



Instructions

AutroVu Explosion-Proof Universal Display AV20



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INSTRUCTIONS

AutroVu Explosion-Proof Universal Display Unit Model AV20

IMPORTANT

Be sure to read and understand the entire instruction manual before installing or operating the gas detection system. The Model AV20 is to be used with the GT3000 to provide early warning of the presence of a toxic 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 AutroVu Model AV20 Universal Display Unit is designed to be used with the GT3000 Toxic Gas Detector.

It is recommended for applications where a 2-wire loop powered gas detector is required. The output is a 4-20 mA signal with HART, corresponding to the output of the GT3000 detector.

Gas concentrations are displayed on an alpha-numeric display in ppm (% for O₂). The display unit reads the linear 4-20 mA DC output signal from the GT3000 that corresponds to the detected gas concentration. The AV20 automatically detects the gas type and operating range of the sensor to which it is connected via the HART signal.

All electronics are enclosed in an explosion-proof aluminum or stainless steel housing. The display unit is used with a single GT3000, which may be either directly coupled to the display unit, or remotely located using a sensor termination box. The AV20 features non-intrusive calibration, which can be performed by using a handheld magnet to activate internal magnetic switches on the faceplate. Calibration can also be performed by activating the GT3000's internal magnetic reed switch with a magnet.



DESCRIPTION

The AV20 provides display and control capabilities for the GT3000, and utilizes the following I/O:

Signal Inputs:	4-20 mA loop with HART, from the GT3000
User Inputs:	Magnetic switches (4) on the display panel
Visible Outputs:	LCD display
Signal Outputs:	4-20 mA with HART, from the GT3000

HART COMMUNICATION

The AV20 is a HART primary master and communicates with the GT3000, which is a HART slave device. Upon power-up, the AV20 requests the gas type, gas range, and unit of measurement from the GT3000. During normal operation, the AV20 continually polls the GT3000 for status information. Because the AV20 is a primary master, a secondary master can also be used to communicate with the GT3000 at the same time. If an Asset Management System (AMS) is used, it should be configured as a secondary master to avoid communication conflicts with the AV20.

MAGNETIC SWITCHES

Four internal magnetic switches provide a non-intrusive user interface that allows adjustment of configuration parameters and calibration in the field without the use of a HART handheld device.

The switches are labeled as follows:

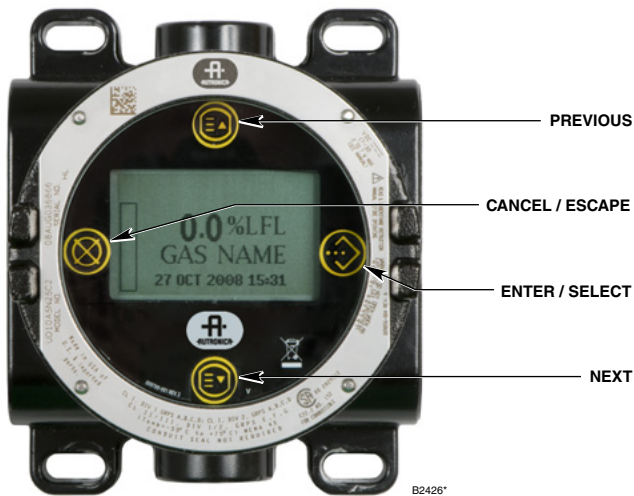
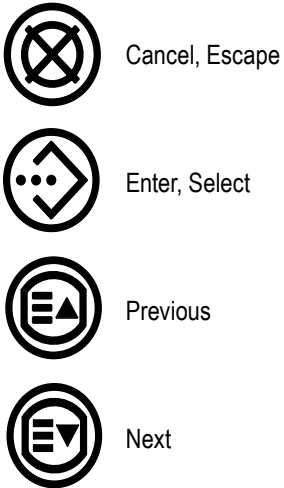


Figure 1—Faceplate of AV20

DEVICE ENCLOSURE

The housing for the AV20 consists of a multi-port aluminum or stainless steel explosion-proof junction box with a clear viewing window. Available conduit entry sizes include 3/4 inch NPT and M25.

DEVICE DISPLAY

The AV20 is provided with a 160 x 100 dot matrix LCD display. See Figure 1.

During normal operation, the LCD display indicates the gas type and units measured.

