

Envent Engineering Ltd.

Hydrogen Sulfide Analyzer Model 330S-Ex

User's Manual



Revision 2
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Table of Contents

INTRODUCTION	1
<i>Warranty & Liability Statements</i>	<i>1</i>
Limitation of Warranty.....	2
<i>Disclaimer</i>	<i>2</i>
<i>Key Symbols.....</i>	<i>3</i>
<i>Warnings & Cautions.....</i>	<i>3</i>
Warning & Cautions for 330S-Ex H ₂ S Analyzers	3
<i>Analyzer Specifications</i>	<i>6</i>
PRINCIPLE OF OPERATION	7
<i>Physical Reaction.....</i>	<i>7</i>
<i>Analysis Cycles.....</i>	<i>8</i>
INSTALLATION	10
<i>Receiving the Analyzer.....</i>	<i>10</i>
Unpacking the Analyzer	10
Standard spare parts for 330S-Ex H ₂ S analyzers:	10
<i>Installation procedure & Start-up.....</i>	<i>11</i>
<i>Installation Requirements</i>	<i>12</i>
Electrical Requirements	12
Location for the System	12
Earth Connections, Entry Specifications & Space Requirements.....	13
Sample Point Selection	17
Sample inlet & sample sweep.....	17
Vent line	17
Sample Volume & Flow Rate.....	18
<i>Installation of Analyzer Components.....</i>	<i>19</i>
Analog Outputs	19
Sample Chamber	20
Humidifier Unit	22
Eductor Block	24
OPERATION & CONFIGURATION	25
<i>Analyzer Display Interface</i>	<i>25</i>
CALIBRATION PROCEDURES	27
<i>H₂S Gas Calibration.....</i>	<i>27</i>
<i>Re-zero Sensor Procedure.....</i>	<i>29</i>
MAINTENANCE	30
<i>H₂S Sensing Tape Change Procedure</i>	<i>30</i>

<i>Sample Conditioning System Cleaning Procedure</i>	31
Material List	31
Procedure.....	32
TROUBLESHOOTING	33
APPENDICES	43
<i>Recommended Spare Parts List</i>	43
<i>Sealing Compound: For sealing fittings in Hazardous Locations</i>	44
<i>Safety Data Sheet for H₂S Sensing Tape</i>	56

List of Figures

Figure 1. H ₂ S Analyzer Principle of Operation Diagram	7
Figure 2. H ₂ S Analysis Cycle	8
Figure 3. Enclosure Entries & Earth Connections.....	13
Figure 4. Space Requirements & Entry Specifications for Model 330S-Ex (No Backpan)	14
Figure 5. Space Requirements for 330S-Ex with Standard Backpan (Size may vary)	15
Figure 6. Space Requirements for 330S-Ex with Total Sulfur Option (Backpan size may vary)	16
Figure 7. Recommended Venting for 330S-Ex	18
Figure 8. AO 4-20 mA Output Wiring Options.....	20
Figure 9. Sample Chamber (Exploded View).....	21
Figure 10. Event's Humidifier Unit for 330S-Ex	22
Figure 11. Humidifier Unit Installed in a 330S-Ex H ₂ S Analyzer	23
Figure 12. Eductor Block (Venturi Effect).....	24
Figure 13. 330S-Ex Display	25
Figure 14. 330S-Ex H ₂ S Sensing Tape Change Procedure	30

List of Tables

Table 1. 330S-Ex H ₂ S Analyzer Specifications	6
Table 2. Sample Volume and & Flow Rate	18
Table 3. Aperture Strips & Ranges	22
Table 4. Display Button Description/Function	25
Table 5. Display LED Description/Function	26

INTRODUCTION

This manual provides all the necessary information to install, operate and maintain the 330S-Ex model H₂S Analyzer units. This manual is intended for all technical level users.

The Envent 330S-Ex H₂S Analyzer is a uniquely rugged and simple design that utilizes lead acetate-based detection which provides a linear and interference-free output of H₂S concentration. This analyzer can measure a wide range of hydrogen sulfide concentrations from parts per billion (ppb) concentrations to parts per million (ppm) concentrations. With the addition of a dilution sample system, it can read high concentrations in percentage up to 30%. There are other options available such as the sample system for H₂S analysis in liquids or the addition of a hydrogen reaction furnace for total sulfur measurements.

Warranty & Liability Statements

Products manufactured and supplied by Envent Engineering Ltd unless otherwise stated are warranted against defects in materials and workmanship for up to 18 months from the date of shipment or 12 months from date of start-up, whichever occurs first. During the warranty period the manufacturer will, as its option, either repair or replace products, which prove to be defective.

The manufacturer or its representative can provide warranty service at the buyer's facility only upon prior agreement. In all cases the buyer has the option of returning the product for warranty service to a facility designated by the manufacturer or its representatives. The buyer shall prepay shipping charges for products returned to a service facility, and the manufacturer or its representatives shall pay for return of the products to the buyer. The buyer may also be required to pay round-trip travel expenses and labour charges at prevailing labour rates if warranty is disqualified for reasons listed below.

Limitation of Warranty

The foregoing warranty shall not apply to defects arising from:

- Improper or inadequate maintenance by the user;
- Improper or inadequate unpacking or site preparation/installation;
- Unauthorized modification or misuse;
- Operation of the product in unfavorable environments, especially high temperature and/or high humidity;
- Corrosive or other damaging atmospheres or otherwise outside published specifications of analyzer.

Envent Engineering Ltd carries no responsibility for damage cause by transportation or unpacking, unless otherwise specified in the incoterms.

Extended warranty may be available with certified start-up. Contact Envent Engineering Ltd for details.

Envent Engineering Ltd reserves the right to change the product design and specifications at any time without prior notice.

Disclaimer

No other warranty is expressed or implied. The manufacturer specially disclaims the implied warranties of merchantability and fitness for a particular purpose.

The sole remedy of the buyer shall in no case exceed the purchase price of the analyzer.

The manufacturer shall not be liable for personal injury or property damage suffered in servicing the product. The product should not be modified or repaired in a manner at variance with procedures established by the manufacturer.

Envent Engineering Ltd is not responsible for the proper disposal of the H₂S sensing tape which contains lead acetate. It is the responsibility of the end user to properly dispose the tape according to their local or national regulations. Envent Engineering offers to take back used H₂S sensing tape for its proper disposal if needed, please contact us if this service is required. For more information on the H₂S sensing tape, please refer to "Safety Data Sheet for H₂S Sensing Tape" on page 56.

Key Symbols

The following symbols are used throughout this manual. They are intended to draw attention to important information.



Description of hazards that could result in major injury or death.



Description of hazards that could result in minor injury or property damage.



Description of important information regarding safety of personal and/or property.



Caution: hot surface.



Description of useful information to help understand a concept.

Warnings & Cautions

This section covers all warnings and cautions for the 330S-Ex H₂S analyzers. Please read and understand all statements as they are for your own safety when installing, operating and maintaining the analyzer(s). Some of these statements are also noted throughout the manual when relevant.

Warning & Cautions for 330S-Ex H₂S Analyzers



Do not disconnect equipment unless power has been switched off or area is known to be non-hazardous.



Turn off power before servicing. Ensure breakers are off before connecting or disconnecting power supply.



Incorrect configuration of the analyzer may cause incorrect operation. Injury and/or damage to facilities may occur. Check analyzer's functionality after configuration changes have been made.



Substitution of components may impair intrinsic safety and suitability for Class I, zone 1.



Electrostatic Hazard – Backpan and Certification nameplate must be cleaned only with a damp cloth to prevent static charging hazard.



The analyzer should be mounted in an area in which it is not exposed to vibration, excessive pressure, temperature and/or environmental variations.



Disassembly of the pressure regulator and solenoids in the field is not advised. Consult Envent Engineering Ltd if the regulator or solenoid appears contaminated.



Before resuming line pressure, be sure that all port connections, sample sweep and sample conditioning system are securely installed.



All connections must be leaktight to ensure the effectiveness of the analyzer as well as safety. The user is solely responsible for the product selection, safety and warning requirements for the application. If the equipment is used in a manner not specified by Envent Engineering Ltd, the protection provided by the equipment may be impaired.



Do not use solvents, brake cleaners, soaps, detergents or rubbing alcohol to clean up analyzer or sample system.



This unit may require a disconnect device rated 24 VDC and 5A max. It must be protected by a circuit breaker rated 24 VDC and 5A max, and it is to be installed in accordance with local electrical codes.



This unit may require a disconnect device rated 240 VDC and 5A max. It must be protected by a circuit breaker rated 240 VDC and 5A max, and it is to be installed in accordance with local electrical codes.



Envent Engineering H₂S Sensing Tapes are suitable for use, if stored in the original sealed package, for 10 years from date of manufacture. Tapes should be stored in a cool dry location. If the seal on the package has been broken in storage, the H₂S Sensing Tape should be discarded.



Open circuit before removing cover.



Ensure that the analyzer received is suitable for the electrical classification of the installation site:

- The 330S-Ex are designed for:
II 2 G Ex db ib op is IIB+H₂ T3 Gb (Check Analyzer Nameplate)



Tape enclosure (blue chassis) knob has a capacitance of 119.7 μ F, user must determine suitability in the specific application.



The glass window on the XP enclosure must remain installed in order to maintain area classification.



Seals not poured. Pour seals before energizing the circuit (See "Sealing Compound: For sealing fittings in Hazardous Locations" on page 44 for further details).



Ensure the setscrews provided for the XP motor box and XP electronic enclosure window are tight and secured. This also applies for total sulfur enclosure caps.



Analyzer may utilize an optional CCS, Model 646 Series pressure switch located on the side of the XP enclosure:

- Dual seal, MWP 500psi
- Annunciation is visible leakage from the pressure adjustment cover (flow from this cover can indicate the possibility that a failed primary seal condition could exist in the pressure switch).



If the 330S-Ex has a total sulfur enclosure, ensure its caps are engaged to a minimum of 12 threads.



No modifications to the flamepaths are permitted without consultation with the controlled documentation.



Cables used in the equipment must be rated to a minimum ambient of 70 °C. Only suitably approved Ex db IIB+H2 Gb cable glands, blanking elements or thread adapters with a service temperature rating of 0 °C to 50 °C to be used.



Maximum inlet pressure (after sample conditioning system) of 30 psig.



Repair of the flamepaths are not intended.



For IS system installation drawing (H2S-Ex-57), contact Envent Engineering.



Total Sulfur Furnace reaches a temperature of up to 900 °C internally after 1 hour on. Do not touch external surface as it can reach up to 150 °C. Allow enclosure 1 hour after powering down the analyzer to cool down before servicing.

Analyzer Specifications





Analyzer Specification	
Measurement Method	ASTM D4084 - 07: Standard Test Method for Analysis of Hydrogen Sulfide in Gaseous Fuels (Lead Acetate Reaction Rate Method)
Ambient Temperature	0-50 °C (standard) consult factory for other requirements, 0 to 90% humidity (non-condensing)
Power	12-24 VDC @ less than 3W
	Or, 100-240 VAC 50/60 Hz, 5W, (300W when total sulfur option is included)
Electrical Certification	 II 2 G Ex db ib op is IIB+H2 T3 Gb
	ATEX CERTIFICATE NUMBER; ITS17ATEX108436X  IECEx CERTIFICATE NUMBER; IECEx ITS 17.0032X  
Output Ranges	Standard ranges are between 10-100 ppb and 0-100 ppm
Response Time	20 seconds to 90% of step change
Accuracy	±1.5% of full range on channel For dilution (option): ±2.5% For Total Sulfur (Option): ±2.0% For PPB (Option): Based on "base noise average"
Display	Graphic Liquid Crystal Display; menu is scrolled by internal button or magnetic wand (330S)
Outputs	Two 4-20mA outputs (loop power required), optional 4-20mA powered output boards are available
	Serial Communication: (1) RS-232 Modbus protocol (3) RS-485 Modbus protocol (One RS-485 for remote display option) Ethernet port as an optional feature
	4 SPDT relays (120 VAC 5A maximum)
	4 solid state solenoid drivers
Optional Features	
Total Sulfur	Utilized when all sulfur compounds need to be measured. A Total sulfur reaction furnace is added which allows the analyzer to measure total sulfur
Dilution Sample System	Utilized when the analyzer needs to measure ranges above 100 ppm. A permeable membrane dilution system
Parts Per Billion	Utilized when analyzer requires to read in parts per billion (<1 ppm)
Low Tape Sensor	Utilized when an alarms is required when the H ₂ S sensing tape needs to be changed
Low Pressure Switch	Utilized for alarming when sample pressure drops below 10 PSI
AO Powered Boards	Utilized for loop-powered analog outputs
Expander AO Board	Utilized when more than two analog outputs are required
Ethernet Port	Utilized for TCP/IP communication capabilities
Auto Calibration	Utilized to initiate a calibration based on time of day or manually

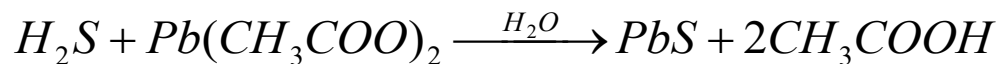
Table 1. 330S-Ex H₂S Analyzer Specifications

PRINCIPLE OF OPERATION

Physical Reaction

Envent's models 330S-Ex H₂S analyzers use ASTM D4084 – 07: Standard Test Method for analysis of hydrogen sulfide in gaseous fuels (Lead Acetate reaction rate method). This method uses lead acetate impregnated paper. Throughout this document the term lead acetate tape will be written as "H₂S sensing tape". Refer to "Safety Data Sheet for H₂S Sensing Tape" on page 56 for safety information on the H₂S sensing tape and "Disclaimer" on page 2.

The H₂S sensing tape reacts when in contact with hydrogen sulfide by the compound relationship shown below. This tape does not react to any other sulfur compounds in the gas stream. This makes it free from interference when more than one sulfur compound is present in the sample stream. The H₂S reaction is visibly evident by a brown stain directly on the H₂S sensing tape.



The electronics built into the models 330S-Ex have been programmed to measure the rate of darkening over time which, in turn, gives the hydrogen sulfide concentration level. When no H₂S is in contact with the H₂S sensing tape, the analyzer sensor reads 1000 mV (+/- 100 mV).

The sensor block has a LED and a photodiode detector. The LED emits a red beam of light which is reflected off of the H₂S sensing tape to the photodiode which detects the light intensity. The darker the H₂S sensing tape becomes when in contact to H₂S, the less light the photodiode detector receives reducing the millivolt value, which in turn, increases the H₂S value.

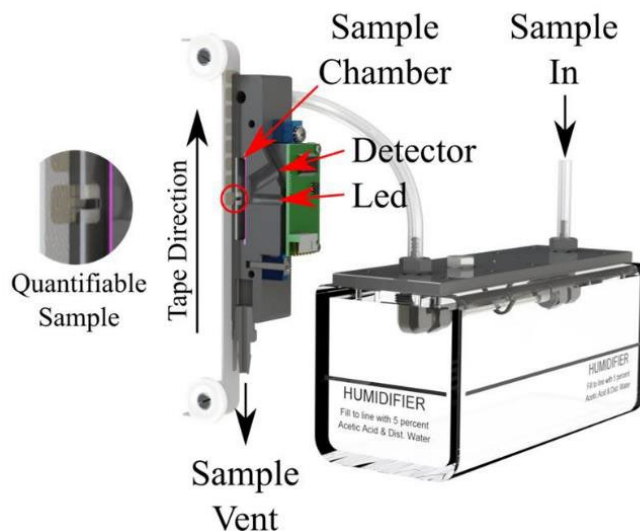


Figure 1. H₂S Analyzer Principle of Operation Diagram

Figure 1 above shows a flow and pressure regulated of a filtered sample gas passing through the humidifier into the sample chamber. An aperture in the sample chamber, which differs in sizes depending on the application, allows the gas to come in contact with the H₂S sensing tape creating a brown stain.



NOTE

Flow and pressure are the most important variables when measuring H₂S and must be kept at a constant state for the analyzer to measure H₂S properly. Pressure should be kept at a constant 15 psig. The lowest pressure found to be tolerable for proper H₂S measurement is 0.5 psig. Flow must be kept at a constant flow of 2 cm (between 100-200 cc/min). A change in flow of +/- 1 cm affects the reading by 10% of full range.

Analysis Cycles

The analysis of the color rate of change on the H₂S sensing tape is measured in analysis cycles. An analysis Cycle lasts up to a maximum of 720 seconds (12 minutes).



NOTICE

Do not change the Maximum Analysis Time, consult Envent Engineering Ltd.

Once an analysis cycle is complete, the motor moves the H₂S sensing tape giving the sensor block new tape surface area to start the analysis again. In normal operation, if the analyzer is being exposed to H₂S within its range, the analysis cycle should last between 150 to 210 seconds (1.5 to 2.5 min); the cycle lasts 720 seconds if no H₂S is present.

