



Instructions

AutroVu Explosion-Proof Universal Display Unit AV10



COPYRIGHT ©

This publication, or parts thereof, may not be reproduced in any form, by any method, for any purpose.

Autronica Fire and Security AS and its subsidiaries assume no responsibility for any errors that may appear in the publication, or for damages arising from the information in it. No information in this publication should be regarded as a warranty made by Autronica Fire and Security. The information in this publication may be updated without notice.

Product names mentioned in this publication may be trademarks. They are used only for identification.



Table of Contents

APPLICATION.....	1	Calibration.....	G-3
DESCRIPTION.....	1	Menu Structure.....	G-4
HART Communication.....	3	APPENDIX H – AV10 WITH PIR9400.....	H-1
Magnetic Switches.....	3	Wiring.....	H-1
Relays.....	4	Installation Notes.....	H-2
4-20 mA Output Modes.....	4	Orientation.....	H-2
MODBUS / Fieldbus Compatibility.....	4	Changing Operating Modes.....	H-3
Device Enclosure.....	4	Calibration.....	H-3
Device Display.....	4	Menu Structure.....	H-4
Logging.....	5	APPENDIX I – AV10 WITH HC200.....	I-1
IMPORTANT SAFETY NOTES.....	5	Wiring.....	I-1
INSTALLATION.....	6	Orientation.....	I-2
Identification Of Vapor(S) To Be Detected.....	6	Calibration.....	I-3
Identification Of Detector Mounting Locations.....	6	Menu Structure.....	I-4
WIRING.....	7	APPENDIX J – AV10 WITH HC600.....	J-1
Power Supply Requirements.....	7	Wiring.....	J-1
Wiring Cable Requirements.....	7	Orientation.....	J-3
Shield Connections.....	7	Calibration.....	J-3
Jumper Setting For 4-20 mA Loop.....	7	HC600 Transmitter Lamp Fault Condition.....	J-4
Foundation Fieldbus (Optional).....	7	Menu Structure.....	J-4
Wiring Procedure.....	8	APPENDIX K – AV10 WITH NTMOS.....	K-1
STARTUP.....	12	Wiring.....	K-1
Troubleshooting.....	16	Installation Notes.....	K-1
SPECIFICATIONS.....	19	Orientation.....	K-4
DEVICE REPAIR AND RETURN.....	22	Calibration.....	K-4
ORDERING INFORMATION.....	22	Menu Structure.....	K-5
APPENDIX A – FM APPROVAL.....	A-1	APPENDIX L – AV10 WITH C706X.....	L-1
APPENDIX B – CSA CERTIFICATION.....	B-1	Wiring.....	L-1
APPENDIX C – ATEX APPROVAL.....	C-1	Installation.....	L-3
APPENDIX D – IECEX APPROVAL.....	D-1	Calibration.....	L-4
APPENDIX E – ADDITIONAL APPROVALS.....	E-1	Menu Structure.....	L-4
APPENDIX F – AV10 WITH HANDHELD HART COMMUNICATOR.....	F-1	APPENDIX M – AV10 WITH MODEL CGS.....	M-1
Wiring.....	F-1	Wiring.....	M-1
Menu Structure.....	F-1	Important Notes.....	M-1
APPENDIX G – AV10 WITH GT3000.....	G-1	Installation.....	M-3
Wiring.....	G-1	Calibration.....	M-3
Orientation.....	G-2	K Factor.....	M-4
Live Maintenance.....	G-2	Menu Structure.....	M-4
		APPENDIX N – AV10 WITH GENERIC 4-20 MA SENSORS.....	N-1
		Operation.....	N-1
		Menu Structure.....	N-1

INSTRUCTIONS

AutoVu Explosion-Proof Universal Display Unit Model AV10

IMPORTANT

Be sure to read and understand the entire instruction manual before installing or operating the gas detection system. This product can be used with a variety of Autronica gas detectors to provide early warning of the presence of a toxic or explosive gas mixture. Proper device installation, operation, and maintenance is required to ensure safe and effective operation. If this equipment is used in a manner not specified in this manual, safety protection may be impaired.

APPLICATION

The AutoVu Model AV10 is recommended for applications that require a gas detector with digital readout of detected gas levels as well as analog 4-20 mA output with HART, relay contacts, and MODBUS RS485 (FOUNDATION™ Fieldbus option available). The AV10 Universal Display Unit is designed for use with Autronica gas detectors listed in Table 1.

The display unit is designed and approved as a 'stand alone' device and performs all the functions of a gas controller.

When furnished with the CGS interface board, the device can be used only with a CGS sensor for detection of combustible gas. The AV10/CGS combination is certified as a "Gas Detector".

Gas concentration and unit of measurement are displayed on a digital display. The display unit provides a linear isolated/non-isolated 4-20 mA DC output signal (with HART) that corresponds to the detected gas concentration.

All electronics are enclosed in an explosion-proof aluminum or stainless steel housing. The display unit is used with a single detector that may be either coupled directly to the AV10, or remotely located using a sensor termination box.

The AV10 features non-intrusive calibration. A magnet is used to perform calibration as well as to navigate the AV10's internal menu.



DESCRIPTION

The AV10 Universal Display can be used with various 4-20 mA gas detection devices, with or without HART. The unit provides display, output and control capabilities for the gas detector.

The AV10 utilizes the following I/O:

Signal Inputs: 4-20 mA loop from the sensing device

User Inputs: Magnetic switches (4) on the display panel
HART communication (handheld field communicator or AMS)
FOUNDATION™ Fieldbus (if selected)

Signal Outputs: 4-20 mA output loop with HART
MODBUS RS485 or foundation™ Fieldbus
Three alarm relays and one fault relay

Visible Outputs: Backlit LCD display
HART slave interface via HART Communicator

Table 1—Range and Default Values for Alarms and Calibration Gas Concentration

AV10 ALARM DATA					CALIBRATION
Gas Detector		High Alarm Value	Low Alarm Value	Aux alarm Value	Cal Gas
GT3000--Hydrogen Sulfide	Range	10-90%	5-50%	5-90%	30-90%
	Default	40%	10%	40%	50%
GT3000--Ammonia	Range	10-90%	5-50%	5-90%	30-90%
	Default	40%	10%	40%	50%
GT3000--Chlorine	Range	10-90%	5-50%	5-90%	30-90%
	Default	40%	10%	40%	50%
GT3000--Hydrogen	Range	10-60%	5-50%	5-90%	30-90%
	Default	40%	10%	40%	50%
GT3000--Oxygen	Range	5-20.5% v/v	5-20.5% v/v	5-20.5% v/v	20.9% v/v
	Default	18% v/v	18% v/v	18% v/v	20.9% v/v
GT3000--Carbon Monoxide	Range	10-90%	5-50%	5-90%	30-90%
	Default	40%	10%	40%	50%
GT3000--Sulfur Dioxide	Range	10-90%	5-50%	5-90%	30-90%
	Default	40%	10%	40%	50%
PIR9400	Range	10-60%	5-50%	5-90%	50%
	Default	40%	10%	40%	50%
HC200	Range	10-60%	5-50%	5-90%	30-90%
	Default	40%	10%	40%	50%
HC600	Range	1-3 LFL-meters	0.25-3 LFL-meters	NA	NA
	Default	2 LFL-meters	1 LFL-meter	NA	NA
C706x*	Range	10-90%	5-50%	5-90%	30-90%
	Default	40%	10%	40%	50%
CGS Combustible	Range	10-60%	5-50%	5-90%	50%
	Default	40%	10%	40%	50%
NTMOS--Hydrogen Sulfide	Range	10-90%	5-50%	5-90%	50%
	Default	40%	10%	40%	50%
Generic Detector	Range	10-90%	5-50%	5-90%	N/A
	Default	40%	10%	40%	50%

Notes: All values are a percentage of full scale with the exception of Oxygen, which is the actual percent of Oxygen, and HC600, which is the value in LFL-meters.

Low alarm must be less than or equal to the high alarm.

Changing the Measurement Range will reset all alarm and Cal Gas values to the default settings for the selected range.

Alarm relays are selectable for either normally energized or normally de-energized coils, with selectable latching or non-latching contacts. Fault relay is normally energized (with no faults).

*Does not support O₂, but includes C7064C and C7064E hydrogen sulfide, C7067E chlorine, C7066E carbon monoxide, and C7068E sulfur dioxide.

HART COMMUNICATION

A HART interface provides device status information and field programming capability.

MAGNETIC SWITCHES

Four internal magnetic switches provide a non-intrusive user interface that allows navigation through the menu and adjustment of configuration parameters in the field without the use of a HART handheld device. See Figure 1 for switch locations.

These switches are used for device configuration, checking status

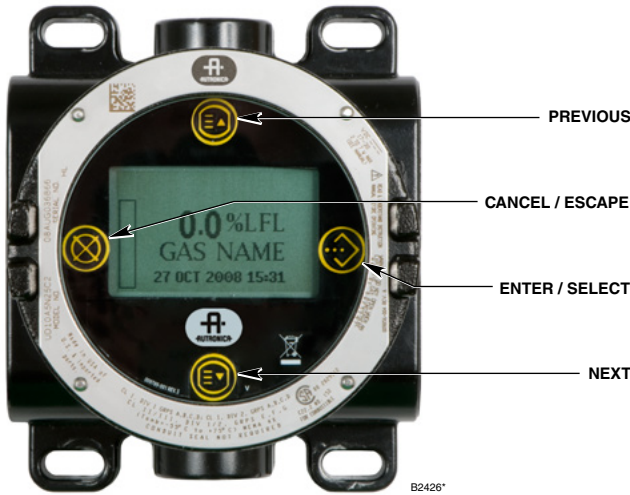


Figure 1—Faceplate of AV10

and event logs, and performing calibration. The switches are labeled as follows:



To actuate a magnetic switch, lightly touch the magnet to the viewing window of the AV10 directly over the switch icon on the faceplate.

CAUTION

Handle magnets with care! Personnel wearing pacemakers/defibrillators should not handle magnets. Modern magnet materials are extremely strong magnetically and somewhat weak mechanically. Injury is possible to personnel, and magnets themselves can easily get damaged if allowed to snap towards each other, or if nearby metal objects are allowed to be attracted to the magnets.

NOTE

Autronica offers two magnet options for activating internal magnetic switches. While the two magnets can usually be used interchangeably, the best results will be achieved if they are used as follows: The Magnetic Tool (p/n 116-009700-001) is the stronger magnet and is recommended for activating the switches on the AV10 viewing window. The Calibration Magnet (p/n 116-102740-002) is recommended for applications that involve initiating calibration or resetting the detector by touching the side of a metal junction box or detector housing (HC200, HC600, etc). Throughout this manual, the term “magnet” can refer to either device.

Access To Menus

To access the menus, use the magnet to activate the ENTER/SELECT button. This will display the Main Menu.

The actual menu structure varies depending upon the device that is connected to the AV10. Menus for the various devices can be found in the corresponding Appendix in this manual.

Some areas of the menu contain additional information, which is indicated by the presence of an arrow on that particular line. By placing the magnet to the glass over the ENTER/SELECT button, the next screen with the additional information will be shown.

The AV10 automatically returns to the main screen after 10 minutes if no activity occurs.

Quick Access/Shortcut: Fault Menu

To access the fault menu quickly, when a fault is present, touch the magnet to the glass by the PREVIOUS button.

RELAYS

The display unit has 4 output relays — high alarm, low alarm, auxiliary alarm, and fault. The relays have form C (SPDT) contacts. Low, auxiliary and high alarm relay contacts are selectable for latching or non-latching operation, as well as normally energized or normally de-energized (default) coils. During normal operation, the fault relay is energized.

IMPORTANT

Direct connection of 120/240 VAC to the relay terminals inside the AV10 enclosure is not allowed, since switching relay contacts can induce electrical noise into the electronic circuitry, possibly resulting in a false alarm or other system malfunction. If the application requires that AC powered equipment be controlled by the transmitter, the use of externally located relays is recommended.

External relays, solenoids, motors, or other devices that can cause inductive transients should be transient suppressed. Place a diode across the coil for DC devices. See Figure 2.

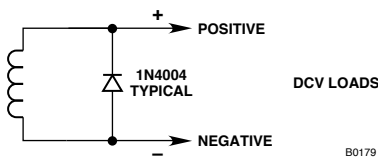


Figure 2—Transient Suppression for Inductive Loads

4-20 MA OUTPUT MODES

The AV10 offers two operating modes for its 4-20 mA output circuit.

NOTE

A minimum output of 1 mA is required for proper HART communication.

In the Standard (default) Mode, the linear 4-20 mA output corresponds to 0-100% full scale gas detected at the sensor, with 3.8 mA indicating calibrate mode, and 3.6 mA or lower indicating a fault condition. This mode ensures that the current level is always high enough to support HART communication and must be selected when using HART communication for fault diagnostics.

In Replicate Mode, the output of the AV10 matches the output of the connected detector (except for loop test/trim, response test, calibration, or if the AV10 has an internal fault). This mode can be used with detectors such as PIR9400 or HC200 where multiple current levels below 4 mA are used for fault diagnostic purposes.

AV10 with AutoPoint HC200

HC200 supports two fault modes: PIR9400 and HC200 (Eclipse) mode. PIR9400 fault mode uses fault codes below 1 mA, while HC200 (Eclipse) mode uses no levels below 1 mA. In the Standard (default) mode, the AV10 programs the HC200 for HC200 (Eclipse) fault mode to ensure proper HART communication in the event of a fault. In the Replicate mode, the AV10 programs the HC200 for PIR9400 fault mode.

MODBUS / FIELD BUS COMPATIBILITY

The AV10 supports RS485 MODBUS RTU communication. See Addendum number 95-8639 for details. A model with MODBUS RS485 or FOUNDATION™ Fieldbus communication (field selectable via jumpers) is also available.

DEVICE ENCLOSURE

The AV10 housing is a 5 port aluminum or stainless steel explosion-proof junction box with a clear viewing window.

DEVICE DISPLAY

The AV10 is provided with a 160 x 100 dot matrix backlit LCD display. See Figure 1.

During normal operation, the LCD continuously displays the detected gas level, gas type, and units of measurement. The real time clock can also be displayed if desired.

The display shows the following alarm information:

- High gas alarm
- Low gas alarm
- Aux alarm

The display indicates the following fault information:

- Device fault
- Display fault

The AV10 has smart capabilities to allow easy access to the following information:

- Detector information
- Measurement range
- Alarm setpoints
- Alarm and event logs

For detailed HART menu structure, refer to the appropriate Appendix.

LOGGING

Events that can be logged in the AV10 include:

- Calibration (Date, time and success Y/N are logged for detectors that do not provide their own calibration logging capabilities.)

Faults that are logged in the AV10 include:

- Detector fault
- Low power
- General fault

Alarms that are logged in the AV10 for gas detector inputs include:

- High gas alarm
- Low gas alarm
- Aux alarm.

The AV10 has its own battery backed real time clock (RTC) and its own event logs. The RTC in the AV10 can be set from the AV10 display, MODBUS or HART interfaces. The RTC in the gas detector (any HART detector having an RTC) can be set independently using the AV10 menu, or by using the synchronize command, which will set the detector RTC to the same time as the AV10 RTC. See Figure 3.

The AV10 can display the detector event and calibration logs (if available). The AV10 has its own 1,000-entry event log available under the Display Status->History->Event Log menu.

AV10 event logs can be read from the HART interface or the MODBUS interface.

Detector calibration and event logs can also be read from the detector HART interface (where available).

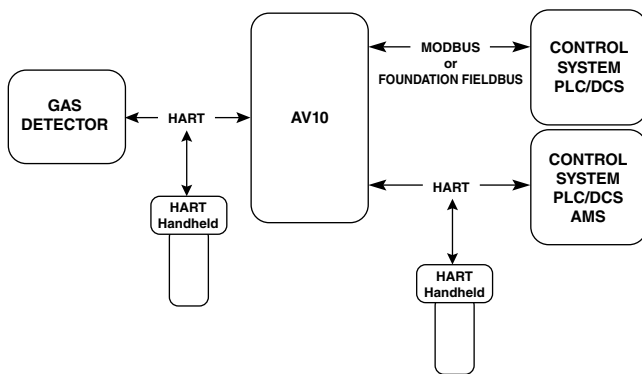


Figure 3—AV10 Logging

IMPORTANT SAFETY NOTES

CAUTION

The wiring procedures in this manual are intended to ensure proper functioning of the device under normal conditions. However, because of the many variations in wiring codes and regulations, total compliance to these ordinances cannot be guaranteed. Be certain that all wiring complies with the NEC as well as all local codes. If in doubt, consult the authority having jurisdiction before wiring the system. Installation must be done by a properly trained person.

CAUTION

This product has been tested and approved for use in hazardous areas. However, it must be properly installed and used only under the conditions specified within this manual and the specific approval certificates. Any device modification, improper installation, or use in a faulty or incomplete configuration will render warranty and product certifications invalid.

CAUTION

The device contains no user serviceable components. Service or repair should never be attempted by the user. Device repair should be performed only by the manufacturer.

LIABILITIES

The manufacturer's warranty for this product is void, and all liability for proper function of the detector is irrevocably transferred to the owner or operator in the event that the device is serviced or repaired by personnel not employed or authorized by Detector Electronics Corporation, or if the device is used in a manner not conforming to its intended use.

CAUTION

Observe precautions for handling electrostatic sensitive devices.

CAUTION

Unused conduit entries must be closed with suitably certified blanking elements upon installation.

INSTALLATION

NOTE

The gas detector housing must be electrically connected to earth ground. A dedicated earth ground terminal is provided on the AV10.

NOTE

Refer to the Model AV10 Safety Manual (number 116-P-AV10/SAFETY/IGB) for specific requirements and recommendations applicable to the proper installation, operation, and maintenance of SIL Certified Model AV10 displays.

The detector must always be installed per local installation codes.

Before installing the gas detector, define the following application details:

IDENTIFICATION OF VAPOR(S) TO BE DETECTED

It is necessary to identify the vapor(s) of interest at the job site. The fire hazard properties of the vapor, such as vapor density, flashpoint, and vapor pressure should be identified and used to assist in selecting the optimum detector mounting location within the area.

For cross sensitivity information, refer to each gas detector's corresponding instruction manual. Refer to Table 5 in the Specifications section for a list of gas detectors and their corresponding instruction manuals.

IDENTIFICATION OF DETECTOR MOUNTING LOCATIONS

Identification of the most likely leak sources and leak accumulation areas is typically the first step in identifying the best detector mounting locations. In addition, identification of air current/wind patterns within the protected area is useful in predicting gas leak dispersion behavior. This information should be used to identify optimum detector installation points.

If the vapor of interest is lighter than air, place the detector above the potential gas leak. Place the detector close to the floor for gases that are heavier than air. Note that air currents may cause a gas that is slightly heavier than air to rise under some conditions. Heated gases may also exhibit the same phenomenon.

The most effective number and placement of detectors varies depending on the conditions on site. The individual designing the installation must often rely on experience and common sense to determine the detector quantity and best locations to adequately protect the area. Note that it is typically advantageous to locate detectors where they are accessible for maintenance. Locations near excessive heat or vibration sources should be avoided.

Final suitability of possible gas detector locations should be verified by a job site survey.

The gas detector must be mounted with the sensor in the correct orientation as shown in Table 2.

If the AV10 faceplate is not correctly oriented, it can be rotated at 90 degree increments by pulling the electronic module from the four mounting posts that secure it to the junction box and repositioning it as desired. Note that the module is held in place by a compression fitting – no screws are involved.

Table 2—Device Orientation

Device	Orientation
GT3000	Vertical with Sensor Pointing Down
PIR9400	Horizontal
HC200	Horizontal
HC600	Horizontal (Fixed to a vertical post)
CGS	Vertical with Sensor Pointing Down
C706X	Vertical with Sensor Pointing Down
NTMOS	Vertical with Sensor Pointing Down

WIRING

POWER SUPPLY REQUIREMENTS

Calculate the total gas detection system power consumption rate in watts from cold start-up. Select a power supply with adequate capability for the calculated load. Ensure that the selected power supply provides regulated and filtered 24 Vdc output power for the entire system. If a back-up power system is required, a float-type battery charging system is recommended. If an existing source of 24 Vdc power is being utilized, verify that system requirements are met. The acceptable voltage range is 18-30 Vdc measured at the input to the AV10.

NOTE

The power supply must meet the noise requirements for HART systems. If noise or ripple on the main power source could interfere with the HART function, an isolated power source (Figure 11) is recommended. (For detailed information regarding power supply specifications, refer to the HART Communication Foundation's document "FSK Physical Layer Specification" HCF_SPEC-54.)

WIRING CABLE REQUIREMENTS

Always use proper cabling type and diameter for input power as well as output signal wiring. 14 to 18 AWG shielded stranded copper wire is recommended. Correct wire size depends on the device and wire length. Refer to the appropriate Appendix for additional information. The maximum cable length from power source to AV10 is 2000 feet. Maximum cable length from AV10 to sensor is 2000 feet.

NOTE

The use of shielded cable in conduit or shielded armored cable is highly recommended. In applications where the wiring is installed in conduit, dedicated conduit is recommended. Avoid low frequency, high voltage, and non-signaling conductors to prevent nuisance EMI problems.

CAUTION

The use of proper conduit installation techniques, breathers, glands, and seals is required to prevent water ingress and/or maintain the explosion-proof rating.

SHIELD CONNECTIONS

The AV10 provides terminals for proper grounding of wiring cable shields (located on the sensor, 4-20 mA, and operating power terminal blocks). These shield terminals are not connected internally, but are connected to ground through capacitors. The capacitors ensure an RF ground, while preventing 50/60 Hz ground loops.

Ground all shields as shown in the wiring examples throughout this manual.

IMPORTANT

For proper grounding, all junction boxes / metal enclosures must be connected to earth ground.

The following are required for installations requiring CE Mark compliance:

- For shielded cable installed in conduit, attach the wire shields to the "shield" connections on the terminal blocks, or to earth ground on the case.
- For installations without conduit, use double shielded cable. Terminate the outer shield to earth ground on the case. Terminate the inner shield to the "shield" connection on the terminal blocks.

JUMPER SETTING FOR 4-20 MA LOOP

In order for the 4-20 mA current loop to operate properly, +24 Vdc must be applied to terminal P1-3. This can be accomplished in one of two ways:

- For a non-isolated 4-20 mA loop, set jumper plug as shown in Figure 4. This applies +24 Vdc to P1-3 via an internal connection to terminals P2-2 and P2-5.
- If the 4-20 mA loop will receive power from a source other than the AV10's main power source (isolated), set the jumper plug as shown in Figure 5 to remove the internal connection.

FOUNDATION FIELDBUS (Optional)

Some AV10 models allow the use of either RS485/MODBUS or Foundation Fieldbus communication via connection to J2 on the terminal board. Four jumpers are provided to select between the two protocols. If the device is equipped for Foundation Fieldbus, it will be shipped from the factory with the jumpers preset for that mode. If the user wants to switch to RS485/MODBUS (for example, to retrieve logs), the four jumpers can easily be moved. Figures 6 and 7 show the jumper settings for each mode of communication.

Note that the pin identification for the J2 connector is different for each communication protocol. For Foundation Fieldbus it is "- +". For RS485/MODBUS it is "B A com".

WIRING PROCEDURE

NOTE

The following section shows the output of the AV10 wired to a generic 4-20 mA signal receiver in various configurations. Since the AV10 can be used with a variety of different detection devices, information that is specific to each detector model (wiring, calibration, HART menus, etc.) is covered in an Appendix that is dedicated to that device. Refer to the appropriate Appendix at the back of this manual for specific information when wiring the detection system. For information on devices not covered in an Appendix, refer to the manual provided by the device's manufacturer.

Figure 4 shows jumper plug P12 positioned to power the 4-20 mA loop from the main power source (non-isolated output).

Figure 5 shows jumper plug P12 positioned for powering the 4-20 mA loop from an external wire/jumper or from a separate power source (isolated output).

Figure 6 shows the correct jumper positions and J2 terminal identification for using Foundation Fieldbus communication.

Figure 7 shows the correct jumper positions and J2 terminal identification for using MODBUS communication.

Refer to Figure 8 for an illustration of the AV10 wiring terminal board (see Figure 6 for Foundation Fieldbus connections).

Figure 9 shows a AV10 Wired to a PLC using 3-Wire Shielded Cable with a 4-20 mA Non-Isolated Sourcing Output.

Figure 10 shows a AV10 Wired to a PLC using 4-Wire Shielded Cable with a 4-20 mA Non-Isolated Sourcing Output.

Figure 11 shows a AV10 Wired to a PLC with a 4-20 mA Isolated Sourcing Output.

GREASE/LUBRICATION

To ease installation and future removal, ensure that all junction box covers and sensor threads are properly lubricated. If the need arises for additional lubrication, use either Lubriplate grease (see Ordering Information for part number) or Teflon tape. Avoid the use of silicone grease.

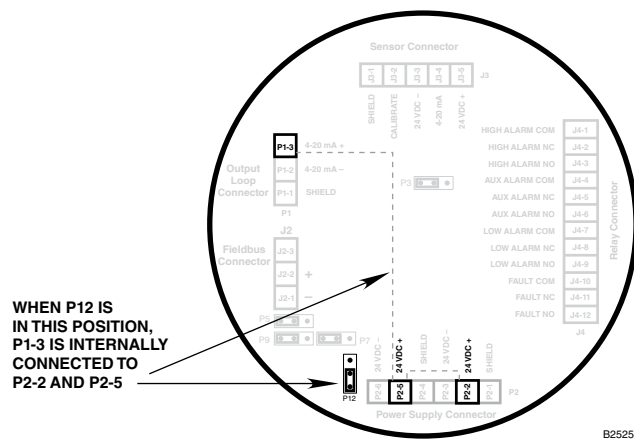


Figure 4—Position of Jumper P12 for Non-Isolated 4-20 mA Loop Output

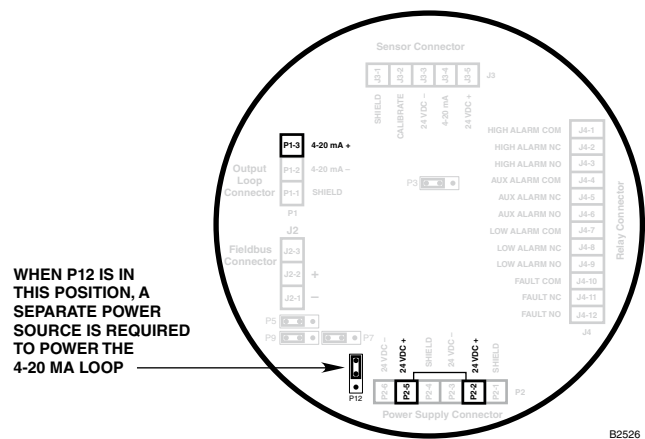
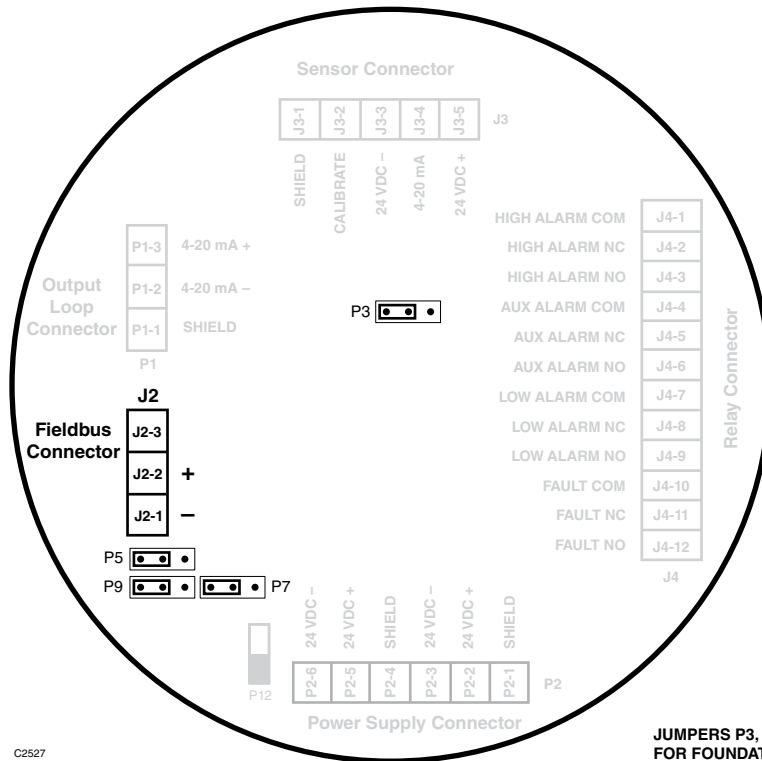


Figure 5—Position of Jumper P12 for Isolated 4-20 mA Loop Output

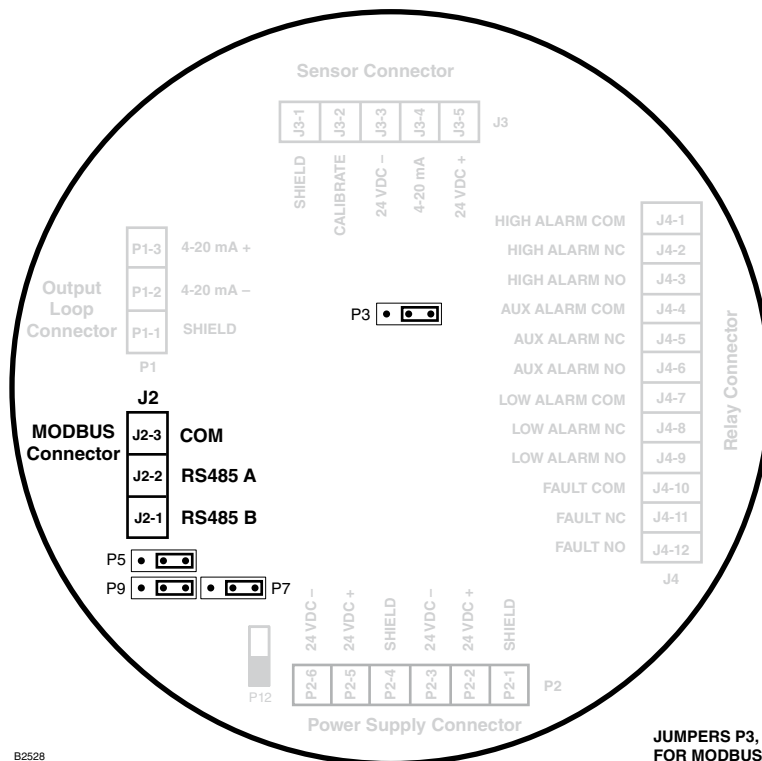


NOTE: FOUNDATION FIELDBUS IS AVAILABLE ON SELECT MODELS. REFER TO THE MODEL MATRIX IN THE ORDERING INFORMATION SECTION FOR DETAILS.