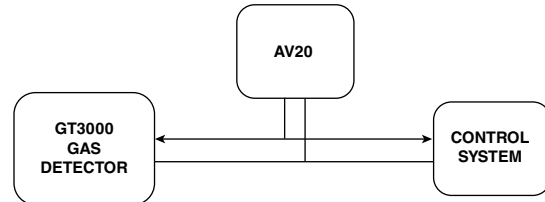
The AV20 communicates with the sensor and allows easy access to the following information:

- Sensor information/fault/status
- Transmitter information/fault/status
- Gas type and measurement range
- History, event, and calibration logs

Refer to Appendix A for details regarding the HART menu structure.

LOGGING

The AV20 has no logging capability of its own, but reads the logs that are stored in the GT3000 and displays them on the LCD screen. If an AMS is used, it communicates directly with the GT3000 and not with the AV20.



Operating and history logs that are stored in the GT3000 and displayed by the AV20 include:

- Calibration
- Sensor running hours
- Sensor temperature
- Events

OUTPUT TEST

The AV20 can start and stop a 4-20 mA Loop Test for checking correct operation of system output devices.

REAL TIME CLOCK

The Real Time Clock resides in the GT3000 can be set by the AV20, HART handheld, or AMS. The AV20 reads and displays the current time/date from the GT3000.

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 ordinances. 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 or trained service personnel.

LIABILITIES

The manufacturer's warranty for this product is void, and all liability for proper function of the Display 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 Autronica Fire and Security, 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 entries must be closed with suitably certified blanking elements upon installation.

INSTALLATION

NOTE

The AV20 housing must be electrically connected to earth ground. A dedicated earth ground terminal is provided on the AV20.

Install gas detectors in the appropriate locations following the guidelines below. The AV20 should be located where it can be easily viewed by personnel. The GT3000 can be attached directly to the AV20 housing, or it can be mounted remotely using an STB termination box (see "Sensor Separation" for additional information). Detectors must always be installed per local installation practices.

Always define the following application details:

IDENTIFICATION OF VAPOR(S) TO BE DETECTED

It is necessary to always identify the vapor(s) of interest at the job site. In addition, 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.

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 sensor installation points.

If the vapor of interest is lighter than air, place the sensor above the potential gas leak. Place the sensor 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 at the job 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 if possible.

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

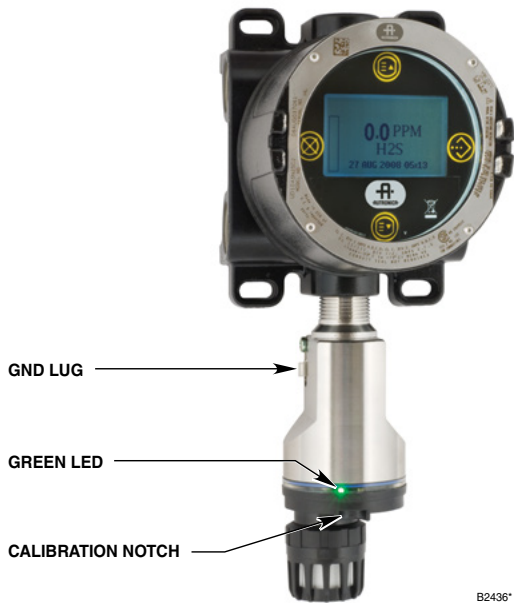


Figure 2—Correct Mounting Orientation

DEVICE MOUNTING ORIENTATION

The gas detector must be mounted in a vertical position only, with the sensor pointing down. See Figure 2.

IMPORTANT

The GT3000 must be oriented with the LEDs facing forward so they are easily visible to personnel within the area. To ensure correct orientation (the LEDs are not visible when power is off), position the GND lug on the left hand side and the calibration notch to the front. Note that the LEDs are located directly above the calibration notch.

SENSOR SEPARATION

Autronica sensor termination boxes (Model STBs) enable the installation of the GT3000 separately from the AV20 Universal Display Unit. Two-conductor shielded cable is required to prevent possible nuisance EMI/RFI.

The maximum cable length between the termination box and the AV20 is 2000 ft.

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.

NOTE

The AV20 and GT3000 communicate using HART protocol, which requires a power supply with low noise levels for proper operation. (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. 22 AWG (0,32 mm²) to 14 AWG (2,08 mm²) shielded stranded copper wire is recommended.

Always install a properly sized, master power fuse or breaker on the system power circuit.

NOTE

The use of shielded cable in conduit or shielded armored cable is required. 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.

WIRING PROCEDURE

Refer to Figures 3 and 4 for wiring illustrations.