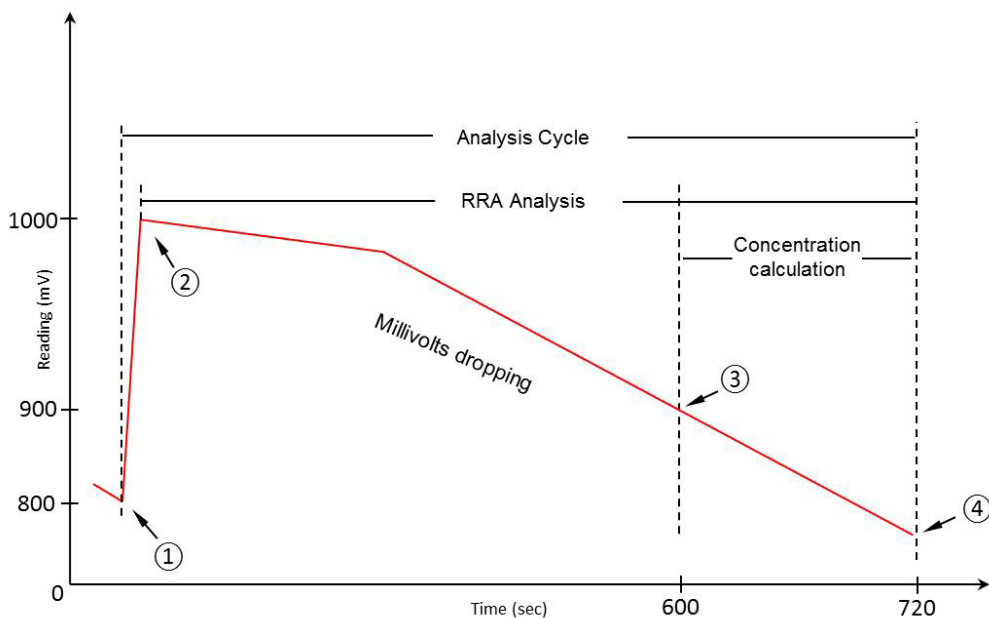


Figure 2. H₂S Analysis Cycle

Figure 2 shows a complete analysis cycle from when the motor has advanced the H₂S sensing tape from a previous analysis (1), to the end of the current analysis (4). Once the H₂S sensing tape has finished moving and new tape surface area is exposed, the reflection of light from the LED to the photodiode detector is at its maximum and results in a voltage output from the sensor block of 1000 mV (+/- 100 mV). This voltage is captured by the analyzer and it is referred to as the "Zero Voltage". The zero voltage will vary for each surface area of the H₂S sensing tape and will represent the starting point for the H₂S reading for that cycle.

From stage (2) to (4) the H₂S value starts increasing as the millivolt value drops from exposure to H₂S. This stage is called "RRA Analysis". The RRA stands for Rapid Response Algorithm and it is the instantaneous H₂S readings calculated every 67 ms. As the H₂S sensing tape darkens, the RRA value starts going up every second. Although the RRA values are calculated almost instantaneously, they are not as accurate as the final reading obtained at the "Concentration Calculation" stage (3) to (4). However, RRA values can be used as a trigger alarms setpoint in case the application requires a rapid response time (less than the RRA Analysis completion). The first part of the RRA Analysis (2) to (3) completes when the mV value drops 100 mV. Once it drops 100 mV, stage (3) to (4) "Concentration Calculation" starts.

On this stage, the H₂S slope is optimal for calculating the final H₂S value for that Cycle. Algorithms are used by the controller board to calculate as accurately as possible the H₂S final value. Once the final value is obtained, it will stay at that value (shown in the display and 4-20 mA analog outputs) until the next cycle has finished and updates the H₂S current reading. This stage will always be 1/5 of the amount of time it takes stage (2) to (3) to complete. Thus, if stage (2) to (3) took 600 seconds, then stage (3) to (4) will take 120 seconds.



It is important that the analyzer is used for its calibrated H₂S range. Do not use this unit for an application that will require readings outside of its calibrated range. This will cause the H₂S sensing tape to run out faster and may cause less accurate readings. The range is determined by the aperture strip in the sample chamber. For more information analyzer ranges, refer to "Aperture Strip" on page 21.

INSTALLATION

Receiving the Analyzer

Inspect the packaging for external damage right after is received. If there is any physical damage, please contact Envent Engineering Ltd and request that the carrier's agent be present when the analyzer is unpacked. If a disagreement arises the incoterms agreed by the seller and the customer will overrule any dispute.

Unpacking the Analyzer



If damage is found in the shipping container see previous section "Receiving the Analyzer".

1. Open the shipping container and remove the foam packing or other packing materials from the shipping box.
2. Take out the analyzer and the start-up kit.



The 330S-Ex H₂S analyzer with a standard Sample conditioning system weights approximately 105 lb (48 kg). Unpacking and transporting requires a minimum of two persons.

3. Make sure the start-up kit is complete (refer to list below). For some special and more complex analyzers, there might be extra parts in the start-up kit.

Standard spare parts for 330S-Ex H₂S analyzers:

1. 330S-Ex Customer Binder
 - Customer Manual(s) and Addendums
 - Factory Calibration Certificate
 - Factory Configuration
 - Drawing Package
 - Cal Gas Certificate(s)
2. USB flash drive (containing all documentation)
3. 300' (91.44 m) H₂S Sensing Tape. Part No. 330133XS
4. 1 Liter Analyzer Fluid. Part No. 330129
5. Funnel
6. 330S-Ex Serial Comm. External Cable (USB to Mini USB). Part No. 600002
7. Humidifier (uninstalled). Part No. 330061
8. Bolts For explosion proof enclosure (x22)
9. Resin preparation to pour seals

Installation procedure & Start-up

The following steps should be followed for proper installation and start-up of the analyzer. Refer to sections "Installation Requirements" on page 12 and "Installation of Analyzer Components" on page 19 for more information.

1. Unpack the analyzer and check for damages.
2. Ensure the analyzer power supply and range are suitable for the installation location.
3. Check that the hazardous location rating is suitable for the installation location.
4. Ensure that the selected installation site provides adequate room for maintenance and repair.
5. Select an installation location close to the sample point.
6. Bolt the analyzer to the wall with the H₂S sensing tape drive at approximately eye level.
7. Wire the power, analog outputs and discrete outputs from the analyzer.
8. Tube the Sample inlet, sample sweep, and sample vent lines from the analyzer.
9. Ensure there is enough H₂S Sensing tape.
10. Install the Humidifier, if applicable. Ensure there is enough 5% acetic acid or distilled water in the humidifier.
11. Apply power to the analyzer. The display will illuminate and the H₂S sensing tape will advance for a few seconds.
12. Press the menu button until mV is displayed. Check that the mV reading is 1000 mV (± 100 mV).



There are two mV values shown in the display, the "mV Zero" and the "mV" Values. Check for the "mV" Values.

13. Make sure the sample inlet valve, sample sweep valve, and pressure regulator are completely closed. The pressure regulator is completely closed when the knob handle is counterclockwise.
14. Turn on the sample gas flow to the conditioning sample system and then open the sample inlet valve.

15. Open the sweep valve slightly and adjust pressure regulator to 15 psig and the flow meter to 2.0.
16. Allow twenty minutes for the analyzer to stabilize. The analyzer calibration can be verified if calibration gas is available. If no calibration gas is available, the analyzer may be operated using the factory calibration settings until calibration gas is available.

Installation Requirements

Electrical Requirements

The 330S-Ex H₂S analyzer's controller board can either be 110-240VAC or 10-32VDC. Consult the analyzer nameplate attached to it or factory calibration certificate for more information.



Certification nameplate shows the voltage range at which the controller board can withstand (e.g., 120 – 240 VAC), however, when using external devices which are powered by the controller board (e.g., solenoids), that voltage range no longer applies and only the external device's voltage rating shall be used; e.g., 120 VAC rated solenoid, the analyzer shall be powered with only 120 VAC and not 240 VAC.

The power consumption for a VDC analyzer is 3 Watts and for a VAC is 5 Watts. For the total sulfur option the power consumption 300 Watts.



Ensure the setscrews provided for the XP motor box and XP electronic enclosure window are tight and secured. This also applies for total sulfur enclosure caps.



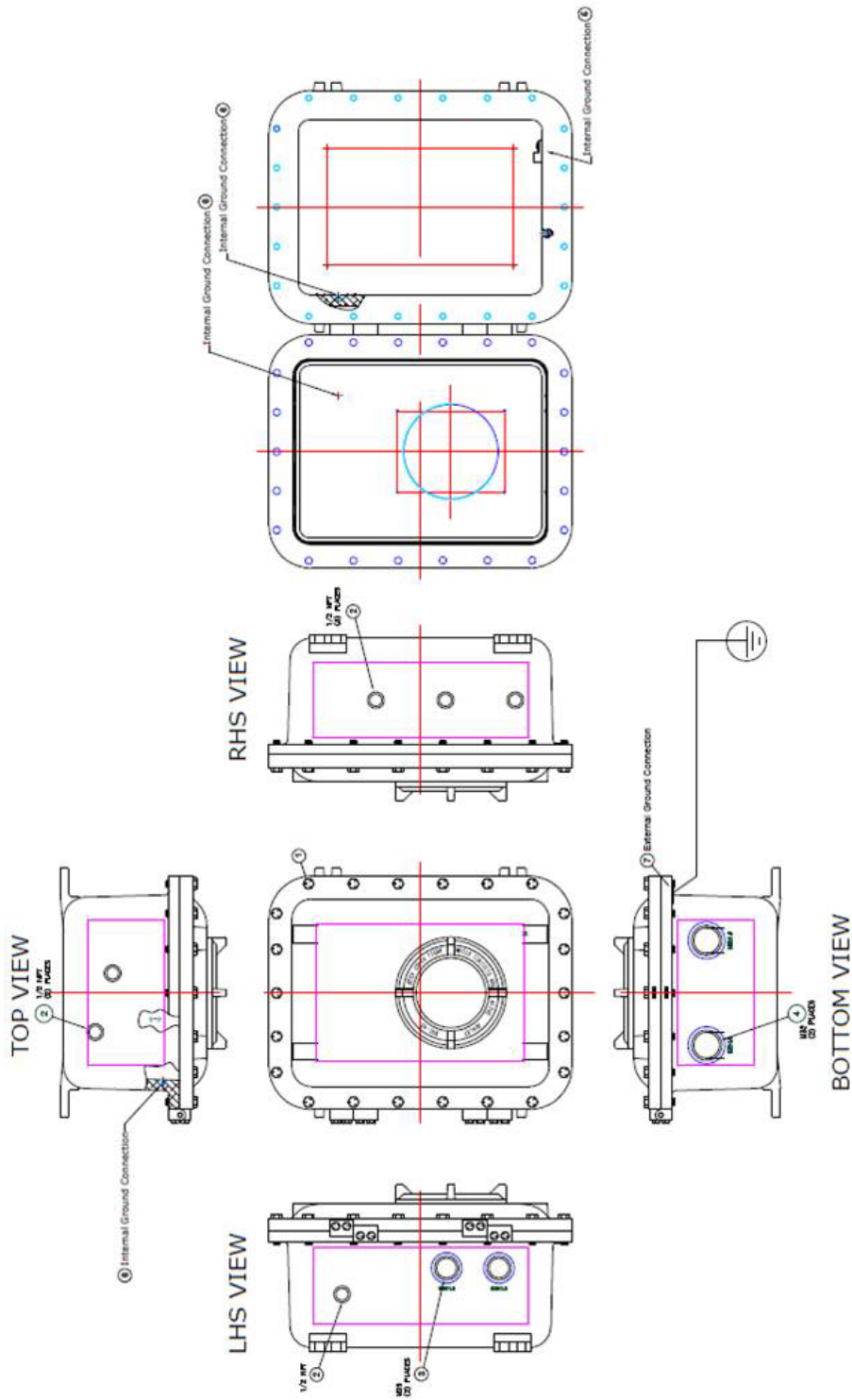
Cables implemented in the equipment must be rated to a minimum ambient of 70 °C
Only suitably approved Ex db IIB+H2 Gb cable glands, blanking elements or thread adaptors with a service temperature rating of 0 °C to 50 °C to be used.

Location for the System

First to be considered is the electrical area classification the analyzer will be installed in. Make sure the analyzer meets the requirements for the installation site. These analyzers are to be installed in Zone 1 areas.

The 330S-Ex H₂S analyzer should be mounted in an area in which it is not exposed to vibration, excessive pressure, temperature and/or environmental variations. The ambient temperature range for the analyzers is 0 to 50 Degree Celsius.

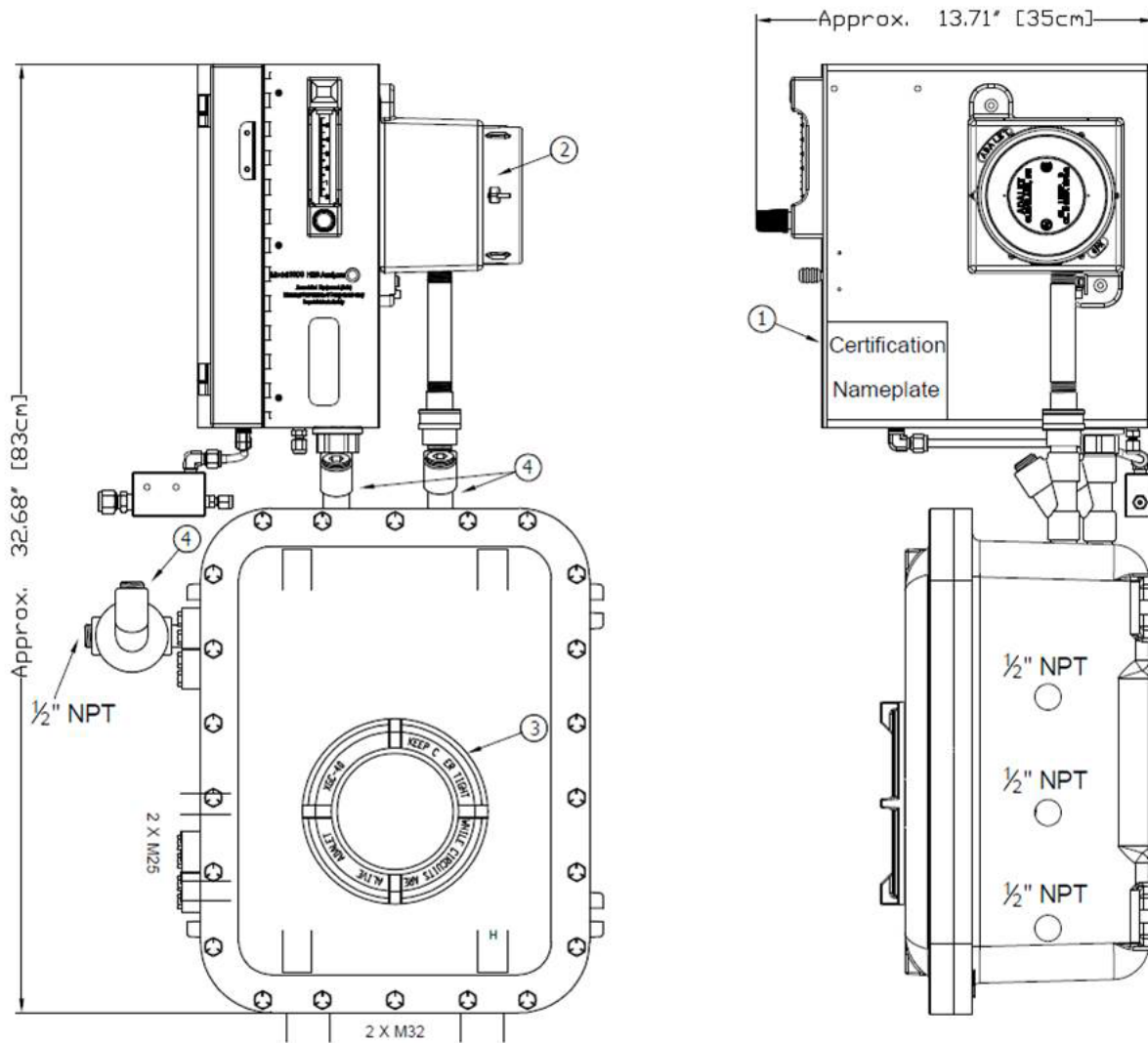
Earth Connections, Entry Specifications & Space Requirements



Notes:

1. M10 x 1.5 x 40 mm stainless steel to secure XP Enclosure Door (x22).
2. 1/2 NPT Entries.
3. M25 Entries.
4. M32 Entries.
5. Internal ground connection: Use 1/4 - 20 x 3/8 screw to fasten internal ground block. Internal ground wiring must be 16 AWG (1.31 mm2) minimum which is identically sized to the phase conductors.
6. Internal wiring connection: Use 6-32 x 1/4" screw, #6 external washer & 16-14 AWG ring terminal (All stainless steel components) Internal ground wiring must be 16 AWG (1.31 mm2) minimum which is identically sized to the phase conductors.
7. External ground connection: Use 10-24 x 1/4" screw, #10 external washer & 12-10 ring terminal (all stainless steel components). External ground wiring must be 11 AWG (4 mm2) minimum. End user must connect external earth from this connection.

