Factory default is zero seconds.
Important: In addition to lengthening the time period between the outbreak of a fire and the fire alarm, a time delay can also affect sensitivity. Consult the factory for guidance before setting a time delay over five seconds.
Note: FM Approval covers the detector's performance with zero time delay only.

CALIBRATION MENU



1) Loop test This test allows the operator to manually set the analog signal output at 1, 2, 3, or between 4 and 20 mA in increments of 2 (4, 6, 8, etc.). When the loop test is completed, ensure that the current loop is returned to automatic operation.

2) D/A trim This function allows adjustment of the 0–20 mA span factor.

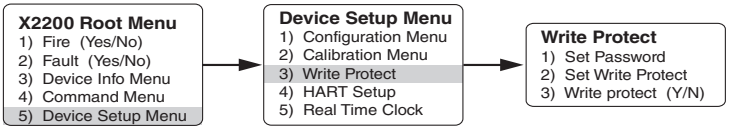
NOTE
Trim in increments of 0.1 mA resolution only.

3) Calibrate o_i This procedure calibrates the o_i test signal for the UV sensor.

1. Bypass/disable all Alarm outputs connected to the detector.
2. Thoroughly clean the sensor and o_i reflector for the UV sensor. Check the o_i source openings for contaminants and clean as needed.
3. Cover the detector with the provided cover.
4. Initiate o_i Calibration. The detector performs the calibration automatically and notifies the operator upon completion. The procedure takes approximately two minutes.
5. Upon completion of o_i calibration, remove the cover and return all alarm outputs to service.

WRITE PROTECT

This function enables the operator to enable/disable password and write protection capability, as well as to enter or change a password. The device is provided from the factory with Write Protect off. With Write Protect on, the use of a password is required to enable writing to the device.



1) Set Password The password is used to validate the command to enable or disable writes in the device. (The factory default password is: 1*******. Once the password has been changed, the default password is no longer valid.)

To change the password:

1. Select "Set Password" and enter the password. Hit "Send."
2. If enabled, disable Write Protect. Hit "Send."
3. Select "Set Password" and enter a new password. Do not hit "Send" yet.
4. From within the "Set Write Protect" menu, select "Change Password." Hit "Send."

⚠CAUTION

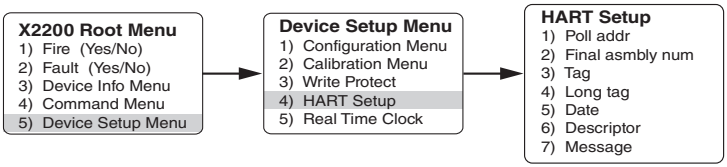
Always record the new password. If the password is forgotten, the device must be returned to the factory for re-programming.

2) Set Write Protect With Write Protect enabled, variables cannot be written to the device and commands that cause actions to be performed in the device cannot occur.

3) Write protect (Y/N) This indicates whether or not Write Protect is enabled.

HART SETUP

This menu allows editing of the following functions:



1) Poll addr Address used by the host device to identify a field device. Note that if it is set to an address other than "0," the Detector will output 1 mA.

2) Final asmbly num A number that is used for identification purposes and is associated with the overall field device.

3) Tag Text that is associated with the field device installation. This text can be used by the operator in any way. Max of eight character input.

4) Long tag Text that is associated with the field device installation. This text can be used by the operator in any way. Max of 32 character input.

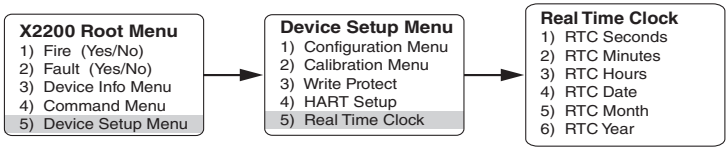
5) Date Any date chosen by the operator to be used for any purpose. XX/XX/XXXX (month/day/year).

6) Descriptor Text associated with the field device that can be used by the operator in any way.

7) Message Text associated with the field device that can be used by the operator in any way.

REAL TIME CLOCK

To set the real time clock, enter the current time and date information into the appropriate fields.



1) RTC Seconds 0 to 59

2) RTC Minutes 0 to 59

3) RTC Hours 0 to 23

4) RTC Date 1 to 31

5) RTC Month 1 to 12

6) RTC Year 0 to 99

95-8638

FlexSonic® Acoustic Leak Detector

X3301 Multispectrum IR Flame Detector

PointWatch Eclipse® IR Combustible Gas Detector

FlexVu® Universal Display with GT3000 Toxic Gas Detector

Eagle Quantum Premier® Safety System

Carrier

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