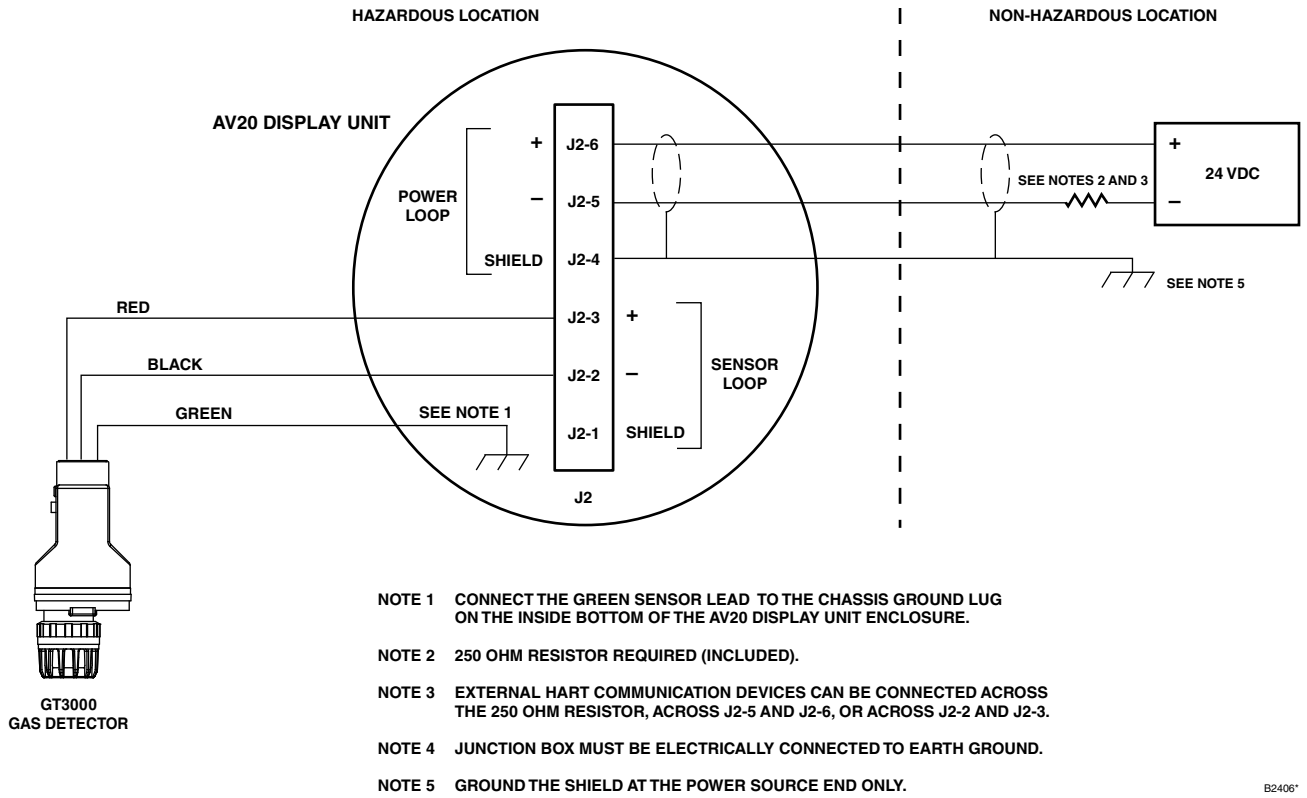


Figure 3—Basic Wiring for Explosion Proof AV20 with GT3000

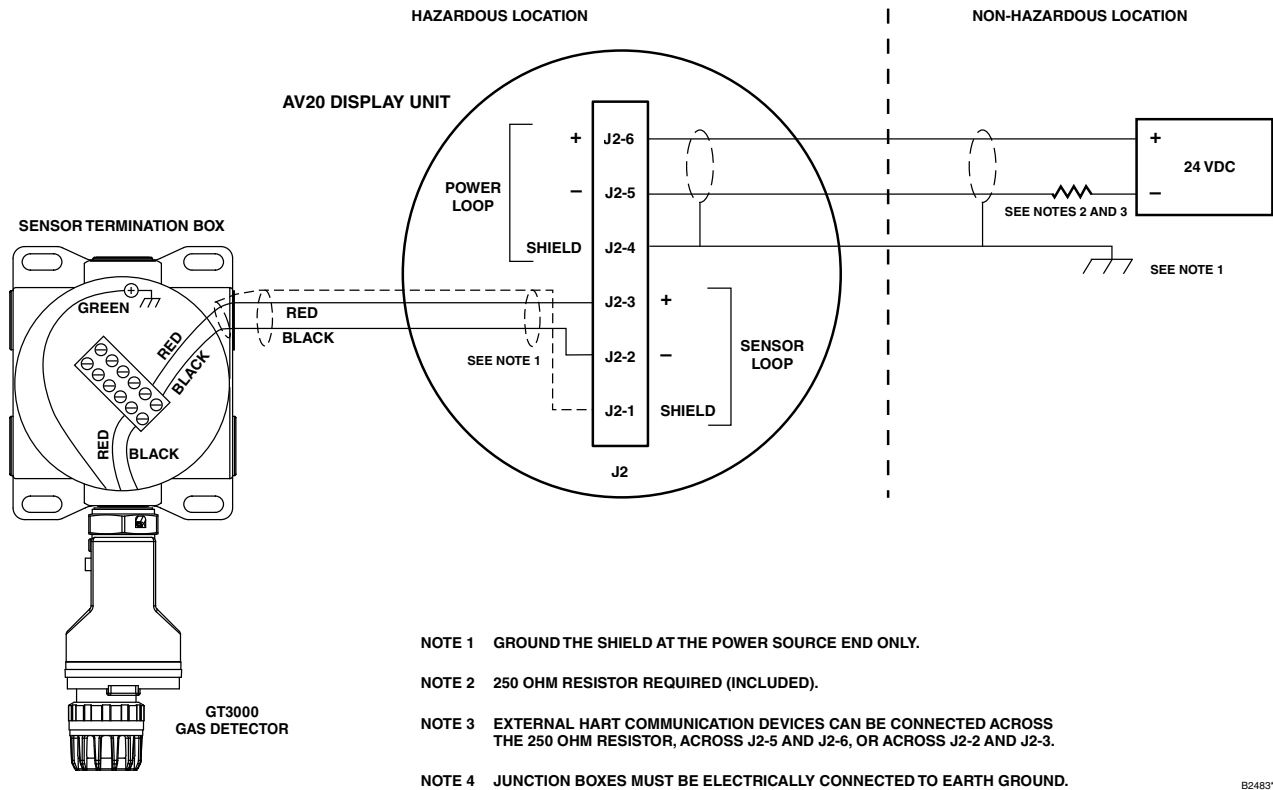


Figure 4—Basic Wiring for Explosion Proof AV20 and GT3000 with Terminal Box

Table 1— GT3000 LEDs During Calibration

Device Status	Green LED	Yellow LED
Normal	Steady On	Off
Waiting for Zero	Off	Steady On
Waiting for Gas	Off	Blinking
Waiting for Span	Off	Blinking
Remove Cal Gas	Off	Off
Normal	Steady On	Off

Table 2— GT3000 LEDs and 4-20 mA Output During Various Status Conditions

Function	Green LED	Yellow LED	Analog 4-20 mA Signal
Warm-up	Off	Steady On	3.5
Normal Operation	Steady On	Off	4-20
Fault Condition	Off	Steady On	3.5
Calibration	See Table 1		3.8

CALIBRATION

The calibration process is automatic, with the exception of gas delivery. LEDs on the GT3000 and messages on the AV20 faceplate guide the operator when to apply and remove the calibration gas. See Table 1.

NOTE

The AV20 allows the operator to adjust the calibration gas concentration within the range of 30 to 90% full scale. The default value for all gas sensors except oxygen is 50% full scale. Oxygen sensors use a default value of 20.9%.

GENERAL CALIBRATION INFORMATION

All GT3000 Gas Detectors require a two-point calibration — zero and span.

The calibration process can be initiated using the magnetic switch on the GT3000 or using the magnetic switches on the AV20 faceplate. All sensors, including oxygen, should be in clean air (20.9% oxygen) when the calibration sequence is initiated.

Once calibration is initiated, the process proceeds automatically. The yellow LED on the GT3000 and the digital display on the AV20 are used to inform the operator of the progress of the calibration procedure, and also signal when to apply and when to remove the calibration gas.

The calibration can be aborted after zero calibration by activating the magnetic switch on the GT3000 or navigating the AV20 menu.

If the calibration sequence is aborted or not completed successfully, the detector reverts back to the previous calibration values and signals a calibration fault. If a successful calibration cannot be performed, the calibration fault can be cleared by activating the magnetic switch on the GT3000 for one second.