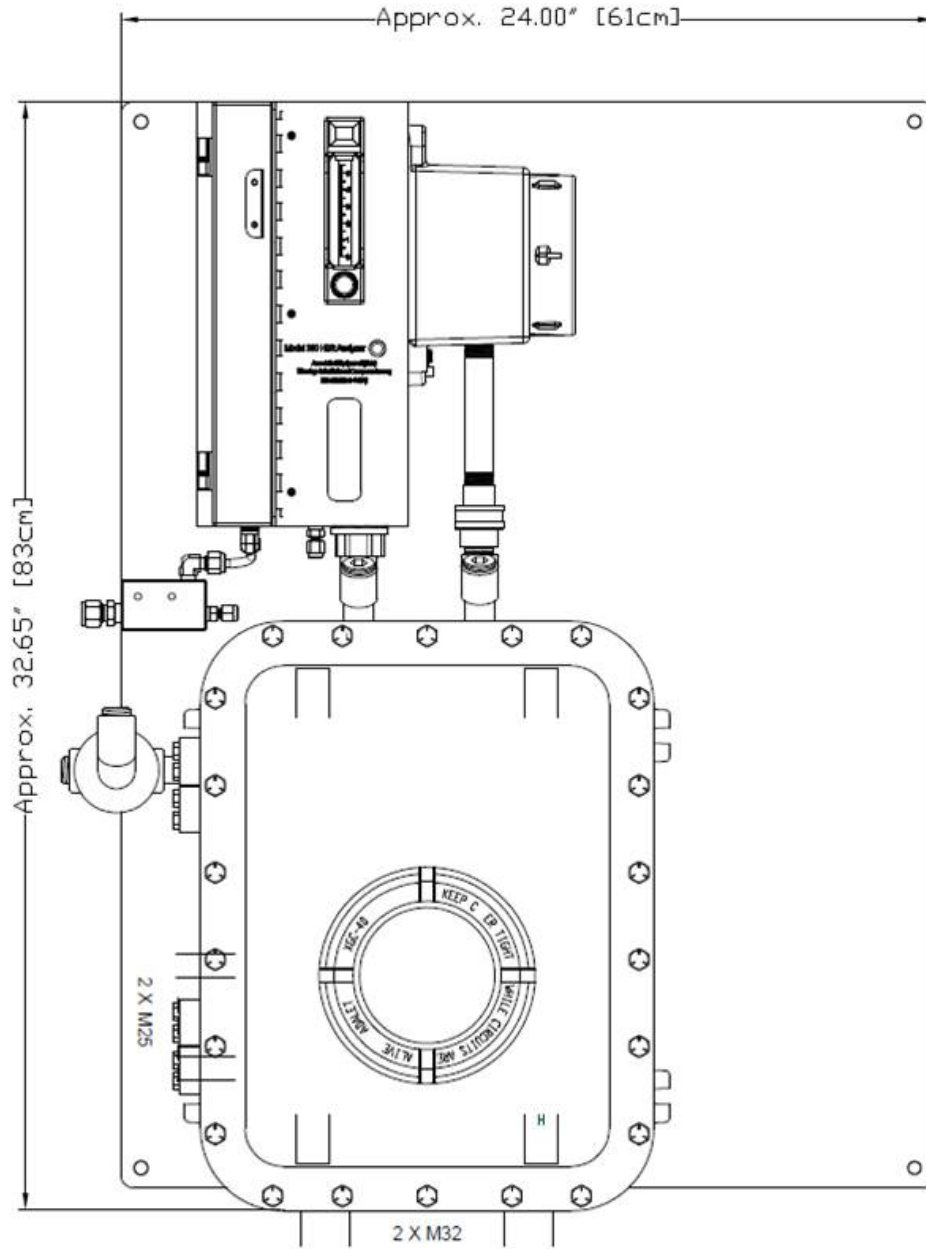
Figure 3. Enclosure Entries & Earth Connections



Notes:

1. ATEX-IEC Certification Nameplate Location.
2. XP Motor Enclosure cover must be secured with set screw provided.
3. XP Enclosure Window must be secured with set screw provided.
4. Vertical (Cortem EYS1) & Horizontal (Cortem EZS1) electrical seals must be poured with provided compound before powering up unit. Total cross sectional area of the cables, including isolation, shall be no more than 40% of the cross-sectional area of the fitting. The minimum length of the compound shall be ≥ 20 mm and at least 20% of that cross-sectional area shall be filled with compound.

Figure 4. Space Requirements & Entry Specifications for Model 330S-Ex (No Backpan)



Notes:

- Backpan size and/or Sample Conditioning System may vary (Sample Conditioning System not shown).
- Backpan must maintain a resistance to earth of less than $10 \times 10^9 \Omega$ to ensure no isolated metal parts exist.

Figure 5. Space Requirements for 330S-Ex with Standard Backpan (Size may vary)

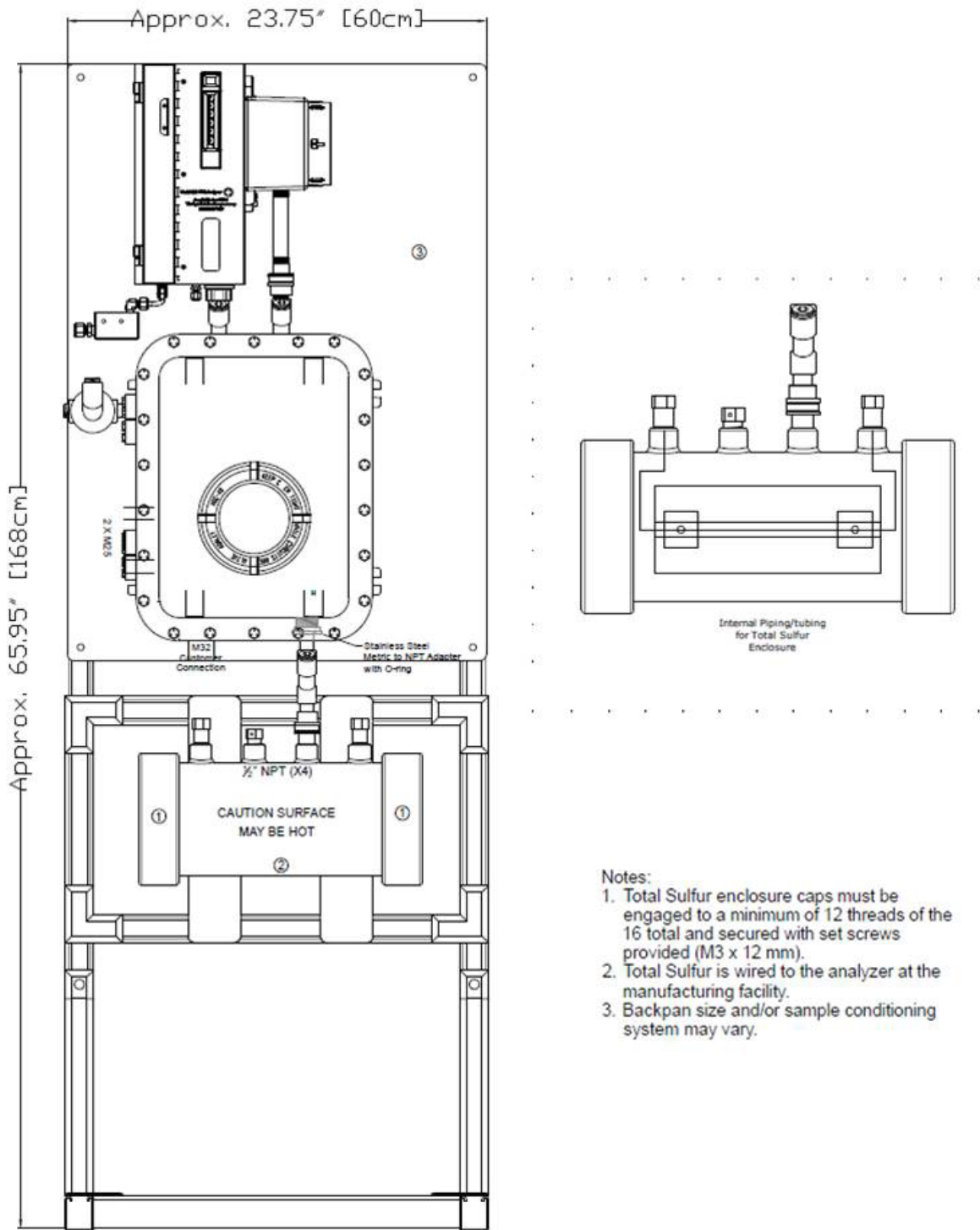


Figure 6. Space Requirements for 330S-Ex with Total Sulfur Option (Backpan size may vary)



Make sure to leave at least 1 foot (0.31 m) of extra space on the left side of the 330S-Ex H₂S analyzer. This will allow proper opening of the side door located at the upper blue chassis where the H₂S sensing tape is located.

Sample Point Selection

The sample to the 330S-Ex H₂S analyzer must be representative of the process stream and should be taken from a point as close as possible to the analyzer to avoid lag times and sample degradation in the tubing. A probe must be installed vertically on a horizontal section of pipe ensuring that the sample is drawn from the middle third of the pipeline.

An optional Genie GPR Probe regulator may be used. The function of this probe is to ensure a clean dry sample to the analyzer and to reduce the pressure of the sample. The lower pressure will improve the response time of the analyzer. Refer to Figure 10.



It is advisable that the probe not be installed on a vertical pipe.

Sample inlet & sample sweep

1/4 inch (0.635 cm) 316 stainless steel tubing and fittings are recommended for the sample inlet and sample sweep tubing. Sample sweep can be connected to a flare line if available. Refer to Figure 10.



1/8 inch 316 stainless steel tubing can also be used if the response time of the analyzer is of particular concern.

Vent line

3/8 inch (0.9525 cm) stainless steel tubing and fittings are recommended for the vent line to a maximum of 6 feet (1.83 m) in length. 1/2 inch (1.27 cm) stainless steel tubing should be used for vent lines exceeding 6 feet (1.83 m). The tubing should be installed with a slight downward slope and should be as short as possible. Refer to Figure 10.



The sample vent line must be tubed to atmospheric pressure outside and cannot be connected to a flare line or header.

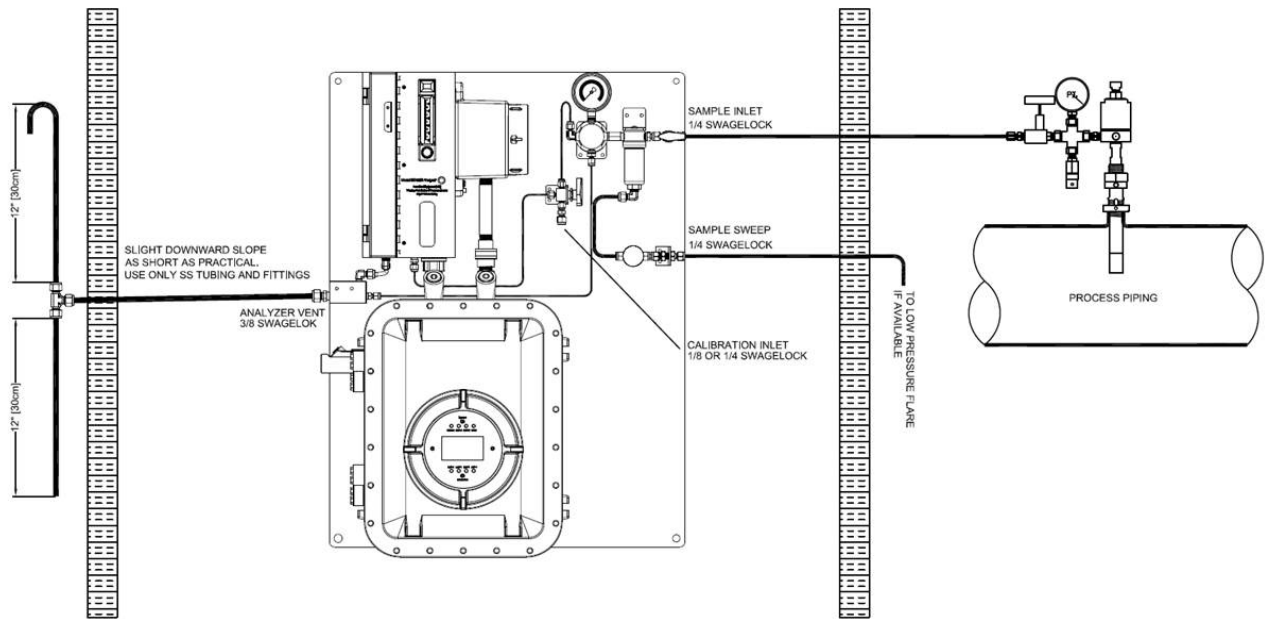


Figure 7. Recommended Venting for 330S-Ex

Sample Volume & Flow Rate

The sample should be supplied to the 330S-Ex H₂S analyzer at 10-15 psig and at a flow between 100-200 cc/min (set flowmeter at 2.0). A bypass sweep is recommended to reduce sample lag time in the sample line if it is at high pressure or it is longer than 15 feet (4.6 m) (The Standard H₂S conditioning sample system has a bypass sweep). The standard sample tubing material is 1/4" 316 stainless steel; however, 1/8" (0.3175 cm) stainless steel tubing can be used if the response time is critical (refer to Table 2).

Tube Size (")	Tube Gauge	ID (")	ID (cm)	Flow (SCFH)	Flow Std. (cc/min)	Pressure (PSIA)	Lag Time per 100' (30.48 m)	Lag Time per 100' (30.48 m)
3/8	20	0.319	0.810	5	2359	800	36.30	2178
3/8	20	0.319	0.810	5	2359	200	9.07	544
3/8	20	0.319	0.810	5	2359	50	2.27	136
1/4	20	0.181	0.459	5	2359	800	11.69	701
1/4	20	0.181	0.459	5	2359	200	2.92	175
1/4	20	0.181	0.459	5	2359	50	0.73	44
1/8	20	0.081	0.205	5	2359	800	2.34	140
1/8	20	0.081	0.205	5	2359	200	0.59	35
1/8	20	0.081	0.205	5	2359	50	0.15	9

Table 2. Sample Volume and & Flow Rate



Carbon steel sample line and/or fittings are not acceptable.

Installation of Analyzer Components

In this section, the description and installation of the main components of the 330S-Ex H₂S analyzers are covered.



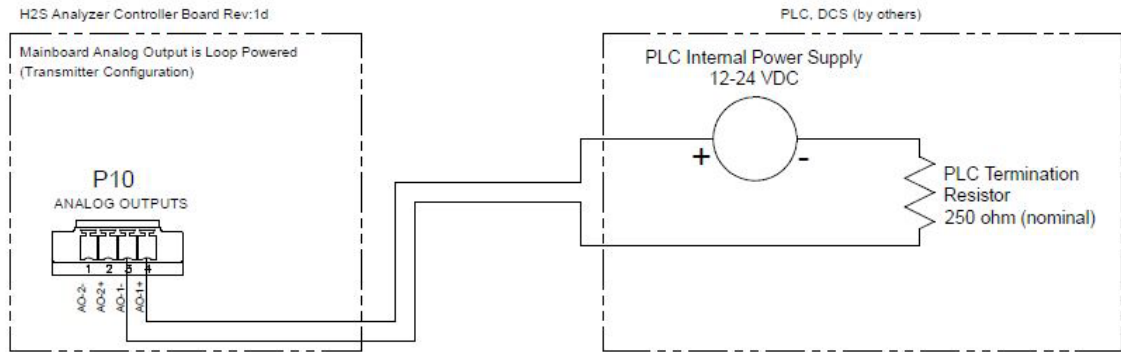
Total sulfur and dilution system options are not covered in this section. Please refer to the total sulfur and dilution manuals

Analog Outputs

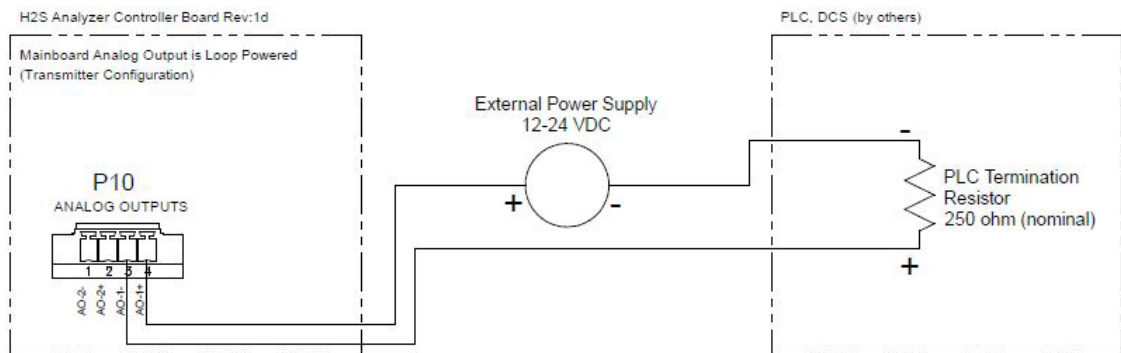
The H₂S controller board has two isolated loop power 4-20mA outputs which can be set up for different variable outputs. Loop power (10-32 Volts) sourced from the end device (PLC) is required for the analog to output. Figure 11 shows the different wiring set ups for the analog outputs.