JUMPERS P3, P5, P7, AND P9 MUST BE POSITIONED AS SHOWN FOR FOUNDATION FIELDBUS COMMUNICATION

C2527

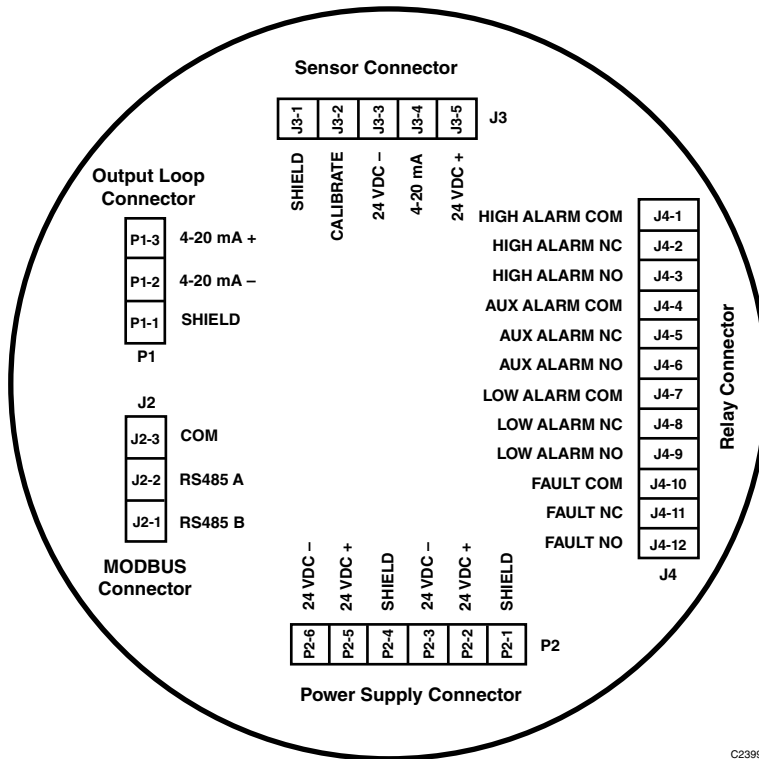
Figure 6—Foundation Fieldbus Communication



JUMPERS P3, P5, P7, AND P9 MUST BE POSITIONED AS SHOWN FOR MODBUS/RS485 COMMUNICATION

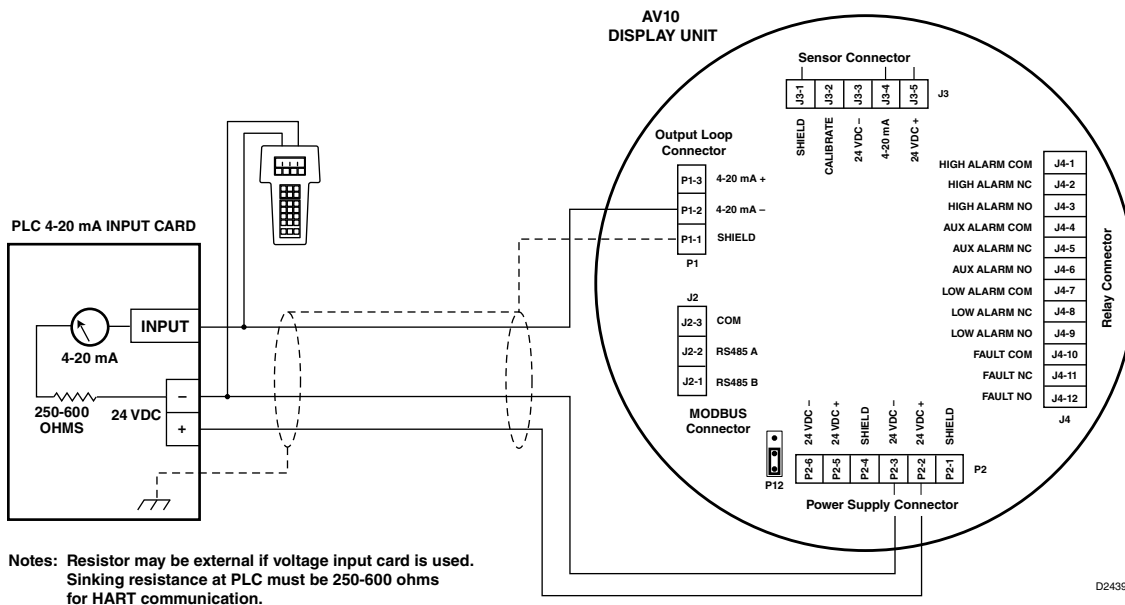
B2528

Figure 7—MODBUS Communication



C2399

Figure 8—Wiring Terminals on AV10 Terminal Board



D2439*

Figure 9—AV10 Wired to PLC using 3-Wire Shielded Cable with 4-20 mA Non-Isolated Sourcing Output

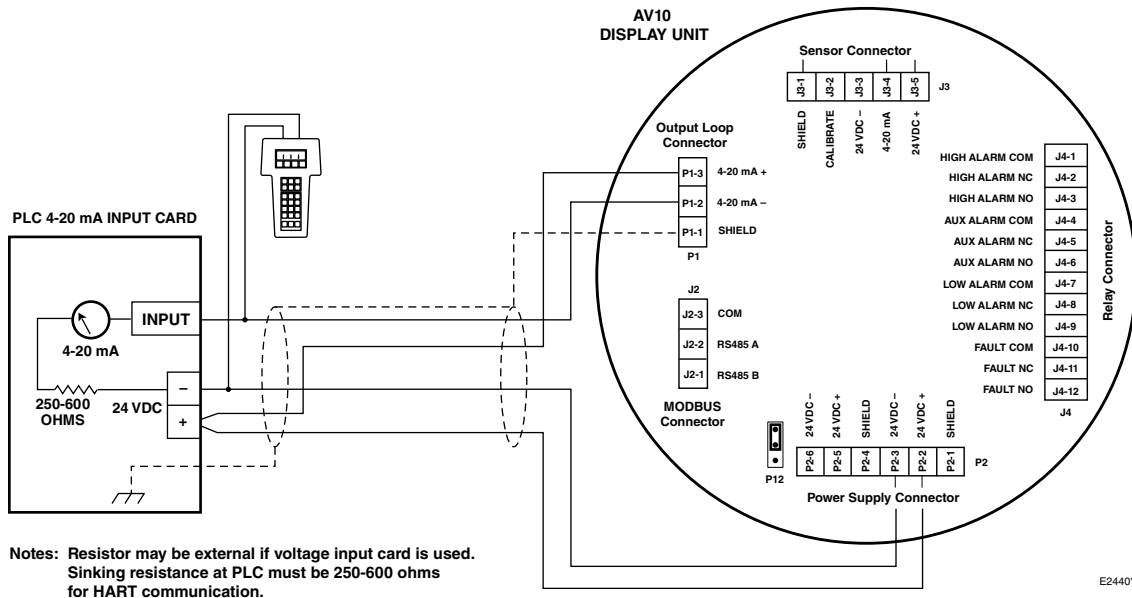


Figure 10—AV10 Wired to PLC using 4-Wire Shielded Cable with 4-20 mA Non-Isolated Sourcing Output

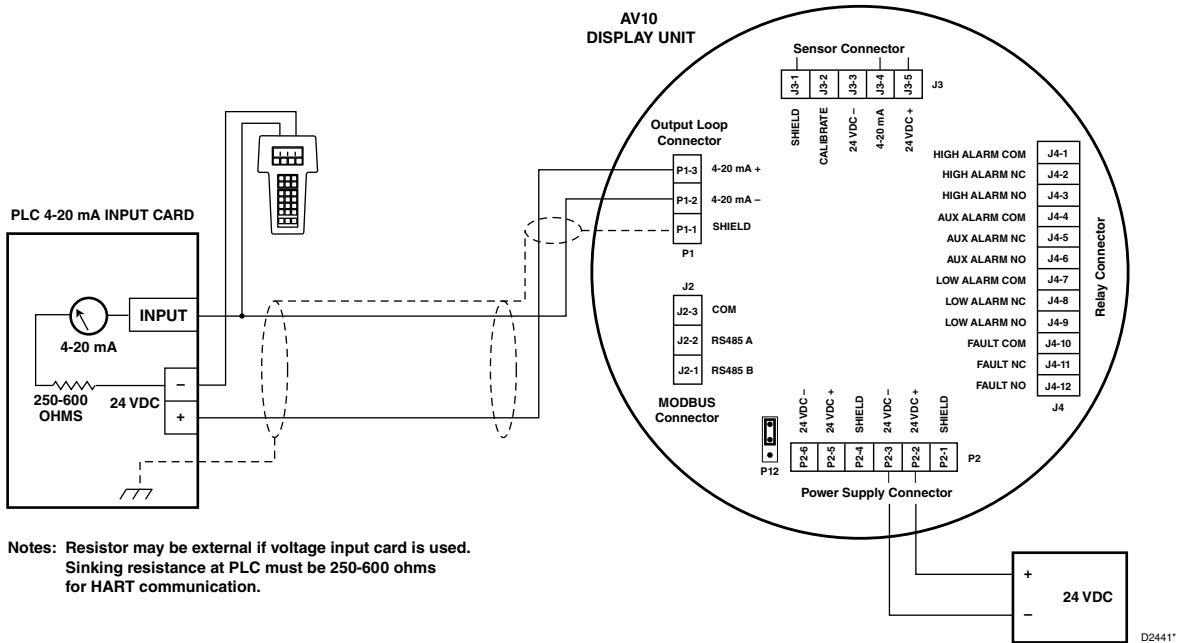


Figure 11—AV10 Wired to PLC with 4-20 mA Isolated Sourcing Output

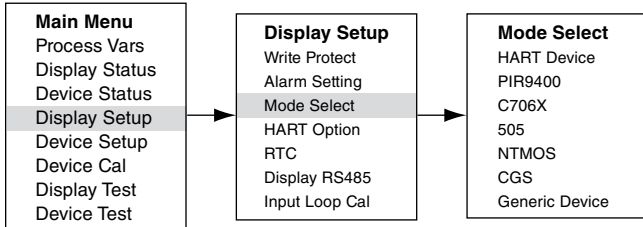
IMPORTANT

Isolated operation is highly recommended to prevent noise or ripple on the main power source from interfering with the HART function.

STARTUP

After power has been applied and the warm-up period is complete, select the AV10 operating mode. To do this:

1. Access the Main Menu by touching the magnet to the ENTER/SELECT button. From there, navigate to the "Mode Select" menu.



2. From the "Mode Select" menu, select and enter the appropriate operating mode based on the type of detector being used.

NOTE

If using a PIR9400, note that changing the gas type on the AV10 does not change the gas type at the PIR9400. This change is made using a switch located in the PIR9400. Refer to the PIR9400 instruction manual (95-8440) for details.

NOTE

If using a C706X detector, navigate to the "Device Setup" menu and select the appropriate gas type and unit of measurement.

3. To exit, activate CANCEL/ESCAPE three times to return to the main display screen.
4. If the detector is replaced with another detector type, the AV10 will not recognize it until the mode is changed.
5. If the AV10 Display is in PIR9400 mode and if:
 - a. The connection between PIR9400 and the AV10 is removed, the AV10 will show a FAULT on the Gas Screen. When the connection between PIR9400 and AV10 is restored, the AV10 will remove the FAULT indication when current increases beyond 3.6 mA.
 - b. Someone removes the PIR9400 & connects a HART enabled Gas Detector, it will not be recognized by the AV10 Display until the mode is changed to HART.

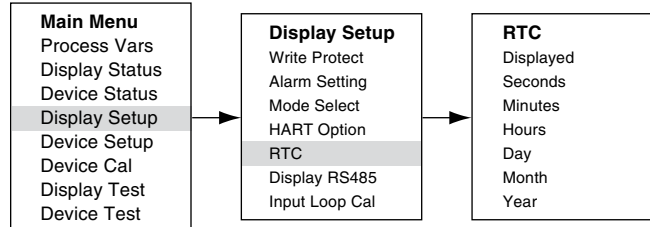
RTC

NOTE

The AV10 is set at the factory for US Central Standard time.

To display and set the Real Time Clock and Date for the AV10:

1. Using the magnet to activate the switches on the AV10 display, navigate to the RTC menu.



2. The first item on the RTC screen is "Displayed". Y (Yes) or N (NO) is shown to indicate whether the time and date will be displayed on the main screen. To change the setting, use the ENTER/SELECT button to go to the next screen, then use the PREVIOUS or NEXT buttons to toggle between Y and N. Once the chosen input is selected, use the ENTER/SELECT button to enter the selection. Use the CANCEL/ESCAPE button to exit without changing.

3. Use the same method to set time and date.

Specifically for the GT3000 Transmitter, the RTC for the transmitter can be synchronized to the RTC of the display by going through the Main Menu->Device Setup->RTC-> 1st slot "Sync W/Disp".

Latching Alarms

The high, auxiliary and low alarm relay settings are programmable and can be set for latching or non-latching operation. Alarm configuration can be done using the local display menu or external HART interface. Latched alarms on the display can be cleared through the Display Setup > Alarm Setting submenu using the magnet or external HART interface.

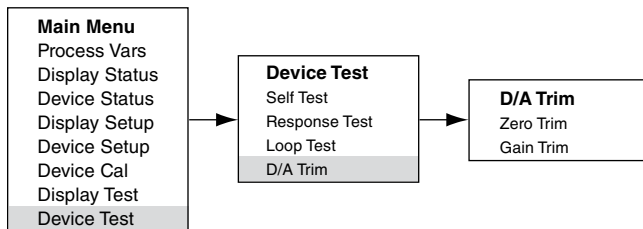
4-20 mA Loop Calibration

Both the input and output current loops of the AV10 are trimmed at the factory. They can also be trimmed in the field for maximum accuracy using the following procedures. If the detector connected to the AV10 is HART enabled, its 4-20 mA output signal can also be trimmed.

When the AV10 is used with a detector that supports HART communication, the output of the detector should be calibrated first.

HART Detector Signal Calibration

Navigate down the menu to Device Test > D/A (Digital to Analog) Trim.

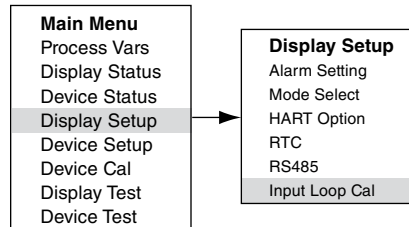


Select Zero Trim. When this screen is entered, a warning message is presented. Select ENTER to continue. When the message "Connect Reference Meter" is presented, install the current meter on the mA line between the detector and AV10. Select ENTER to continue. When the message "Set Input Current to 4mA?" is presented, select ENTER to begin the Zero Trim function. The detector will now set its 4 mA output value. If the value indicated on the current meter is not 4.00 mA, enter the measured value into the AV10 using the Previous and Next switches. The AV10 calculates and corrects for the difference between the actual and entered values. When the current meter value is at the desired 4.00 mA, select ENTER to accept the new zero trim value.

Select Gain Trim. Follow the same procedure for gain/span calibration.

AV10 Input Trim

When the AV10 is used with a detector that supports HART communication, an automated process can be used to trim the AV10 input. Navigate down the menu to "Input Loop Cal".

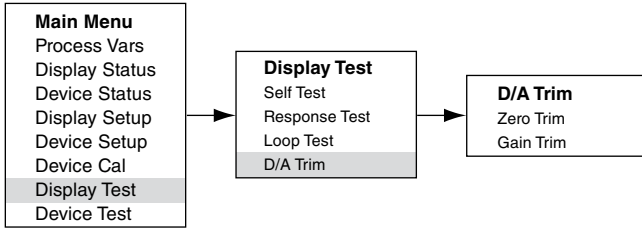


Upon entering Input Loop Cal, the AV10 commands the detector to output 4 mA, and then automatically calibrates its own input. The AV10 then commands the detector to output 20 mA and subsequently calibrates its own input.

If a non-HART detector is being used, the Input Loop Cal may be performed with a mA current source or loop calibrator connected to the AV10 Sensor Connector. Follow the loop calibration instructions shown by the AV10 for this procedure.

AV10 Output Trim

To calibrate the AV10 output loop, navigate down the menu to Display Test > D/A Trim.



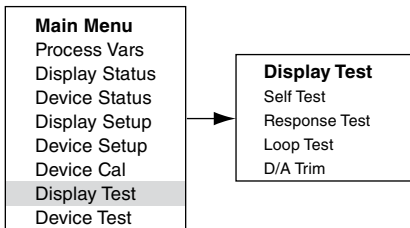
Select Zero Trim. When this screen is entered, a warning message is presented. Select ENTER to continue. When the message "Connect Reference Meter" is presented, install the current meter on the AV10 mA output. Select ENTER to continue. When the message "Set Output Current to 4mA?" is presented, select ENTER to begin the Zero Trim function. The AV10 will now set its 4 mA output value. If the measured value on the current meter is not 4.00 mA, enter the measured value into the AV10 using the Previous and Next switches. The AV10 calculates and corrects for the difference between the actual and entered values. When the current meter value is at the desired 4.00 mA, select ENTER to accept the new zero trim value.

Select Gain Trim. Follow the same procedure for gain/span calibration.

OPTIONAL SYSTEM TESTS

The following tests are available for verifying proper operation of various functions of the gas detection system.

- The Self Test, Response Test, and Loop Test are accessed from the "Display Test" screen. (A "Device Test" screen is available for performing the same tests on HART enabled detectors.)
- The Proof Test is performed by applying test gas to the sensor. It is **not** accessed from the "Display Test" screen and does **not** inhibit the outputs.



Self-Test

This test commands the AV10 to perform a fully automatic internal test. At the completion of the test, the AV10 will indicate a pass or fail.

Response Test

This test inhibits the AV10's outputs, thereby providing a means of testing the system by applying gas to the detector without activating any alarms or affecting the output.

NOTE

If the Response Test is not terminated by the operator, the test will automatically time out after ten minutes and the UD10 will return to normal operation.

Loop Test

This test temporarily forces the AV10's 4-20 mA output to a specific level. This is an easy way to test the output signal of the AV10 for accuracy, to verify the capabilities of the system, and to verify the input signal of a receiver. To perform this test, connect a current meter to the output loop. Navigate to Display Test and select Loop Test, then follow the prompts on the AV10 Screen.

NOTE

If the Loop Test are not terminated by the operator, the test will automatically time out after one minute and the AV10 will return to normal operation.

Proof Test

A Proof Test (bump test) can be performed at any time to verify proper operation and calibration of the system. Since this test does not inhibit the AV10's outputs, secure any output devices prior to performing the test to prevent unwanted actuation.

HISTORY

There are two separate histories, one for the display and one for the detector (if available). Both will state the number of hours that the unit has been operating, and the highest and lowest recorded temperature (with time and date stamp).

PASSWORD PROTECTION

The AV10 allows the use of a password for restricting changes to configuration parameters and limiting access to safety critical commands. The AV10 is shipped from the factory with the password protection (Write Protect) feature disabled.

The following are locked when Write Protect security is enabled:

Alarm Setting screen – All options except “RST Latch Alarms”

Mode Select screen – All options

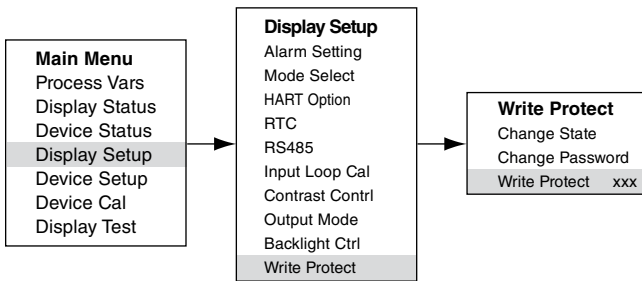
HART Option – All options

RTC – All options except Displayed Y/N

Output Mode

Display Test screen – All options

To enable the Write Protect feature, navigate to the Write Protect screen.



Select “Change State” to toggle between Enabled and Disabled.

Select “Change Password” to enter a new password.

“Write Protect” indicates whether password protection is Enabled or Disabled.

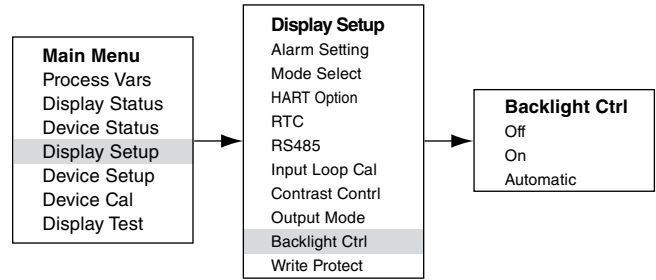
The default password is 1*****.

IMPORTANT

Take care not to lose the password. Future changes cannot be made without a password.

DISPLAY BACKLIGHT OPERATION

The UD10 can be programmed to turn on the backlight feature of the digital display when an alarm or fault occurs or a magnetic switch is activated. Navigate to the Backlight Ctrl screen.



Off = The backlight is always off.

On = The backlight is always on.

Automatic = Normal operation – Backlight is off
 Alarm – Backlight flashes on and off
 Fault – Backlight is on steady
 Magnetic Switch – Backlight is on steady

The backlight automatically turns off 10 minutes after the last Magnetic Switch activation. If the backlight is on following a magnetic switch activation and then an alarm condition occurs, the backlight will remain on steady and not flash until the 10 minute time-out is complete. Then it will begin flashing.

TROUBLESHOOTING

If a Fault condition is indicated on the AV10 faceplate, the nature of the fault can be determined by using the magnetic tool to navigate to the appropriate Fault screen.

NOTE

Refer to the Menu in the appropriate Appendix of this manual for the path to the proper Fault screen.

Shortcut: From the main display screen, touch the magnet to the “Previous” switch to go directly to the Fault screen.

Example:

For a Display (AV10) related fault:

Main Menu > Display Status > Fault/Status > Fault

For a Device (Sensor) related fault:

Main Menu > Device Status > Fault/Status > Sensor Fault

When the active fault has been identified, refer to the Troubleshooting Tables for a description of the fault and suggested corrective action.

Refer to Table 3 for Display Faults and Table 4 for Device Faults.

Table 3—Troubleshooting Guide - Display Faults

Display Faults	Description	Recommended Action
Input Loop FLT	Fault in sensor or sensor loop	Check sensor wiring. Calibrate sensor. Ensure that sensor type matches configuration.
Output Loop FLT	Fault in 4-20 mA output loop	Check 4-20 mA loop wiring for shorts or opens.
EE Fault	Fault in non-volatile memory	Return to factory.
ADC Ref Fault	ADC reference voltage too high or low	Return to factory.
24V Fault	Problem in 24 volt power supply or power wiring	Check power wiring and output voltage of power supply.
Flash Fault	FLASH memory Fault	Return to factory.
RAM Fault	Fault in volatile memory	Return to factory.
WDT Fault	Watchdog timer is non-functional	Return to factory.
12V Fault	12 volt internal power supply out of tolerance	Check power source. Return to factory.
5V Fault	5 volt internal power supply out of tolerance	Check power source. Return to factory.
3V Fault	3 volt internal power supply out of tolerance	Check power source. Return to factory.

Note: A fault condition will cause an oxygen detector to generate an alarm output as the decreasing 4-20 mA signal passes through the alarm range.

Table 4—Troubleshooting Guide - Device Faults

Device Faults	Description	Recommended Action
Loop Fault	Current loop below fault threshold	Check 4-20 mA loop wiring for shorts or opens.
Supply Voltage Fault	24 volt power supply voltage too low	Verify proper wiring to the device and correct voltage output from the power supply.
Calibration Fault	Bad calibration	This fault can be caused if the calibration is allowed to time out. If so, recalibrate. Ensure that there is enough gas in the calibration bottle to complete the calibration. Ensure that the gas being used for calibration is the correct type and concentration. It must match the configured setting.
Memory Fault	Self-detected memory fault	Return to factory.
ADC Fault	Self-detected ADC fault	Return to factory.
Internal Voltage Fault	Self-detected voltage fault	Check supply voltage. Return to factory.
Zero Drift	Sensor signal has drifted negative	Device may have been calibrated with background gas present. Recalibrate the detector. Purge with clean air if needed.
Temperature Sensor Fault	Temperature sensor is out of range	Return to factory.
Wrong Sensor Type	Wrong sensor type is installed	Sensor type must match configuration. Change sensor or configuration.
Lamp Fault	Open or shorted lamp	Replace lamp. Return to factory.
Alignment Fault	Open path alignment problem	Align the device as specified in the instruction manual.
Blocked Optic Fault	Optical path is blocked	Locate and remove obstruction from the optical path.
Cal Line Active	Cal line is active at start-up	Ensure that the Cal line wiring is not shorted and the switch is open.
Low Cal Line	Cal line is shorted.	Check wiring.
Sensor Fault	Self-detected fault with the sensor	Check sensor wiring. Calibrate sensor. Ensure that sensor type matches configuration.
Noise Fault*	Excessive noise on signal	Check HC600 alignment.
Align ADC Fault*	Alignment ADC saturated	Check HC600 alignment.
Align Fault*	Alignment fault	Check HC600 alignment.
Align Warning*	Alignment warning	Check HC600 alignment.
DAC Fault	DAC fault detected	Return to factory.
General Fault	Unspecified fault	Verify correct power wiring and supply voltage. Consult the factory.
High Fault	Detector output is higher than specified limit	Verify correct sensor type and calibration.
Low Fault	Detector output is lower than specified limit	Verify correct sensor type and calibration.
Dirty Optics	Detector optics are dirty	Perform the cleaning procedure as described in the detector manual, then perform calibration.
Start Cal Fault	Calibration fault	Verify correct sensor type and calibrate.

*HC600 only.

Table 4—Troubleshooting Guide - Device Faults, Continued

Device Faults	Description	Recommended Action
EE Fault	Fault in non-volatile memory	Power may have been interrupted while the device was updating its internal data logs. Recycle power.
Ref ADC Sat	Sensor signal level is outside the range of the AD converter	Return to factory.
Active ADC Sat	Sensor signal level is outside the range of the AD converter	Return to factory.
24V Fault	Problem in 24 volt power supply or power wiring	Check power wiring and output voltage of power supply.
Flash CRC Fault	Memory fault	Return to factory.
RAM Fault	Fault in volatile memory	Return to factory.
Low Voltage	Power supply voltage outside of limits	Check power supply voltage. Return to factory.
Temp Fault	Temperature sensor fault	Return to factory.
Software Fault	Internal software fault	Return to factory.
EE Safety Fault	Internal configuration fault	Return to factory.
Gas Under Range	Sensor signal has drifted negative	Device may have been calibrated with background gas present. Recalibrate the detector. Purge with clean air if needed.
Sensor Mismatch	Wrong sensor type is installed	Sensor type must match configuration. Change sensor or configuration.
ADC CNTR Fault	Internal hardware fault	Return to factory.
3V Fault	3 volt internal power supply out of tolerance	Return to factory.
Comm Fault	Communication fault	Check detector wiring and power supply.
GEN Fault	Unspecified fault	Verify correct power wiring and supply voltage. Consult the factory.
12V Fault	12 volt internal power supply out of tolerance	Return to factory.
5V Fault	5 volt internal power supply out of tolerance	Return to factory.

SPECIFICATIONS

OPERATING VOLTAGE—

24 Vdc nominal, operating range is 18 to 30 Vdc.
Ripple cannot exceed 0.5 volt P-P.

OPERATING POWER—

Standard model, with heater and backlight off:

No alarm: 1.5 watts @ 24 Vdc.
Alarm: 3 watts @ 24 Vdc (20 mA current loop output, and all 3 alarm relays energized.)

Backlight on: 0.5 watt additional.
Heater on: 3.5 watts additional.
CGS model: Add 4 watts with CGS interface board and CGS sensor installed.

Maximum power in alarm, with heater and backlight on:
7 watts @ 30 Vdc (Standard model)
11 watts @ 30 Vdc (CGS model)

NOTE

Heater turns on when the internal temperature drops below -10°C (default operation). Heater function can be disabled to save power.

NOTE

Appropriate relays will be activated when a fault or alarm occurs.

CURRENT OUTPUT—

Linear isolated 4-20 mA output with HART.
3.8 mA indicates calibrate mode.
3.6 mA or less indicates a fault condition.
Maximum loop resistance is 600 ohms at 18 to 30 Vdc.

CURRENT OUTPUT RESPONSE TIME—

Toxic gas mode: T90 \leq 5 seconds.
Combustible gas mode: T90 \leq 4 seconds.
Combustible gas - open path mode: T90 \leq 4 seconds.
AV10 w CGS: T90 $<$ 12 seconds.

CURRENT OUTPUT ACCURACY—

Toxic gas mode: $<$ 1% error.
Combustible gas mode: $<$ 1% error.
Combustible gas - open path mode: \leq 0.01 LFL/M.
AV10 w CGS: \pm 3% LFL 0-50 range,
 \pm 5% LFL 51-100 range.

RELAY CONTACTS—

Three Alarm Relays: Form C, 5 amperes at 30 Vdc.
Selectable energized/de-energized.
Selectable latching or non-latching.
Refer to Table 1 for range and default settings.

WARNING

When in non-latching mode, the control device must latch the alarm output.

One Fault Relay: Form C, 5 amperes at 30 Vdc.
Normally energized for no fault condition with power applied.

RELAY RESPONSE TIME—

\leq 2 seconds.

WIRING TERMINALS—

14 to 18 AWG wire can be used.

OPERATING TEMPERATURE—

-55°C to $+75^{\circ}\text{C}$.

STORAGE TEMPERATURE—

-55°C to $+75^{\circ}\text{C}$.

HUMIDITY RANGE—

5 to 95% RH (Autronica verified).

ELECTRO-MAGNETIC COMPATIBILITY—

EMC Directive 2004/108/EC
EN55011 (Emissions)
EN50270 (Immunity)

DIMENSIONS—

See Figures 12 and 13.