For help assessing when a fault has occurred, see Table 2.

The calibration process can fail for the following causes:

- Zero is out of range
- Span is out of range
- Time-Out.

The time and date of calibration events are logged in the GT3000's non-volatile memory along with the calibration outcome. Possible calibration scenarios include the following:

- Successful Calibration
- Aborted Calibration
- Failed Calibration

NOTE

The calibration procedure must be completed within a ten minute period. If the calibration is not completed, a calibration fault will be generated and the previous calibration data will be used.

NOTE

To ensure reliable protection, it is important to check and calibrate the detection system on a regularly scheduled basis. The frequency of these checks is determined by the requirements of the particular installation – typically 30, 60, or 90 day intervals, depending on the ambient conditions.

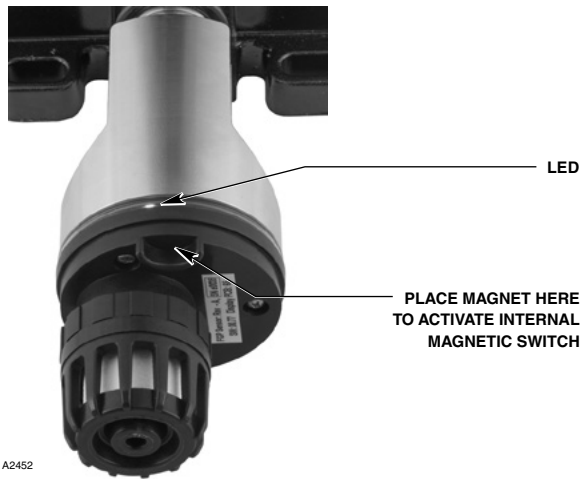


Figure 5—Location of Magnetic Switch on GT3000 Detector

CALIBRATION PROCEDURE

1. Clean air must be present at the sensor prior to initiating calibration. The use of bottled air is recommended.
2. Calibration can be initiated in one of two ways:
 - A. Hold the calibration magnet against the designated location on the sensor module (see Figure 5) until the green LED turns off and the yellow LED turns on steady (approximately one second).
 - B. Initiate calibration via the magnetic switches on the AV20. Select Main Menu > Device Cal > Calibration > Execute.

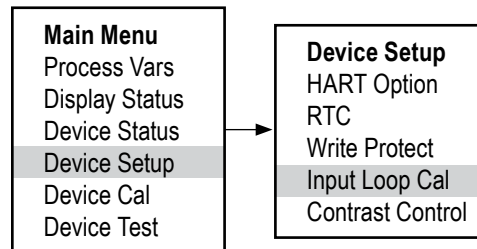
The AV20 indicates “Waiting for Zero”. The transmitter immediately begins taking zero readings.

3. When the zero calibration is complete, the yellow LED changes from steady to blinking and the AV20 indicates “Waiting for Gas”. Apply the calibration gas to the sensor. When gas is detected, the AV20 indicates “Waiting for Span”.
4. When the yellow LED turns off and the AV20 indicates “Remove Cal Gas”, remove the calibration gas. The gas level at the sensor gradually returns to zero. The green LED turns on steady to indicate that the device has returned to normal operation, using the new calibration data.

INPUT TRIM

The input current loop of the AV20 is trimmed at the factory. However, it can also be trimmed in the field using the following automated process.

Navigate through the menu to “Input Loop Cal”.



Upon entering Input Loop Cal, the AV20 commands the detector to output 4 mA, and then automatically calibrates its own input. The AV20 then commands the detector to output 20 mA, and subsequently calibrates its own input.

SPECIFICATIONS

OPERATING VOLTAGE—

24 Vdc nominal, operating range is 19 to 30 Vdc.
AV20 maximum loop voltage drop (Vd) 5.0 volts.
Maximum loop supply 30.0 Vdc.

OPERATING POWER—

0.8 watt maximum.

OPERATING CURRENT—

A minimum of 3.5 mA.

CURRENT OUTPUT—

Linear 4-20 mA with HART output directly from GT3000.
250 ohm termination resistor is required (included).

OPERATING TEMPERATURE—

–20°C to +70°C.

STORAGE TEMPERATURE—

–40°C to +70°C.

HUMIDITY RANGE—

5 to 95% RH (Autronica verified).

SENSOR COMPATIBILITY—

The AV20 can be used with any of the Autronica GT3000 line of gas detectors.