The third wiring option shown in Figure 11 uses Envent's powered AO board(s) to provide self-powered analog outputs. These boards are available at Envent Engineering Ltd.

PLC set for loop power (Two-wire Transmitter)



PLC Set for Externally Supplied Loop Power (Three-wire Transmitter)



Event Powered Analog Output Board Option

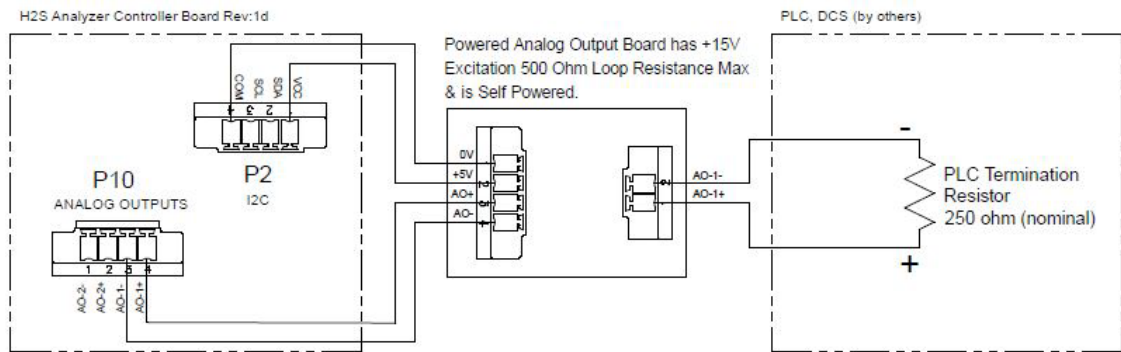


Figure 8. AO 4-20 mA Output Wiring Options

Sample Chamber

The sample chamber is the component that allows the H₂S sample to come in contact to the H₂S sensing tape which in turn is read by the sensor block. The sample chamber is made of the following components:

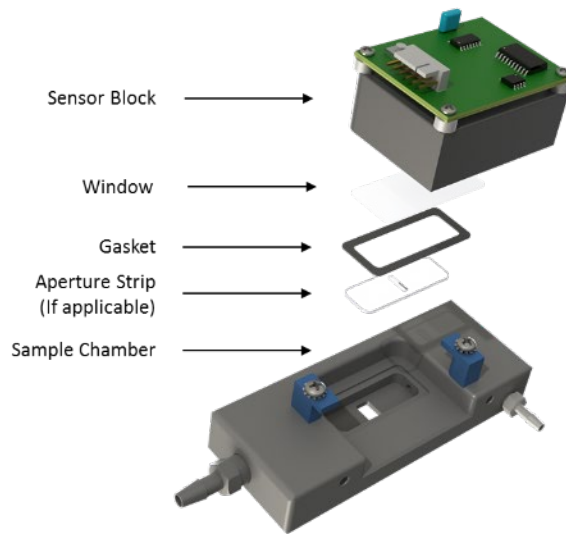


Figure 9. Sample Chamber (Exploded View)

Sensor Block

The sensor block measures the intensity of the LED light reflected off of the H₂S sensing tape. It is composed of an electronic board, a red-light emitting diode and a photodiode, refer to Figure 12. As the tape gets darker due to exposure to H₂S, the photodiode receives less light. Less light translates to more H₂S.

Window & Gasket

These two components seal the small compartment where the H₂S comes inside the sample chamber, refer to Figure 12. The window keeps a clear view for the LED and the photodiode to work properly and isolates them from the sample gas. The rubber gasket seals the Sample Chamber compartment preventing any leaks.

Aperture Strip

The sample chamber has a fixed size aperture of ¼ inch (0.635 cm) which is used for concentrations in between 1 ppm to 16 ppm.

For concentration applications below 1 ppm or above 16 ppm an aperture strip is installed behind the window in the Sample Chamber, refer to Figure 12. These aperture strips keep the analysis time to be approximately the same regardless of the range.

Various sizes of apertures match different measurement ranges. Table 3 shows the aperture size according to its range.

H ₂ S Range	Aperture Strip	Event PN
50 ppb to 1 ppm	ppb style	330110
1 ppm to 16 ppm	None (1/4" (0.635 cm) fixed aperture size)	N/A
16 ppm to 30 ppm	1/16" (0.1588 cm)	330103
30 ppm to 50 ppm	1/32" (0.080 cm)	330102
50 ppm to 100 ppm	Pin Holes	330100
100 ppm to 500 ppm	Laser Dot	330109
Over 500 ppm	Addition of a dilution panel. Consult Factory.	

Table 3. Aperture Strips & Ranges

Aperture strips can be changed to accommodate for a different range application. Refer to the table shown above to select the best option on the new concentration application. Contact Envent Engineering Ltd to purchase an aperture strip.



Remember: gain and span values on analog outputs will have to change based on new range application. Please re-calibrate analyzer. Refer to "H₂S Gas Calibration" on page 27.

The adhesive used to glue the aperture strip in its place is RTV108 Translucent Adhesive. RTV102, RTV103, and RTV109 could also be used.

Humidifier Unit

For the H₂S to adhere to the surface of the H₂S Sensing tape, it needs to be humidified. The humidifier unit helps having constant moisture content in the sample which increases the chemical reaction on the H₂S Sensing tape. Envent Engineering Ltd offers a unique design of humidifiers meant to meet the requirements for humidification of the sample before it gets into contact with the H₂S sensing tape; refer to Figure 13 .

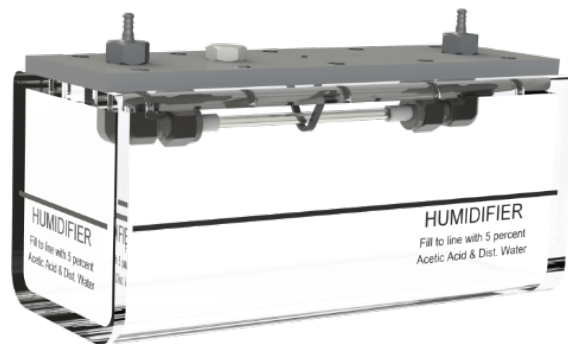


Figure 10. Envent's Humidifier Unit for 330S-Ex

The humidifier works by using Nafion Tubing. This material has the capability to transport water vapor from the most humidified medium to the driest medium. The sample gas traveling inside the Nafion tube is dryer than the outside of the tube which is being saturated with water, thus, humidifying the gas sample. It is important to have a constant flow to create a constant humidification of the sample gas.

The humidifier unit can be filled with distilled water or 5% Acetic Acid up to where the line indicates on the unit. Acetic acid is preferable over distilled water since it prevents the liquid to create mold and fungus overtime. Moreover, the freezing point for water is 0 °C and for 5% Acetic Acid is -2 °C making it more reliable under freezing temperatures.



The analyzer should not be exposed to ambient temperatures lower than 0 °C. By default, all H₂S analyzers have a temperature alarm set to 0 °C descending.



The analyzer should be mounted in an area in which it is not exposed to vibration, excessive pressure, temperature and/or environmental variations.

Figure 14 shows how to install the humidifier unit in a model 330S-Ex H₂S analyzer.

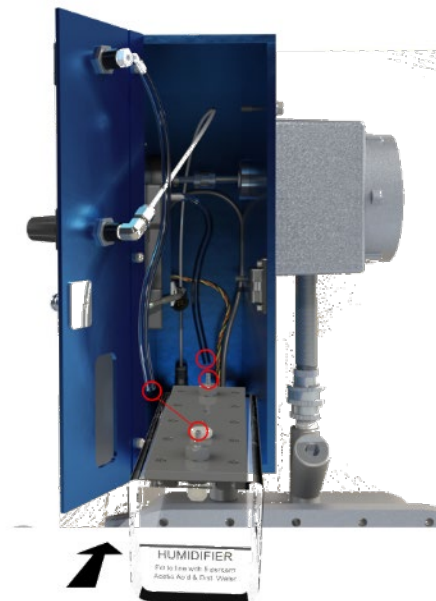


Figure 11. Humidifier Unit Installed in a 330S-Ex H₂S Analyzer

Eductor Block

The analyzer reading can be affected by positive or negative pressure on the sample vent line. This can be caused by strong winds blowing across or directly into the vent; or by mechanical venting (exhaust fan). The eductor will eliminate any influence on the analyzer reading; refer to Figure 15 .

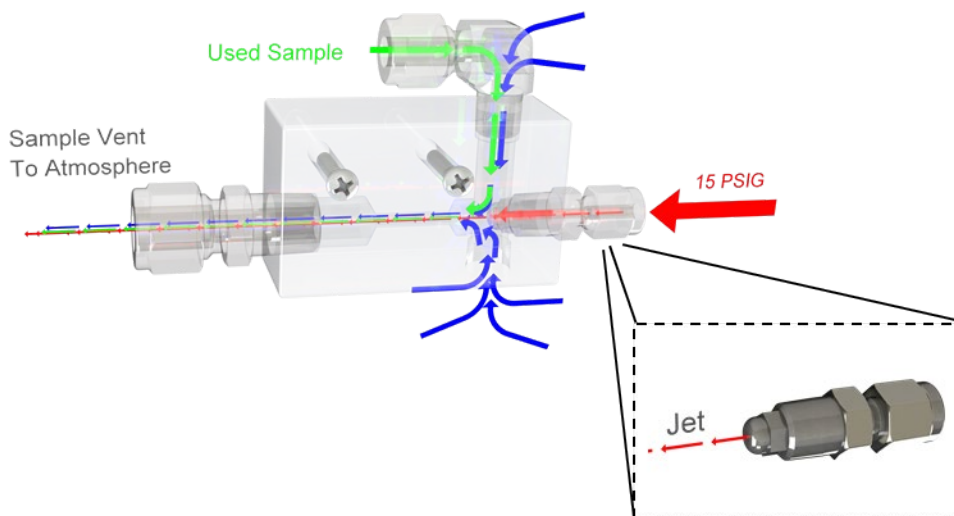


Figure 12. Eductor Block (Venturi Effect)

In cold climates, since the analyzer is venting a moist sample, freezing can occur. The eductor will help reduce freezing problems in the vent line due to the increased velocity and drying effect of the sweep gas. The eductor vent can be retrofitted to existing analyzers.



In normal conditions, the eductor makes a noise similar to a gas leak. This noise is normal and it is due to the 15 psig pressure being expelled through the restricted fitting creating suction from the gas vent line (Venturi Effect). DO NOT block the opening at the bottom of the eductor or the modified elbow fitting.

OPERATION & CONFIGURATION

The 330S-Ex H₂S analyzer can be configured by using the display-button function or by connecting the analyzer to a computer through USB.

Analyzer Display Interface

By using the analyzer's display, the user can only view and/or change certain parameters set at the factory. The display is made up of a Graphic Display, four (4) pushbuttons and (8) LED's. Refer to Figure 16.



Figure 13. 330S-Ex Display

The Descriptions and Function of the display buttons and LED's are described in table Table 4 & Table 5.

Button	Description/Function
Bypass	Used to inhibit all analyzer alarms to a non-alarm state and sets the analog 4-40 mA output to 2 mA. The Bypass LED illuminates when Bypass mode is enabled.
Scroll Right [→]	Used to move the cursor to the right. Also used to SAVE configuration adjustments when moved all the way to the right of the screen.
Scroll Left [←]	Used to move the cursor to the left. Also used to CANCEL configuration adjustments when moved all the way to the left of the screen.
Menu/Set	Used to cycle through the menu options. Also used to increase numerical values when making configuration adjustments.

Table 4. Display Button Description/Function

LED	Description/Function
Bypass	Illuminates when the analyzer is in bypass mode.
LED A & B	Red LEDs that can be used for different alarm configurations. By default, these LEDs are left as spare.
Fault	Illuminates when there is a fault in the Analyzer. Fault is used for Board temperature, Sensor High/Low, Low H ₂ S sensing tape sensor, Pressure switch, etc.
LED 1 to 4	Green LEDs that can be used for different alarms or conditions. By default, H alarm activates LED-1 and HH alarm activates LED-2. (Refer to the LED Sticker to the right side of the blue chassis on the XP enclosure).

Table 5. Display LED Description/Function

CALIBRATION PROCEDURES

H₂S Gas Calibration

Depending on the application, the 330S-Ex H₂S analyzer will require more or fewer periodic calibrations. There is no specific time as to how often the H₂S analyzer should be calibrated. It will depend on the application, importance of accuracy for the application, and how dirty or clean the environment and sample are. The following is the calibration procedure for the 330S-Ex H₂S analyzer:

1. Source a calibration gas of H₂S in balance of N₂ regulated to 15 psi (check expiry date). H₂S concentration to be approximately 2/3 of full-scale range or close to the H₂S alarm set point.
2. Press the bypass button and verify the "Bypass" LED illuminates (alarms will be held in the non- alarm state).
3. Turn off all gas supplies to the analyzer and check that a sufficient amount of H₂S sensing tape is installed.
4. Press the "Menu/Set" button until "Mtr Run" is displayed. Press the right arrow [→], the H₂S sensing tape will advance for approximately 10 seconds.
5. Press the "Menu/Set" button until "mV" is displayed ("###mV"). If the mV reading is 1000mV (±100mV), proceed to the next step, otherwise re-zero sensor (Refer to "Re-zero Sensor Procedure" on page 29).
6. Connect calibration gas to calibration port and turn the 3-way calibration valve 180°. The valve handle should be pointing towards where the gas bottle tubing is connected to (Calibration Inlet).
7. Turn on sample inlet valve, ensure that the sample regulator is supplying 15psig to the eductor (make sure there is suction from the eductor block). Adjust the flow meter to 2.0. Wait until the H₂S reading has stabilized (10 to 15 minutes).
8. With calibration gas applied, if H₂S reading is satisfactory (±2% of analyzer full range) skip to step 16, if H₂S reading is not satisfactory a gain adjustment is required, continue to step 9.
9. Press the "Menu/Set" button until the gain setting is displayed ("### Gain").
10. Calculate the new gain. New gain value should be within approximately 25% of the gain installed at the factory.

$$\left[\frac{\text{Cal Gas Concentration}}{\text{Current Readings}} \right] \times (\text{Current Gain}) = (\text{New Gain})$$

11. To adjust the gain setting such that the analyzer displays the correct H₂S concentration, press the right [→] and / or left [←] arrows until the cursor is underneath the number you wish to change.
12. Adjust the number using the "Menu/Set" button (it will increase until "9" then will cycle back through "0").
13. Save the new gain value by pressing the right arrow [→] until "Saved" appears or discard by pressing the left [←] arrow until "Cancel" appears.
14. Allow the analyzer to complete two cycles using the new gain value. The H₂S reading should match the calibration gas concentration. Repeat step 10 if necessary.
15. Return to sample gas flow using the 3-way calibration valve.
16. Set the sample gas pressure to 15 psig and set the flow meter to 2.0.
17. Disconnect the calibration gas supply.
18. After waiting 10 to 15 minutes confirm the analyzer reads below the H₂S alarm set points.
Remove the analyzer from bypass mode by pressing the bypass button. Verify the "Bypass" LED turns off.



Alarms are armed after removing the bypass mode.

Re-zero Sensor Procedure

1. Press the bypass button and verify that the "Bypass" LED illuminates.
2. Turn off sample gas flow using sample inlet valve.
3. Press the "Menu/Set" button until "Mtr Run" is displayed. Press the right arrow [→], the H₂S sensing tape will advance for approximately 10 seconds.
4. Remove the sensor cover.
5. Press the small pushbutton on the sensor block located on the lower left side next to the wire connector.
 - The sensor block will implement a "re-zero" procedure, indicated by a lit, red LED.
 - When the "re-zero" procedure is complete the LED light will turn green.
6. Initiate another motor run (Step 3).
7. Press the "Menu/Set" button until "### mV" is displayed.
 - Value should be 1000mV (± 100 mV)
8. Put on sensor cover.
9. Turn on sample gas flow using sample inlet valve.
10. Set the gas pressure to 15 psig and the flow meter to 2.0.
11. Confirm the analyzer reads below the H₂S alarm set points.
12. Remove the analyzer from bypass mode by pressing the bypass button. Verify the "Bypass" LED turns off.