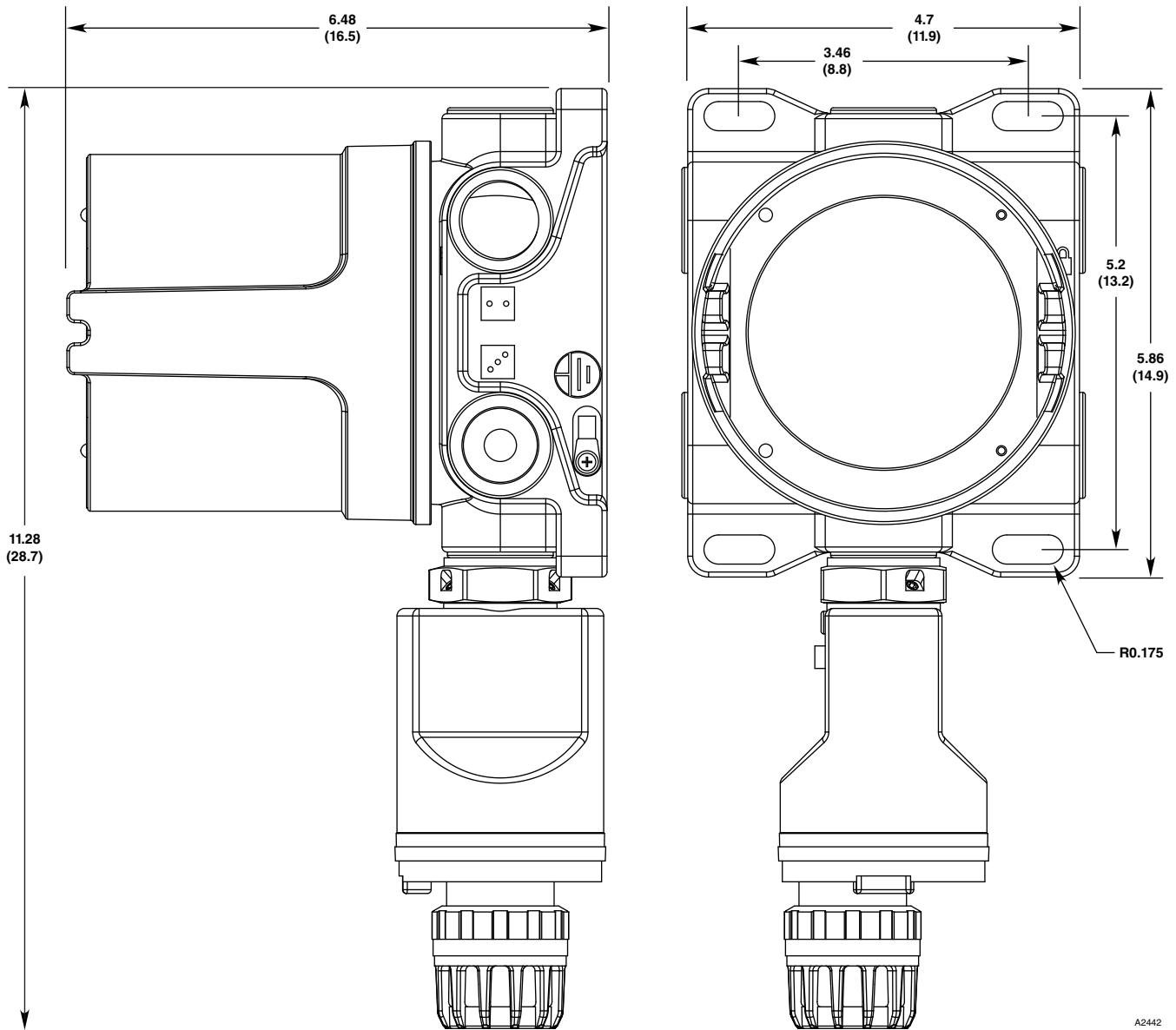


Figure 12—Dimensions of AV10 with GT3000 in Inches (Centimeters)

CONDUIT ENTRIES—

3/4" NPT or M25.

ENCLOSURE MATERIAL—

Epoxy coated aluminum or 316 stainless steel.

SHIPPING WEIGHT—

Aluminum: 4.15 pounds (1.88 kilograms).

Stainless steel: 10.5 pounds (4.76 kilograms).

WARRANTY—

12 months from date of installation or 18 months from date of shipment, whichever occurs first.

DETECTOR COMPATIBILITY—

The AV10 can be used with the Autronica gas detectors listed in Table 5.

UNIT OF MEASUREMENT—

PPM, % LFL, % V/V, LFLM, or Mg/M³.

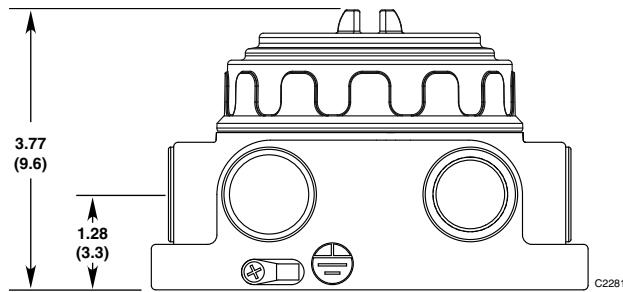
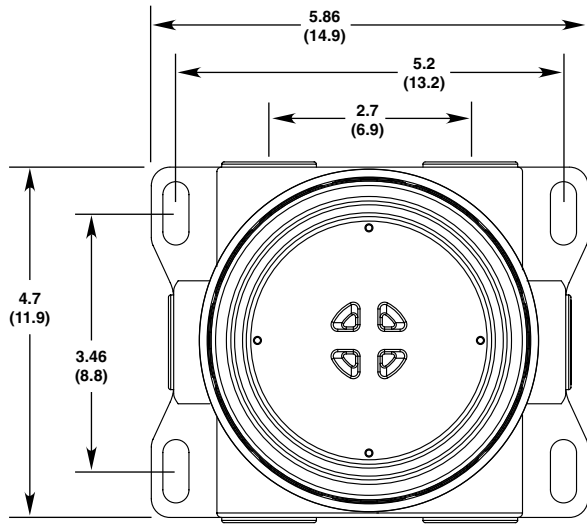


Figure 13—Dimensions of Model STB Termination Box in Inches (Centimeters)

CERTIFICATION—

For complete approval details, refer to the appropriate Appendix:



- Appendix A – FM
- Appendix B – CSA
- Appendix C – ATEX
- Appendix D – IECEx
- Appendix E – INMETRO

SIL Approval - IEC 61508
Certified SIL 2 Capable.

For specific information regarding SIL safety certification, refer to the Model AV10 Safety Reference Manual (number 116-P-AV10/SAFETY/IGB).

Table 5—Gas Detectors Compatible with the AV10

Device	Toxic ¹	Catalytic Combustible	IR ² Combustible	Instruction Manual
GT3000	X			95-8616
PIR9400			X	95-8440
HC200			X	HC200/IGB
HC600			X	HC600/IGB
CGS		X		90-1041
C706X ³	X			95-8396 95-8411 95-8414 95-8439
NTMOS ⁴	X			95-8604

- 1 Hydrogen sulfide, Ammonia, Chlorine, Hydrogen, Oxygen, Carbon Monoxide, and Sulfur Dioxide.
- 2 Methane, Ethane, Ethylene, Propane, and Propylene.
- 3 C7065E Oxygen detector is not supported.
- 4 Hydrogen sulfide only.

DEVICE REPAIR AND RETURN

Prior to returning devices, contact the nearest local Autronica Fire and Security office so that a Return Material Identification (RMI) number can be assigned. **A written statement describing the malfunction must accompany the returned device or component to assist and expedite finding the root cause of the failure.**

Pack the unit properly. Always use sufficient packing material. Where applicable, use an antistatic bag as protection from electrostatic discharge. The RMI number should be clearly marked on the outside of the box.

NOTE

Inadequate packaging that ultimately causes damage to the returned device during shipment will result in a service charge to repair the damage incurred during shipment.

Return all equipment transportation prepaid to the factory in Trondheim.

NOTE

It is highly recommended that a spare be kept on hand for field replacement to ensure continuous protection.

ORDERING INFORMATION

Sensor module, transmitter module and termination boxes (if used) must be ordered separately.

Refer to the AV10 Model Matrix for ordering details.

ACCESSORIES

Part Number	Description
116-009700-001	Magnetic Tool
116-103922-001	475 Field Communicator
116-010268-001	Gas Inspector CD
116-010204-001	W6300G1003 Gas Inspector Connector
116-005003-001	Lubriplate grease, 1 oz.
116-101197-001*	Stop Plug, 3/4" NPT, AL
116-101197-004*	Stop Plug, 3/4" NPT, SS
116-101197-005	Stop Plug, M25, AL, IP66
116-101197-003	Stop Plug, M25, SS, IP66
116-010816-001	Stop Plug, 20PK, 3/4" NPT, AL
116-010817-001	Stop Plug, 20PK, 3/4" NPT, SS
116-010818-001	Stop Plug, 20PK, M25, AL, IP66, EXDE
116-010819-001	Stop Plug, 20PK, M25, SS, IP66, EXDE
116-104190-001	Stop Plug, M25, AL, INMETRO
116-104190-002	Stop Plug, 3/4" NPT, AL, INMETRO
116-104190-003	Stop Plug, M25, SS, INMETRO
116-104190-004	Stop Plug, 3/4" NPT, SS, INMETRO
116-102804-001	Reducer, M25 to M20, AL
116-102804-003	Reducer, M25 to M20, SS

*NEMA 4/IP66 rating requires addition of non-hardening thread sealant or Teflon tape.

REPLACEMENT PARTS

Part Number	Description
116-010569-001	Electronics Module - Relay/4-20 mA
116-010550-001	Electronics Module - Foundation Fieldbus

ASSISTANCE

For assistance in ordering a system to meet the needs of a specific application, please contact:

Autronica Fire and Security AS
P.O.Box 5620
NO-7483 Trondheim
Norway
Tel: +47 90 90 55 00
Fax: +47 73 58 25 01
Web site: www.autronicafire.com
E-mail: info@autronicafire.no

AV10 MODEL MATRIX

MODEL	DESCRIPTION	
AV10	Universal Display Unit	
	TYPE	MATERIAL
	A	Aluminum
	S	Stainless Steel (316)
	TYPE	THREAD TYPE
	5M	5 Port, Metric M25
	5N	5 Port, 3/4" NPT
	TYPE	OUTPUTS
	25	Relay, 4-20 mA, RS485, HART
	27	Relay, 4-20 mA, FOUNDATION™ Fieldbus, HART
	TYPE	APPROVAL*
	B	INMETRO (Brazil)
	R	VNIIFTRI (Russia)
	S	SIL
	T	SIL/FM/CSA/ATEX/CE/IECEX
W	FM/CSA/ATEX/CE/IECEX	
TYPE	CLASSIFICATION (Div/Zone)	
2	Ex d (Flameproof)	
TYPE	OPTIONAL CONDITIONING BOARD	
(Blank)	None	
C	CGS	
N	NTMOS**	

* Type Approvals can use one or more letters to designate the approvals of the product.

** Not required for DCU Emulator model.

APPENDIX A – FM APPROVAL DESCRIPTION

Class I, Div. 1, Groups B, C & D (T5);
Class I, Div. 2, Groups B, C & D (T4);
Class I, Zone 1/2 AEx d IIC (T5);
Class II/III, Div. 1/2, Groups E, F & G.
Tamb –55°C to +75°C
NEMA/Type 4X, IP66
Conduit seal not required.

Performance verified in accordance with:
ANSI/ISA-92.00.01
ANSI/ISA-12.13.01 (CGS excluded)
FM 6310/6320
ANSI/ISA-12.13.04/FM 6325

This approval does not include or imply approval of gas detector heads or other apparatus to which the subject instrument may be connected. In order to maintain a Factory Mutual Research approved system, the measurement input signal to which this instrument is connected must also be approved by Factory Mutual Research.

NOTE

Consideration must be given to overall Gas System Performance Requirements.

WARNING

When a sensor/detector is connected directly to the AV10 housing, the lower ratings of the two devices will prevail.

APPENDIX B – CSA CERTIFICATION DESCRIPTION

CSA 08 2029512.
Class I, Div. 1, Groups B, C & D (T5);
Class I, Div. 2, Groups B, C & D (T4);
Class II/III, Div. 1/2, Groups E, F & G.
(Tamb = -55°C to +75°C)
Type 4X
Conduit seal not required.
Performance verified in accordance with:
CSA C22.2 #152.

NOTE

Consideration must be given to overall Gas System Performance Requirements.

WARNING

When a sensor/detector is connected directly to the AV10 housing, the lower ratings of the two devices will prevail.

APPENDIX C – ATEX APPROVAL DESCRIPTION

CE 0470  II 2 G
Ex d IIC T5 Gb
Tamb –55°C to +75°C
FM13ATEX0100X
IP66.

Performance verified in accordance with:
EN 60079-29-1 and EN 60079-29-4.

Special Conditions for Safe Use ('X'):

The AV10 control unit complies with EN 60079-29-1 and EN 60079-29-4 only when connected to a Detector Head that also has been evaluated to EN 60079-29-1 and EN 60079-29-4.

NOTE

Consideration must be given to overall Gas System Performance Requirements.

WARNING

When a sensor/detector is connected directly to the AV10 housing, the lower ratings of the two devices will prevail.

APPENDIX D – IECEX APPROVAL DESCRIPTION

Ex d IIC T5 Gb
Tamb –55°C to +75°C
IECEX FMG 13.0042X
IP66.

Performance verified in accordance with:
IEC 60079-29-1

Special Conditions for Safe Use ('X'):

The AV10 control unit complies with IEC 60079-29-1 when connected to a Detector Head with an IEC certificate of conformity to IEC 60079-29-1.

NOTE

Consideration must be given to overall Gas System Performance Requirements.

WARNING

When a sensor/detector is connected directly to the AV10 housing, the lower ratings of the two devices will prevail.

APPENDIX E – ADDITIONAL APPROVALS

INMETRO (Brazil)

CEPEL 09.1803

Ex d IIC T5 Gb IP66

T5 (Tamb –40°C to +75°C) With integral CGS

– OR –

Ex d IIC T6 Gb IP66

T6 (Tamb –55°C to +75°C) Without integral CGS

All cable entry devices shall be Brazil certified in the type of explosion protection, flameproof enclosure 'd', suitable for the conditions of use and correctly installed, with an ingress protection rating of IP66.

A screw or cover lock is provided for a secondary means of fastening the cover.

APPENDIX F – AV10 WITH HANDHELD HART COMMUNICATOR

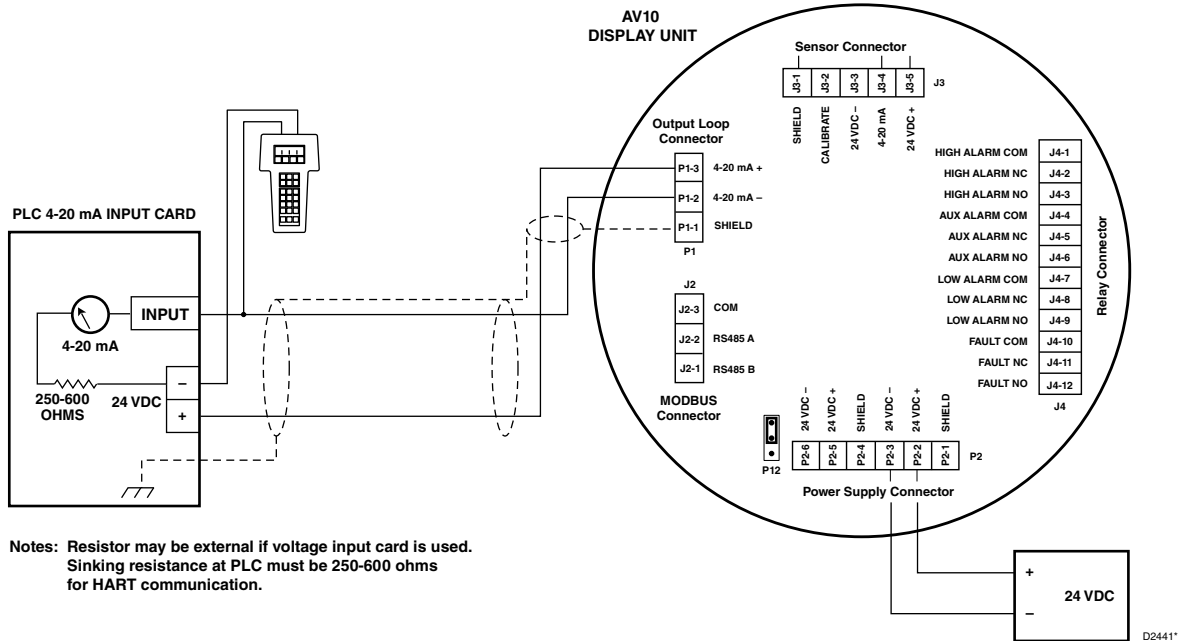
USING A HANDHELD HART DEVICE CONNECTED TO THE AV10'S 4-20 MA OUTPUT (AV10 WITH ANY DETECTOR)

NOTE

Refer to the front of this manual for complete information regarding installation, wiring and startup of the AV10.

WIRING

IMPORTANT



HART Handheld Communicator Connected to the AV10's 4-20 mA Output

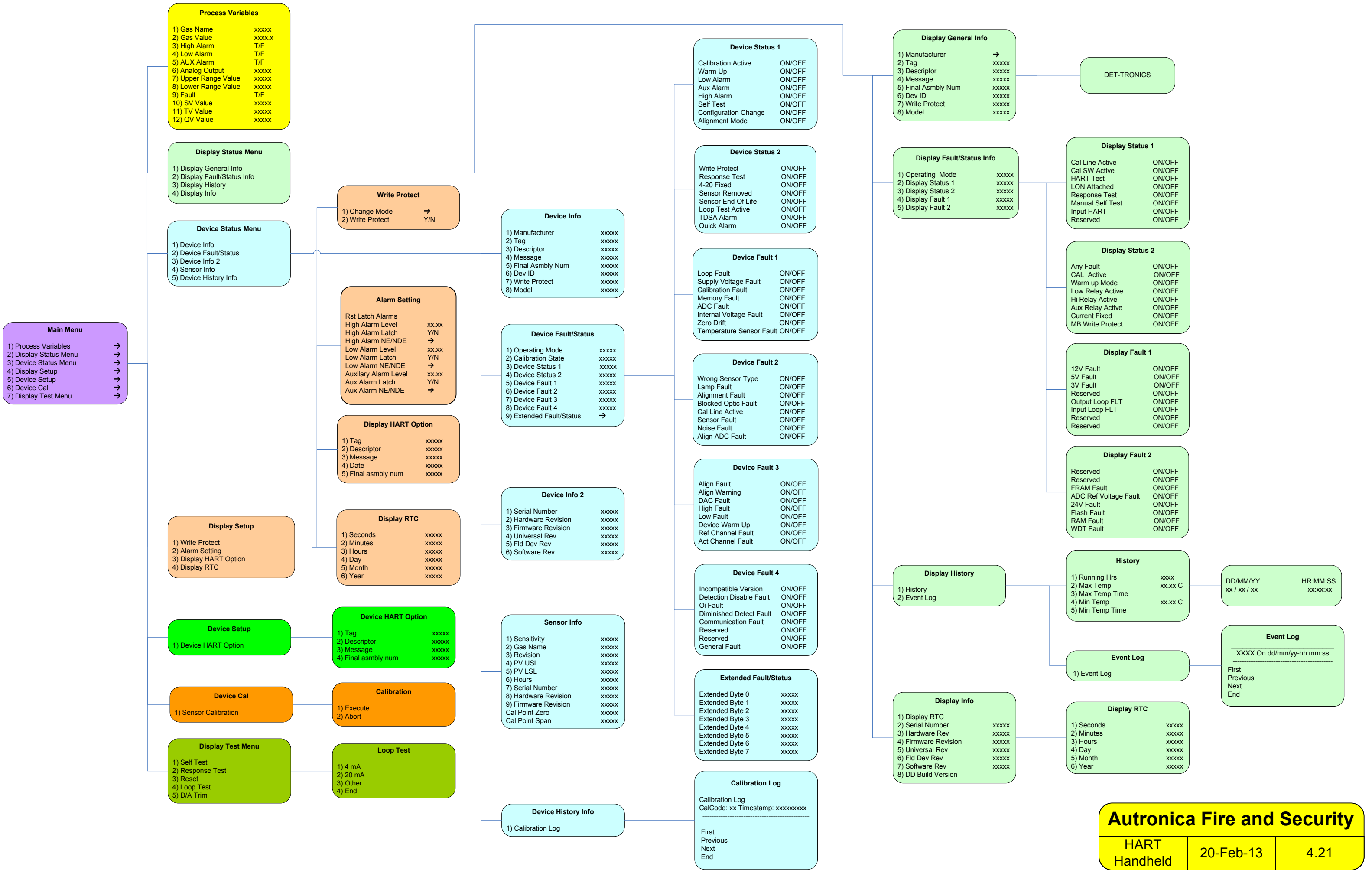
To ensure proper operation of the HART communication system, a power supply with low noise and ripple must be used. If noise or ripple on the main power source could interfere with the HART function, an isolated power source is recommended. For additional information, refer to "Power Supply Requirements" in the Wiring section of this manual.

MENU STRUCTURE

Refer to the following menu tree when using a HART handheld communicator, connected to the AV10's 4-20 mA output.

MENU HELP

Status menus only allow the user to view the data.
The Setup menus allow the user to both view and edit the data.



- Main Menu**
- 1) Process Variables →
 - 2) Display Status Menu →
 - 3) Device Status Menu →
 - 4) Display Setup →
 - 5) Device Setup →
 - 6) Device Cal →
 - 7) Display Test Menu →

- Process Variables**
- 1) Gas Name xxxxx
 - 2) Gas Value xxxxx.x
 - 3) High Alarm T/F
 - 4) Low Alarm T/F
 - 5) AUX Alarm T/F
 - 6) Analog Output xxxxx
 - 7) Upper Range Value xxxxx
 - 8) Lower Range Value xxxxx
 - 9) Fault T/F
 - 10) SV Value xxxxx
 - 11) TV Value xxxxx
 - 12) QV Value xxxxx

- Display Status Menu**
- 1) Display General Info
 - 2) Display Fault/Status Info
 - 3) Display History
 - 4) Display Info

- Device Status Menu**
- 1) Device Info
 - 2) Device Fault/Status
 - 3) Device Info 2
 - 4) Sensor Info
 - 5) Device History Info

- Write Protect**
- 1) Change Mode →
 - 2) Write Protect Y/N

- Alarm Setting**
- Rst Latch Alarms
 - High Alarm Level xx.xx
 - High Alarm Latch Y/N
 - High Alarm NE/NDE →
 - Low Alarm Level xx.xx
 - Low Alarm Latch Y/N
 - Low Alarm NE/NDE →
 - Auxiliary Alarm Level xx.xx
 - Aux Alarm Latch Y/N
 - Aux Alarm NE/NDE →

- Display HART Option**
- 1) Tag xxxxxx
 - 2) Descriptor xxxxxx
 - 3) Message xxxxxx
 - 4) Date xxxxxx
 - 5) Final assembly num xxxxxx

- Display Setup**
- 1) Write Protect
 - 2) Alarm Setting
 - 3) Display HART Option
 - 4) Display RTC

- Display RTC**
- 1) Seconds xxxxxx
 - 2) Minutes xxxxxx
 - 3) Hours xxxxxx
 - 4) Day xxxxxx
 - 5) Month xxxxxx
 - 6) Year xxxxxx

- Device Setup**
- 1) Device HART Option

- Device HART Option**
- 1) Tag xxxxxx
 - 2) Descriptor xxxxxx
 - 3) Message xxxxxx
 - 4) Final assembly num xxxxxx

- Device Cal**
- 1) Sensor Calibration

- Calibration**
- 1) Execute
 - 2) Abort

- Display Test Menu**
- 1) Self Test
 - 2) Response Test
 - 3) Reset
 - 4) Loop Test
 - 5) D/A Trim

- Loop Test**
- 1) 4 mA
 - 2) 20 mA
 - 3) Other
 - 4) End

- Device Info**
- 1) Manufacturer xxxxx
 - 2) Tag xxxxx
 - 3) Descriptor xxxxx
 - 4) Message xxxxx
 - 5) Final Asmbly Num xxxxx
 - 6) Dev ID xxxxx
 - 7) Write Protect xxxxx
 - 8) Model xxxxx

- Device Fault/Status**
- 1) Operating Mode xxxxx
 - 2) Calibration State xxxxx
 - 3) Device Status 1 xxxxx
 - 4) Device Status 2 xxxxx
 - 5) Device Fault 1 xxxxx
 - 6) Device Fault 2 xxxxx
 - 7) Device Fault 3 xxxxx
 - 8) Device Fault 4 xxxxx
 - 9) Extended Fault/Status →

- Device Info 2**
- 1) Serial Number xxxxx
 - 2) Hardware Revision xxxxx
 - 3) Firmware Revision xxxxx
 - 4) Universal Rev xxxxx
 - 5) Fld Dev Rev xxxxx
 - 6) Software Rev xxxxx

- Sensor Info**
- 1) Sensitivity xxxxx
 - 2) Gas Name xxxxx
 - 3) Revision xxxxx
 - 4) PV USL xxxxx
 - 5) PV LSL xxxxx
 - 6) Hours xxxxx
 - 7) Serial Number xxxxx
 - 8) Hardware Revision xxxxx
 - 9) Firmware Revision xxxxx
 - Cal Point Zero xxxxx
 - Cal Point Span xxxxx

- Device History Info**
- 1) Calibration Log

- Device Status 1**
- Calibration Active ON/OFF
 - Warm Up ON/OFF
 - Low Alarm ON/OFF
 - Aux Alarm ON/OFF
 - High Alarm ON/OFF
 - Self Test ON/OFF
 - Configuration Change ON/OFF
 - Alignment Mode ON/OFF

- Device Status 2**
- Write Protect ON/OFF
 - Response Test ON/OFF
 - 4-20 Fixed ON/OFF
 - Sensor Removed ON/OFF
 - Sensor End Of Life ON/OFF
 - Loop Test Active ON/OFF
 - TDSA Alarm ON/OFF
 - Quick Alarm ON/OFF

- Device Fault 1**
- Loop Fault ON/OFF
 - Supply Voltage Fault ON/OFF
 - Calibration Fault ON/OFF
 - Memory Fault ON/OFF
 - ADC Fault ON/OFF
 - Internal Voltage Fault ON/OFF
 - Zero Drift ON/OFF
 - Temperature Sensor Fault ON/OFF

- Device Fault 2**
- Wrong Sensor Type ON/OFF
 - Lamp Fault ON/OFF
 - Alignment Fault ON/OFF
 - Blocked Optic Fault ON/OFF
 - Cal Line Active ON/OFF
 - Sensor Fault ON/OFF
 - Noise Fault ON/OFF
 - Align ADC Fault ON/OFF

- Device Fault 3**
- Align Fault ON/OFF
 - Align Warning ON/OFF
 - DAC Fault ON/OFF
 - High Fault ON/OFF
 - Low Fault ON/OFF
 - Device Warm Up ON/OFF
 - Ref Channel Fault ON/OFF
 - Act Channel Fault ON/OFF

- Device Fault 4**
- Incompatible Version ON/OFF
 - Detection Disable Fault ON/OFF
 - Oi Fault ON/OFF
 - Diminished Detect Fault ON/OFF
 - Communication Fault ON/OFF
 - Reserved ON/OFF
 - Reserved ON/OFF
 - General Fault ON/OFF

- Extended Fault/Status**
- Extended Byte 0 xxxxx
 - Extended Byte 1 xxxxx
 - Extended Byte 2 xxxxx
 - Extended Byte 3 xxxxx
 - Extended Byte 4 xxxxx
 - Extended Byte 5 xxxxx
 - Extended Byte 6 xxxxx
 - Extended Byte 7 xxxxx

- Calibration Log**
- Calibration Log
-
- CalCode: xx Timestamp: xxxxxxxx
-
- First
Previous
Next
End

- Display General Info**
- 1) Manufacturer →
 - 2) Tag xxxxxx
 - 3) Descriptor xxxxxx
 - 4) Message xxxxxx
 - 5) Final Asmbly Num xxxxxx
 - 6) Dev ID xxxxxx
 - 7) Write Protect xxxxxx
 - 8) Model xxxxxx

DET-TRONICS

- Display Fault/Status Info**
- 1) Operating Mode xxxxxx
 - 2) Display Status 1 xxxxxx
 - 3) Display Status 2 xxxxxx
 - 4) Display Fault 1 xxxxxx
 - 5) Display Fault 2 xxxxxx

- Display Status 1**
- Cal Line Active ON/OFF
 - Cal SW Active ON/OFF
 - HART Test ON/OFF
 - LON Attached ON/OFF
 - Response Test ON/OFF
 - Manual Self Test ON/OFF
 - Input HART ON/OFF
 - Reserved ON/OFF

- Display Status 2**
- Any Fault ON/OFF
 - CAL Active ON/OFF
 - Warm up Mode ON/OFF
 - Low Relay Active ON/OFF
 - Hi Relay Active ON/OFF
 - Aux Relay Active ON/OFF
 - Current Fixed ON/OFF
 - MB Write Protect ON/OFF

- Display Fault 1**
- 12V Fault ON/OFF
 - 5V Fault ON/OFF
 - 3V Fault ON/OFF
 - Reserved ON/OFF
 - Output Loop FLT ON/OFF
 - Input Loop FLT ON/OFF
 - Reserved ON/OFF
 - Reserved ON/OFF

- Display Fault 2**
- Reserved ON/OFF
 - Reserved ON/OFF
 - FRAM Fault ON/OFF
 - ADC Ref Voltage Fault ON/OFF
 - 24V Fault ON/OFF
 - Flash Fault ON/OFF
 - RAM Fault ON/OFF
 - WDT Fault ON/OFF

- Display History**
- 1) History
 - 2) Event Log

- History**
- 1) Running Hrs xxxxx
 - 2) Max Temp xx.xx C
 - 3) Max Temp Time xx.xx C
 - 4) Min Temp xx.xx C
 - 5) Min Temp Time