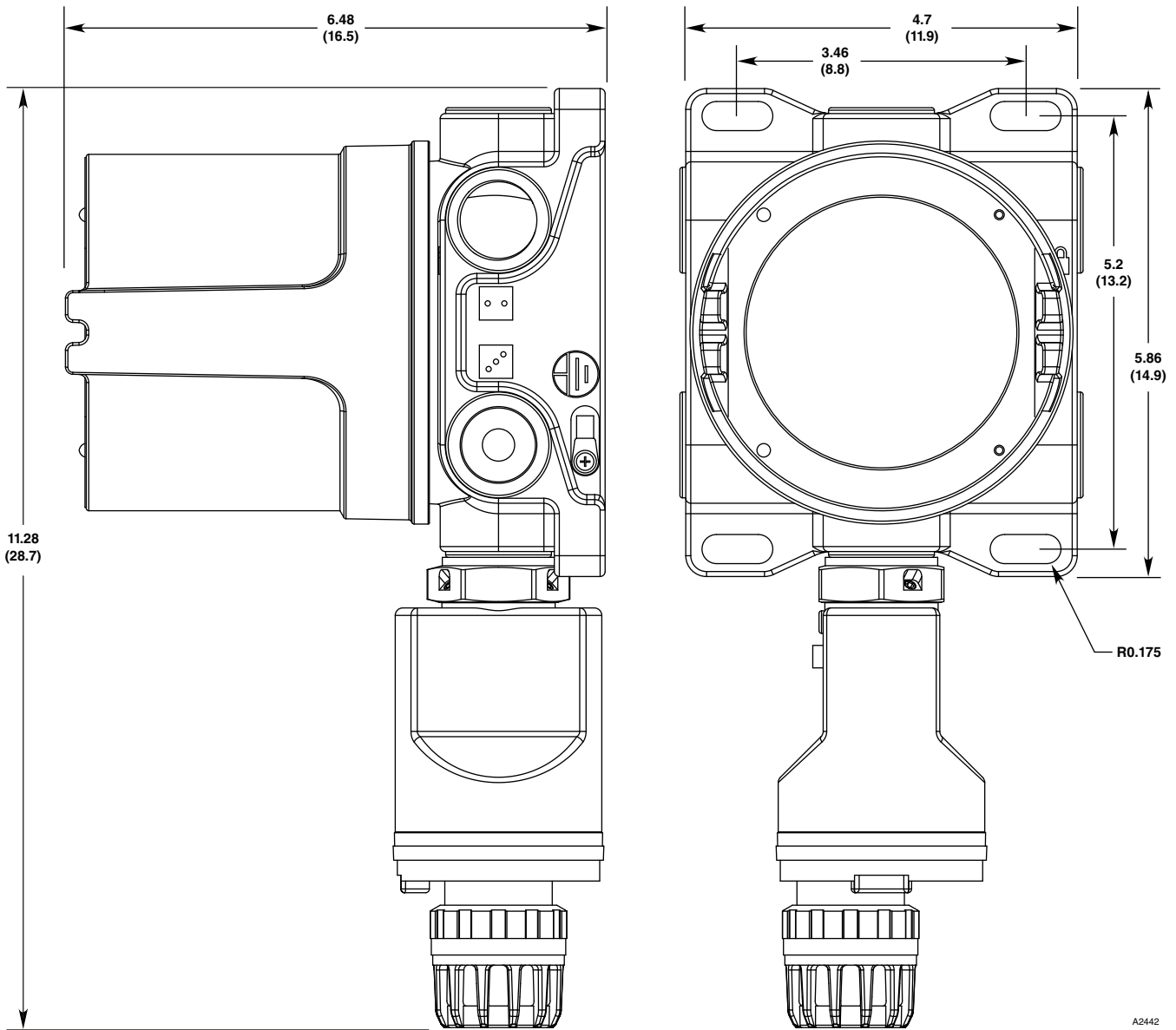


Figure 6—Dimensions of AV20 with GT3000 in Inches (Centimeters)

WIRING TERMINALS—

Terminals can handle wire sized from 22 AWG (0,32 mm²) to 14 AWG (2,08 mm²).

CONDUIT ENTRIES—

3/4" NPT or M25. (Five conduit entries standard.)

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).

DIMENSIONS—

See Figures 6 and 7.