Alarms are armed after removing the bypass mode.

MAINTENANCE

The 330S-Ex H₂S analyzer will provide reliable service with very little attention. If the analyzer is kept clean there should be no requirement to recalibrate from factory gain settings. However, regular check-up (at least every three months) will ensure that the analyzer is operating to specifications.

- Ensure that the H₂S sensing tape take-up and feed reels are tight
- Ensure that the flow meters, humidifier tubing and sample chamber tubing are free of liquid or particulate contamination. If the sample conditioning system is flooded with liquid, refer to "Sample Conditioning System Cleaning Procedure" on page 31.
- Ensure there is enough H₂S sensing tape, especially if a low H₂S sensing tape sensor is not installed. Refer to "H₂S Sensing Tape Change Procedure" on page 30.
- Check the sample conditioning filter(s) every time the H₂S sensing tape is replaced. Replace the filter(s) as required.

H₂S Sensing Tape Change Procedure

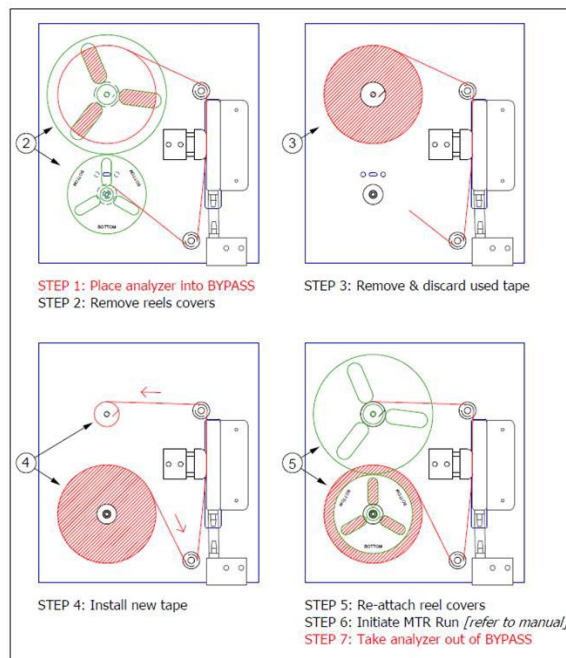


Figure 14. 330S-Ex H₂S Sensing Tape Change Procedure

Sample Conditioning System Cleaning Procedure

During start-up or plant upset situations, the 330S-Ex H2S analyzer may become contaminated with amine or hydrogen sulfide scavenger solution. This may cause the analyzer to read low (this can be determined at calibration). If the analyzer reads low, it will require incremental increases in the gain to maintain calibration. Please refer to factory calibration sheet for factory set gain factor. The scavenger solution is water soluble and therefore is relatively easy to clean.

Material List

Cleaning Kit Part Number: 330900

- Alconox RBS Solid, powdered precision cleaner w/ MSDS (2.5 tbsp)
- 330079 – Rear window and gasket
- MIF-225-PP – Small nipple (x2)
- MIF-32-PVC – Grey nipple
- MIF-32-PP – Big nipple
- MIF-24-PVC – Humidifier replacement tube fittings (x2)
- MIP-4 Humidifier replacement plug
- 06349-40 – Black 1/8" male/female elbow
- LT-2-4 (1/4" x 11") (0.635 x 27.94 cm) – Tubing for sample chamber to humidifier
- LT-2-4 (1/4" x 10") (0.635 x 25.4 cm) – Tubing for flow meter to humidifier
- LT-3-5 (3/16" x 10") (0.77625 x 25.4 cm) – Tubing for sample chamber to vent block
- PFA (24") (60.96 cm) – Tubing for flowmeter to bulkhead



Do not use solvents, brake cleaners, soaps, detergents or rubbing alcohol to clean up analyzer or sample system.

Procedure

1. Mix a 1% (2-1/2 tbsp per gallon) of Alconox in warm water
2. Sample line tubing
 - Shut off flow at the sample point prior to sample conditioning system
 - Flush the sample line and components with cleaning solution
 - Rinse with fresh water
 - Flush with isopropyl alcohol
 - Dry with clean, dry instrument air or gas
3. Sample conditioning system – Take pictures of SCS before disassembling
 - Remove filter elements from filter housings and discard
 - Remove all sample conditioning system components and soak in cleaning solution
 - Ensure valves are fully open when cleaning
 - Flush sample components with fresh water
 - Rinse with isopropyl alcohol
 - Blow dry with clean compressed air or fuel gas
 - If the clear Vinyl tubing appears discolored, replace the tubing.
 - Nafion tubing on humidifier should be replaced if it appears contaminated



Disassembly of the pressure regulator and solenoids in the field is not advised. Consult the factory if the regulator or solenoid appears contaminated.

4. Re-assemble Stainless Steel Tubing to analyzer according to analyzer drawing, refer to pictures taken before disassembling or refer to drawing package.
5. Once sample conditioning system has been re-assembled, apply calibration gas to the analyzer. Refer to "H₂S Gas Calibration" on page 27.

TROUBLESHOOTING

H₂S Readings Issues		
Problems	Possible Reasons	Possible Solutions
Erratic H ₂ S Readings	Trigger slide and H ₂ S sensing tape not seated properly	Ensure trigger slide and H ₂ S sensing tape are seated in the groove of the sample chamber.
	Pressure in building moving up and down from fan, exhaust or wind	The eductor should counteract this effect, however, the eductor may be plugged or vent blocked. Check there is no blockage and that all vent tubing and fitting are 316 stainless steel, sized 3/8" (0.9525 cm) or larger on a downward slope.
	Sample vent/Eductor either blocked or frozen	Check there is no blockage on the vent and/or eductor. Check for vacuum in Eductor block. Vent tubing and fittings should be 316 stainless steel 3/8" (0.9525 cm) or larger on a downward slope. Possible heat trace required.
	Analog input 2 jumper removed	Re-install jumper in Analog Input across (+4-20 & -4-20) on the controller board.
	Sensor block fault	Re-zero sensor block. Refer to " Re-zero Sensor procedure" on page 29. Check for green status led on sensor block once procedure is done & proper mV on white H ₂ S sensing tape.
	Sensor did not zero on white H ₂ S sensing tape	Check the H ₂ S Sensing tape, if not properly installed, refer to "H ₂ S Sensing Tape Change Procedure" on page 30 or on sticker in the analyzer's door. Perform a motor Run: Display>Press Menu Button until "MTR Run">Press right button. This will activate the motor and move the H ₂ S Sensing tape for a few seconds. Re-zero sensor block if necessary. Refer to "Re-zero Sensor procedure" on page 29.
	Regulator not maintaining 15 psig (Changing flow rate to analyzer)	Replace Regulator, Consult Envent Engineering Ltd.
<i>Continued on next page</i>		

H₂S Readings Issues (Cont'd)		
Problems	Possible Reasons	Possible Solutions
	Contaminants in sample chamber	Clean sample chamber, aperture and window; replace if required. Contact Envent Engineering Ltd for replacement assistance.
	Contaminants or liquid carry over in sample conditioning system	If contaminants or liquid has carried over the sample system, refer to page 31.
	Humidifier leaking	Humidifier needs to either be repaired or replaced. Consult Envent Engineering Ltd.
	Possible high pressure in flare line (Dilution option only)	Install a higher rated check valve.
Slow response	Aperture in chamber not optimized for required range	Consult "Aperture Strip" on page 21 for aperture size and contact Envent Engineering Ltd to order aperture and for assistance to install new aperture and re-calibrate analyzer. Refer to "H ₂ S Gas Calibration" on page 31.
	Contaminants or liquid carry over in sample conditioning system	If contaminants or liquid has carried over the sample system, refer to page 31.
Higher than Expected Readings	Sample vent/Eductor either blocked or frozen	Check there is no blockage on the vent and/or eductor. Check for vacuum in Eductor block Vent tubing and fittings should be 316 stainless steel 3/8" (0.9525 cm) or larger on a downward slope. Possible heat trace required.
	Contaminants in sample chamber	Clean sample chamber, aperture and window; replace if required. Contact Envent Engineering Ltd for replacement assistance.
	Aperture out of place or not optimized for required range	Remove the sample chamber, unscrew the sensor block and check that the aperture is not out of place. Consult "Aperture Strip" on page 21 for aperture size and "H ₂ S Gas Calibration" on page 27. Contact Envent Engineering Ltd to order aperture (if applicable) and for assistance to install new aperture and re-calibrate analyzer.

Continued on next page

H₂S Readings Issues (Cont'd)		
Problems	Possible Reasons	Possible Solutions
	Sensor/ sensor wire failure	Re-zero the sensor block. Refer to "Re-zero Sensor procedure" on page 29. If procedure fails, sensor or sensor wire may require replacement.
	Gain set too high	Gain is too high for the current setup. Re-calibrate analyzer and refer to current gain (from factory). The difference between factory gain and new gain should not be greater than +/- 2%. If necessary, do a gas calibration. Refer to "H ₂ S Gas Calibration" on page 27.
	Higher than required pressure/flow	Adjust pressure regulator to 15psig and flow meter to "2"
	Dilution canister tubing loose (Dilution option only)	Tubing inside the canister leaking. Open canister (follow all safety procedures to bleed out all high H ₂ S level concentrations) and re-connect the tubing to the fittings on canister lid. Contact Envent engineering Ltd for replacement if required.
	Total Sulfur's Hydrogen flow was decreased at the flow meter (Total Sulfur option only)	The flow of hydrogen being mixed with sample gas has been decreased. Either the hydrogen bottle is empty, or the flow was decreased through the flow meter knob. Adjust back to appropriate flow rate.
Lower than Expected Readings	Leaks in the sample system causing lower readings	Do a leak check on the sample system and humidifier. Use Snoop to detect the possible leaks in the system.
	Flow is too low	Make sure that the flow of sample gas coming into the analyzer is set to "2" (100 - 200 cc/min) at the flow meter.
	Gain set too low	Gain is too low for the current setup. Re-calibrate analyzer and refer to current gain (from factory). The difference between factory gain and new gain should not be greater than +/- 2%. If necessary, do a gas calibration. Refer to "H ₂ S Gas Calibration" on page 27.
<i>Continued on next page</i>		

H₂S Readings Issues (Cont'd)		
Problems	Possible Reasons	Possible Solutions
	Not using the humidifier or humidifier leaking	<p>A humidifier is not necessary if the sample gas inlet is already humidified. If the sample gas inlet is dry, a humidifier must be used. Make sure the humidifier unit is placed and installed correctly. Please refer to "</p> <p>Humidifier Unit" on page 22.</p> <p>Humidifier Leaking: it needs to either be repaired or replaced. Consult Envent Engineering Ltd.</p>
	Sensor/ sensor wire failure	<p>Re-zero the sensor block. Refer to "Re-zero Sensor Procedure" on page 29.</p> <p>If procedure fails, sensor or sensor wire may require replacement.</p>
	Dilution Instrument air or carrier gas flow was increased (Dilution option only)	<p>If the instrument air or the carrier gas is increased in flow, the readings will be lower. Make sure to keep a constant flow and pressure for the instrument or carrier gas.</p>
	Hydrogen flow has been increased (Total Sulfur option only)	<p>Lower the hydrogen flow to the specified on the flow meter.</p>

H₂S Sensing Tape Issues		
Problems	Possible Reasons	Possible Solutions
Tape does not advance	No tension on take up reel	Check setscrew in take up reel collars, if loose; tighten up with a 1/16" hex key. Do a manual advance on H ₂ S sensing tape. To do a motor run: Display>Press Menu Button until "MTR Run">Press right button. This will activate the motor and move the H ₂ S Sensing tape for a few seconds.
Tape breaking	High liquid content in sample gas	Genie probe and additional filtration may be required in sample conditioning system.
	Feed wheel not spinning freely	Dust and refuse build up between feed wheel and chassis. Requires removal and cleaning of chassis.
	Tape cover wheels pressing against H ₂ S sensing tape	H ₂ S sensing tape cover wheel became warped. Needs to be flattened to not contact tape when on feed wheel bolt. If replacement needed, consult Envent Engineering Ltd.
	Trigger slide not seated properly	Ensure trigger slide is seated in groove of sample chamber.
Overlapping Stains	This is normal in the 1st 1/4 of a new H ₂ S sensing tape. It should not cause any reading problems.	If it is causing reading problems, the "stop threshold" can be modified from 1,000,000 to 500,000. Please consult Envent Engineering Ltd before proceeding with this change.
Excessive H ₂ S sensing Tape consumption	Sample vent either blocked or frozen	Check there is no blockage on the vent and/or eductor. Vent tubing and fittings should be 316 stainless steel 3/8" (0.9525 cm) or larger on a downward slope. Possible heat trace required.
	Contaminants in sample chamber	Clean sample chamber. Replace aperture and window if required. Contact Envent Engineering Ltd for replacement and assistance.
	H ₂ S Sample inlet constantly being out of range from original analyzer intent	If the H ₂ S sample inlet is greater than the range of the analyzer, the tape will be consumed after than in normal operation.
	Aperture out of place	Take out the sample chamber, unscrew the sensor block and check that the aperture is not out of place. If so, refer to "Aperture Strip" on page 21 for aperture size and "H ₂ S Gas Calibration" on page 27.

Continued on next page

H₂S Sensing Tape Issues (Cont'd)		
	Sensor/ sensor wire failure	Try re-zeroing the sensor. Refer to " Re-zero Sensor procedure " on page 29. If procedure fails, Sensor or sensor wire may require replacement.
H ₂ S sensing Tape coming out of sample chamber/trigger slide	Trigger slide not seated properly	Ensure trigger slide is seated in groove of sample chamber

Electronics Issues		
Problems	Possible Reasons	Possible Solutions
Fault LED (Sensor High)	Incorrect zeroing	Make sure the H ₂ S Sensing tape is installed properly and do a motor run. To do a motor run: Display>Press Menu Button until "MTR Run">Press right button. This will activate the motor and move the H ₂ S Sensing tape for a few seconds. The alarm should clear.
	Faulty Sensor	Sensor needs to be replaced. Contact Envent Engineering Ltd for replacement.
Fault LED (Sensor Low)	Sensor did not zero on white H ₂ S sensing tape because H ₂ S sensing tape came out of sample chamber slot	Re-install H ₂ S Sensing tape. Refer to "H ₂ S Sensing Tape Change Procedure" on page 30 or on sticker in the analyzers door. Re-zero sensor block. Refer to Refer to "Re-zero Sensor procedure" on page 29.
	Sensor/ sensor wire failure	Re-zero the sensor block. Refer to "Re-zero Sensor Procedure" on page 29. If procedure fails, sensor or sensor wire may require replacement.
<i>Continued on next page</i>		

Electronics Issues (Cont'd)		
Problems	Possible Reasons	Possible Solutions
	IS Barrier failure (For 330S analyzer series only)	IS Barrier may need replacement. Consult Envent Engineering Ltd.
	Contaminants in sample chamber	Clean sample chamber. Replace aperture and window if required. Contact Envent Engineering Ltd for replacement and assistance.
Fault LED (Low H ₂ S sensing Tape)	New H ₂ S sensing tape is required	H ₂ S Sensing tape requires change (Average of 2 to 3 days left, from the moment alarm goes off, for the tape to be completely used up). Refer to "H ₂ S Sensing Tape Change Procedure" on page 30 or on sticker in the analyzers door.
	Low H ₂ S sensing tape sensor failure	If the alarm does not clear once a new H ₂ S sensing tape is installed, the low H ₂ S sensing tape sensor or its wires have failed and need to be replaced. Consult Envent Engineering Ltd to order a replacement. Low H ₂ S sensing Tape Sensor Part #: 330046A
Fault LED (Low Pressure)	Pressure of sample gas is lower than setpoint of pressure switch (factory set to 10 psi descending)	Inspect the sample inlet upstream to troubleshoot the problem.
	Pressure switch failed	If pressure is above 10 psi and alarm continuous, the pressure switch setpoint might have changed. Set back to 10 psi descending. Also, check pressure switch wiring If the problem persists, pressure switch might need replacement. Contact Envent Engineering Ltd.
	Pressure regulator failed	The problem might be coming from the pressure regulator. Troubleshoot and consult Envent Engineering Ltd.
Fault LED (Oven Fail)	Fuse not installed.	Fuse for furnace does not come installed in the controller board. Please check spare fuse bag and install fuse.
	Oven not working properly	Oven failed and temperature has dropped below the optimal temperature. Please consult Envent Engineering Ltd.
Blank Display	Contrast needs adjustment	Change contrast by turning the potentiometer in the display board.
<i>Continued on next page</i>		

Electronics Issues (Cont'd)		
Problems	Possible Reasons	Possible Solutions
Analyzer not communicating with PC	Multiple reasons could be causing the analyzer to not communicate properly with the PC.	<p>Check that the analyzer is ON.</p> <p>Check that the communication cable is properly connected.</p> <p>If the software application was open before connecting the communication cable from the analyzer to the computer, close the software and re-open it. Try again and enable communication.</p>
Analyzer not turning ON	Blown fuse	Check fuse in the controller board. Replace if required.
	Controller board Malfunction	Consult Envent Engineering Ltd for a controller board replacement.
	Not using the appropriate voltage rating	Make sure to use the appropriate voltage to power the analyzer. DC controller boards can be powered with 12 - 24 VDC and AC controller boards can be powered with 110 to 240 VAC. Keep in mind that if solenoids are controlled by the controller board, the voltage must match the solenoids voltage rating.
Red LED on Sensor Block	Sensor block fault	<p>Re-zero sensor block. Refer to "Re-zero Sensor Procedure" on page 29.</p> <p>Check for green status led on sensor block once procedure is done. If sensor LED stays red, consult Envent Engineering Ltd for a replacement.</p>
	Wiring not done properly	Make sure the wiring is done correctly.
Analog Outputs (4-20 mA) not working	Not using an external power supply	The analog outputs in the controller board are loop powered and not self-powered unless <u>AO boards</u> were installed as per customer request. If AO boards were not requested, an external power supply must be used.
<i>Continued on next page</i>		

Electronics Issues (Cont'd)		
Problems	Possible Reasons	Possible Solutions
	The system variable for output has been modified.	By factory configuration, the analog outputs (1 & 2) are configured to output based on H ₂ S Sample 1. Make sure that if they are modified, that the right system variables are selected.
Not coming out of alarm	Alarms are latched	If alarms are latched, they need to be acknowledged. Go to the display> cycle through until "ACK" is reached> press the right button to acknowledge all latched alarms. To deactivate the latching on any alarm, use the ICE software, and connect to the analyzer and de-select latching on any alarm that is latched.
	The analyzer is actually in alarm	Make sure the alarm setpoint values are as desired and that the analyzer is below (or above – like temperature setpoint) those setpoint values.