DD/MM/YY HR:MM:SS
xx / xx / xx xx:xx:xx

- Event Log**
- 1) Event Log

XXXX On dd/mm/yy-hh:mm:ss

First
Previous
Next
End

- Display Info**
- 1) Display RTC
 - 2) Serial Number xxxxxx
 - 3) Hardware Rev xxxxxx
 - 4) Firmware Revision xxxxxx
 - 5) Universal Rev xxxxxx
 - 6) Fld Dev Rev xxxxxx
 - 7) Software Rev xxxxxx
 - 8) DD Build Version

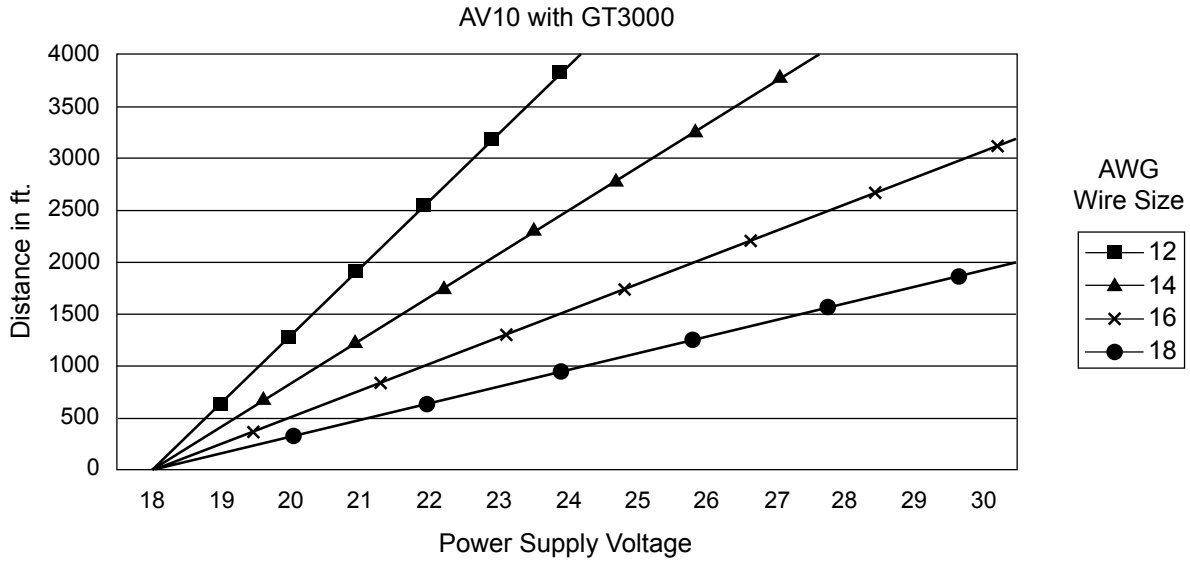
- Display RTC**
- 1) Seconds xxxxxx
 - 2) Minutes xxxxxx
 - 3) Hours xxxxxx
 - 4) Day xxxxxx
 - 5) Month xxxxxx
 - 6) Year xxxxxx

APPENDIX G – AV10 WITH GT3000 TOXIC GAS DETECTOR

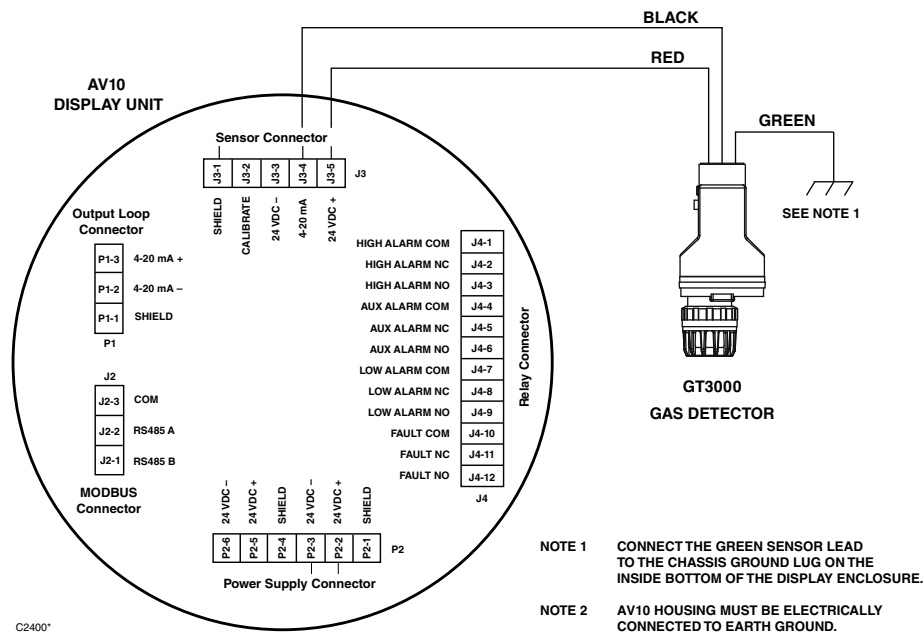
NOTE

For complete information regarding the GT3000 Gas Detector, refer to instruction manual 95-8616.

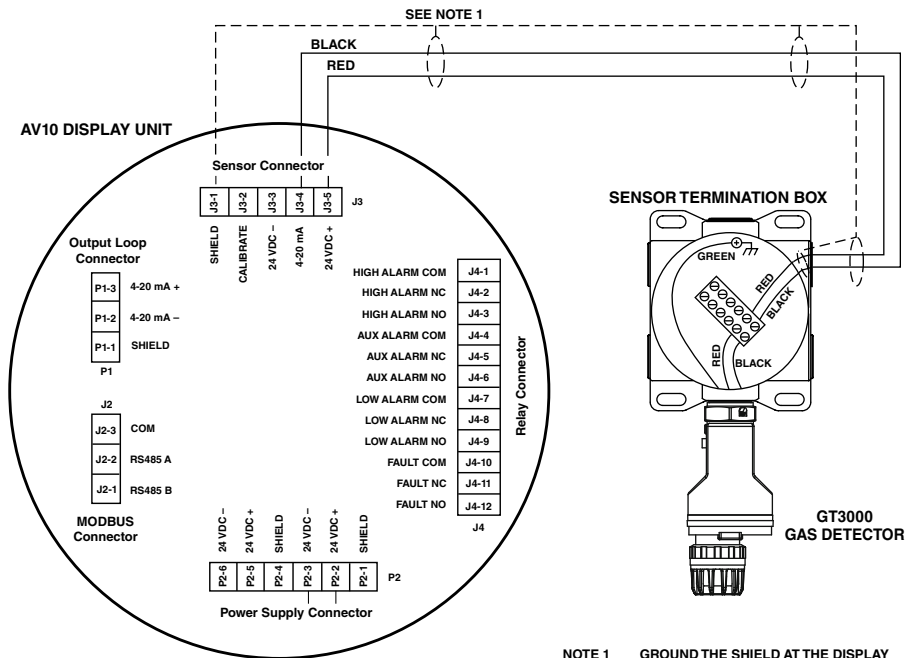
WIRING



Notes: Maximum cable length from power source to AV10 is 2000 feet.
Maximum cable length from AV10 to sensor/STB termination box is 2000 feet.



GT3000 Detector Wired Directly to AV10



- NOTE 1 GROUND THE SHIELD AT THE DISPLAY UNIT END ONLY.
- NOTE 2 HOUSINGS MUST BE ELECTRICALLY CONNECTED TO EARTH GROUND.

AV10 Wired to GT3000 Detector with Sensor Termination Box

ORIENTATION

The device must be mounted in a vertical position only, with the GT3000 pointing down.



LIVE MAINTENANCE

NOTE

The sensor module on the GT3000 Gas Detector can be hot swapped, i.e. replaced without removing power or de-classifying the area. To replace a GTX Transmitter connected to the AV10 with a new transmitter or a different detector type, the area **must** be de-classified.

NOTE

Removing the sensor module with power applied will result in a fault condition until a new sensor module of the same type is installed. When replacing an oxygen sensor, this action will also result in an alarm condition as the decreasing 4-20 mA signal passes through the alarm range. Inhibit response devices to prevent unwanted actuation.

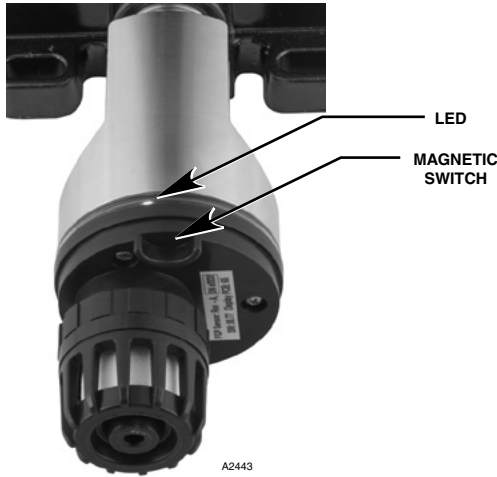
For complete information regarding sensor replacement with the GT3000 Gas Detector, refer to the GT3000 instruction manual number 95-8616.

CALIBRATION

GT3000 WITH TOXIC GAS SENSOR

From GT3000

- Using the magnet, activate the magnetic calibration switch on the GT3000. The green LED turns to yellow.

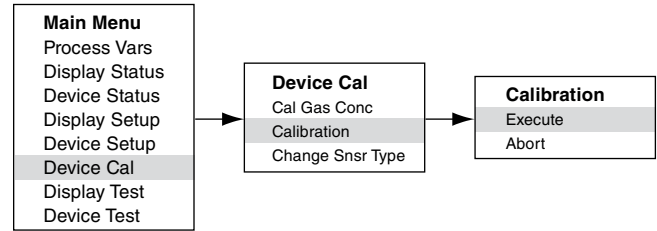


Location of Magnetic Switch on GT3000

- The AV10 will display “Waiting for Zero” on the main display screen, with the yellow LED on the detector housing illuminated continuously.
- The AV10 will then display “Waiting for Signal” on the screen, while the yellow LED on the detector is flashing. The device automatically performs the zero calibration.
- The AV10 will display “Waiting for Gas” on the screen, while the yellow LED on the detector is flashing.
- Apply calibration gas to the sensor.
- The AV10 will display “Waiting for Span” on the screen, while the yellow LED on the detector is flashing.
- When the AV10 displays “Remove Cal Gas” on the screen and all LEDs on the detector housing are off, remove the calibration gas.
- After successful calibration, the AV10 automatically returns to the normal display with the green LED illuminated on the detector.

From AV10

- Using the magnet to activate the switches on the AV10 display, navigate to the Calibration menu.



- Activate “Execute” (Enter/Select) to start calibration.
- The AV10 will display “Waiting for Zero” on the main display screen, with the yellow LED on the detector housing illuminated continuously. The device automatically performs the zero calibration.
- The AV10 will then display “Waiting for Gas” on the screen, while the yellow LED on the detector is flashing.
- Apply calibration gas to the sensor.
- The AV10 will display “Waiting for Span” on the screen, while the yellow LED on the detector is flashing.
- When the AV10 displays “Remove Cal Gas” on the screen and the LEDs on the detector housing are off, remove the calibration gas.
- After completion of a successful calibration, the AV10 automatically returns to the normal mode with the green LED illuminated on the detector.

AV10 mA Output During Calibration (AV10 with GT3000)		
AV10 Display Reading	Standard Mode	Replicate Mode
Waiting for Zero	3.8	3.8
Waiting for Gas	3.8	3.8
Waiting for Span	3.8	3.8
Remove Cal Gas	3.8	3.8
Back to Normal	4.0	4.0

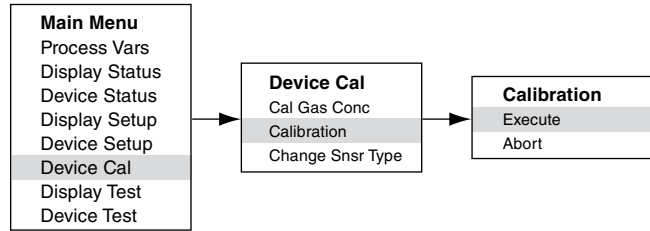
GT3000 WITH OXYGEN SENSOR

From GT3000:

1. Using the magnet, activate the magnetic calibration switch on the GT3000. The green LED turns to yellow.
2. The device automatically performs the zero calibration. The yellow LED on the GT3000 is on continuously. The AV10 displays "Waiting for Zero" on the main display screen.
3. When the yellow LED on the GT3000 flashes, the device automatically performs the span calculation. If using bottled 20.9% oxygen, apply immediately. The AV10 displays "Waiting for Span" on the screen.
4. After successful calibration, the green LED on the GT3000 is on continuously and the AV10 automatically returns to the normal display. Remove calibration gas (if used).

From AV10

1. Using the magnet to activate the switches on the AV10 display, navigate to the Calibration menu.



2. Activate "Execute" (Enter/Select) to start calibration.
3. The AV10 will display "Waiting for Zero" on the main display screen, with the yellow LED on the detector housing illuminated continuously. The device automatically performs the zero calibration.
4. When the AV10 displays "Waiting for Span" on the screen and the yellow LED on the detector is flashing, the device automatically performs the span calculation. If using bottled 20.9% oxygen, apply immediately.
5. After completion of a successful calibration, the AV10 automatically returns to the normal mode with the green LED illuminated on the detector. Remove calibration gas (if used).

MENU STRUCTURE

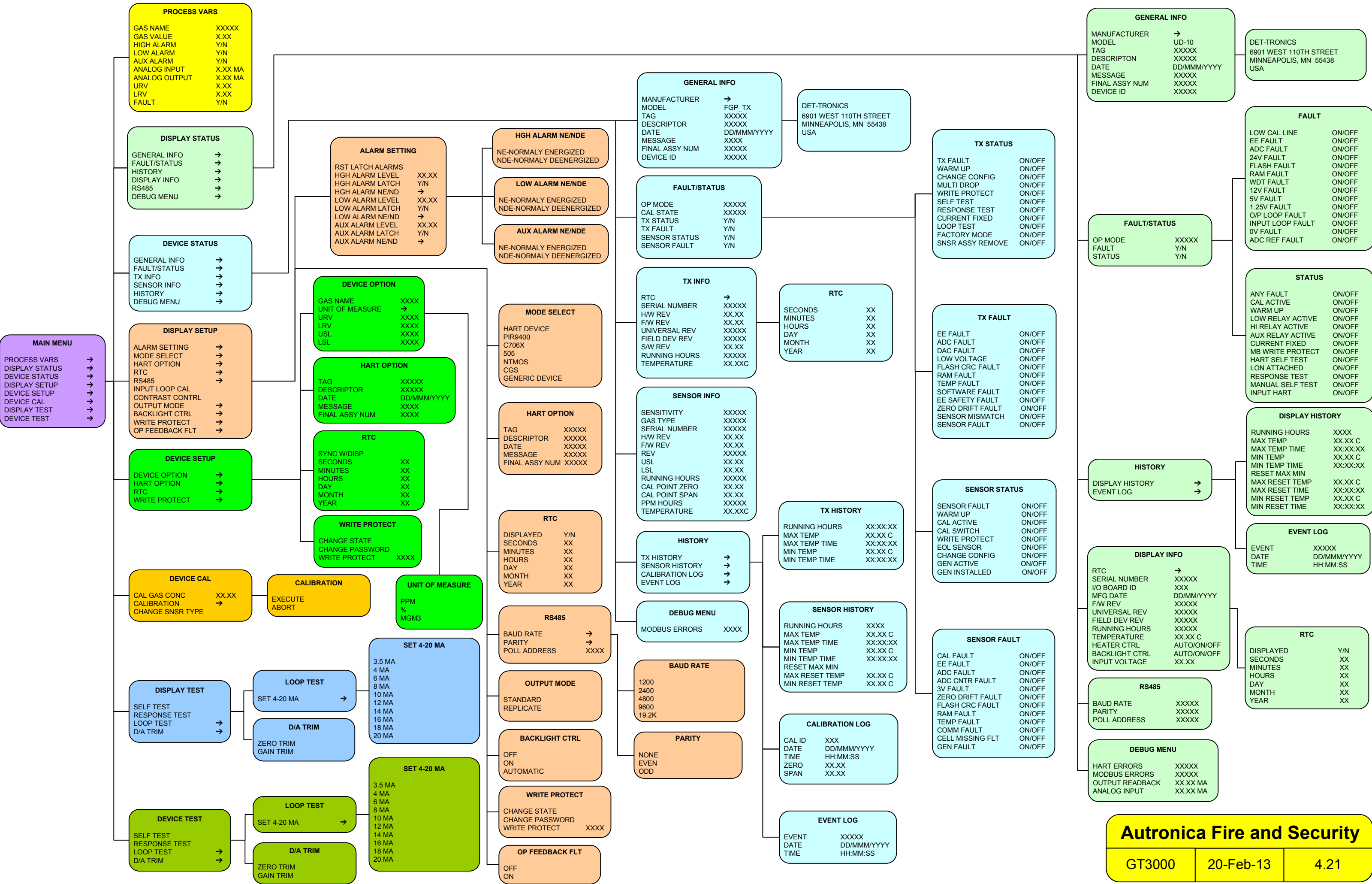
AV10 with GT3000 Detector

Refer to the following menu when using the AV10's LCD display and internal magnetic switches.

When connecting a HART Communicator to the AV10's 4-20 mA output, refer to the "AV10 HART" menu in Appendix E.

MENU HELP

*Status menus only allow the user to view the data.
The Setup menus allow the user to both view and edit the data.*

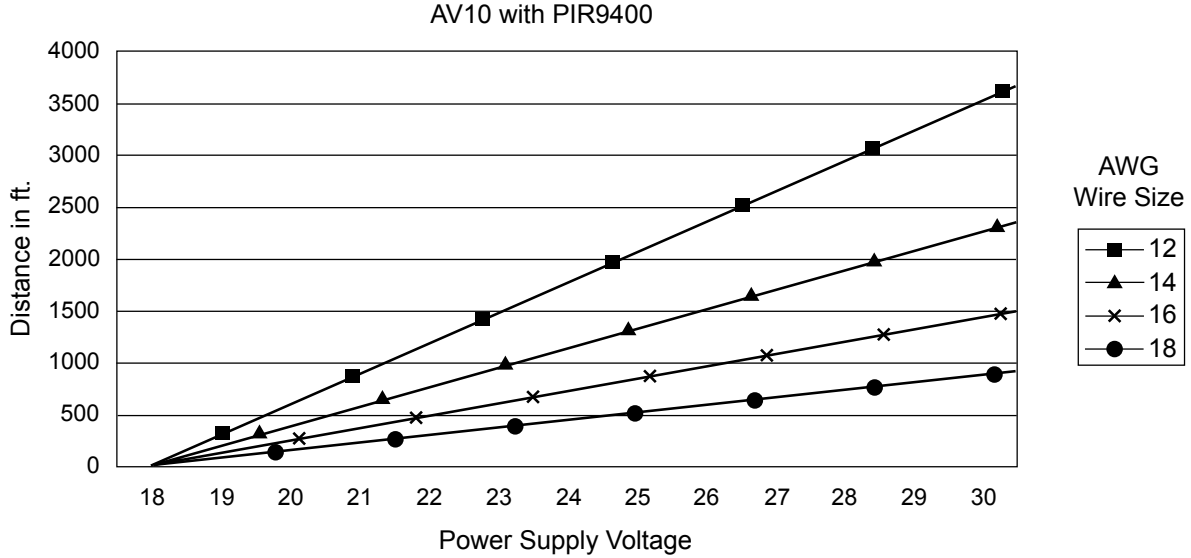


APPENDIX H – AV10 WITH PIR9400

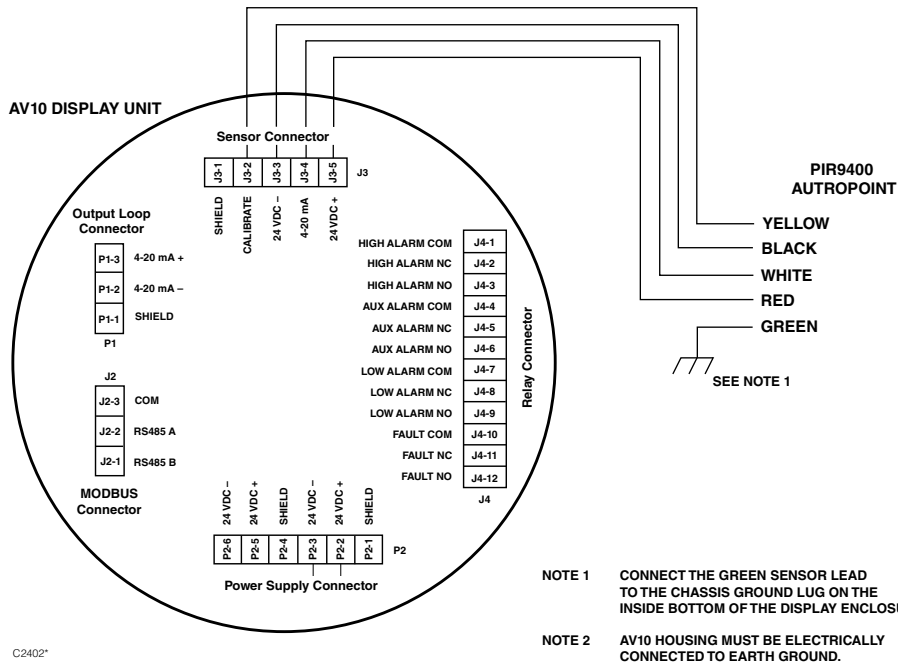
NOTE

For complete information regarding the PIR9400 Gas Detector, refer to instruction manual 95-8440.

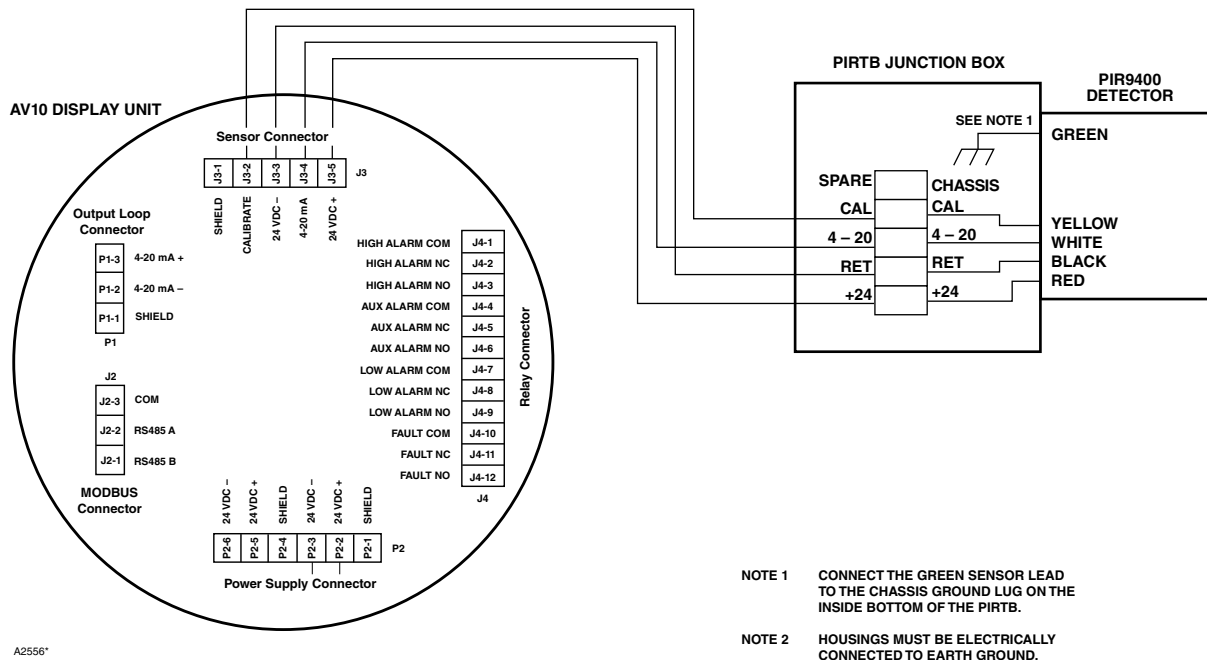
WIRING



Notes: Maximum cable length from power source to AV10 is 2000 feet.
 Maximum cable length from AV10 to PIR9400/PIRTB termination box is 2000 feet.



PIR9400 Wired Directly to AV10



AV10 Wired to PIR9400 with PIRTB Termination Box

INSTALLATION NOTES

IMPORTANT

Hydrocarbon-based grease emits hydrocarbon vapors that will be measured by AutoPoint, resulting in inaccurate gas level readings. Use only low vapor pressure Lubriplate grease or Teflon tape on the AutoPoint detector and associated termination box. Do not get grease on the optics of the detector. A suitable grease is listed in the "Ordering Information" section in this manual.

IMPORTANT

In applications where both AutoPoint and catalytic type sensors are used, ensure that the grease used to lubricate the AutoPoint detector threads does not come into contact with the catalytic sensors, since poisoning of the catalytic sensors could result. It is strongly recommended that maintenance personnel wash their hands between handling the two types of sensors.

ORIENTATION

It is highly recommended that the PIR9400 be installed in the horizontal position. The detector is not position-sensitive in terms of its ability to detect gas. However, the weather baffle assembly provides superior performance when installed in a horizontal position. (See illustration below).



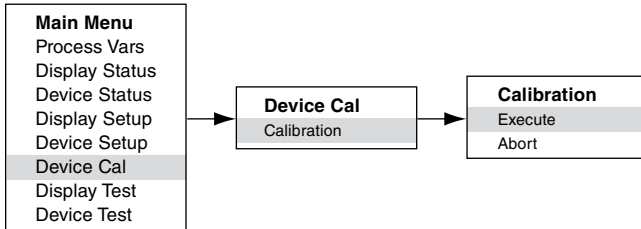
CHANGING OPERATING MODES

When used with a PIR9400, the operating mode of the AV10 must be changed from “HART Device” to “PIR9400” mode. Refer to the “Startup” section of this manual for details.

CALIBRATION

To initiate calibration of the PIR9400 from the AV10 Display:

- Using the magnet to activate the switches on the AV10 display, navigate to the “Calibration” menu.

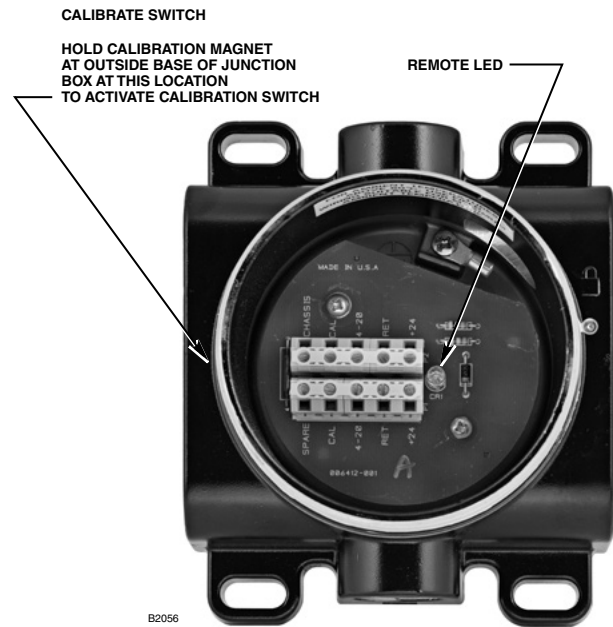


- Activate “Execute” (Enter/Select) to start calibration.
 - The AV10 will display “Waiting for Zero” on the main display screen.
 - The AV10 will then display “Waiting for Gas” on the screen.
 - Apply calibration gas to the PIR9400.
 - The AV10 will continue to display “Waiting for Gas” on the screen.
 - When the AV10 displays “Remove Cal Gas” on the screen, remove the calibration gas from the PIR9400.
 - The AV10 automatically returns to the normal mode after successful calibration.
- The AV10 will then display “Waiting for Gas” on the screen, while the LED at the PIRTB is flashing red.
 - Apply calibration gas to the PIR9400 detector.
 - The AV10 will display “Waiting for Span” on the screen, with a red flashing LED at the PIRTB.
 - When the AV10 displays “Remove Cal Gas” on the screen and the LED at the PIRTB turns off, remove the calibration gas.
 - After successful calibration, the AV10 automatically returns to the normal mode, and the LED on the PIRTB remains off.

To initiate calibration from the PIRTB Termination Box while monitoring calibration using the AV10 display:

- Using the magnet, activate the magnetic calibration switch on the PIRTB Termination Box. The LED at the PIRTB turns from off to steady red.
- The AV10 will display “Waiting for Zero” on the main display screen, with a steady red LED at the PIRTB.

AV10 mA Output During Calibration (AV10 with PIR9400)		
AV10 Display Reading	Standard Mode	Replicate Mode
Waiting for Zero	3.8	2.2
Waiting for Gas	3.8	3.8
Waiting for Span	3.8	3.8
Remove Cal Gas	3.8	3.8
Back to Normal	4.0	4.0



PIRTB Termination Box

MENU STRUCTURE

AV10 with PIR9400 AutoPoint Detector

Refer to the following menu when using the AV10's LCD display and internal magnetic switches.

When connecting a HART Communicator to the AV10's 4-20 mA output, refer to the "AV10 HART" menu in Appendix E.