ELECTRO-MAGNETIC COMPATIBILITY—

EMC Directive 2004/108/EC

EN55011 (Emissions)

EN50270 (Immunity)

WARRANTY—

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

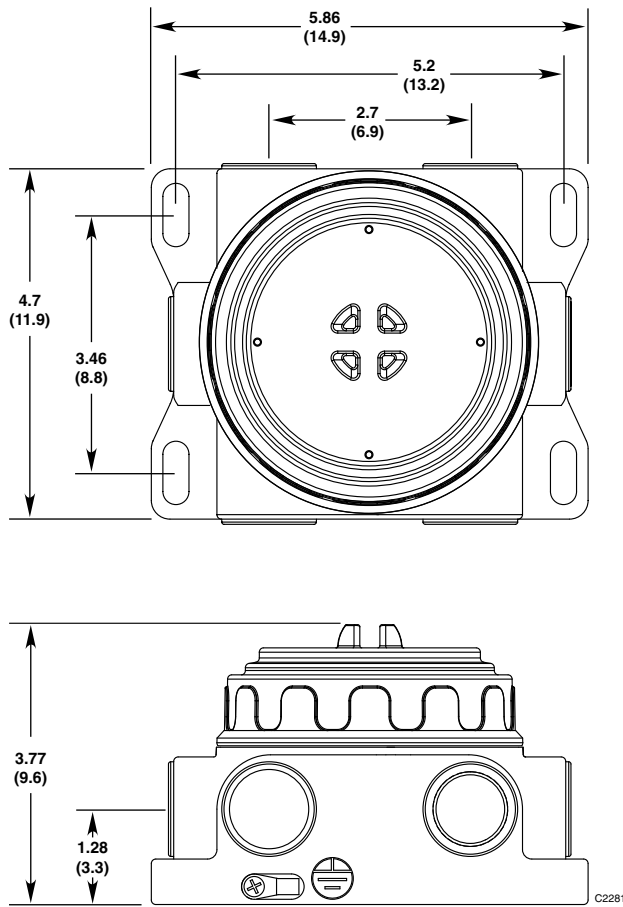


Figure 7—Dimensions of Model STB Termination Box in Inches (Centimeters)

CERTIFICATIONS—

FM:



Class I, Div. 1, Groups B, C & D;
 Class I, Div. 2, Groups B, C & D (T4);
 Class I, Zone 1/2 AEx d IIC T6;
 Class II/III, Div. 1/2, Groups E, F & G.
 Tamb -20°C to +70°C
 NEMA/Type 4X, IP66
 Conduit seal not required.

Performance verified in accordance with:

ANSI/ISA-92.00.01
 ANSI/ISA-92.02.01
 FM 6341 (Draft)
 ANSI/ISA-12.13.01
 ANSI/ISA-12.13.04/FM 6325
 FM 6310/6320

CSA:



CSA 08 2162793.
 Class I, Div. 1, Groups B, C & D;
 Class I, Div. 2, Groups B, C & D (T4);
 Class II/III, Div. 1/2, Groups E, F & G.
 (Tamb = -20°C to +70°C)
 Type 4X, IP66
 Conduit seal not required.

ATEX:



CE 0470 Ex II 2 G
 Ex d IIC T6
 Tamb -20°C to +70°C
 FM13ATEX0101X
 IP66

Performance verified in accordance with:
 EN 61779-1/-4 and EN 50241-1/-2.

IECEX:

Ex d IIC T6
 Tamb -20°C to +70°C
 IECEX FMG 13.0042X
 IP66
 Performance verified in accordance with:
 IEC 61779-1, -4.

INMETRO

CEPEL 12.2128
 Ex d IIC T6 Gb IP66
 T6 (Tamb -20°C to +70°C)

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.

DEVICE REPAIR AND RETURN

Prior to returning devices, contact the nearest local Autronica 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.

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 complete 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 AV20 Model Matrix for ordering details.

REPLACEMENT PARTS

Part Number	Description
116-009700-001	Magnetic Tool
116-009793-001	Electronics Module
116-010253-001	250 ohm Terminating Resistor Kit
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, EX D
116-010817-001	Stop Plug, 20PK, 3/4" NPT, SS, EX D
116-010818-001	Stop Plug, 20PK, M25, AL, IP66, EXDE
116-010819-001	Stop Plug, 20PK, M25, SS, IP66, EXDE
116-102804-001	Reducer, M25 to M20, AL
116-102804-003	Reducer, M25 to M20, SS
116-103922-001	475 Field Communicator
116-005003-001	Lubriplate grease, 1 oz.