Sample Conditioning System Issues		
Problems	Possible Reasons	Possible Solutions
Liquid Carried over in SCS	Sample too wet for current conditioning sample system.	If a one-time occurrence: Cleaning required for sample system, refer to "Sample Conditioning System Cleaning Procedure" on page 31. If more than one time occurrence: Sample conditioning system may need a system for wet/dirty sample gas (extra filters set as coalescing, add liquid float stops, etc.). Consult Envent Engineering Ltd.
Regulator not maintaining 15 psi (erratic H ₂ S readings)	Problems with the Regulator (over pressured)	Replace Regulator, Consult Envent Engineering Ltd.
	Liquid carried over into regulator	Consult Envent Engineering Ltd.
	Problems with the (50 psi) sample pre-regulator at the sample point.	Heated regulator may be required if liquid hydrocarbon carry over is present at the pre-regulation sample.
<i>Continued on next page</i>		

Sample Conditioning System Issues (cont'd)		
Problems	Possible Reasons	Possible Solutions
Pressure gauge not working	Over pressured gauge	Replacement is required. Consult Envent Engineering Ltd for replacement.
Flowmeter not working	Liquid carried over into flowmeter	Consult Envent Engineering Ltd.
Frozen humidifier	Analyzer is being exposed to temperatures below 0 degrees °C (or - 2 degrees °C if 5% acetic acid is used)	Do not expose analyzer to temperatures below 0 degrees °C or - 2 degrees °C
Humidifier leaking liquid	The humidifier body cracked - Could be due to extreme temperature changes.	A replacement may be required. Consult Envent Engineering Ltd for a replacement.

Calibration Issues		
Problems	Possible Reasons	Possible Solutions
Change gain more than +/- 25% from original gain after calibration	Not using the right calibration bottle	Make sure the calibration bottle is within analyzer range. It is recommended that calibration gas used is close in value to where the alarm setpoint values need to be (for more accuracy).

APPENDICES

Recommended Spare Parts List

Part Number	Quantity	Description
330053	1	Eductor Block
330063	1	Humidifier Rebuild kit c/w Elbows, Nafion Tube, ftg
330079	2	Rear Window & Gasket
330100 - 330110	1	Aperture Strip (Associated to measurement range)
330130	1	4 liter Containers of Acetic Acid
330133XS	12	300' (91.44 m) Lead Acetate Tape (H ₂ S Sensing Tape)
330406	1	Box of 10 Micro Filter Glass Fiber Element 12/19-57-50CSK
330423	2	13" (33.02 cm) Chubby Quartz Tube (Total Sulfur option only)
3300429	1	TS Ceramic Heater (Total Sulfur option only)
330431	4	Kalrez O-rings (Total Sulfur option only)
330900	1	Tubing, Cleaner, Fittings Maintenance Kit

Sealing Compound: For sealing fittings in Hazardous Locations



RACCORDI DI BLOCCAGGIO
SERIE EYS-EZS IN ESECUZIONE
II 2GD Ex d IIC Ex tD A21 IP66
SERIE EYD-EZD IN ESECUZIONE
II 2G Ex d IIC
ISTRUZIONI DI SICUREZZA,
USO E MANUTENZIONE

Sealing fittings series
EYS-EZS execution
II 2GD Ex d IIC Ex tD A21 IP66
series EYD-EZD execution
II 2G Ex d IIC
safety, maintenance and mounting
instructions

IN ACCORDO ALLA DIRETTIVA 94/9/CE
according to directive 94/9/EC

SALES

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20129 Milano, Italia

NATIONAL SALES

tel. +39 02 76 1103 29
fax +39 02 73 83 402
Info@cortemmilano.it

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tel. +39 02 76 1105 01
fax +39 02 70 00 54 71
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WORKS and HEADQUARTER

Via Aquileia 10, 34070 Villése (Gorizia), Italia
Tel. 0481-964911 fax. 0481-964999





RACCORDI DI BLOCCAGGIO
ISTRUZIONI DI SICUREZZA, USO E MANUTENZIONE

sealing fittings
safety, maintenance and mounting instruction

Raccordi di bloccaggio tipo EYS-EZS-EYD-EZD

Esecuzione Ex d IIC Ex tD A21 IP66

Costruite in accordo alle normative europee

EN 60079-0 (2006)

EN 60079-1 (2004)



EN 61241-0 (2006)



EN 61241-1 (2004)

Ed in accordo alla nuova direttiva ATEX

94/9/CE del 23-03-1994

Numero di certificato

ELFIT EYS,   0722 II 2GD Ex d IIC Ex tD A21
IP66 CESI 03 ATEX 085

ELFIT EYD,   0722 II 2GD Ex d IIC Ex tD A21
IP66 CESI 03 ATEX 085

Sealing fittings type EYS-EZS-EYD-EZD

Execution Ex d IIC Ex tD A21 IP66

Manufactured in according to european codes

EN 60079-0 (2006)

EN 60079-1 (2004)



EN 61241-0 (2006)



EN 61241-1 (2004)

And in according to the new Directive ATEX

94/9/EC of 23-03-1994

Certificate number

ELFIT EZS,   0722 II 2GD Ex d IIC Ex tD A21
IP66 CESI 03 ATEX 085


ELFIT EZD,   0722 II 2GD Ex d IIC Ex tD A21
IP66 CESI 03 ATEX 085

ISTRUZIONI DI SICUREZZA




SAFETY INSTRUCTIONS

Rivolte a personale qualificato in accordo con le leggi nazionali, incluse le relative norme e, dove applicabile in accordo con IEC 60079-17 riguardante le apparecchiature elettriche per atmosfere potenzialmente esplosive.

- Non sono ammesse modifiche al prodotto
- I raccordi di bloccaggio possono essere installati solo con resina ELFIT.
- Devono essere utilizzate solo parti di ricambio ELFIT
- Le operazioni di manutenzione ordinarie e straordinarie devono essere effettuate solo da personale qualificato con l'approvazione di tecnici "esperti"
- Devono essere seguite scrupolosamente le seguenti istruzioni per ottenere una perfetta installazione
 - Devono essere strettamente osservate le norme nazionali di sicurezza e prevenzione infortuni, e le prescrizioni indicate con  nel presente fascicolo tecnico.

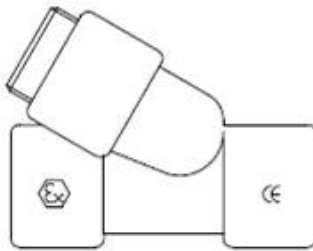
They are specifically conceived for qualified staff in accordance with the national regulations, there included the related standards and, where applicable in compliance with IEC 60079-17 standard concerning the electrical appliances for potentially explosive atmospheres.

- Changes of the design and modifications to the junction box are not permitted
- The sealing fittings can be fit only with ELFIT resin.
 - Only ELFIT spare parts can be used
- Everyday and extraordinary maintenance must be carried out only by qualified personnel prior approval of "expert" technicians
- The following instructions must be strictly followed so as to obtain a perfect installation
- The national safety rules and accident prevention regulations, specified as  in this technical booklet, must be strictly respected.

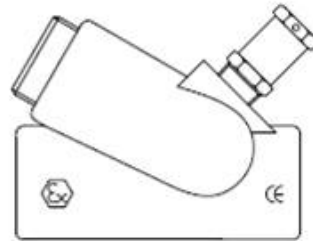


Serie a tipi di raccordi di bloccaggio
Sealing fittings serie and type

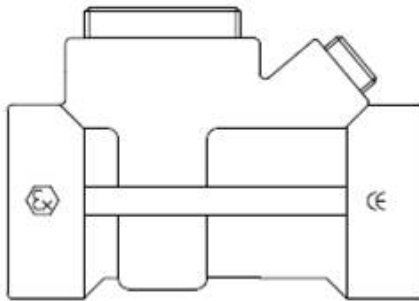
Raccordo di bloccaggio tipo EYS
Filettatura disponibile da 1/2" a 1"
Sealing fitting type EYS
Thread available from 1/2" to 1"



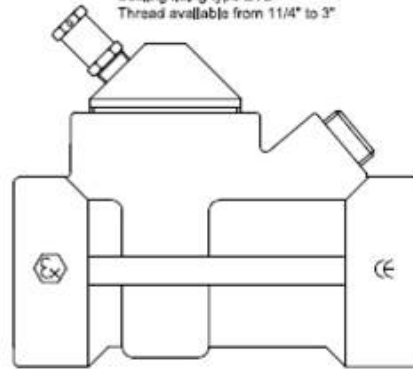
Raccordo di bloccaggio tipo EYD
Filettatura disponibile da 1/2" a 1"
Sealing fitting type EYD
Thread available from 1/2" to 1"



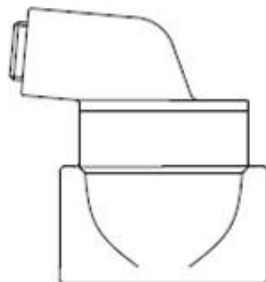
Raccordo di bloccaggio tipo EYS
Filettatura disponibile da 1 1/4" a 3"
Sealing fitting type EYS
Thread available from 1 1/4" to 3"



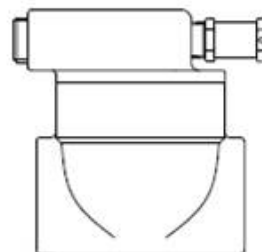
Raccordo di bloccaggio tipo EYD
Filettatura disponibile da 1 1/4" a 3"
Sealing fitting type EYD
Thread available from 1 1/4" to 3"



Raccordo di bloccaggio tipo EZS
Filettatura disponibile da 1/2" a 3"
Sealing fitting type EZS
Thread available from 1/2" to 3"



Raccordo di bloccaggio tipo EZD
Filettatura disponibile da 1/2" a 3"
Sealing fitting type EZD
Thread available from 1/2" to 3"



ISTRUZIONI D'USO



INSTRUCTIONS OF USE

Il range di temperatura dei raccordi di bloccaggio va da -20°C a +60°C

• Per il bloccaggio ed il modo di protezione IP vedere Esempio E (pag. 7)

• Per la preparazione e l'impiego della resina seguire quanto indicato a pag. 4 della presente Istruzione d'uso.

• Per la preparazione del prodotto alla resinatura seguire quanto indicato a :
Pag. 5 esempio A per EYS e EYD
Pag. 6 esempio B per EZS e EZD

• Per la preparazione dei raccordi serie EYD e EZD con valvolina di drenaggio seguire quanto indicato negli esempi C pag.8 e D pag.10

• Lo schema 1. Indica la posizione da tenere per l'utilizzo dei prodotti serie EZS e EZD sia per applicazioni orizzontali che per applicazioni verticali.

• La sezione massima dei conduttori sigillati all'interno del raccordo non deve superare il 40% della sezione totale dello stesso.

The temperature of the blocking connections ranges from -20°C to +60°C

• For the blocking and the IP protection rating, see Example E (pag. 7)

• Follow what specified on pag.4 of this Operating Instruction for the preparation and use of the resin.

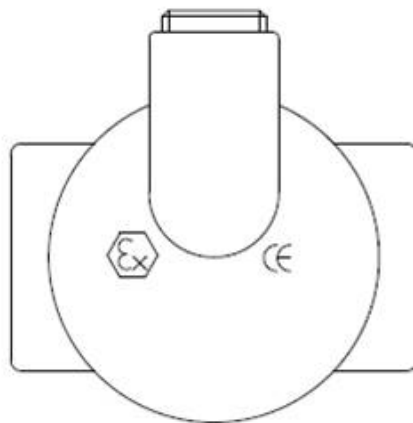
• Follow what specified on :
Pag. 5 example A for EYS and EYD
Pag. 6 example B for EZS and EZD
to prepare the product for its treatment with resin.

• Follow what specified in the Examples C pag.8 and D pag.10 for the preparation of EYD and EZD series connections with drain valve.

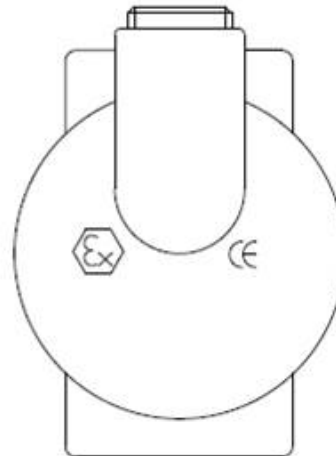
• Layout nr.1 indicates the correct position to be adopted when using the EZS and EZD series products, both for horizontal and vertical applications.

• The maximum section of sealed connectors inside the connection must not be over 40% of the overall section of the same connection.

Schema 1 / Scheme 1



Posizione per il montaggio in orizzontale
Position for horizontal assembled



Posizione per il montaggio in verticale
Position for vertical assembled



RACCORDI DI BLOCCAGGIO
ISTRUZIONI DI SICUREZZA, USO E MANUTENZIONE

sealing fittings
safety, maintenance and mounting instruction

1-Ostruire, con una quantità di fibra sintetica o naturale, la parte (a) inferiore del raccordo di bloccaggio serie EYS (Esempio A pag.5) e/o le due estremità laterali (a) del raccordo di bloccaggio serie EZS (Esempio B pag.6).

2-Montare i cavi dal foro di versamento e distanzarli uno dall'altro per evitare il formarsi di un percorso di aria tra di essi, difficile da riempire con la resina sigillante.

3-Inserire la fibra tra i conduttori e la parete interna del raccordo in modo tale da impedire che la resina fuoriesca dalla parte inferiore (EYS) o lateralmente (EZS). L'inserimento della fibra a mezzo di adeguato attrezzo (cacciavite, punteruolo o similare) non deve danneggiare l'isolamento dei conduttori.

4-Preparare la resina sigillante seguendo le istruzioni indicate su pag. 9

Si raccomanda di preparare la quantità di resina sigillante in funzione della quantità dei raccordi di bloccaggio da riempire. La quantità di resina da usare è indicata in tabella A. Evitare di eseguire la preparazione della resina a temperature ambientali basse in quanto ne risulterebbe un aumento della sua viscosità rendendo in tal modo difficoltosa la procedura di riempimento.

5-Versare la resina sigillante nel raccordo di bloccaggio attraverso l'imbocco B. Il livello della resina deve raggiungere la parte inferiore del foro di riempimento (altezza S) (vedere pag.5 e 6).

6- Per EYS e EYD alla fine delle operazioni indicate ai punti 1,2 e 3 prima di ostruire l'imbocco con il tappo 4, si consiglia di coprire con un velo di resina almeno due filetti dello stesso per aumentare la tenuta. Alla fine dell'operazione di resinatura si consiglia prima di ostruire l'imbocco con il tappo 3, di coprire con un velo di resina almeno due filetti dello stesso per aumentare la tenuta.

7- Per EZS o EZD si consiglia prima di assemblare il coperchio 1 sul corpo 2 di coprire almeno due filetti con un velo di resina per aumentare la tenuta dello stesso. Alla fine dell'operazione di resinatura si consiglia prima di ostruire l'imbocco con il tappo 3, di coprire con un velo di resina almeno due filetti dello stesso per aumentare la tenuta.