MENU HELP

*Status menus only allow the user to view the data.
The Setup menus allow the user to both view and edit the data.*

MAIN MENU

- PROCESS VARS →
- DISPLAY STATUS →
- DEVICE STATUS →
- DISPLAY SETUP →
- DEVICE CAL →
- DISPLAY TEST →

PROCESS VARS

GAS NAME	XXXX
GAS VALUE	X.XX
HIGH ALARM	Y/N
LOW ALARM	Y/N
AUX ALARM	Y/N
ANALOG INPUT	X.XX MA
ANALOG OUTPUT	X.XX MA
URV	X.XX
LRV	X.XX
FAULT	Y/N

DISPLAY STATUS

- GENERAL INFO →
- FAULT/STATUS →
- HISTORY →
- DISPLAY INFO →
- RS485 →
- DEBUG MENU →

DEVICE STATUS

- DEVICE INFO →
- FAULT/STATUS →
- CALIBRATION LOG →

DISPLAY SETUP

- ALARM SETTING →
- MODE SELECT →
- HART OPTION →
- RTC →
- RS485 →
- INPUT LOOP CAL →
- CONTRAST CONTRL →
- OUTPUT MODE →
- BACKLIGHT CTRL →
- WRITE PROTECT →
- OP FEEDBACK FLT →

DEVICE SETUP

- DEVICE OPTION →

DEVICE CAL

- CALIBRATION →
- CAL GAS CONC → XX.XX

DISPLAY TEST

- SELF TEST →
- RESPONSE TEST →
- LOOP TEST →
- D/A TRIM →

DEVICE INFO

- MANUFACTURER →
- MODEL PIR9400
- GAS NAME XXXXX
- UNIT OF MEASURE XXXXX
- URV XX.XX
- LRV XX.XX

DET-TRONICS
6901 WEST 110TH STREET
MINNEAPOLIS, MN 55438
USA

FAULTS/ STATUS

- FAULTS Y/N

FAULTS

WARM UP	ON/OFF
REF. CHANNEL FLT	ON/OFF
ACT CHANNEL FLT	ON/OFF
STARTUP CAL FLT	ON/OFF
24 V FAULT	ON/OFF
BLOCK OPTICS	ON/OFF
CAL FAULT	ON/OFF
LOW FAULT	ON/OFF
HIGH FAULT	ON/OFF

CALIBRATION LOG

CAL ID	XXXX
DATE	DD/MMM/YYYY
TIME	HH:MM:SS
ZERO	XXXX
SPAN	XXXX

DEVICE OPTION

- GAS TYPE →
- GAS NAME XXXXX
- UNIT OF MEASURE %LFL
- URV XX.XX
- LRV XX.XX

GAS TYPE

- METHANE
- ETHANE
- PROPANE
- PROPYLENE
- ETHYLENE

CALIBRATION

- EXECUTE
- ABORT

LOOP TEST

- SET 4-20 MA →

SET 4-20 MA

- 3.5 MA
- 4 MA
- 6 MA
- 8 MA
- 10 MA
- 12 MA
- 14 MA
- 16 MA
- 18 MA
- 20 MA

D/A TRIM

- ZERO TRIM
- GAIN TRIM

ALARM SETTING

- RST LATCH ALARMS
- HGH ALARM LEVEL XX.XX
- HGH ALARM LATCH Y/N
- HGH ALARM NE/ND →
- LOW ALARM LEVEL XX.XX
- LOW ALARM LATCH Y/N
- LOW ALARM NE/ND →
- AUX ALARM LEVEL XX.XX
- AUX ALARM LATCH Y/N
- AUX ALARM NE/ND →

HGH ALARM NE/NDE

- NE-NORMALY ENERGIZED
- NDE-NORMALY DEENERGIZED

LOW ALARM NE/NDE

- NE-NORMALY ENERGIZED
- NDE-NORMALY DEENERGIZED

AUX ALARM NE/NDE

- NE-NORMALY ENERGIZED
- NDE-NORMALY DEENERGIZED

MODE SELECT

- HART DEVICE
- PIR9400
- C706X
- 505
- NTMOS
- CGS
- GENERIC DEVICE

HART OPTION

- TAG XXXXX
- DESCRIPTOR XXXXX
- DATE DD/MMM/YYYY
- MESSAGE XXXXX
- FINAL ASSY NUM XXXXX

RTC

- DISPLAYED Y/N
- SECONDS XX
- MINUTES XX
- HOURS XX
- DAY XX
- MONTH XX
- YEAR XX

RS485

- BAUD RATE →
- PARITY →
- POLL ADDRESS XXXX

BAUD RATE

- 1200
- 2400
- 4800
- 9600
- 19.2K

PARITY

- NONE
- EVEN
- ODD

OUTPUT MODE

- STANDARD
- REPLICATE

BACKLIGHT CTRL

- OFF
- ON
- AUTOMATIC

WRITE PROTECT

- CHANGE STATE
- CHANGE PASSWORD
- WRITE PROTECT XXXX

OP FEEDBACK FLT

- OFF
- ON

GENERAL INFO

- MANUFACTURER →
- MODEL UD-10
- TAG XXXXX
- DESCRIPTOR XXXXX
- DATE DD/MMM/YYYY
- MESSAGE XXXXX
- FINAL ASSY NUM XXXXX
- DEVICE ID XXXXX

DET-TRONICS
6901 WEST 110TH STREET
MINNEAPOLIS, MN 55438
USA

FAULT

LOW CAL LINE	ON/OFF
EE FAULT	ON/OFF
ADC FAULT	ON/OFF
24V FAULT	ON/OFF
FLASH FAULT	ON/OFF
RAM FAULT	ON/OFF
WDT FAULT	ON/OFF
12V FAULT	ON/OFF
5V FAULT	ON/OFF
1.25V FAULT	ON/OFF
O/P LOOP FAULT	ON/OFF
INPUT LOOP FAULT	ON/OFF
0V FAULT	ON/OFF
ADC REF FAULT	ON/OFF

FAULT/STATUS

- OP MODE XXXXX
- FAULT Y/N
- STATUS Y/N

STATUS

ANY FAULT	ON/OFF
CAL ACTIVE	ON/OFF
WARM UP	ON/OFF
LOW RELAY ACTIVE	ON/OFF
HI RELAY ACTIVE	ON/OFF
AUX RELAY ACTIVE	ON/OFF
CURRENT FIXED	ON/OFF
MB WRITE PROTECT	ON/OFF
HART SELF TEST	ON/OFF
LON ATTACHED	ON/OFF
RESPONSE TEST	ON/OFF
MANUAL SELF TEST	ON/OFF
INPUT HART	ON/OFF

DISPLAY HISTORY

RUNNING HOURS	XXXX
MAX TEMP	XX.XX C
MAX TEMP TIME	XX:XX:XX
MIN TEMP	XX.XX C
MIN TEMP TIME	XX:XX:XX
RESET MAX MIN	
MAX RESET TEMP	XX.XX C
MAX RESET TIME	XX:XX:XX
MIN RESET TEMP	XX.XX C
MIN RESET TIME	XX:XX:XX

HISTORY

- DISPLAY HISTORY →
- EVENT LOG →

EVENT LOG

EVENT	XXXXX
DATE	DD/MMM/YYYY
TIME	HH:MM:SS

DISPLAY INFO

- RTC →
- SERIAL NUMBER XXXXX
- I/O BOARD ID XXX
- MFG DATE DD/MMM/YYYY
- F/W REV XXXXX
- UNIVERSAL REV XXXXX
- FIELD DEV REV XXXXX
- RUNNING HOURS XXXXX
- TEMPERATURE XX.XX C
- HEATER CTRL AUTO/ON/OFF
- BACKLIGHT CTRL AUTO/ON/OFF
- INPUT VOLTAGE XX.XX

RTC

DISPLAYED	Y/N
SECONDS	XX
MINUTES	XX
HOURS	XX
DAY	XX
MONTH	XX
YEAR	XX

RS485

- BAUD RATE XXXXX
- PARITY XXXXX
- POLL ADDRESS XXXXX

DEBUG MENU

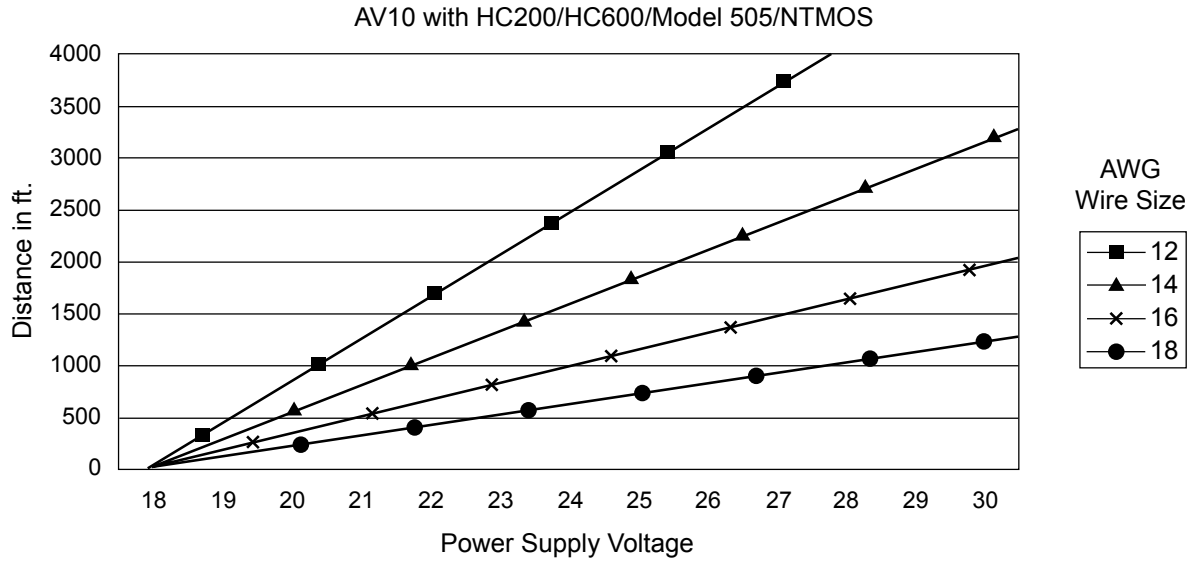
- HART ERRORS XXXXX
- MODBUS ERRORS XXXXX
- OUTPUT READBACK XX.XX MA
- ANALOG INPUT XX.XX MA

APPENDIX I – AV10 WITH AUTROPOINT HC200

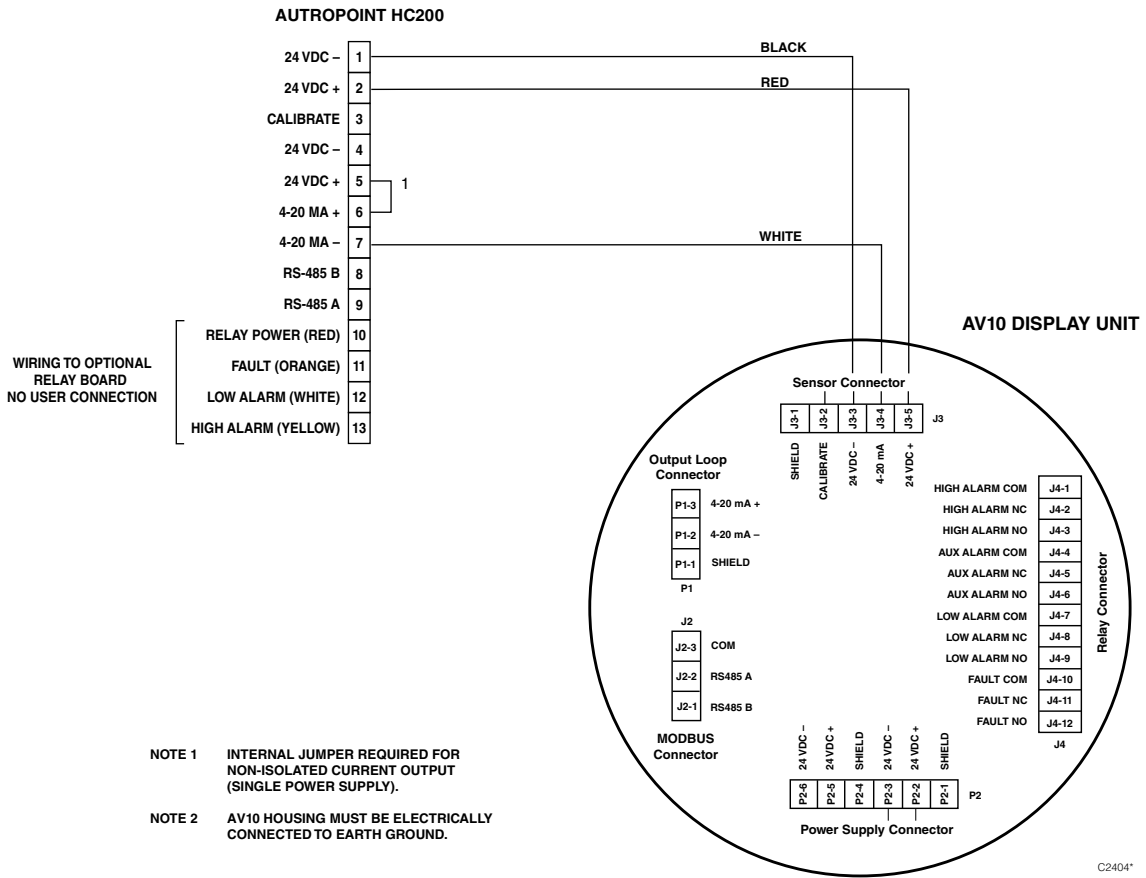
NOTE

For complete information regarding the HC200 Gas Detector, refer to instruction manual HC200_igb.

WIRING



Notes: Maximum cable length from power source to AV10 is 2000 feet.
Maximum cable length from AV10 to sensor/STB termination box is 2000 feet.



Model HC200 Wired Directly to AV10

ORIENTATION

It is highly recommended that the HC200 be installed in the horizontal position. The detector is not position-sensitive in terms of its ability to detect gas. However, the weather baffle assembly provides superior performance when the HC200 is installed with the baffle in a horizontal position.



CORRECT

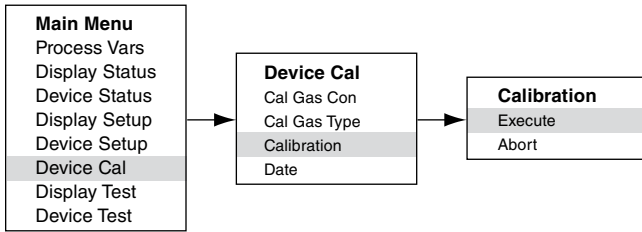


INCORRECT

CALIBRATION

To initiate calibration of the HC200 from the AV10 Display:

- Using the magnet to activate the switches on the AV10 display, navigate to the "Calibration" menu.

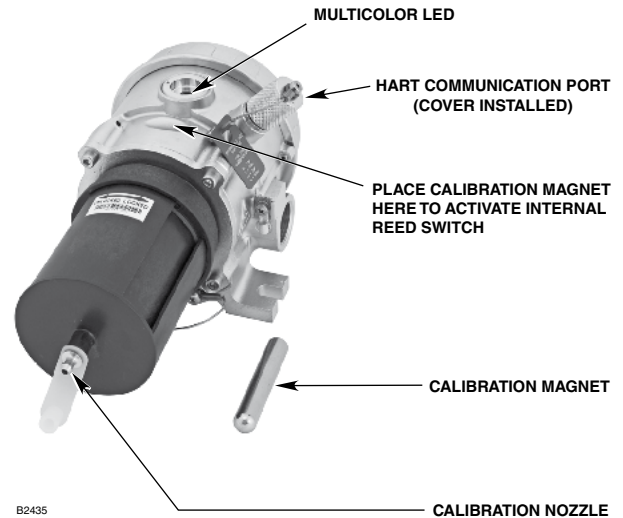


- Activate "Execute" (Enter/Select) to start calibration.
- The AV10 will display "Waiting for Zero" on the main display screen, with a solid red LED on the HC200 housing illuminated.
- The AV10 will then display "Waiting for Gas" on the screen, while the LED on the HC200 is flashing red.
- Apply calibration gas to the HC200
- The AV10 will display "Waiting for Span" on the screen, while a red flashing LED on the HC200 housing is illuminated.
- When the AV10 displays "Remove Cal Gas" on the screen and the LED on the HC200 housing is off, remove the calibration gas.
- After successful calibration, the AV10 automatically returns to the normal display with the green LED illuminated on the HC200 housing.

To initiate calibration from the HC200 while monitoring calibration using the AV10 display:

- Using the magnet, activate the magnetic calibration switch on the HC200 detector. See Figure below. The LED turns from green to red.
- The AV10 will display "Waiting for Zero" on the main display screen, with a solid red LED on the HC200 housing illuminated.
- The AV10 will then display "Waiting for Gas" on the screen, while the LED on the HC200 is flashing red.
- Apply calibration gas to the HC200 detector.
- The AV10 will display "Waiting for Span" on the screen, while a red flashing LED on the HC200 housing is illuminated.
- When the AV10 displays "Remove Cal Gas" on the screen and the LED on the HC200 housing is off, remove the calibration gas.
- After successful calibration, the AV10 automatically returns to the normal mode with the green LED illuminated on the HC200.

AV10 mA Output During Calibration (AV10 with HC200)		
AV10 Display Reading	Standard Mode	Replicate Mode
Waiting for Zero	3.8	2.2
Waiting for Gas	3.8	2.0
Waiting for Span	3.8	2.0
Remove Cal Gas	3.8	1.8
Back to Normal	4.0	4.0



AutoPoint HC200 Gas Detector

MENU STRUCTURE

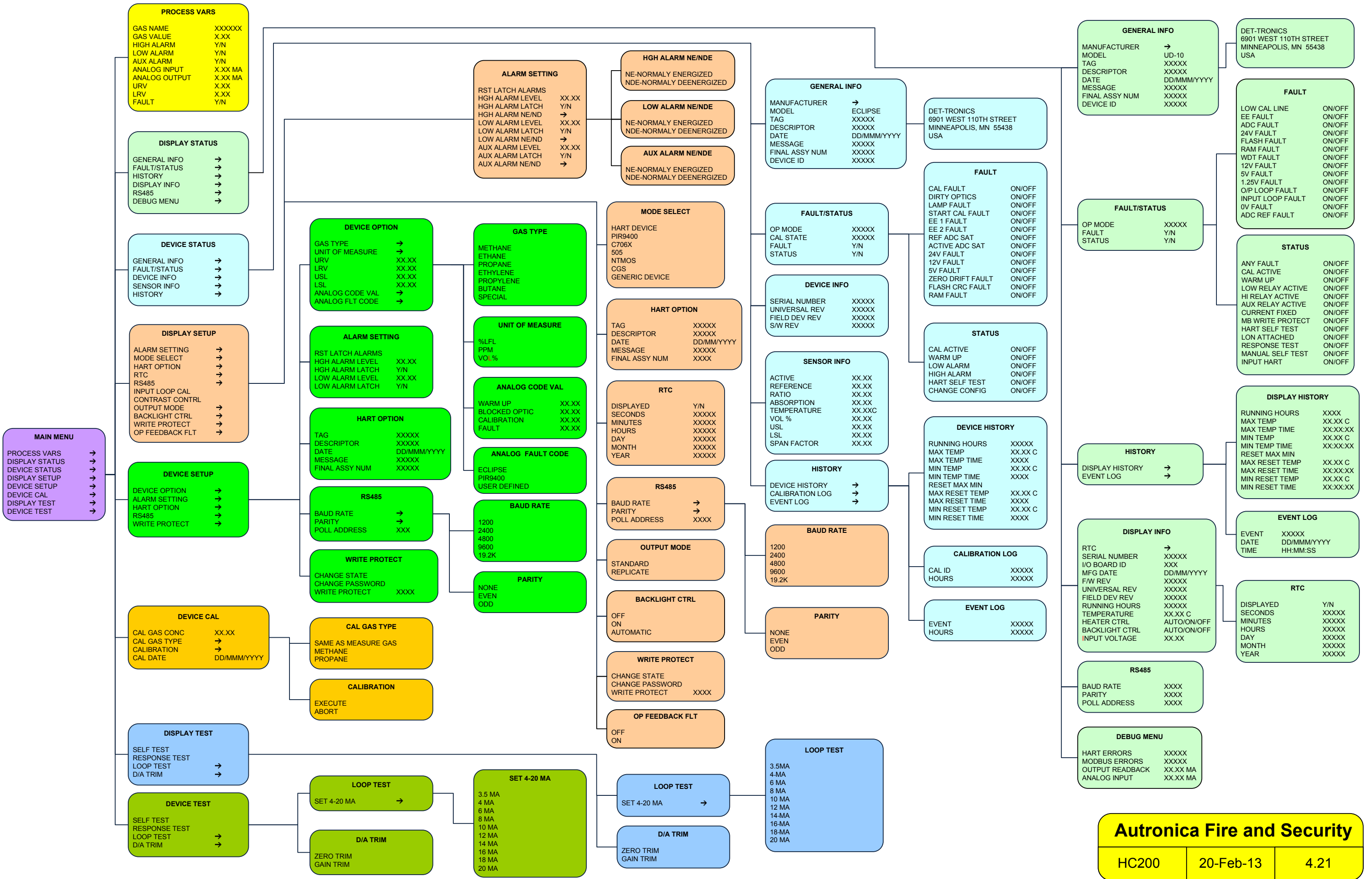
AV10 with AutoPoint HC200

Refer to the following menu when using the AV10's LCD display and internal magnetic switches.

When connecting a HART Communicator to the AV10's 4-20 mA output, refer to the "AV10 HART" menu in Appendix E.

MENU HELP

*Status menus only allow the user to view the data.
The Setup menus allow the user to both view and edit the data.*



PROCESS VARS

GAS NAME	XXXXXX
GAS VALUE	X.XX
HIGH ALARM	Y/N
LOW ALARM	Y/N
AUX ALARM	Y/N
ANALOG INPUT	X.XX MA
ANALOG OUTPUT	X.XX MA
URV	X.XX
LRV	X.XX
FAULT	Y/N

DISPLAY STATUS

GENERAL INFO	→
FAULT/STATUS	→
HISTORY	→
DISPLAY INFO	→
RS485	→
DEBUG MENU	→

DEVICE STATUS

GENERAL INFO	→
FAULT/STATUS	→
DEVICE INFO	→
SENSOR INFO	→
HISTORY	→

DISPLAY SETUP

ALARM SETTING	→
MODE SELECT	→
HART OPTION	→
RTC	→
RS485	→
INPUT LOOP CAL	→
CONTRAST CONTRL	→
OUTPUT MODE	→
BACKLIGHT CTRL	→
WRITE PROTECT	→
OP FEEDBACK FLT	→

DEVICE SETUP

DEVICE OPTION	→
ALARM SETTING	→
HART OPTION	→
RS485	→
WRITE PROTECT	→

DEVICE CAL

CAL GAS CONC	XX.XX
CAL GAS TYPE	→
CALIBRATION	→
CAL DATE	DD/MM/YYYY

DISPLAY TEST

SELF TEST	→
RESPONSE TEST	→
LOOP TEST	→
D/A TRIM	→

DEVICE TEST

SELF TEST	→
RESPONSE TEST	→
LOOP TEST	→
D/A TRIM	→

ALARM SETTING

RST LATCH ALARMS	
HGH ALARM LEVEL	XX.XX
HGH ALARM LATCH	Y/N
HGH ALARM NE/ND	→
LOW ALARM LEVEL	XX.XX
LOW ALARM LATCH	Y/N
LOW ALARM NE/ND	→
AUX ALARM LEVEL	XX.XX
AUX ALARM LATCH	Y/N
AUX ALARM NE/ND	→

HGH ALARM NE/DE

NE-NORMALLY ENERGIZED
NDE-NORMALLY DEENERGIZED

LOW ALARM NE/DE

NE-NORMALLY ENERGIZED
NDE-NORMALLY DEENERGIZED

AUX ALARM NE/DE

NE-NORMALLY ENERGIZED
NDE-NORMALLY DEENERGIZED

DEVICE OPTION

GAS TYPE	→
UNIT OF MEASURE	→
URV	XX.XX
LRV	XX.XX
USL	XX.XX
LSL	XX.XX
ANALOG CODE VAL	→
ANALOG FLT CODE	→

GAS TYPE

METHANE
ETHANE
PROPANE
ETHYLENE
PROPYLENE
BUTANE
SPECIAL

MODE SELECT

HART DEVICE
PIR9400
C706X
505
NTMOS
CGS
GENERIC DEVICE

ALARM SETTING

RST LATCH ALARMS	
HGH ALARM LEVEL	XX.XX
HGH ALARM LATCH	Y/N
LOW ALARM LEVEL	XX.XX
LOW ALARM LATCH	Y/N

UNIT OF MEASURE

%LFL
PPM
VOL %

HART OPTION

TAG	XXXXX
DESCRIPTOR	XXXXX
DATE	DD/MM/YYYY
MESSAGE	XXXXX
FINAL ASSY NUM	XXXX

HART OPTION

TAG	XXXXX
DESCRIPTOR	XXXXX
DATE	DD/MM/YYYY
MESSAGE	XXXXX
FINAL ASSY NUM	XXXXX

ANALOG CODE VAL

WARM UP	XX.XX
BLOCKED OPTIC	XX.XX
CALIBRATION	XX.XX
FAULT	XX.XX

RTC

DISPLAYED	Y/N
SECONDS	XXXXX
MINUTES	XXXXX
HOURS	XXXXX
DAY	XXXXX
MONTH	XXXXX
YEAR	XXXXX

RS485

BAUD RATE	→
PARITY	→
POLL ADDRESS	XXX

ANALOG FAULT CODE

ECLIPSE
PIR9400
USER DEFINED

RS485

BAUD RATE	→
PARITY	→
POLL ADDRESS	XXXX

WRITE PROTECT

CHANGE STATE	
CHANGE PASSWORD	
WRITE PROTECT	XXXX

BAUD RATE

1200
2400
4800
9600
19.2K

OUTPUT MODE

STANDARD
REPLICATE

BAUD RATE

1200
2400
4800
9600
19.2K

PARITY

NONE
EVEN
ODD

BACKLIGHT CTRL

OFF
ON
AUTOMATIC

WRITE PROTECT

CHANGE STATE	
CHANGE PASSWORD	
WRITE PROTECT	XXXX

OP FEEDBACK FLT

OFF
ON

LOOP TEST

3.5 MA
4 MA
6 MA
8 MA
10 MA
12 MA
14 MA
16 MA
18 MA
20 MA

LOOP TEST

SET 4-20 MA →

SET 4-20 MA

3.5 MA
4 MA
6 MA
8 MA
10 MA
12 MA
14 MA
16 MA
18 MA
20 MA

LOOP TEST

SET 4-20 MA →

D/A TRIM

ZERO TRIM
GAIN TRIM

D/A TRIM

ZERO TRIM
GAIN TRIM

GENERAL INFO

MANUFACTURER	→
MODEL	ECLIPSE
TAG	XXXXX
DESCRIPTOR	XXXXX
DATE	DD/MM/YYYY
MESSAGE	XXXXX
FINAL ASSY NUM	XXXXX
DEVICE ID	XXXXX

DET-TRONICS
6901 WEST 110TH STREET
MINNEAPOLIS, MN 55438
USA

FAULT/STATUS

OP MODE	XXXXX
CAL STATE	XXXXX
FAULT	Y/N
STATUS	Y/N

DEVICE INFO

SERIAL NUMBER	XXXXX
UNIVERSAL REV	XXXXX
FIELD DEV REV	XXXXX
S/W REV	XXXXX

SENSOR INFO

ACTIVE	XX.XX
REFERENCE	XX.XX
RATIO	XX.XX
ABSORPTION	XX.XX
TEMPERATURE	XX.XXC
VOL %	XX.XX
USL	XX.XX
LSL	XX.XX
SPAN FACTOR	XX.XX

HISTORY

DEVICE HISTORY	→
CALIBRATION LOG	→
EVENT LOG	→

FAULT

CAL FAULT	ON/OFF
DIRTY OPTICS	ON/OFF
LAMP FAULT	ON/OFF
START CAL FAULT	ON/OFF
EE 1 FAULT	ON/OFF
EE 2 FAULT	ON/OFF
REF ADC SAT	ON/OFF
ACTIVE ADC SAT	ON/OFF
24V FAULT	ON/OFF
12V FAULT	ON/OFF
5V FAULT	ON/OFF
ZERO DRIFT FAULT	ON/OFF
FLASH CRC FAULT	ON/OFF
RAM FAULT	ON/OFF

STATUS

CAL ACTIVE	ON/OFF
WARM UP	ON/OFF
LOW ALARM	ON/OFF
HIGH ALARM	ON/OFF
HART SELF TEST	ON/OFF
CHANGE CONFIG	ON/OFF

DEVICE HISTORY

RUNNING HOURS	XXXXX
MAX TEMP	XX.XX C
MAX TEMP TIME	XXXX
MIN TEMP	XX.XX C
MIN TEMP TIME	XXXX
RESET MAX MIN	
MAX RESET TEMP	XX.XX C
MAX RESET TIME	XXXX
MIN RESET TEMP	XX.XX C
MIN RESET TIME	XXXX

CALIBRATION LOG

CAL ID	XXXXX
HOURS	XXXXX

EVENT LOG

EVENT	XXXXX
HOURS	XXXXX

GENERAL INFO

MANUFACTURER	→
MODEL	UD-10
TAG	XXXXX
DESCRIPTOR	XXXXX
DATE	DD/MM/YYYY
MESSAGE	XXXXX
FINAL ASSY NUM	XXXXX
DEVICE ID	XXXXX

DET-TRONICS
6901 WEST 110TH STREET
MINNEAPOLIS, MN 55438
USA

FAULT/STATUS

OP MODE	XXXXX
FAULT	Y/N
STATUS	Y/N

FAULT

LOW CAL LINE	ON/OFF
EE FAULT	ON/OFF
ADC FAULT	ON/OFF
24V FAULT	ON/OFF
FLASH FAULT	ON/OFF
RAM FAULT	ON/OFF
WDT FAULT	ON/OFF
12V FAULT	ON/OFF
5V FAULT	ON/OFF
1.25V FAULT	ON/OFF
O/P LOOP FAULT	ON/OFF
INPUT LOOP FAULT	ON/OFF
0V FAULT	ON/OFF
ADC REF FAULT	ON/OFF

STATUS

ANY FAULT	ON/OFF
CAL ACTIVE	ON/OFF
WARM UP	ON/OFF
LOW RELAY ACTIVE	ON/OFF
HI RELAY ACTIVE	ON/OFF
AUX RELAY ACTIVE	ON/OFF
CURRENT FIXED	ON/OFF
MB WRITE PROTECT	ON/OFF
HART SELF TEST	ON/OFF
LON ATTACHED	ON/OFF
RESPONSE TEST	ON/OFF
MANUAL SELF TEST	ON/OFF
INPUT HART	ON/OFF

HISTORY

DISPLAY HISTORY	→
EVENT LOG	→

DISPLAY HISTORY

RUNNING HOURS	XXXX
MAX TEMP	XX.XX C
MAX TEMP TIME	XX:XX:XX
MIN TEMP	XX.XX C
MIN TEMP TIME	XX:XX:XX
RESET MAX MIN	
MAX RESET TEMP	XX.XX C
MAX RESET TIME	XX:XX:XX
MIN RESET TEMP	XX.XX C
MIN RESET TIME	XX:XX:XX