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

ASSISTANCE

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

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

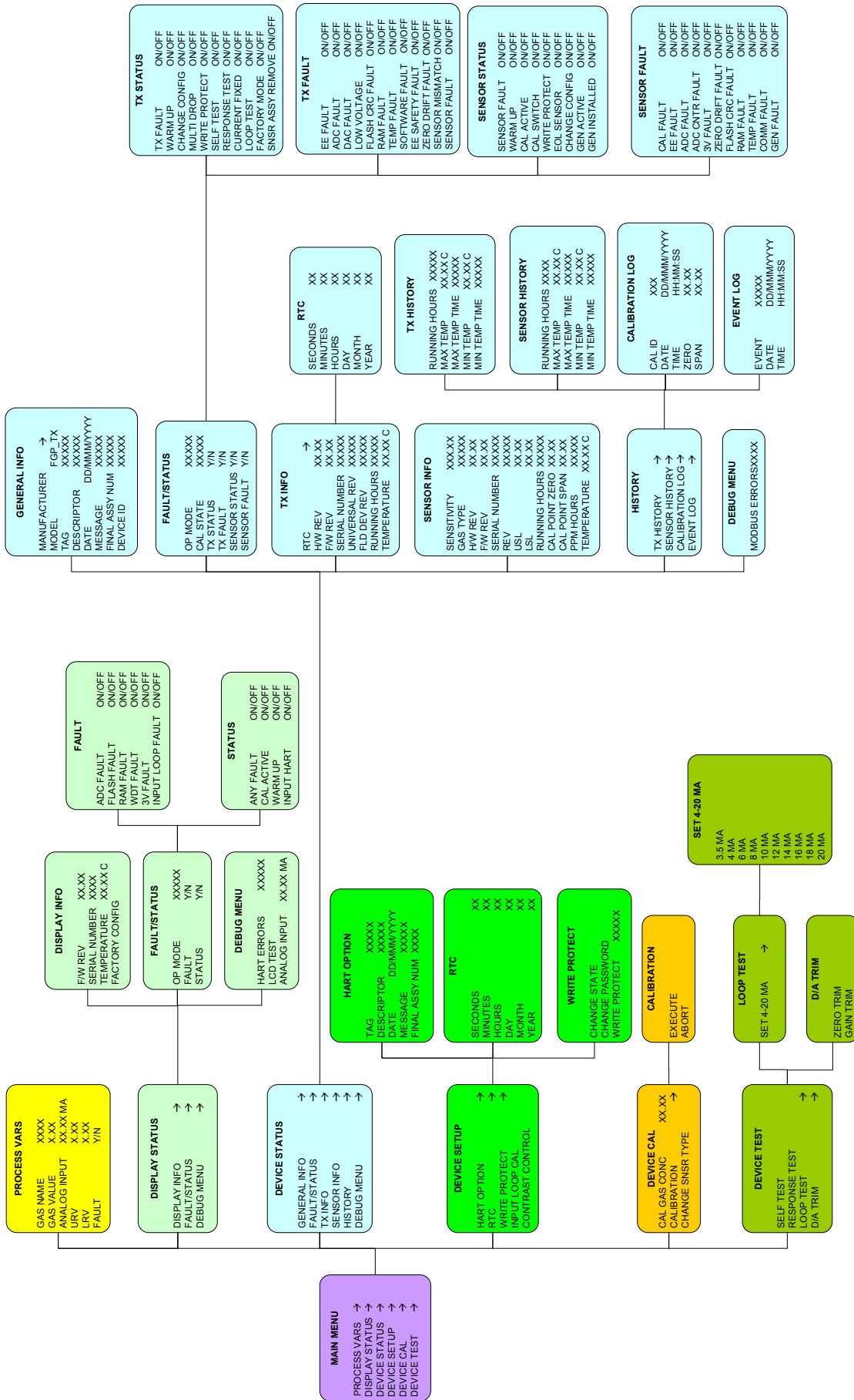
AV20 MODEL MATRIX

MODEL	DESCRIPTION	
AV20	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
	26	Pass-Through 4-20 mA, HART
	TYPE	APPROVAL
	W	FM/CSA/ATEX/CE/IECEX
	TYPE	CLASSIFICATION (Div/Zone)
	2	Ex d (Flameproof)

APPENDIX – HART COMMUNICATION

MENU STRUCTURE - AV20 WITH GT3000

This section displays the menu trees for the AV20 connected to the GT3000. The menu tree shows the primary commands and options available when using menu selections.





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