1-Obstruct, with an amount of natural or synthetic fibre, the lower part (a) of the EYS series blocking connection (Example A pag.5) and/or the two lateral ends (a) of the EZS series blocking connection (Example B pag.6).

2- Move away the cables from the filling hole and keep them well apart so as to avoid the formation of an air passage in between them, which is difficult to be filled with sealing resin.

3-Insert the fibre between the cables and the inner wall of the connection so as to avoid that the same resin might percolate out of the lower part (EYS) or from one side (EZS). Be careful when applying the resin with a proper tool (screwdriver, punch or similar) as this might damage the insulation of the cables.

4-Prepare the sealing resin by following the instructions referred to on pag.9. You are recommended to prepare the amount of resin in accordance with the quantity of the blocking connections to be filled. Table A shows you the amount of resin needed. Avoid to carry out the preparation of the resin at low room temperatures since there could be an increase of its viscosity and therefore the filling procedure could be very difficult.

5-Pour the sealing resin in the blocking connection by means of the opening B. The resin level must reach the lower part of the filling hole (Level S) (see pag.5 and 6).

6- As for EYS and EYD units, at the end of operating specified under sections 1,2 and 3, and before obstructing the opening with tap 4, you are advised to apply a thin layer of resin on at least two threads so as to increase its holding. At the end of the resining operation, before obstructing the opening with the tap 3, you are advised to apply a thin layer of resin on at least two threads of it so as to increase its holding.

7- As for EZS or EZD units, you are recommended, before assembling the cover 1 on the body 2, to cover at least two threads with a thin layer of resin so as to increase the holding of it. At the end of the resining operation, before obstructing the opening with tap 3, you are recommended to apply a thin layer of resin over at least two threads of it so as to increase its holding.

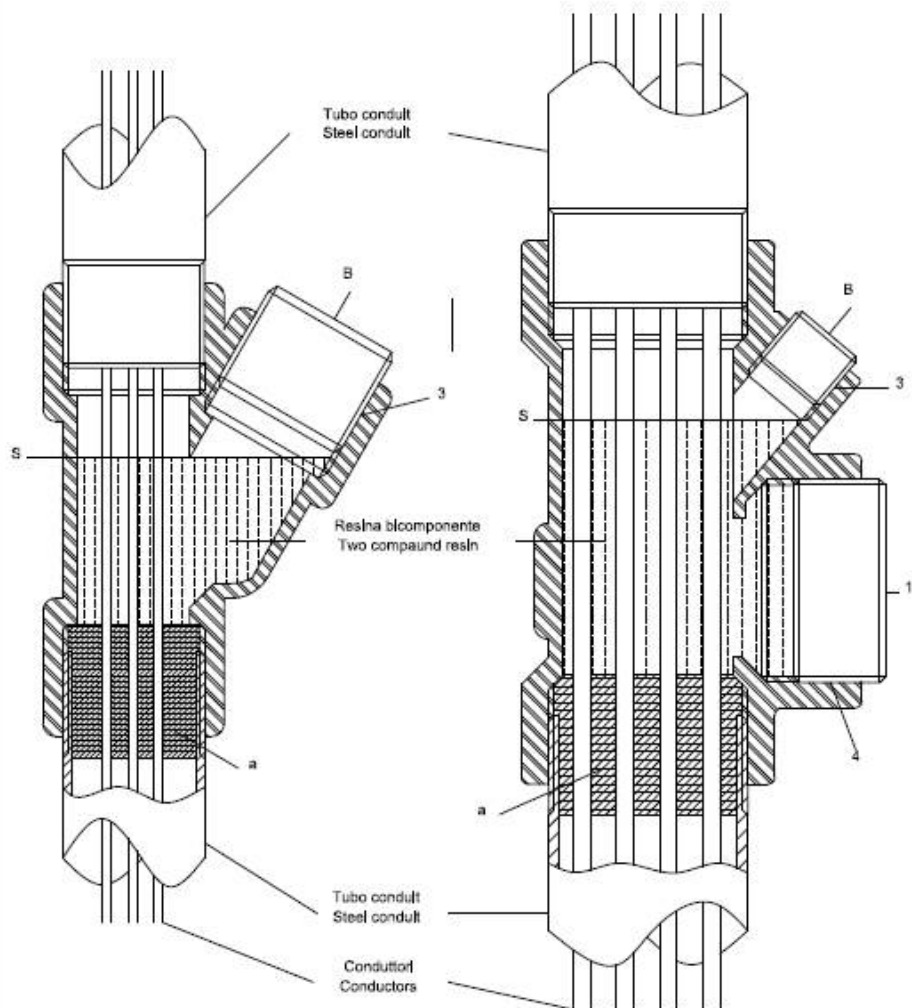
Tabella A / Table A

Dimensioni Sizes	Qtà resina EYS/EYD Q.ty resin EYS/EYD	Qtà resina EZS/EZD Q.ty resin EZS/EZD
1/2"	35 g	140 g
3/4"	50 g	140 g
1"	100 g	140 g
1 1/4"	240 g	390 g
1 1/2"	240 g	390 g
2"	360 g	570 g
2 1/2"	1250 g	1000 g
3"	1250 g	1000 g

Tabella 1 / Table 1

Confezioni disponibili Available packages Componente/Component A	Confezioni disponibili Available packages Componente/Component B
100 g	25 g
300 g	75 g
400 g	100 g
1000 g	250 g

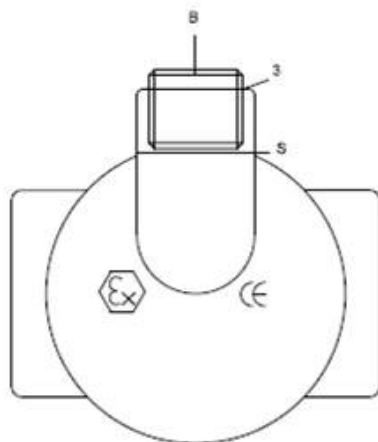
Esempio A / Example A



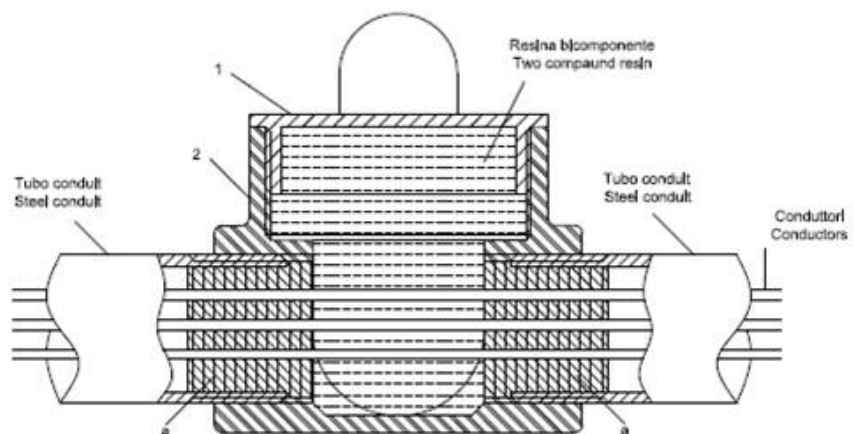
1= Inbocco per l'inserimento della fibra sintetica necessaria ad ostruire il passaggio del tubo conduit (solo per EYS e EYD da 1 1/4" a 3")

1= Hub for inserting the synthetic fibre necessary to obstruct the passage of the conduit pipe (only for EYS and EYD from 1 1/4" to 3")

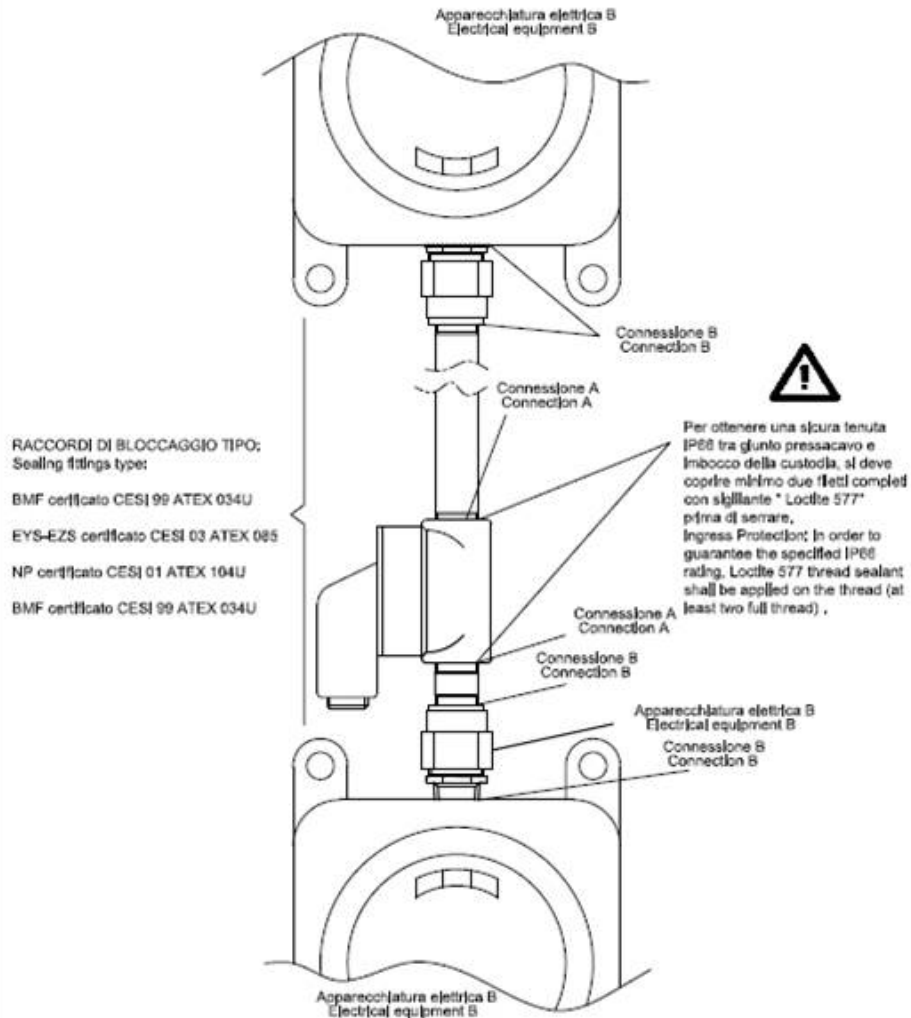
Esempio B / Example B



Posizione da mantenere per
la resinatura
Position to maintain for the
sealing



Esempio E / Example E

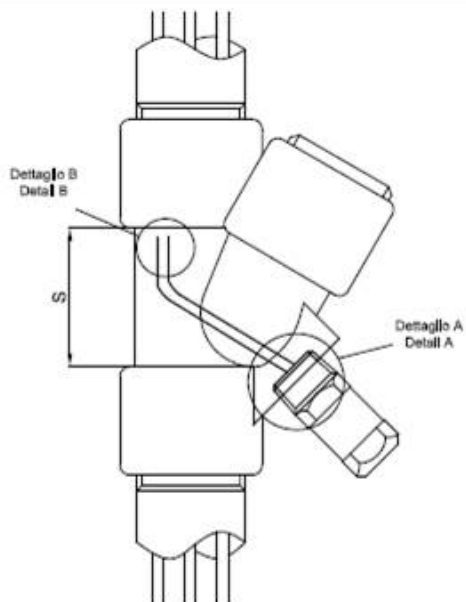


RACCORDI DI BLOCCAGGIO TIPO:
Sealing fittings type:
BMF certificato CESI 99 ATEX 034U
EYS-EZS certificato CESI 03 ATEX 085
NP certificato CESI 01 ATEX 104U
BMF certificato CESI 99 ATEX 034U

A-Connessioni e apparecchiature elettriche con una protezione IP68 testata e certificata.
B-Connessioni e apparecchiature elettriche con grado di protezione IP non testato.
E' obbligo dell'installatore, fare in modo che le connessioni e le apparecchiature B, assicurino una protezione IP adeguata.

A-Connections and electrical equipment with a degree protection IP68 tested and certificate.
B-These connection and electrical equipment must assure a degree protection IP.
The technician in charge of the installation operation to make provisions so as all connections and the B appliances, ensure an adequate IP protection.

Esempio C
Example C



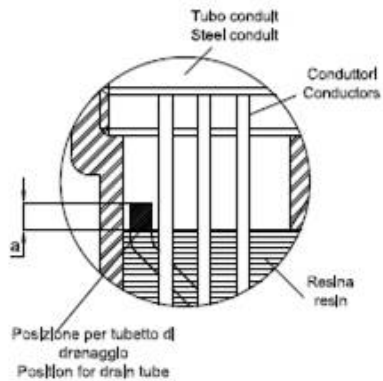
Note

- Il tappo in gomma da applicare alla valvola di drenaggio è obbligatorio, avendo la funzione di non fare trafilare la resina attraverso la valvola (dettaglio B).
- Per assicurare un corretto drenaggio si deve posizionare il tubetto come indicato nel dettaglio A altezza minima $a=5$ mm.

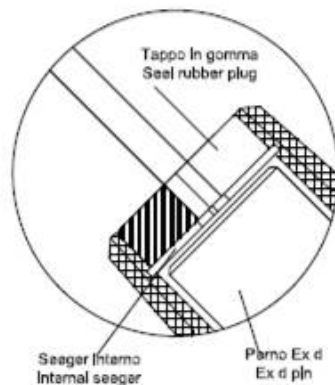
Note

- The rubber tap to be applied to the drain valve is obligatory as its function is that of preventing the resin from percolating through the valve (Detail B).
- To ensure a correct draining, you have to position the small pipe as shown on Detail A minimum height $a=5$ mm.

Dettaglio B
Detail B



Dettaglio A
Detail A





RACCORDI DI BLOCCAGGIO
ISTRUZIONI DI SICUREZZA, USO E MANUTENZIONE

sealing fittings
safety, maintenance and mounting instruction

PREPARAZIONE RESINA / PREPARATION RESIN

CARATTERISTICHE

Resina poliuretanica bicomponente di colore nero (dopo la miscelazione dei due componenti)
Tempo di indurimento circa 4 ore
Tempo di catalizzazione 24 ore
Codice = CRV420

RESINA (Componente A)

- composto di colore nero
- codice = CRV420H71
- rapporto di miscelazione 100%

CATALIZZATORE (Componente B)

- composto di colore marrone
- codice = CRV420H72
- rapporto di miscelazione 25%

RAPPORTO COMPOSTI DA MISCELARE

Rapporto 100g (composto A) a 25g (composto B) al momento dell'uso

CONFEZIONI DISPONIBILI

Vedere tabella 1 pag.4

PREPARAZIONE DEL COMPOSTO (MISCELAZIONE COMPONENTE A CON B)

Per utilizzo totale

- Miscelare il componente A fino ad ottenere un composto omogeneo e liquido eliminando eventuali sedimentazioni o depositi
- Aggiungere l'intero contenuto del componente B
- Miscelare il composto fino a renderlo omogeneo
- Colare il composto nel raccordo precedentemente preparato (vedere esempio A pag.5 per EYS e B pag.6 per EZS)

Per utilizzo parziale

- Versare una parte del componente A in un contenitore metallico o plastico privo di impurità
- Aggiungere il componente B, mantenendo sempre il rapporto di miscelazione in peso o percentuale
- Miscelare il composto fino a renderlo omogeneo
- Colare il composto nel raccordo precedentemente preparato (vedere esempio A per EYS e B per EZS)

TEMPO DI UTILIZZO DEL COMPOSTO MISCELATO

- Temperatura ambiente di 20°C entro 30 minuti dalla miscelazione
- Temperatura ambiente di 15°C entro 45 minuti dalla miscelazione

CHARACTERISTICS

Two-component, polyurethan black resin (after mixing the two components),
Hardening time around 4 hours,
Catalyzing time 24 hours,
Code = CRV420

RESIN (Component A)

- black compound
- code = CRV420H71
- mixing ratio 100%

CATALYZING AGENT (Component B)

- brown compound
- code = CRV420H72
- mixing ratio 25%

RATIO OF COMPOUNDS TO BE MIXED

Ratio 100g (compound A) with 25g (compound B) when ready to be used

AVAILABLE PACKAGES

See table 1 pag.4

PREPARATION OF THE COMPOUND (MIXING COMPONENT A WITH COMPONENT B)

For a complete usage

- Mix component A for as much as to obtain a liquid, homogeneous compound and get rid of possible solid bits or remains
- Add on the whole content of component B
- Stir the compound for as much as to obtain a homogeneous substance
- Let the substance glue into the previously prepared connection (see example A for EYS and B for EZS)

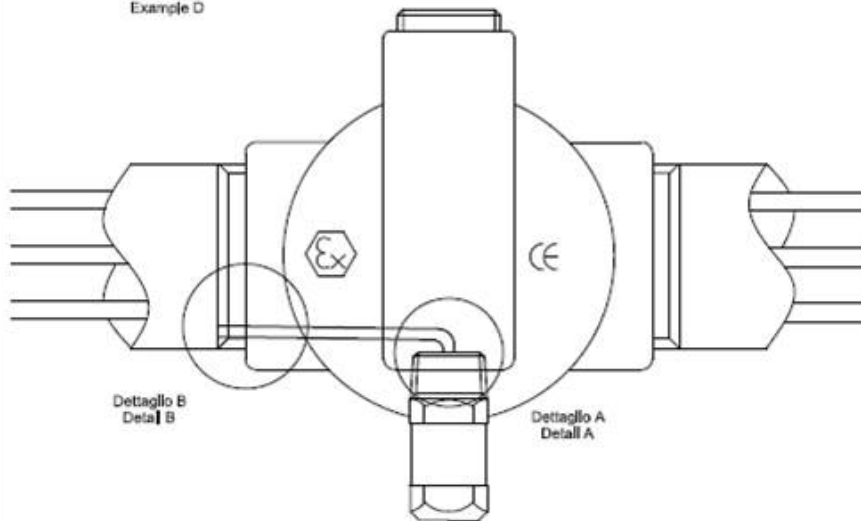
For a partial usage

- Pour a part of component A into a metallic or plastic container free of impurities
- Add on the component B, by always keeping the correct mixing ratio of weight or percentage
- Stir the compound for as much as to make it homogeneous
- Let the substance glue down on the previously prepared connection (see example A pag.5 for EYS and B pag.6 for EZS)

TIME OF USE FOR THE MIXED UP COMPOUND

- Room temperature equal to 20°C within 30 minutes from stirring up
- Room temperature of 15°C within 45 minutes from stirring up.