DISPLAY INFO

RTC	→
SERIAL NUMBER	XXXXX
I/O BOARD ID	XXX
MFG DATE	DD/MM/YYYY
F/W REV	XXXXX
UNIVERSAL REV	XXXXX
FIELD DEV REV	XXXXX
RUNNING HOURS	XXXXX
TEMPERATURE	XX.XX C
HEATER CTRL	AUTO/ON/OFF
BACKLIGHT CTRL	AUTO/ON/OFF
INPUT VOLTAGE	XX.XX

EVENT LOG

EVENT	XXXXX
DATE	DD/MM/YYYY
TIME	HH:MM:SS

RS485

BAUD RATE	XXXX
PARITY	XXXX
POLL ADDRESS	XXXX

RTC

DISPLAYED	Y/N
SECONDS	XXXXX
MINUTES	XXXXX
HOURS	XXXXX
DAY	XXXXX
MONTH	XXXXX
YEAR	XXXXX

DEBUG MENU

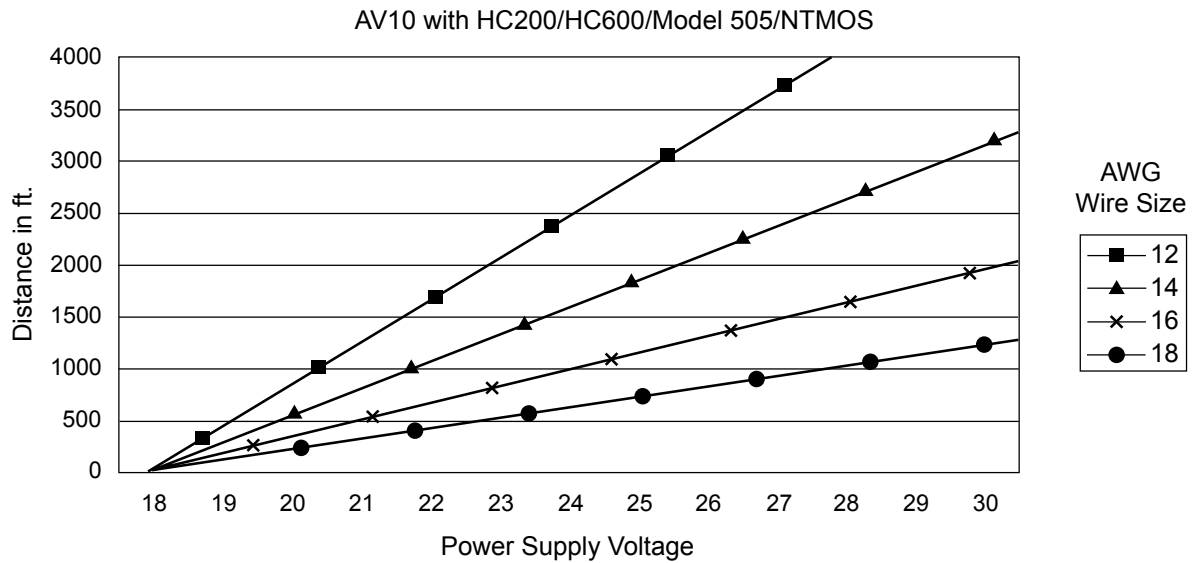
HART ERRORS	XXXXX
MODBUS ERRORS	XXXXX
OUTPUT READBACK	XX.XX MA
ANALOG INPUT	XX.XX MA

APPENDIX J – AV10 WITH AUTROPATH HC600 OPEN PATH GAS DETECTOR

NOTE

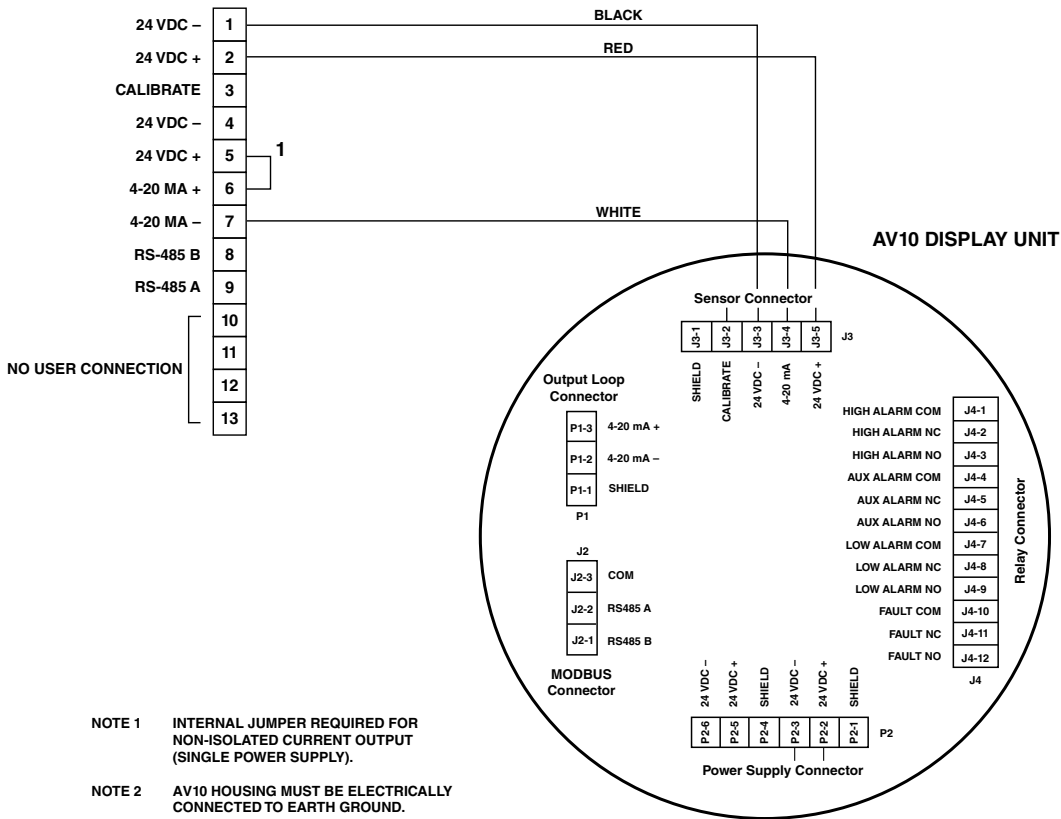
For complete information regarding the HC600 Gas Detector, refer to instruction manual hc600_igb.

WIRING



Notes: Maximum cable length from power source to AV10 is 2000 feet.
Maximum cable length from AV10 to sensor/STB termination box is 2000 feet.

AUTOPATH HC600



NOTE 1 INTERNAL JUMPER REQUIRED FOR NON-ISOLATED CURRENT OUTPUT (SINGLE POWER SUPPLY).

NOTE 2 AV10 HOUSING MUST BE ELECTRICALLY CONNECTED TO EARTH GROUND.

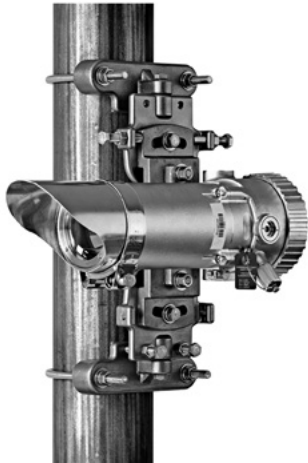
C2405*

Model HC600 Wired Directly to AV10

ORIENTATION

HC600 modules must be affixed to a solid, non-vibrating structure capable of supporting a minimum of 100 lbs (46 kg), located within the system's rated separation distance. See examples below.

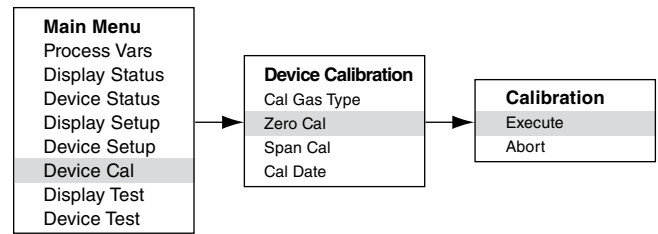
In all cases, the maximum movement of the supporting structure under all anticipated operating conditions must be no more than ± 0.25 degrees. When using a vertical post, the post should be absolutely stable and without vibration. Generally, when the post is set into the ground, the portion below grade should be set in concrete at least 1 meter deep.



CALIBRATION

To initiate zero calibration of the HC600 from the AV10 Display:

- Using the magnet to activate the switches on the AV10 display, navigate to the "Calibration" menu.

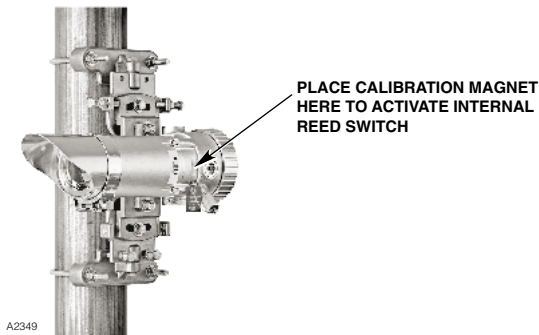


- Activate "Execute" (Enter/Select) to start calibration.
- The AV10 will display "Waiting for Zero" on the main display screen, with a solid red LED on the HC600 housing illuminated.
- After the calibration is successfully completed, the AV10 automatically returns to the normal display with the green LED illuminated on the HC600 housing.

AV10 mA Output During Calibration (AV10 with HC600)		
AV10 Display Reading	Standard Mode	Replicate Mode
Waiting for Zero	3.8	2.2
Back to Normal	4.0	4.0

To initiate zero calibration from the HC600:

1. Using the magnet, activate the magnetic calibration switch on the HC600 receiver. See Figure below. The green LED will turn red.
2. The AV10 will display “Waiting for Zero” on the main display screen, with a solid red LED on the HC600 housing illuminated.
3. After the calibration is successfully completed, the AV10 automatically returns to the normal display with the green LED illuminated on the HC600 housing.



Location of Receiver's Internal Magnetic Switch

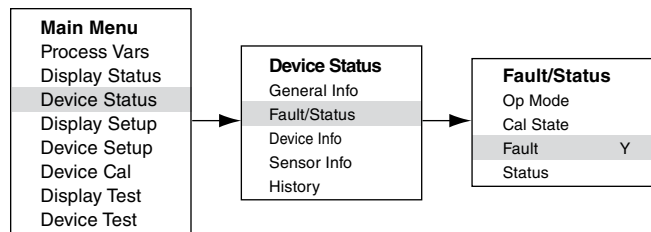
HC600 TRANSMITTER LAMP FAULT CONDITION

If the HC600 system experiences a Transmitter (Tx) Lamp Fault condition, the AV10 display will not indicate a fault condition and its output will remain at 4 mA. The HC600 system is still fully functional and able to detect gas. If a gas alarm condition should occur, the alarm condition will override the Tx Lamp Fault condition.

The HC600 system indicates a fault condition by amber indicator LEDs on both the transmitter and the receiver.

To verify an HC600 Tx Lamp Fault condition, within the Menu Structure of the AV10 Display navigate to the device Fault/Status menu:

The Fault status will indicate Y (Yes). Click on “Fault” and the Fault menu will identify the fault as a “Lamp Fault”.



For complete information regarding HC600 fault indications and operation of the HC600 transmitter lamps, refer to the HC600 instruction manual, number 95-8556.

MENU STRUCTURE

AV10 with AutoPath HC600 open path gas detector

Refer to the following menu when using the AV10's LCD display and internal magnetic switches.

When connecting a HART Communicator to the AV10's 4-20 mA output, refer to the “AV10 HART” menu in Appendix E.

MENU HELP

*Status menus only allow the user to view the data.
The Setup menus allow the user to both view and edit the data.*

MAIN MENU

- PROCESS VARS →
- DISPLAY STATUS →
- DEVICE STATUS →
- DISPLAY SETUP →
- DEVICE SETUP →
- DEVICE CAL →
- DISPLAY TEST →
- DEVICE TEST →

PROCESS VARS

GAS NAME	XXXXXX
GAS VALUE	X.XX
HIGH ALARM	Y/N
LOW ALARM	Y/N
AUX ALARM	Y/N
ANALOG INPUT	X.XX MA
ANALOG OUTPUT	X.XX MA
URV	X.XX
LRV	X.XX
FAULT	Y/N

DISPLAY STATUS

- GENERAL INFO →
- FAULT/STATUS →
- HISTORY →
- DISPLAY INFO →
- RS485 →
- DEBUG MENU →

DEVICE STATUS

- GENERAL INFO →
- FAULT/STATUS →
- DEVICE INFO →
- SENSOR INFO →
- HISTORY →

DISPLAY SETUP

- ALARM SETTING →
- MODE SELECT →
- HART OPTION →
- RTC →
- RS485 →
- INPUT LOOP CAL →
- CONTRAST CONTRL →
- OUTPUT MODE →
- BACKLIGHT CTRL →
- WRITE PROTECT →
- OP FEEDBACK FLT →

DEVICE SETUP

- DEVICE OPTION →
- ALARM SETTING →
- HART OPTION →
- RS485 →
- RTC →
- WRITE PROTECT →

DEVICE CAL

CAL GAS CONC	XX.XX
CAL GAS TYPE	→
ZERO CALIBRATION	→
SPAN CAL FACTOR	XXXXX
CAL DATE	DD/MMM/YYYY

DISPLAY TEST

- SELF TEST →
- RESPONSE TEST →
- LOOP TEST →
- D/A TRIM →

DEVICE TEST

- SELF TEST →
- RESPONSE TEST →
- LOOP TEST →
- D/A TRIM →

DEVICE OPTION

GAS NAME	→
UNIT OF MEASURE	→
URV	XXXXX
LRV	XXXXX
USL	XXXXX
LSL	XXXXX
ANALOG CODE VAL	→
ANALOG FLT CODE	→
BLOCK OPTIC TIME	XXXXXX
HEATER CONTROL	X

ALARM SETTING

RST LATCH ALARMS	
HGH ALARM LEVEL	XXXXX
HGH ALARM LATCH	Y/N
LOW ALARM LEVEL	XXXXX
LOW ALARM LATCH	Y/N

HART OPTION

TAG	XXXXX
DESCRIPTOR	XXXXX
DATE	DD/MMM/YYYY
MESSAGE	XXXXX
FINAL ASSY NUM	XXXXX

RS485

BAUD RATE	→
PARITY	→
POLL ADDRESS	XXX

RTC

SYNC W/DISP	
SECONDS	XXXX
MINUTES	XXXX
HOURS	XXXX
DAY	XXXX
MONTH	XXXX
YEAR	XXXX

WRITE PROTECT

CHANGE STATE	
CHANGE PASSWORD	
WRITE PROTECT	XXXX

CAL GAS TYPE

SAME AS MEASURE GAS	
METHANE	
PROPANE	

ZERO CALIBRATION

EXECUTE	
ABORT	

LOOP TEST

SET 4-20 MA	→
-------------	---

D/A TRIM

ZERO TRIM	
GAIN TRIM	

LOOP TEST

SET 4-20 MA	→
-------------	---

D/A TRIM

ZERO TRIM	
GAIN TRIM	

ALARM SETTING

RST LATCH ALARMS	
HGH ALARM LEVEL	XX.XX
HGH ALARM LATCH	Y/N
HGH ALARM NE/ND	→
LOW ALARM LEVEL	XX.XX
LOW ALARM LATCH	Y/N
LOW ALARM NE/ND	→
AUX ALARM LEVEL	XX.XX
AUX ALARM LATCH	Y/N
AUX ALARM NE/ND	→

GAS NAME

METHANE	
ETHANE	
PROPANE	
PROPYLENE	
BUTANE	
SPECIAL	

UNIT OF MEASURE

LFLM	
VOLM	
OP/LM	

ANALOG CODE VAL

WARM UP	XXXXXX
BLOCKED OPTIC	XXXXXX
CALIBRATION	XXXXXX
FAULT	XXXXXX

ANALOG FLT CODE

OPECL	
PIR9400	
USER DEFINED	

BAUD RATE

1200	
2400	
4800	
9600	
19.2K	

PARITY

NONE	
EVEN	
ODD	

SET 4-20 MA

3.5 MA	
4 MA	
6 MA	
8 MA	
10 MA	
12 MA	
14 MA	
16 MA	
18 MA	
20 MA	

SET 4-20 MA

3.5 MA	
4 MA	
6 MA	
8 MA	
10 MA	
12 MA	
14 MA	
16 MA	
18 MA	
20 MA	

HGH ALARM NE/NDE

NE-NORMALY ENERGIZED	
NDE-NORMALY DEENERGIZED	

LOW ALARM NE/NDE

NE-NORMALY ENERGIZED	
NDE-NORMALY DEENERGIZED	

AUX ALARM NE/NDE

NE-NORMALY ENERGIZED	
NDE-NORMALY DEENERGIZED	

MODE SELECT

HART DEVICE	
PIR9400	
C706X	
505	
NTMOS	
CGS	
GENERIC DEVICE	

HART OPTION

TAG	XXXXX
DESCRIPTOR	XXXXX
DATE	DD/MMM/YYYY
MESSAGE	XXXXX
FINAL ASSY NUM	XXXXX

RTC

DISPLAYED	Y/N
SECONDS	XX
MINUTES	XX
HOURS	XX
DAY	XX
MONTH	XX
YEAR	XX

RS485

BAUD RATE	XXXX
PARITY	XXXX
POLL ADDRESS	XXXX

OUTPUT MODE

STANDARD	
REPLICATE	

BACKLIGHT CTRL

OFF	
ON	
AUTOMATIC	

WRITE PROTECT

CHANGE STATE	
CHANGE PASSWORD	
WRITE PROTECT	XXXX

OP FEEDBACK FLT

OFF	
ON	

GENERAL INFO

MANUFACTURER	→
MODEL	OPECL_RX
TAG	XXXX
DESCRIPTOR	XXXXX
DATE	DD/MMM/YYYY
MESSAGE	XXXX
FINAL ASSY NUM	XXXX
DEVICE ID	XXXX

DET-TRONICS
6901 WEST 110TH STREET
MINNEAPOLIS, MN 55438
USA

FAULT

CAL FAULT	ON/OFF
DIRTY OPTICS	ON/OFF
LAMP FAULT	ON/OFF
START CAL FAULT	ON/OFF
EE FAULT	ON/OFF
NOISE FAULT	ON/OFF
REF ADC SAT	ON/OFF
ACTIVE ADC SAT	ON/OFF
24V FAULT	ON/OFF
ALIGN ADC SAT	ON/OFF
ALIGN FAULT	ON/OFF
ZERO DRIFT FAULT	ON/OFF
FLASH CRC FAULT	ON/OFF
RAM FAULT	ON/OFF
ALIGN WARNING	ON/OFF
BLOCKED OPTICS	ON/OFF

STATUS

CAL ACTIVE	ON/OFF
WARM UP	ON/OFF
LOW ALARM	ON/OFF
HIGH ALARM	ON/OFF
HART SELF TEST	ON/OFF
ALIGN MODE	ON/OFF
CHANGE CONFIG	ON/OFF

FAULT/STATUS

OP MODE	XXXXX
CAL STATE	XXXXX
FAULT	Y/N
STATUS	Y/N

DEVICE INFO

RTC	→
SERIAL NUMBER	XXXXX
UNIVERSAL REV	XXXXX
FIELD DEV REV	XXXXX
S/W REV	XXXXX

RTC

SECONDS	XX
MINUTES	XX
HOURS	XX
DAY	XX
MONTH	XX
YEAR	XX

SENSOR INFO

ACTIVE	XX.XX
REFERENCE	XX.XX
RATIO	XX.XX
GAS GAIN	XX.XX
TEMPERATURE	XX.XX C
ABSORPTION	XX.XX
COEFFICIENT	→

COEFFICIENT

COEFF A	X.XXXXX
COEFF B	X.XXXXX
COEFF C	X.XXXXX
COEFF D	X.XXXXX
COEFF E	X.XXXXX

HISTORY

- DEVICE HISTORY →
- CALIBRATION LOG →
- EVENT LOG →

DEVICE HISTORY

RUNNING HOURS	XXXX
MAX TEMP	XX.XX C
MAX TEMP TIME	X:XX:XX
MIN TEMP	XX.XX C
MIN TEMP TIME	X:XX:XX
RESET MAX MIN	
MAX RESET TEMP	XX.XX C
MAX RESET TIME	XX:XX:XX
MIN RESET TEMP	XX.XX C
MIN RESET TIME	XX:XX:XX

BAUD RATE

1200	
2400	
4800	
9600	
19.2K	

PARITY

NONE	
EVEN	
ODD	

CALIBRATION LOG

CAL ID	XXXXX
DTIME	MM/DD-HH:MM

EVENT LOG

EVENT	XXXXX
DTIME	MM/DD-HH:MM

GENERAL INFO

MANUFACTURER	→
MODEL	UD-10
TAG	XXXXX
DESCRIPTOR	XXXXX
DATE	DD/MMM/YYYY
MESSAGE	XXXXX
FINAL ASSY NUM	XXXXX
DEVICE ID	XXXXX

DET-TRONICS
6901 WEST 110TH STREET
MINNEAPOLIS, MN 55438
USA

FAULT

LOW CAL LINE	ON/OFF
EE FAULT	ON/OFF
ADC FAULT	ON/OFF
24V FAULT	ON/OFF
FLASH FAULT	ON/OFF
RAM FAULT	ON/OFF
WDT FAULT	ON/OFF
12V FAULT	ON/OFF
5V FAULT	ON/OFF
1.25V FAULT	ON/OFF
O/P LOOP FAULT	ON/OFF
INPUT LOOP FAULT	ON/OFF
0V FAULT	ON/OFF
ADC REF FAULT	ON/OFF

FAULT/STATUS

OP MODE	XXXXX
FAULT	Y/N
STATUS	Y/N

STATUS

ANY FAULT	ON/OFF
CAL ACTIVE	ON/OFF
WARM UP	ON/OFF
LOW RELAY ACTIVE	ON/OFF
AUX RELAY ACTIVE	ON/OFF
CURRENT FIXED	ON/OFF
MB WRITE PROTECT	ON/OFF
HART SELF TEST	ON/OFF
LON ATTACHED	ON/OFF
RESPONSE TEST	ON/OFF
MANUAL SELF TEST	ON/OFF
INPUT HART	ON/OFF

HISTORY

- DISPLAY HISTORY →
- EVENT LOG →

DISPLAY HISTORY

RUNNING HOURS	XXXX
MAX TEMP	XX.XX C
MAX TEMP TIME	XX:XX:XX
MIN TEMP	XX.XX C
MIN TEMP TIME	XX:XX:XX
RESET MAX MIN	
MAX RESET TEMP	XX.XX C
MAX RESET TIME	XX:XX:XX
MIN RESET TEMP	XX.XX C
MIN RESET TIME	XX:XX:XX

EVENT LOG

EVENT	XXXXX
DATE	DD/MMM/YYYY
TIME	HH:MM:SS

DISPLAY INFO

RTC	→
SERIAL NUMBER	XXXXX
I/O BOARD ID	XXX
MFG DATE	DD/MMM/YYYY
F/W REV	XXXXX
UNIVERSAL REV	XXXXX
FIELD DEV REV	XXXXX
RUNNING HOURS	XXXXX
TEMPERATURE	XX.XX C
HEATER CTRL	AUTO/ON/OFF
BACKLIGHT CTRL	AUTO/ON/OFF
INPUT VOLTAGE	XX.XX

RTC

DISPLAYED	Y/N
SECONDS	XX
MINUTES	XX
HOURS	XX
DAY	XX
MONTH	XX
YEAR	XX

RS485

BAUD RATE	XXXXX
PARITY	XXXXX
POLL ADDRESS	XXXXX

DEBUG MENU

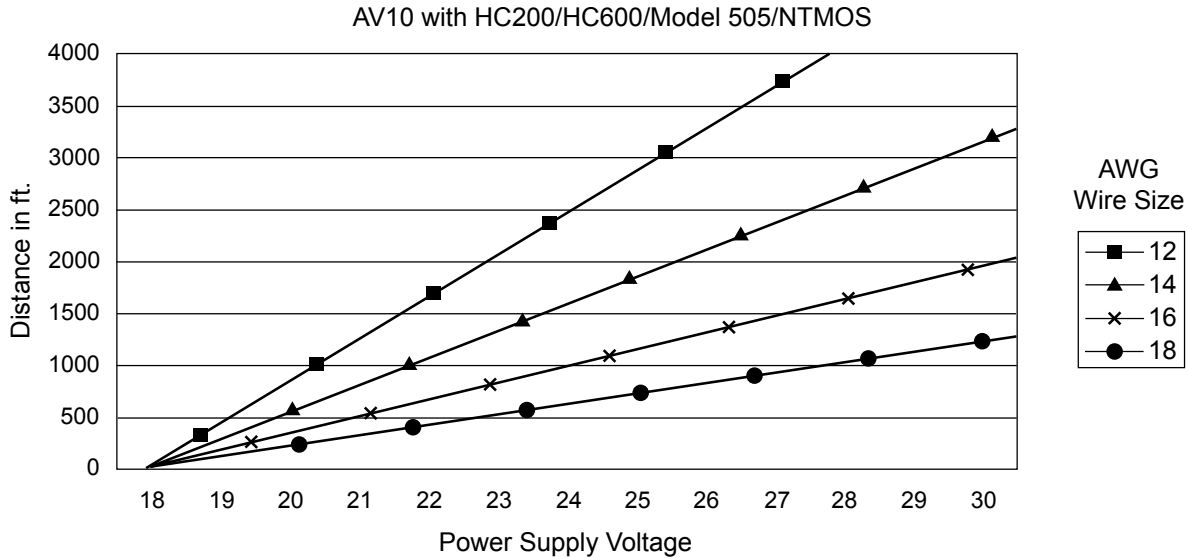
HART ERRORS	XXXXX
MODBUS ERRORS	XXXXX
OUTPUT READBACK	XX.XX MA
ANALOG INPUT	XX.XX MA

APPENDIX K – AV10 WITH NTMOS H2S SENSOR

NOTE

For complete information regarding the NTMOS Gas Detector, refer to instruction manual 95-8604.

WIRING



Notes: Maximum cable length from power source to AV10 is 2000 feet.
Maximum cable length from AV10 to sensor/STB termination box is 2000 feet.

INSTALLATION NOTES

NOTE

Never use silicone grease with the NTMOS detector.

NOTE

A junction box spacer or standoff may be used to increase the distance between the device and the mounting surface, thereby facilitating installation and use of the ampoule calibrator.

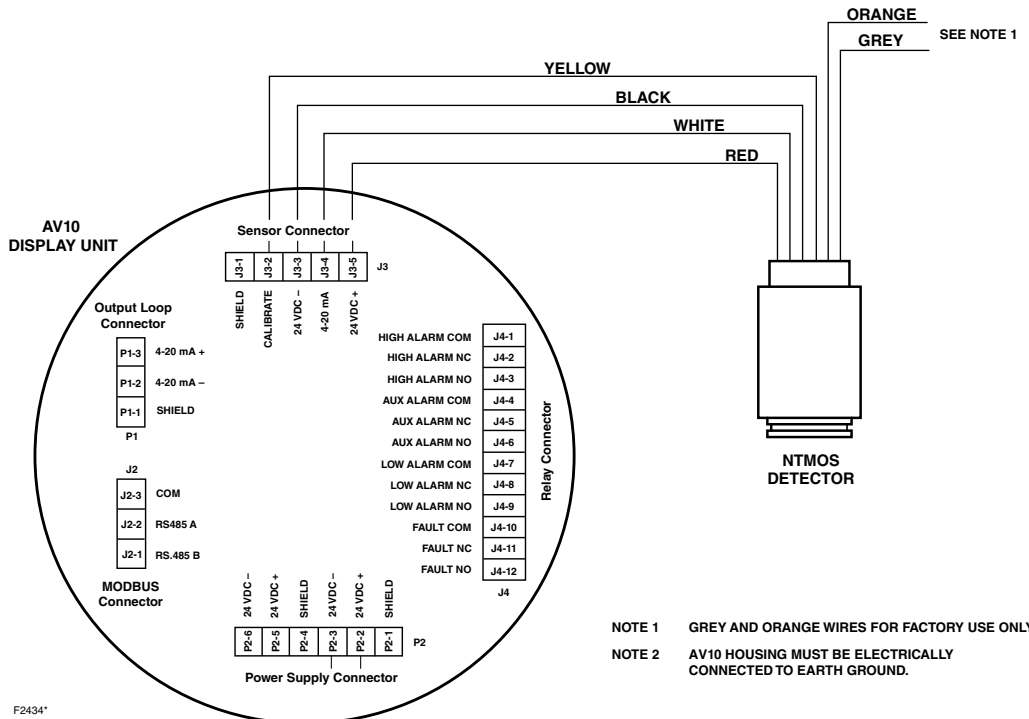
NOTE

For non-HART applications, the NTMOS detector can be wired to the Sensor Connector terminals (J3) on the AV10 module. If HART communication will be used, the NTMOS detector must be wired to the optional NTMOS Connector Board, located on the inside bottom of the AV10 housing. Refer to the appropriate wiring diagram.

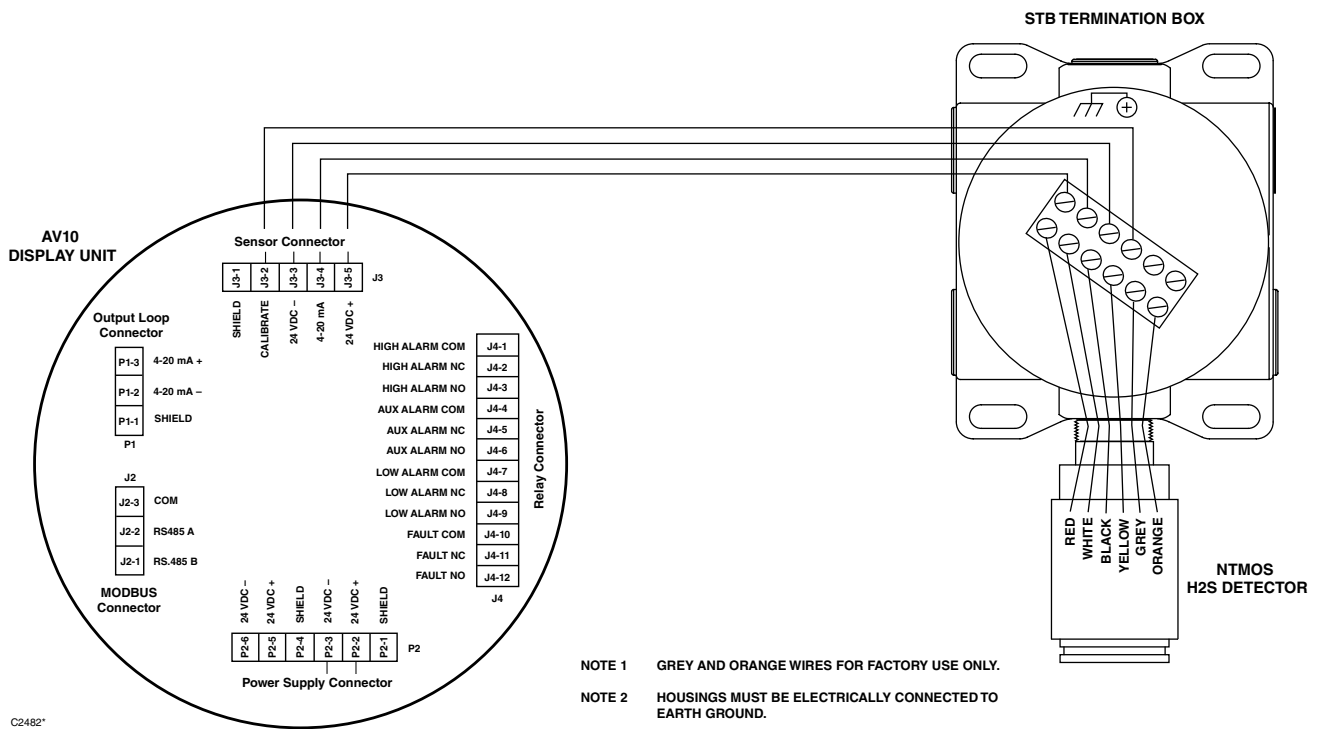
Proper Termination of Orange and Grey Wires

The orange and grey wires on the NTMOS detector are for factory use only. Proper field termination of these wires can be accomplished in any of the following ways:

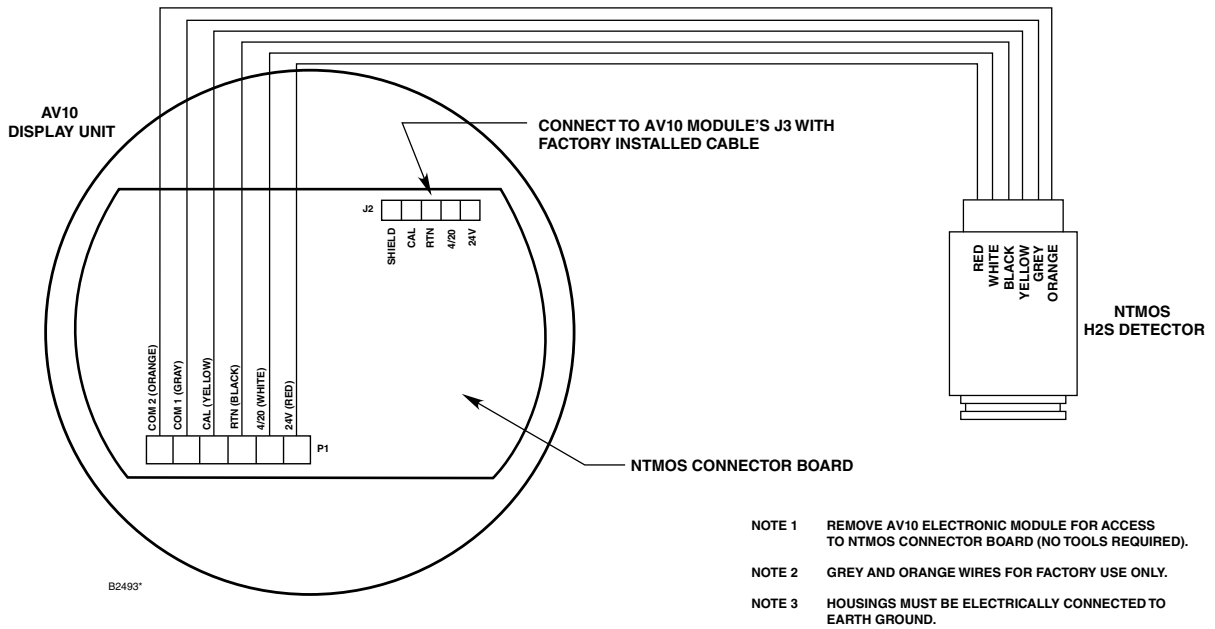
- If wiring to optional NTMOS Connector Board, use the terminals provided (grey to COM 1 & orange to COM 2).
- If codes allow, they can be taped off and left unconnected.
- Connect both wires to the “Shield” terminal (J3-1).
- Connect both wires to Power Supply Minus (24 Vdc -).
- Connect to unused terminals in the STB Sensor Termination Box.



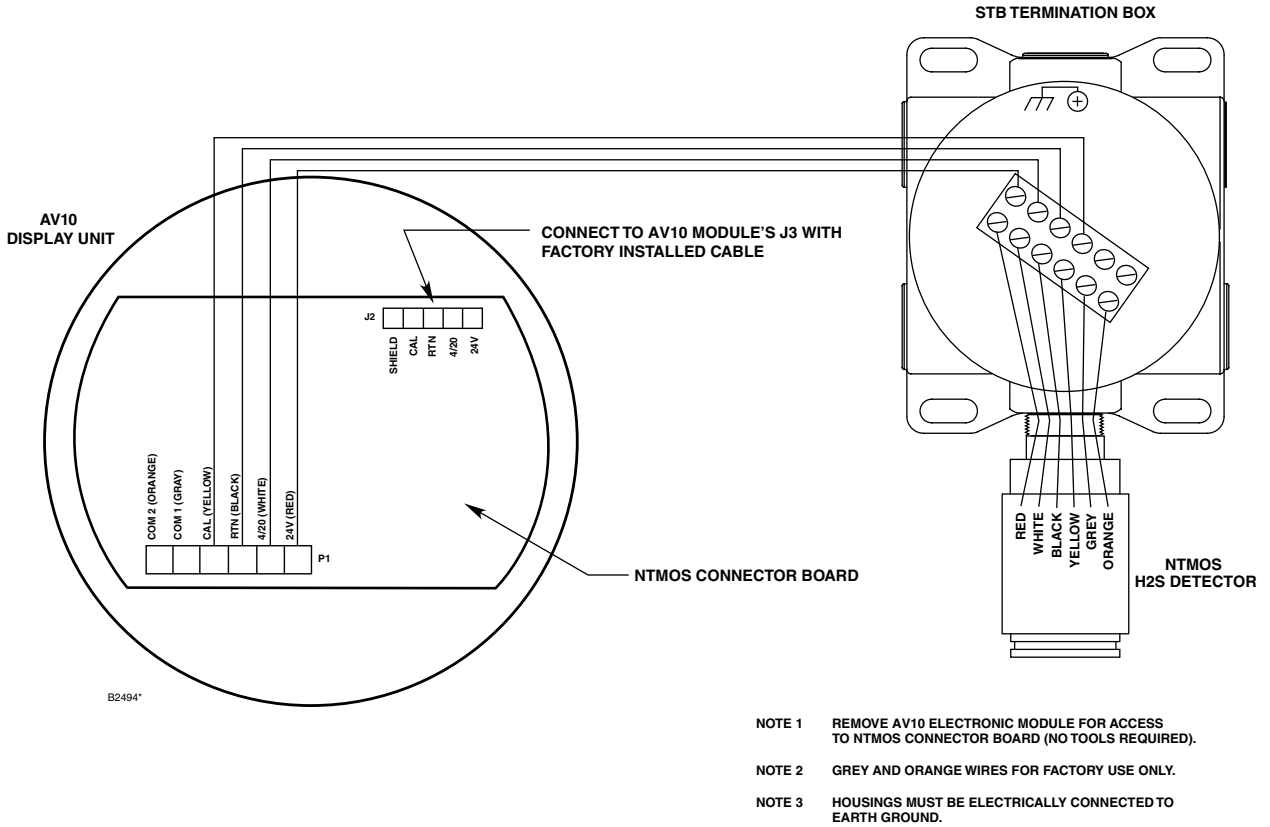
NTMOS Detector Wired Directly to AV10 (Non-HART Applications Only)



AV10 Wired to NTMOS Detector with STB Termination Box (Non-HART Applications Only)



NTMOS detector Wired Directly to AV10 via the NTMOS Connector Board
(NTMOS Connector board is **Required** for HART Communication)



AV10 with NTMOS Connector Board Wired to NTMOS detector with STB Termination Box
(NTMOS Connector board is **Required** for HART Communication)

ORIENTATION

The AV10/NTMOS assembly must be mounted with the detector pointing down (see photo below).



- Humidification Tube Calibration Kit (116-010272-001) with bottled 50 ppm H₂S in air (116-227117-014). For complete information regarding use of the Humidification Tube Calibration Kit, refer to instruction manual number 95-8648.

NOTE

When calibrating with bottled 50 ppm H₂S in air, the humidification tube **must** be used.

CALIBRATION

Calibration Notes

The NTMOS detector must be calibrated using 50 ppm H₂S in air (never use H₂S in nitrogen).

Autronica provides two acceptable sources of 50 ppm H₂S calibration gas for use with NTMOS detectors.

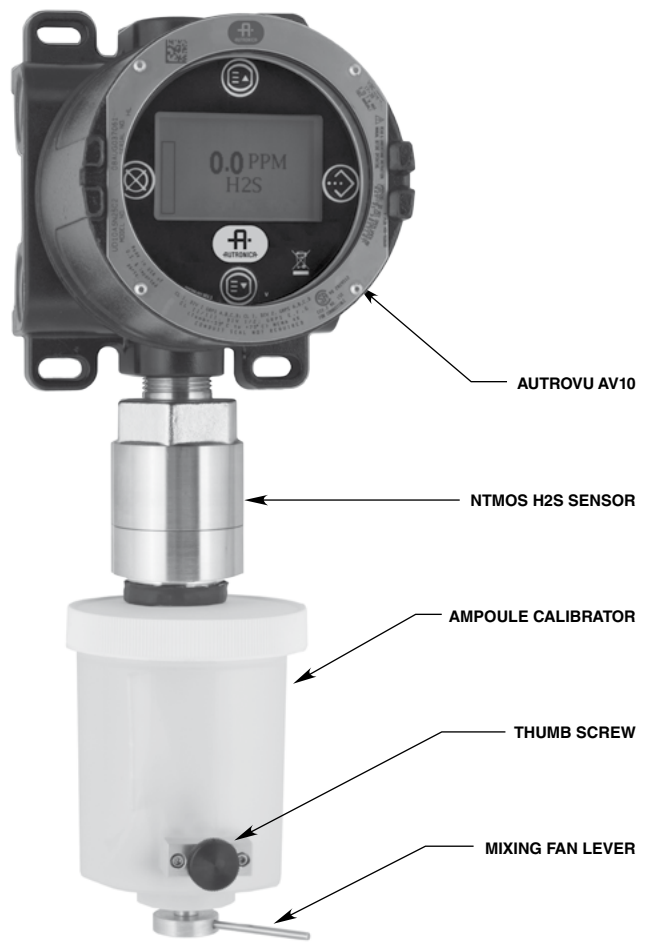
WARNING

The use of any other H₂S calibration mixture will produce inaccurate calibration results, possibly resulting in a dangerous condition if the detector under-reports the level of H₂S.

- 50 ppm Ampoule Calibration Kit (116-007098-005) with 50 ppm ampoules (116-225741-001)

To operate the Ampoule Calibrator:

- Remove the cover and insert a 50 ppm H₂S ampoule into the ampoule holder inside the calibrator. Tighten the thumb screw until snug.
- Place the cover back on the calibrator and connect it snugly to the NTMOS detector.
- Tighten the thumb screw until the ampoule breaks.
- Rotate the mixing fan by slowly turning the mixing fan lever.



Ampoule Calibrator Attached to NTMOS detector



Humidification Tube Calibration Kit Attached to NTMOS detector

5. Apply calibration gas to the detector.
6. With 50 ppm H₂S applied to the detector, the AV10 display will continue to show “Waiting for Span” while the span calibration is being performed.
7. When the AV10 Display shows “Remove Cal Gas” the calibration is complete. Remove calibration gas from the detector.
8. When the gas level falls below the lowest alarm setpoint, the AV10 automatically exits the Calibrate mode and returns to normal operating mode.

MENU STRUCTURE

AV10 with NTMOS H₂S Detector

Refer to the following menu when using the AV10’s LCD display and internal magnetic switches.

When connecting a HART Communicator to the AV10’s 4-20 mA output, refer to the “AV10 HART” menu in Appendix E.

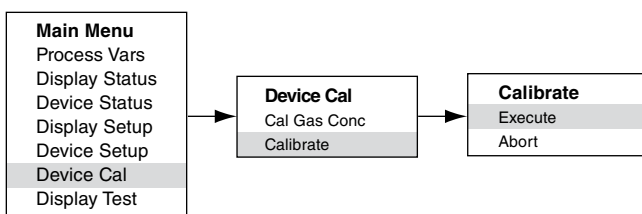
MENU HELP

Status menus only allow the user to view the data. The Setup menus allow the user to both view and edit the data.

Calibration Procedure

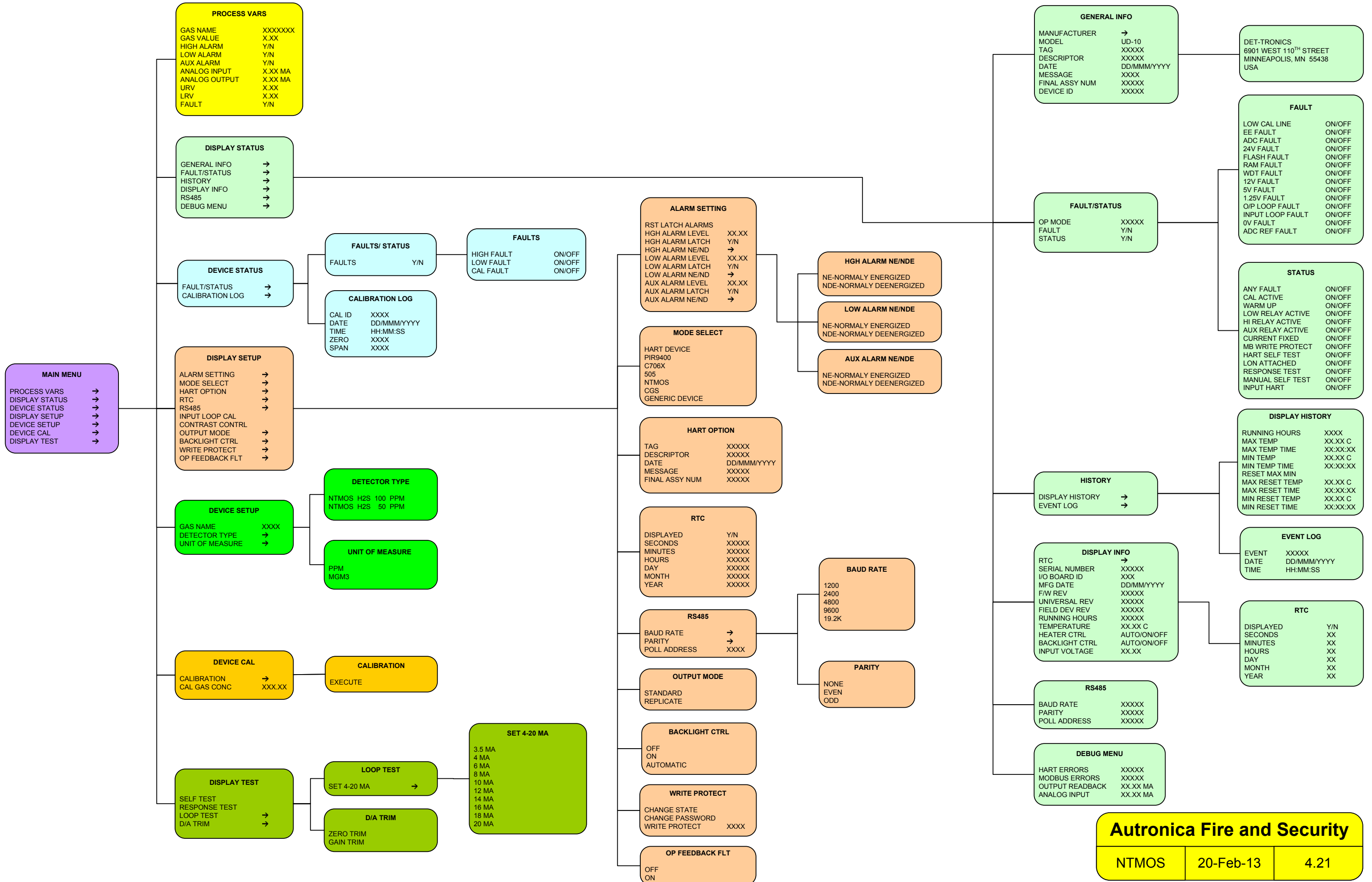
To calibrate the NTMOS detector with the AutoVu AV10 Display:

1. Touch the magnet to the ENTER/SELECT button to display the Main Menu. Follow the illustration below to navigate to the “Calibrate” menu.



2. Activate “Execute” (Enter/Select) to begin the zero calibration.
3. The AV10 will display “Waiting for Zero” on the main display screen.
4. When zero calibration is complete (approximately one minute), the AV10 will display “Waiting for Span” on the main display screen.

AV10 mA Output During Calibration (AV10 with NTMOS)		
AV10 Display Reading	Standard Mode	Replicate Mode
Waiting for Zero	3.8	2.2
Waiting for Gas	3.8	3.8
Waiting for Span	3.8	3.8
Remove Cal Gas	3.8	3.8
Back to Normal	4.0	4.0

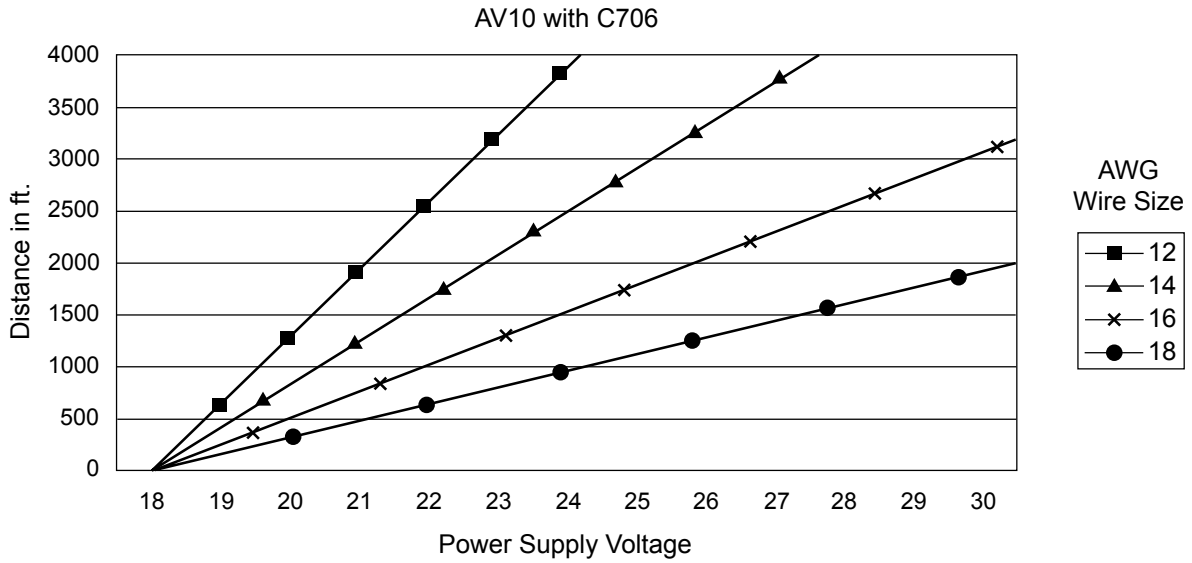


APPENDIX L – AV10 WITH C706X TOXIC GAS SENSOR

NOTE

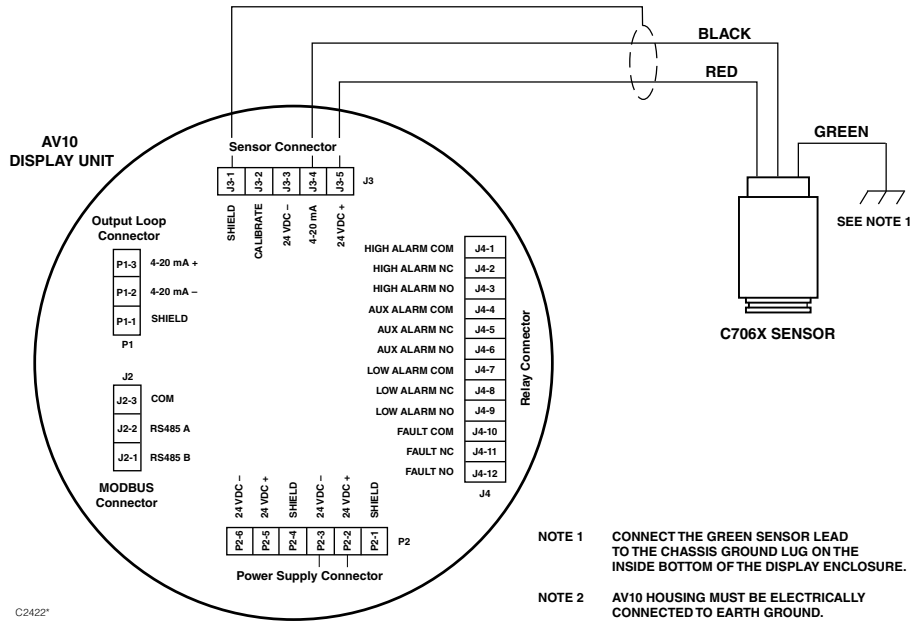
For complete information regarding the C7064E H2S Gas Sensor, refer to instruction manual 95-8396.
For the C7067E Chlorine Gas Sensor, refer to instruction manual 95-8439.

WIRING

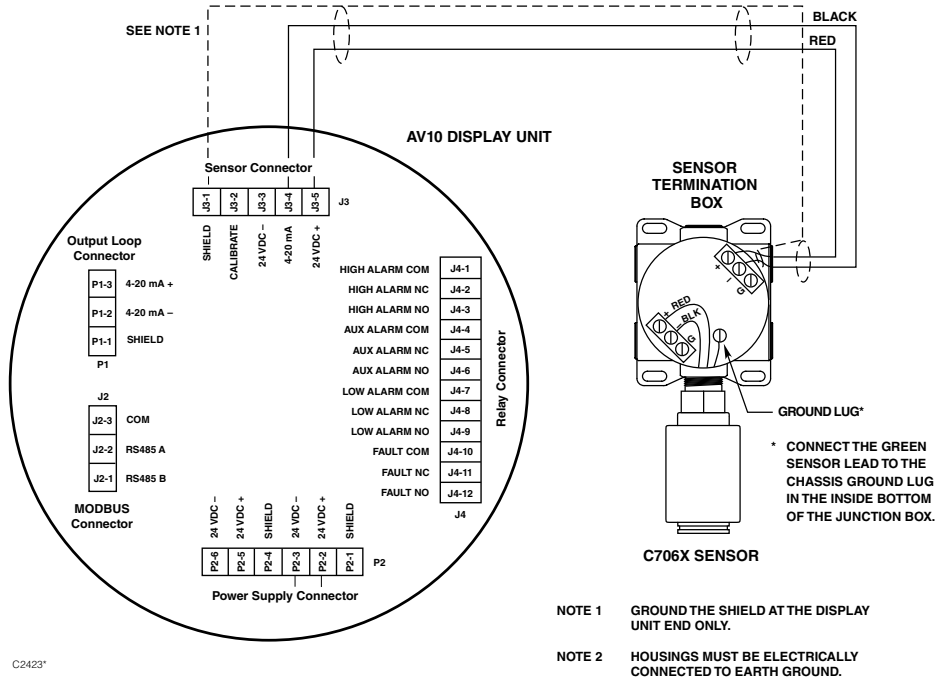


Notes: Maximum cable length from power source to AV10 is 2000 feet.
Maximum cable length from AV10 to sensor/STB termination box is 2000 feet.

Model C7065E oxygen sensor is not supported.



C706X Sensor Wired Directly to AV10



AV10 Wired to C706X Sensor with STB Termination Box

INSTALLATION

WIRING REQUIREMENTS

The simplest installation involves installing the sensor into one of the AV10 openings and connecting the wiring directly to the AV10. If the installation requires separation of the C706X sensor and the AV10 Display, the sensor can be connected to a STB sensor termination box, and the C706X/STB combination wired to the AV10. In this case, shielded cable is recommended to help protect against interference caused by extraneous electrical "noise." In applications where the cable is installed in conduit, the conduit should not be used for wiring to other electrical equipment whenever possible. If other equipment power wiring is run in the same conduit, the cabling **must** be shielded. The maximum allowable distance between the C706X sensor and AV10 Display Unit is limited by the resistance of the cabling used.

INSTALLATION AND WIRING PROCEDURE

1. Determine the best mounting locations for the detectors.
2. Install the C706X sensor within the proper opening in the AV10 or STB junction box. Mount the AV10/C706X with the sensor oriented vertically and the opening pointing down. The AV10 should be electrically connected to earth ground.

NOTE

The electrochemical sensor cell does not need to be installed within the C706X housing while installing and wiring the detector/junction box. It is recommended to keep the sensor in the manufacturer's sealed shipping bag in a cool storage environment until actual power-up and calibration commissioning is performed. This will ensure that the sensor will provide maximum longevity.

3. Terminate all three C706X conductors at the proper terminals. Refer to the appropriate illustration for details.
4. Double check that all wiring is the proper size and type and has been installed correctly. Check operating voltage at the C706X sensor and the AV10 Display Unit.

NOTE

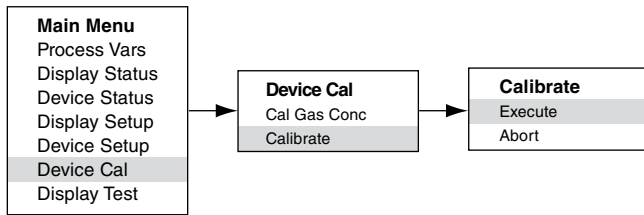
Do not apply power to the system with the junction box cover removed unless the area has been de-classified.

5. Proceed with startup and calibration.

CALIBRATION

To initiate calibration of the C706X sensor from the AV10 Display:

1. Using the magnet to activate the switches on the AV10 display, navigate to the "Calibrate" menu.



2. Activate "Execute" (Enter/Select) to start calibration.
3. The AV10 will display "Waiting for Zero" on the main display screen as it performs zero calibration.
4. When zero calibration is complete, the AV10 will display "Waiting for Gas" on the screen.
5. Apply calibration gas to the sensor.
6. The AV10 will display "Waiting for Span" on the screen while the span calibration is being performed.
7. When the AV10 displays "Remove Cal Gas" on the screen, remove the calibration gas from the sensor.
8. When calibration is complete, "Remove Cal Gas" is no longer displayed on the screen and the AV10 automatically returns to the normal operating mode.

MENU STRUCTURE

AV10 with C706X Series Sensor

Refer to the following menu when using the AV10's LCD display and internal magnetic switches.

When connecting a HART Communicator to the AV10's 4-20 mA output, refer to the "AV10 HART" menu in Appendix E.