Esempio D
Example D



Note

-Il tappo in gomma da applicare alla valvola di drenaggio è obbligatorio, avendo la funzione di non fare trafilare la resina attraverso la valvolina (dettaglio B)

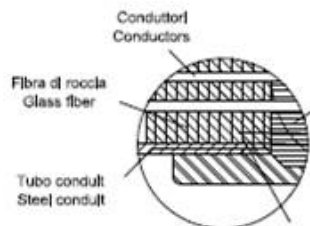
- Per assicurare un corretto drenaggio si deve posizionare il tubetto come indicato nel dettaglio A

Note

-The rubber tap to be applied to the drain valve is obligatory as its function is that of preventing the resin from percolating through the valve (Detail B).

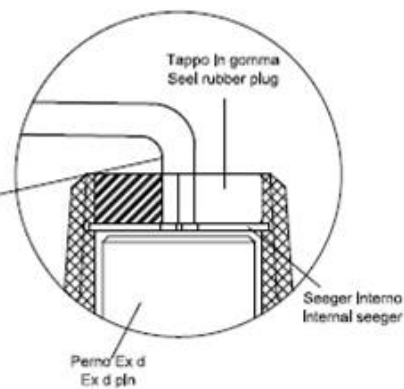
- To ensure a correct draining, you have to position the small pipe as shown on Detail A.

Dettaglio B
Detail B



Posizione per tubetto di drenaggio
Position for drain tube

Dettaglio A
Detail A





RACCORDI DI BLOCCAGGIO
ISTRUZIONI DI SICUREZZA, USO E MANUTENZIONE

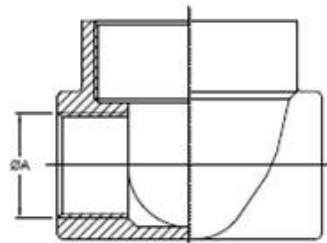
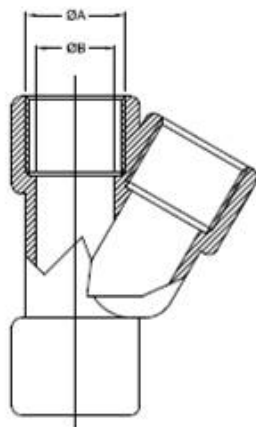
sealing fittings
safety, maintenance and mounting instruction

• La sezione massima dei conduttori sigillati all'interno del raccordo non deve superare il 40% della sezione totale dello stesso

• The maximum section of sealed connectors inside the connection must not be over 40% of the overall section of the same connection.

	ØA	ØB	Sezione totale Total section (mm ²)
EYS-1	1/2"	15	176
EYS-2	3/4"	20	314
EYS-3	1"	26	530
EYS-4	1 1/4"	35	962
EYS-5	1 1/2"	35	962
EYS-6	2"	45	1590
EYS-7	2 1/2"	65	3318
EYS-8	3"	88	3631

	ØA	Sezione totale Total section (mm ²)
EZS-1	1/2"	346
EZS-2	3/4"	547
EZS-3	1"	865
EZS-4	1 1/4"	1378
EZS-5	1 1/2"	1794
EZS-6	2"	2789
EZS-7	2 1/2"	4429
EZS-8	3"	6054



Safety Data Sheet for H₂S Sensing Tape






SAFETY DATA SHEET (SDS) Global Harmonization System

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

- 1.1 Product Identifier / Product Name**
REF (Product Code) 90746
Product Name Lead Acetate Impregnated Paper Tape
1 x roll Lead acetate paper
- 1.2 Relevant identified uses of the substance or mixture and uses advised against**
Relevant identified uses
Product for Analytical Use.
The Exposure scenario is integrated into sections 1-16.
Uses advised against
not described
- 1.3 Details of the supplier and of the safety data sheet**
Manufactured by:
Envent Engineering Ltd.
7060 Farrell Road SE
Calgary, AB, CANADA
Tel.: 1-403-253-4012
E-mail: info@envent-eng.com
- 1.4 Emergency telephone number**
For Chemical Emergency
Spill, Leak, Fire, Exposure, or Accident
Call Envent Engineering 1-403-253-4012
Toll Free: 1-877-936-8368

SECTION 2: HAZARDS IDENTIFICATION

- 2.1 Classification of the substance(s) or mixture(s)**
Lead acetate paper
EU Directive 1999/45/EC
Hazard Symbols R 33-61

GHS Directive
Hazard Symbols T

Signal Word DANGER
GHS08
Hazard Identification **Hazard Classes/Categories**
H360Df Reproductive Toxicity cat. 1B
H412 Hazardous to the aquatic environment - chronic cat. 3
- 2.2 Safety, health and environmental regulations/legislation specific for the substance or mixture**
According to GHS inner packages must be only labelled with symbol(s) and product identifier.
- Lead acetate paper**
EU Directive 1999/45/E
Hazard Symbols:

R 33-61
Danger of cumulative effects. May cause harm to the unborn child.
S 53
Avoid exposure — obtain special instructions before use.
GHS Directive

Revision 1

1

SAFETY DATA SHEET (SDS) Global Harmonization System

Hazard Symbols:



GHS08

Signal Word: DANGER

H360Df

May damage the unborn child. Suspected of damaging fertility.

P202, P280sh, P308+313, P405

Do not handle until all safety precautions have been read and understood. Wear protective gloves/eye protection. IF exposed or concerned: Get medical advice/attention. Store locked up.

2.3 Other hazards

Possible Hazards from physicochemical Properties

Information pertaining to particular Risks to Human and possible Symptoms
Can accumulate within the body.

Information pertaining to particular Risks to the Environment

Other Hazards

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances or 3.2 Mixtures

Lead acetate paper tape

Chemical: lead(II) acetate (trihydrate)

Weight Percent: 10%

Chemical Formula: C4 H6 O4 Pb .3H2 O

Toxic Substance Control Act (TSCA) Inventory: not listed

Registry of Toxic Effects of Chemical Substances (RTECS): OF8050000

EC No.: 206-104-4

acc. 1999/45/EC: R33-52-53-61

Correlation Factor: x 0.546 (-%Pb)

Index No: 082-005-00-8

acc. GHS: H360Df, H412

Chemical : filter paper (cellulose CAS 9004-34-6)

Weight Percent: 80-100%

Chemical Formula: (C6 H10 O5)n

Toxic Substance Control Act TSCA Inventory: listed

Registry of Toxic Effects of Chemical Substances (RTECS): FJ5691460

EC No.: 232-674-9

acc. 1999/45/EC: -

acc. GHS: not necessary

3.3 Remarks

List of R and H phrases: see section

SECTION 4: FIRST AID MEASURES

4.1 Description of First aid measures

Place insured person out of danger zone to fresh air immediately. Ensure quiet, warmth, and provide resuscitation if necessary. If necessary contact medical advice.

4.1.1 After SKIN Contact

Remove dust with wetted tissue. Remove contaminated clothing. Rinse the affected skin or mucous membrane thoroughly under running water.

4.1.2 After EYE Contact

Rub dust with teardrops from eyes or: After contact with the eyes rinse thoroughly under running water with the eyelid wide open with eye washing bottle, eye douche or running water (protect intact eye).

4.1.3 After INHALATION of Vapors

After inhalation of dust fresh air should be inhaled.

4.1.4 After ORAL Intake

After oral intake lots of water should be drunk after it has been ingested.

4.2 Most important symptoms and effects, both acute and delayed

4.3 Indication of any immediate medical attention and special treatment needed



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SECTION 5: FIREFIGHTING MEASURES

- 5.1 Extinguishable Media**
Fire extinguishers appropriate to the fire classification, and, if applicable, a fire blanket must be available in a prominent location in the work area. All extinguishers like WATER FOG, WATER SPRAY, alcohol-resistant FOAM, DRY CHEMICAL, CARBON DIOXIDE can be used.
- 5.2 Special hazards arising from the substance or mixture**
- 5.3 Advice for firefighters**
No, for listed product. Product package burns like paper or plastic.
- 5.4 Additional Information**
—

SECTION 6: ACCIDENTAL RELEASE MEASURES

- 6.1 Personal Precautions, Protective equipment and Emergency procedure**
Regular staff training is necessary.
- 6.2 Environmental precautions**
—
- 6.3 Methods and material for containment and cleaning up**
- 6.4 Reference to other sections**
—

SECTION 7: HANDLING AND STORAGE

- 7.1 Precautions for safe handling**
Handling in accordance with the test instruction, that comes with the product.
- 7.2 Conditions for safe storage, including any incompatibilities**
The original product package of Envent Engineering allows a safe storage.
Storage class: see section 12.1
- 7.2.1 Conditions for safe storage, including any incompatibilities**
Keep original product packages tightly closed during handling and storage.
- 7.3 Specific end use(s)**
—

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

- 8.1 Control parameters**
- | | | | |
|-------------------|--|---------------------------------------|---|
| Chemical: | lead(II) acetate (trihydrate) | CAS No.: | 6080-56-4 |
| Canada CEPA 1999: | not listed | | |
| TSCA Inventory: | not listed | California Prop. 65 List: | listed cancer |
| NIOSH: | human carcinogen | NTP Report on Carcinogens (RoC) List: | Yes (Lead compound - Reasonably anticipated to be a human carcinogen) |
| OSHA: | not listed | | |
| EU carcinogen: | Rc 1, Rr 3 | | |
| EU value: | 0.15 Pb mg/m ³ | | |
| Chemical: | filter paper (cellulose CAS 9004-34-6) | CAS No.: | - |
| Canada CEPA 1999: | DSL yes | | |
| TSCA Inventory: | listed | California Prop. 65 List: | not listed |
| NIOSH: | not listed | | |
| OSHA: | not listed | | |
- 8.2 Exposure controls**
The highest level of cleanliness must be maintained at the workplace.
- 8.2.1 Respiratory Protection**
Only if additional recommendations in test instruction or packing insert.
- 8.2.2 Hand Protection**
Yes, gloves (permeation time >30 min - level 2), consist of PVC, Natural latex, Neopren, or Nitril. Use for short times chemical resistant Latex gloves f.ex. with code EN 374-3 level 1.
- 8.2.3 Eye/face Protection**
Yes, Splash Goggles.
- 8.2.4 Skin Protection**
Recommended.
- 8.2.5 Hygiene measures**
Eating, drinking, smoking, taking snuff and storage of food in work areas and at outdoor workplaces is prohibited. Avoid contact with the skin, eyes and clothing. Rinse any clothing on which the substance has been spilled, and soak it in water. Wash hands thoroughly with soap and water when stopping work and before eating, and then apply protective skin cream.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Lead acetate paper
Appearance : solid
pH: 5-7
Color : colorless
Odor : acetic

9.2 Other information
—

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

no data available

10.2 Chemical stability

no data available

10.3 Possibility of hazardous reactions

no data available

10.4 Conditions to avoid

10.5 Incompatible materials

Only avoid contact with concentrated acids.

10.6 Hazardous decomposition products

In the original package all parts/all reagents are safely and separated stored. Decompositions are not observed during the expiration period under recommended conditions.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Following information is valid for pure substances.

Lead acetate paper

Chemical: LD50_{rat} : *lead(II) acetate (trihydrate)* CAS No.: 6080-56-4

LC₅₀ hmn : 4665 mg/kg

714 mg/kg

Chemical: *filter paper (cellulose CAS 9004-34-6)* CAS No.: -

LD50_{rat} : >5000 mg/kg

LC50_{hl rat} : >58004h mg/m³

LD50_{dm rbt} : >2000 mg/kg

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

Following information is valid for pure chemicals.

Lead acetate paper

Chemical: *lead(II) acetate (trihydrate)* CAS No.: 6080-56-4

Chemical: *filter paper (cellulose CAS 9004-34-6)* CAS No.: -

12.2 Persistence and degradability

no data available

12.3 Bioaccumulative potential

no data available

12.4 Mobility in soil

no data available

12.5 Results of PBT and vPvB assessment

no data available

12.6 Other adverse effects

no data available



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SECTION 13: DISPOSAL CONSIDERATIONS

Please observe local regulations for collection and disposal of hazardous waste and contact waste disposal company, where you will obtain information on laboratory waste disposal (RCRA Code D002/D003, EU waste code number 16 05 06).

13.1 Waste treatment methods

SECTION 14: TRANSPORT INFORMATION

No dangerous goods according the Transport regulations

14.5 Environmental hazards

low, small amounts

14.6 Special precautions for user

not necessary

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

not applicable

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

U.S. Federal Regulations

OSHA "A Guide to The Globally Harmonized System of Classification and Labelling of Chemicals (GHS)"
<https://www.osha.gov/dsg/hazcom/ghs.html>
29 CFR 1910.1200 Hazard communication.
NIOSH Workplace Safety & Health Topics
TSCA Inventory

U.S. State Regulations

California Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986

Canada

Canada CEPA 1999 - Domestic Substances List (DSL), List of Toxic Substances (Schedule 1)

15.2 Chemical safety assessment

--not necessary for these small amounts

SECTION 16: OTHER INFORMATION

16.1 List of R and H Phrases

16.1.1 List of relevant R Phrases

R33	Danger of cumulative effects.
R52/53	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R61	May cause harm to the unborn child.

16.1.2 List of relevant H Phrases

H360Df	May damage the unborn child. Suspected of damaging fertility.
H412	Harmful to aquatic life with long lasting effects.

16.2 Training Advice

Multiple safety training of staffs about danger and protection by using hazards in working area.

16.3 Recommended Restriction on Use

Only for Professional User.

An individual package of this product or test kit has a moderate hazardous potential.

16.4 Further Information

Envent Engineering Ltd. provides the information contained herein in good faith being up-to-date of own realizations at revision time. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgement in determining its appropriateness for a particular purpose.

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16.5 Sources of Key Data

GHS: EU Regulation 1272/2008/EC on Classification, Labelling and Packaging of Substances and Mixtures, amending and repealing EU Directives 67/548/EEC and 1999/45/EC, and amending EU Regulation 1907/2006/EC

MSDS: EU Regulation 453/2010/EU REACH - Requirements for the Compilation of Safety Data Sheets
KÖHN, BIRETT (German), Data Sheets of Hazardous Substances

Prepared: June 2015
Expiry Date: June 2018

This document has been continuously improved and revised over time; see the table below for revision (rev) information.

Revision No.	Revision Date	Revision Description
Rev.0	23 May 2017	Initial Release
Rev.0.1	28 May 2019	Content Improvements
Rev 1	21 Jan 2022	Content Improvement, update Envent's Logo
Rev 2	17 Oct 2024	Removal of 330SDS-EX

Decimal increases on revision numbers (E.g. Rev 1.0 to Rev 1.1) on this user manual means that content changes will not affect or contradict ATEX-IEC certification documentation, thus the notified body does not need to be informed of the changes; for instance, improving writing or layout. A full unit change (E.g. Rev 1.0 to Rev 2.0) will mean that the content changes must be communicated and updated to the notified body.

For further information, or a copy of our most recent operating manual, please visit us at www.envent-eng.com. Envent Engineering Ltd reserves the right to change product design and specifications at any time without prior notice