MENU HELP

*Status menus only allow the user to view the data.
The Setup menus allow the user to both view and edit the data.*

MAIN MENU

- PROCESS VARS →
- DISPLAY STATUS →
- DEVICE STATUS →
- DISPLAY SETUP →
- DEVICE SETUP →
- DEVICE CAL →
- DISPLAY TEST →

PROCESS VARS

GAS NAME	XXXXXX
GAS VALUE	X.XX
HIGH ALARM	Y/N
LOW ALARM	Y/N
AUX ALARM	Y/N
ANALOG INPUT	X.XX MA
ANALOG OUTPUT	X.XX MA
URV	X.XX
LRV	X.XX
FAULT	Y/N

DISPLAY STATUS

- GENERAL INFO →
- FAULT/STATUS →
- HISTORY →
- DISPLAY INFO →
- RS485 →
- DEBUG MENU →

DEVICE STATUS

- FAULT/STATUS →
- CALIBRATION LOG →

DISPLAY SETUP

- ALARM SETTING →
- MODE SELECT →
- HART OPTION →
- RTC →
- RS485 →
- INPUT LOOP CAL →
- CONTRAST CONTRL →
- OUTPUT MODE →
- BACKLIGHT CTRL →
- WRITE PROTECT →
- OP FEEDBACK FLT →

DEVICE SETUP

- GAS NAME XXXX
- DETECTOR TYPE →

FAULT/STATUS

- FAULTS Y/N

FAULTS

HIGH FAULT	ON/OFF
ZERO DRIFT FAULT	ON/OFF
CAL FAULT	ON/OFF

CALIBRATION LOG

CAL ID	XXXX
DATE	DD/MMM/YYYY
TIME	HH:MM:SS
ZERO	XXXX
SPAN	XXXX

DETECTOR TYPE

C7064	H2S	20	PPM
C7064	H2S	50	PPM
C7064	H2S	100	PPM
C7067	CL2	10	PPM
C7066	CO	100	PPM
C7066	CO	500	PPM
C7066	CO	1000	PPM
C7068	SO2	100	PPM
C7069	NO2	20	PPM

DEVICE CAL

- CALIBRATION →
- CAL GAS CONC XXX.XX

CALIBRATION

- EXECUTE
- ABORT

DISPLAY TEST

- SELF TEST
- RESPONSE TEST
- LOOP TEST →
- D/A TRIM →

LOOP TEST

- SET 4-20 MA →

D/A TRIM

- ZERO TRIM
- GAIN TRIM

SET 4-20 MA

- 3.5 MA
- 4 MA
- 6 MA
- 8 MA
- 10 MA
- 12 MA
- 14 MA
- 16 MA
- 18 MA
- 20 MA

ALARM SETTING

RST LATCH ALARMS	
HGH ALARM LEVEL	XX.XX
HGH ALARM LATCH	Y/N
HGH ALARM NE/ND	→
LOW ALARM LEVEL	XX.XX
LOW ALARM LATCH	Y/N
LOW ALARM NE/ND	→
AUX ALARM LEVEL	XX.XX
AUX ALARM LATCH	Y/N
AUX ALARM NE/ND	→

HGH ALARM NE/NDE

- NE-NORMALY ENERGIZED
- NDE-NORMALY DEENERGIZED

LOW ALARM NE/NDE

- NE-NORMALY ENERGIZED
- NDE-NORMALY DEENERGIZED

AUX ALARM NE/NDE

- NE-NORMALY ENERGIZED
- NDE-NORMALY DEENERGIZED

MODE SELECT

- HART DEVICE
- PIR9400
- C706X
- 505
- NTMOS
- CGS
- GENERIC DEVICE

HART OPTION

TAG	XXXXX
DESCRIPTOR	XXXXX
DATE	DD/MMM/YYYY
MESSAGE	XXXXX
FINAL ASSY NUM	XXXXX

RTC

DISPLAYED	Y/N
SECONDS	XX
MINUTES	XX
HOURS	XX
DAY	XX
MONTH	XX
YEAR	XX

RS485

- BAUD RATE →
- PARITY →
- POLL ADDRESS XXXX

BAUD RATE

- 1200
- 2400
- 4800
- 9600
- 19.2K

PARITY

- NONE
- EVEN
- ODD

OUTPUT MODE

- STANDARD
- REPLICATE

BACKLIGHT CTRL

- OFF
- ON
- AUTOMATIC

WRITE PROTECT

- CHANGE STATE
- CHANGE PASSWORD
- WRITE PROTECT XXXX

OP FEEDBACK FLT

- OFF
- ON

GENERAL INFO

MANUFACTURER	→	UD-10
MODEL		XXXXX
TAG		XXXXX
DESCRIPTOR		XXXXX
DATE		DD/MMM/YYYY
MESSAGE		XXXXX
FINAL ASSY NUM		XXXXX
DEVICE ID		XXXXX

DET-TRONICS
6901 WEST 110TH STREET
MINNEAPOLIS, MN 55438
USA

FAULT

LOW CAL LINE	ON/OFF
EE FAULT	ON/OFF
ADC FAULT	ON/OFF
24V FAULT	ON/OFF
FLASH FAULT	ON/OFF
RAM FAULT	ON/OFF
WDT FAULT	ON/OFF
12V FAULT	ON/OFF
5V FAULT	ON/OFF
1.25V FAULT	ON/OFF
O/P LOOP FAULT	ON/OFF
INPUT LOOP FAULT	ON/OFF
0V FAULT	ON/OFF
ADC REF FAULT	ON/OFF

FAULT/STATUS

- OP MODE XXXXX
- FAULT Y/N
- STATUS Y/N

STATUS

ANY FAULT	ON/OFF
CAL ACTIVE	ON/OFF
WARM UP	ON/OFF
LOW RELAY ACTIVE	ON/OFF
HI RELAY ACTIVE	ON/OFF
AUX RELAY ACTIVE	ON/OFF
CURRENT FIXED	ON/OFF
MB WRITE PROTECT	ON/OFF
HART SELF TEST	ON/OFF
LON ATTACHED	ON/OFF
RESPONSE TEST	ON/OFF
MANUAL SELF TEST	ON/OFF
INPUT HART	ON/OFF

DISPLAY HISTORY

RUNNING HOURS	XXXX
MAX TEMP	XX.XX C
MAX TEMP TIME	XX:XX:XX
MIN TEMP	XX.XX C
MIN TEMP TIME	XX:XX:XX
RESET MAX MIN	XX.XX C
MAX RESET TIME	XX:XX:XX
MIN RESET TEMP	XX.XX C
MIN RESET TIME	XX:XX:XX

HISTORY

- DISPLAY HISTORY →
- EVENT LOG →

EVENT LOG

EVENT	XXXXX
DATE	DD/MMM/YYYY
TIME	HH:MM:SS

DISPLAY INFO

RTC	→	
SERIAL NUMBER	XXXXX	
I/O BOARD ID	XXX	
MFG DATE	DD/MM/YYYY	
F/W REV	XXXXX	
UNIVERSAL REV	XXXXX	
FIELD DEV REV	XXXXX	
RUNNING HOURS	XXXXX	
TEMPERATURE	XX.XX C	
HEATER CTRL	AUTO/ON/OFF	
BACKLIGHT CTRL	AUTO/ON/OFF	
INPUT VOLTAGE	XX.XX	

RTC

DISPLAYED	Y/N
SECONDS	XX
MINUTES	XX
HOURS	XX
DAY	XX
MONTH	XX
YEAR	XX

RS485

BAUD RATE	XXXXX
PARITY	XXXXX
POLL ADDRESS	XXXXX

DEBUG MENU

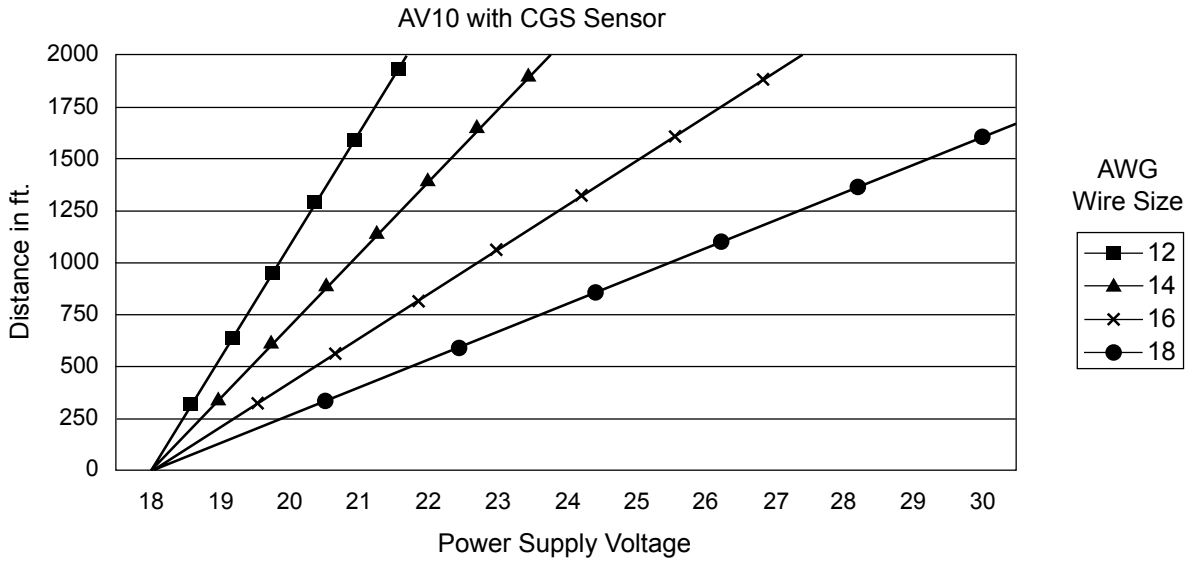
HART ERRORS	XXXXX
MODBUS ERRORS	XXXXX
OUTPUT READBACK	XX.XX MA
ANALOG INPUT	XX.XX MA

Autronica Fire and Security

C706X	20-Feb-13	4.21
-------	-----------	------

APPENDIX M – AV10 WITH MODEL CGS COMBUSTIBLE GAS SENSOR

WIRING



Notes: Maximum cable length from power source to AV10 is 2000 feet.
Maximum cable length from AV10 to CGS sensor is 500 feet
(using 16 AWG cable minimum).

IMPORTANT NOTES

NOTE

The AV10 with CGS Interface option and CGS sensor is certified as a “Gas Detector” and performance approved to standards FM6310/6320, ATEX 60079-29-1, and IEC 60079-29-1.

NOTE

Only Constant Current type CGS sensors may be used with the AV10.

CAUTION

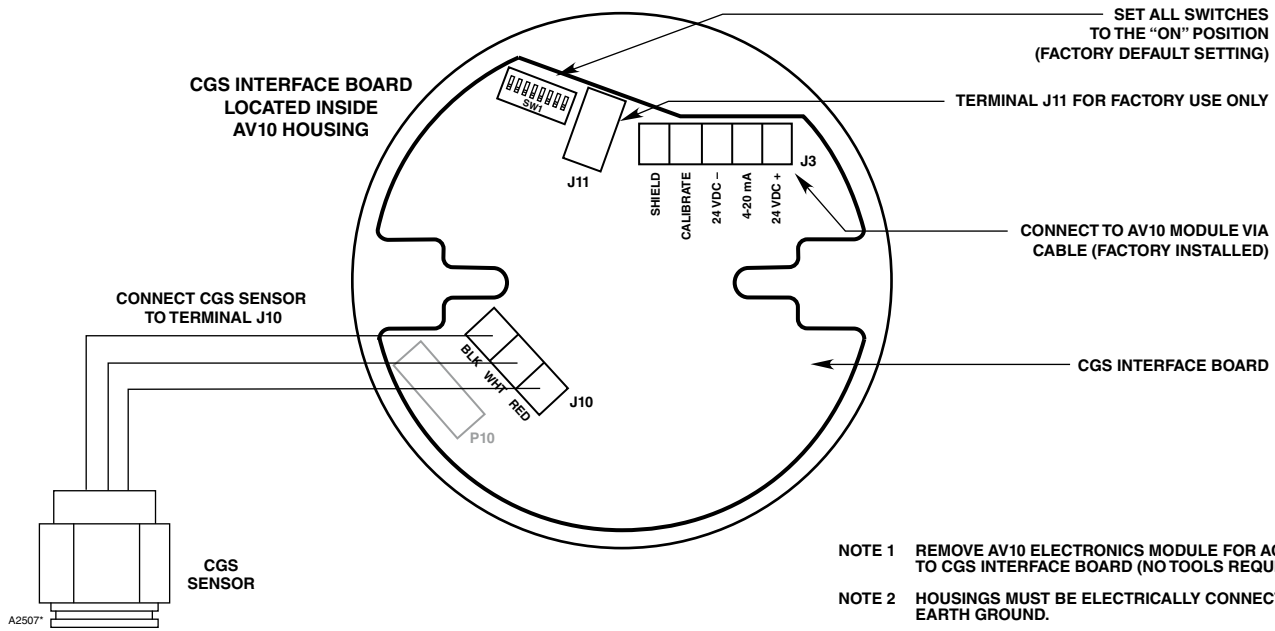
The sintered metal flame arrestor is an integral part of the combustible gas sensor. DO NOT operate the gas detector if the flame arrestor is damaged or missing, since the exposed element is a potential ignition source.

CAUTION

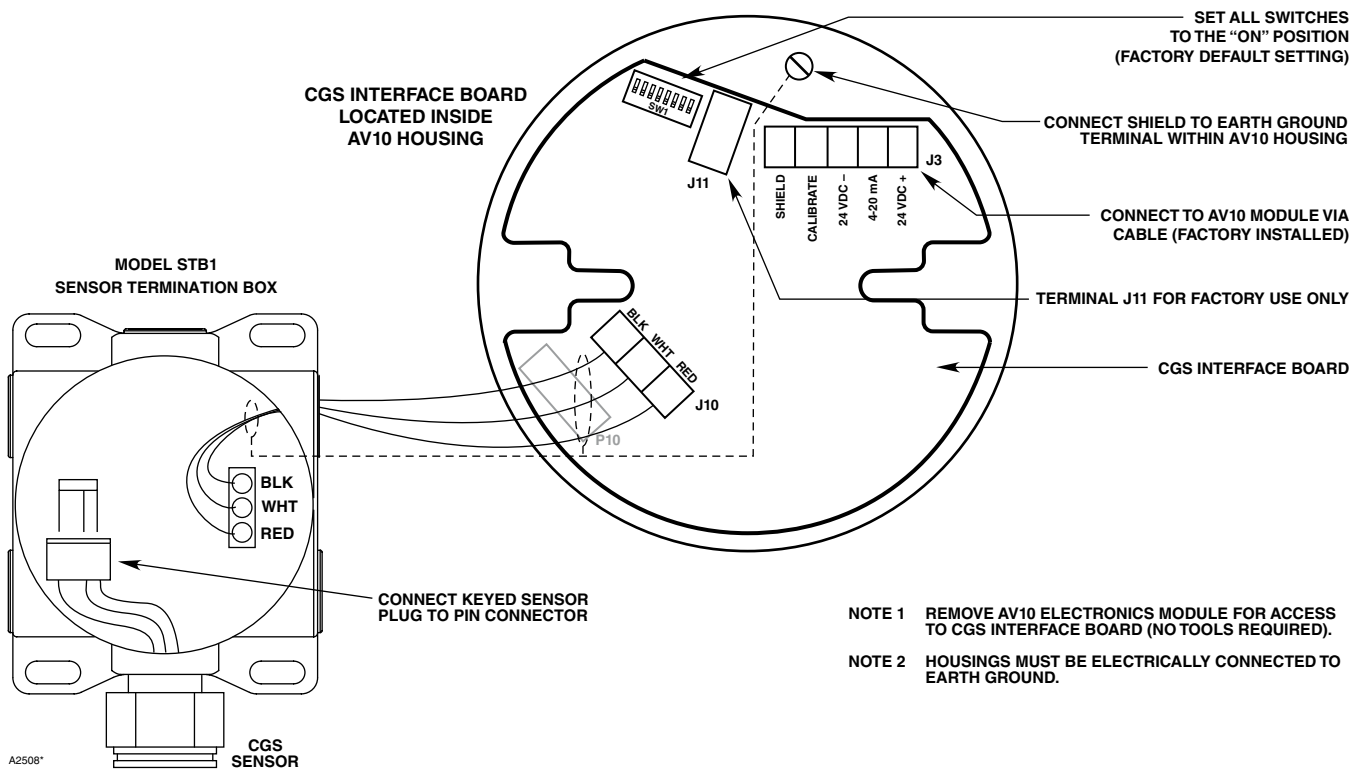
Silicone based lubricants must never be used on or near the CGS sensor, since this can result in irreversible damage to the sensing element.

CAUTION

When used as a stand alone device, the high alarm must always be programmed for latching operation. When used in conjunction with a Control Unit and configured for a non-latching high alarm, the control unit must always latch and require a deliberate manual action to clear a high gas alarm.



CGS Sensor Wired Directly to AV10



AV10 Wired to CGS Sensor with STB Termination Box

INSTALLATION

WIRING REQUIREMENTS

The simplest installation involves installing the sensor into one of the AV10 openings and connecting the wiring directly to the CGS interface board.

Sensor Separation

If the installation requires separation of the CGS sensor and the AV10 Display, the sensor can be connected to a model STB1 sensor termination box, and the CGS/STB combination wired to the AV10.

In this case, shielded cable is recommended to help protect against interference caused by extraneous electrical “noise.”

In applications where the cable is installed in conduit, the conduit should not be used for wiring to other electrical equipment whenever possible. If other equipment power wiring is run in the same conduit, the cabling **must** be shielded.

The maximum allowable distance between the CGS sensor and AV10 Display Unit is 500 feet, with connecting cable 16 AWG minimum.

INSTALLATION AND WIRING PROCEDURE

1. Determine the best mounting locations for the detectors.
2. Install the CGS sensor within the proper opening in the AV10 or STB junction box. Mount the device with the sensor oriented vertically and the opening pointing down. All junction boxes should be electrically connected to earth ground.
3. Terminate all wiring at the proper terminals. Refer to the appropriate illustration for details.
4. Double check that all wiring is the proper size and type and has been installed correctly. Check for correct operating voltage at the device.

NOTE

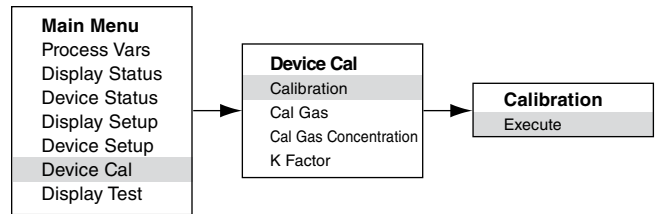
Do not apply power to the system with the junction box cover removed unless the area has been de-classified.

5. Proceed with startup and calibration.

CALIBRATION

To initiate calibration of the CGS sensor from the AV10 Display:

1. Using the magnet to activate the switches on the AV10 display, navigate to the “Calibrate” menu.



2. Activate “Execute” (Enter/Select) to start calibration.
3. The AV10 will display “Waiting for Zero” on the main display screen as it performs zero calibration.
4. When zero calibration is complete, the AV10 will display “Waiting for Gas” on the screen.
5. Apply calibration gas to the sensor.
6. The AV10 will display “Waiting for Span” on the screen while the span calibration is being performed.
7. When the AV10 shows “Remove Cal Gas” on the screen, remove the calibration gas from the sensor.
8. The AV10 automatically exits the Calibrate mode and returns to normal operating mode upon completion of a successful calibration.

AV10 mA Output During Calibration (AV10 with CGS)		
AV10 Display Reading	Standard Mode	Replicate Mode
Apply Zero Gas	3.8	2.2
Waiting for Gas	3.8	3.8
Waiting for Span	3.8	3.8
Remove Cal Gas	3.8	3.8
Back to Normal	4.0	4.0

Determining Sensor Life Remaining

At the time of calibration, the AV10 logs the sensor mV signal. This value can be used for determining the approximate sensor life remaining.

To view all the recorded mV signal values for the sensor, from the Main Menu, navigate to:

Device Status > Calibration Log > Span.

To view the mV signal from the most recent calibration only, from the Main Menu, navigate to:

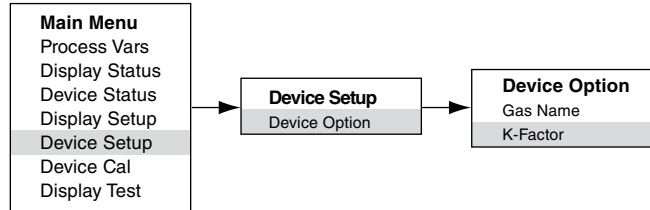
Device Status > Device Info > Response.

A typical new sensor reads between 45 and 55 mV.

- At 21-55 mV, "Cal OK" is recorded in the Cal Log, along with the Span value.
- At 15-20 mV, "Cal OK" is recorded in the Cal Log, along with the Span value. In addition, "Weak Sensor" is shown on the AV10 display for about 20 seconds. After 20 seconds, the "Weak Sensor" message is no longer seen, but a "Weak Sensor" status is recorded (Device Status > Fault/Status > Status).
- At 14 mV or less, "Weak Sensor" is shown on the AV10 display for about 20 seconds, then a Cal Fault is shown. The Cal Log shows "Cal Fail" with a Span value of 0.00 mV.

K FACTOR

If the system will be detecting a gas/vapor other than the gas used in the actual calibration process, a conversion K-Factor must be used. The K-Factor can be entered prior to calibration by navigating to the "Device Option" menu, then selecting "K-Factor". Enter the desired K-Factor and activate the "Enter" button. The new K-Factor will be applied when the sensor is calibrated.



The AV10 communicates the K-Factor to the CGS Interface Board during the calibration process, where the proper correction is made to ensure accurate calibration.

The actual effect of the K-Factor can be observed as the span portion of the calibration is completed. For example, suppose a K-Factor of 0.865 has been programmed. When calibration is performed, the AV10 will display 50% as span is accepted. It will then apply the K-Factor, and the displayed value will change to 43.3% LFL.

For additional information regarding K-Factors, including a list of K-Factors for many common gases, refer to Technical Bulletin number 76-1017.

MENU STRUCTURE

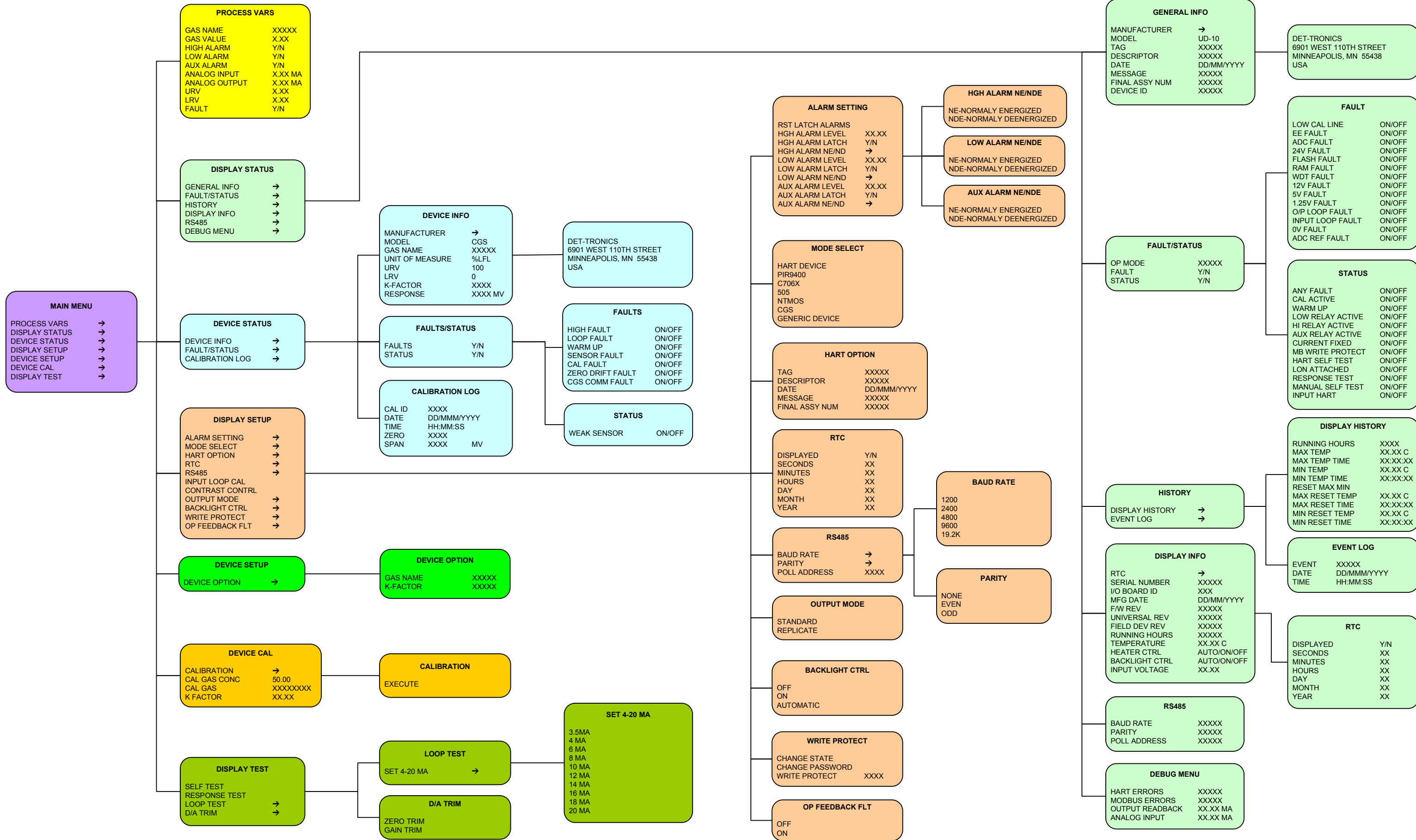
AV10 with CGS Series Sensor

Refer to the following menu when using the AV10's LCD display and internal magnetic switches.

When connecting a HART Communicator to the AV10's 4-20 mA output, refer to the "AV10 HART" menu in Appendix E.

MENU HELP

*Status menus only allow the user to view the data.
The Setup menus allow the user to both view and edit the data.*



APPENDIX N – AV10 WITH GENERIC 4-20 MA SENSORS

NOTE

For complete information regarding installation, wiring, and calibration of the sensor, refer to the instruction manual provided by the sensor manufacturer.

OPERATION

The AV10 can be used with generic sensors that generate a calibrated linear 4-20 mA signal, with or without HART. The AV10 allows the operator to select the upper and lower range values and unit of measurement. The AV10 then analyzes the 4-20 mA input signal from the sensor and displays the value with the designated measurement unit, and also controls the alarm outputs.

UPPER AND LOWER RANGE VALUES

The upper range value (URV) and lower range value (LRV) are selected using the magnetic tool and the AV10's menu system (Main Menu > Device Setup). The URV corresponds to the 20 mA signal while the LRV corresponds to 4 mA. The default values are 0 for the LRV and 100 for the URV. When the generic detector supports HART communication, the URV and LRV come from the attached detector.

MEASUREMENT UNIT TEXT

The operator can select the appropriate measurement unit from a pre-entered list: % (default), PPM, LFL, or PPB, or he can enter his own custom 4-character string. Measurement unit text is displayed on the main screen with the process variable. When the generic detector supports HART communication, the unit text comes from the attached detector.

LOW FAULT THRESHOLD

The operator can enter a low input fault threshold in the range of 0.5 to 4 mA (default is 3.5 mA). When the input signal is at or below this point, an "Out of Range Low Fault" is annunciated. This feature can be enabled/disabled as desired.

HIGH FAULT THRESHOLD

The operator can enter a high input fault threshold in the range of 20 to 27 mA (default is 21 mA). When the input signal is at or above this point, an "Out of Range High Fault" is annunciated. This feature can be enabled/disabled as desired.

ALARMS

The Low, High and Auxiliary alarm levels are independently field adjustable. Alarm levels are set and displayed with the selected measurement units. All alarm levels must be within the LRV to URV range.

ALARM LATCHING

Latching or non-latching function is independently selectable for each alarm. The default setting is non-latching. Latched alarms can be reset with a "Reset Latched Alarms" command from the menu system or a power cycle.

SENSOR CALIBRATION

The AV10 does not support generic sensor calibration. Generic sensors must be pre-calibrated following the procedure described in the instruction manual provided by the sensor manufacturer.

4-20 MA OUTPUT READING

While in Generic mode, the AV10 displays values below the 4 mA level to allow the use of 0-20 mA sensors.

MENU STRUCTURE

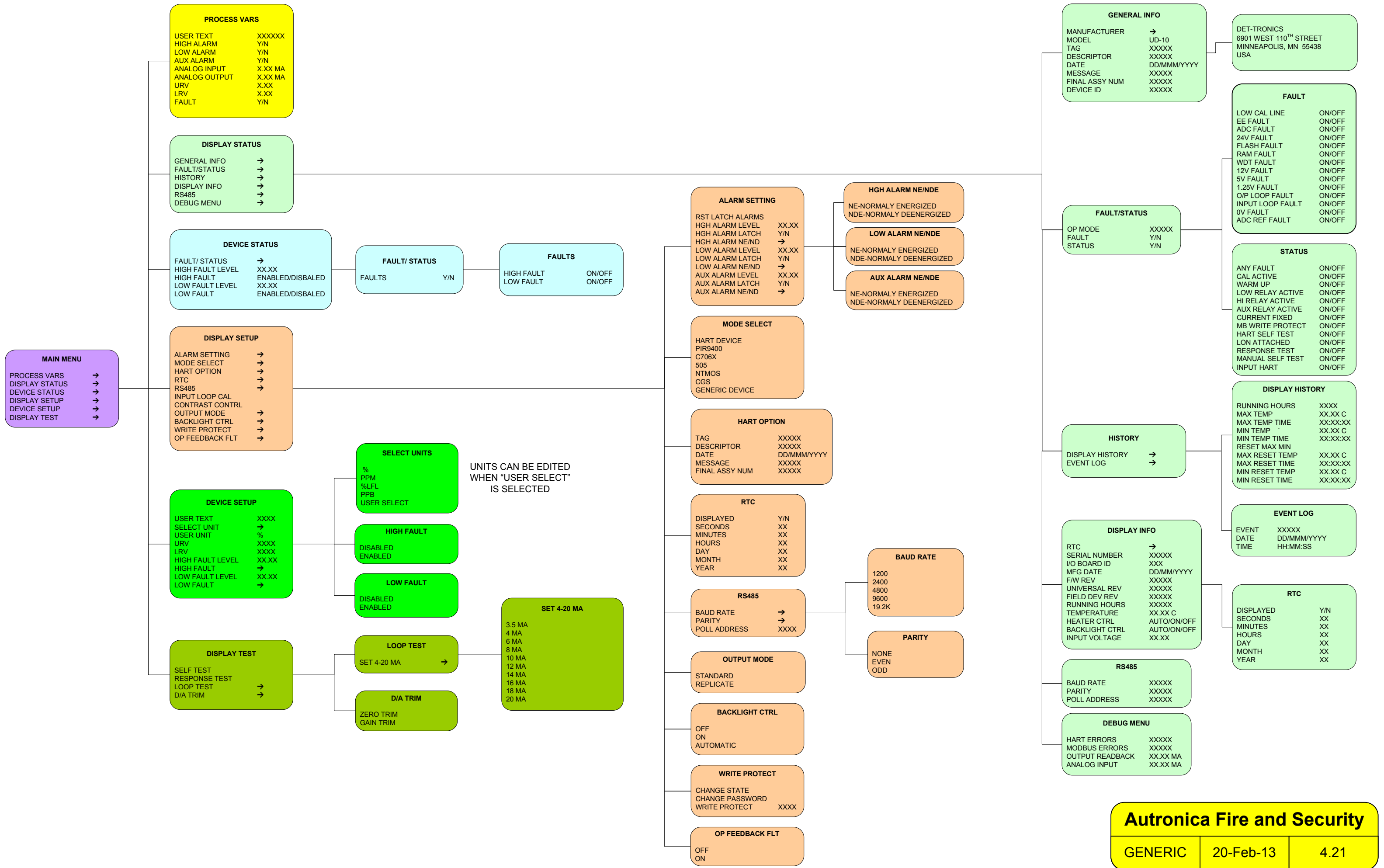
AV10 with Generic 4-20 mA Sensors

Refer to the following menus when using the AV10's LCD display and internal magnetic switches. Two different menus are provided to accommodate sensors with or without HART communication.

When connecting a HART Communicator to the AV10's 4-20 mA output, refer to the "AV10 HART" menu in Appendix E.

MENU HELP

Status menus only allow the user to view the data. The Setup menus allow the user to both view and edit the data.





Autronica Fire and Security AS
Haakon VII's gt. 4, NO-7041 Trondheim, Norway | Tel: +47 90 90 55 00 | Fax: +47 73 58 25 01
E-mail: info@autronicafire.no | www.autronicafire.com