ecotech
environmental monitoring solutions

H_2S 1100

Hydrogen Sulfide Converter

User Manual

Version: 1.5

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Revisions:

Version:	Date:	Description:
1.4	12/05/2004	Change factory set temperature from 275 to 300°C Add 98507550 option information
1.5	30/06/06	Change Factory set temperature from 300 to 350°C

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2. INTRODUCTION

Thank you for purchasing the Ecotech Model H2S-1100 Hydrogen Sulfide Converter. The converter is a product of high quality machinery and workmanship and utilizes a simple method of converting hydrogen sulfide (H_2S) to sulfur dioxide (SO_2) for subsequent analysis by a Sulfur Dioxide Analyser.

This manual provides a complete product description including all operating instructions and maintenance information.

2.1 Features

The Ecotech Model H2S-1100 Hydrogen Sulfide Converter employs both catalytic and thermal principles in the conversion of H_2S to SO_2. Converter efficiency is better than 96% over a temperature range of 200°C to 400°C. A factory set temperature of 350°C is used. If another temperature is required then allow a 48 hour stabilization period before the converter efficiency is determined.

H_2S in polluted atmospheres is oxidized by the H_2S Converter according to the following equation:

$$2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$$

The Ecotech Model H2S-1100 Hydrogen Sulfide Converter is used in conjunction with a Sulfur Dioxide Analyser (preferably a fluorescence type Analyser, such as Ecotech 9850 with 98507550 option fitted. This option provides two additional ports for connecting the converter.)

The H_2S Converter quantitatively oxidizes all H_2S in a sample atmosphere to SO_2, thus allowing the above reactions to be used for the measurement of H_2S. Because the H_2S operates at moderate temperatures (275-350°C), it does not convert many of the other sulfur compounds into SO_2, thus resulting in only a quantitative measurement of H_2S in the atmosphere.

2.2 Specifications

Power:	Input power 115/230 VAC 50/60 Hz. (selectable)
Fuse:	5A (type 3AG) for internal 12V supply (on rear panel)
	Internal Power supply fuse: 6A slow-blow (115 V)
	Internal Power supply fuse: 4A slow-blow (230V)
Flow Rate:	450 – 750 cc/min
Ambient temperature:	0°C – 50°C, RH non condensing
Converter temperature:	350 °C for 96% conversion

SO_2 Scrubber temperature:20°C – 40°C, RH non condensing (ambient)

Ambient air **H_2S** Converter: H_2S less than 2 ppm, 96% efficiency (new converter)

Converter life: 6000 ppm/hours of **$H_2S \rightarrow SO_2$** conversion.

Converter life will also depend on condition of the sample gas.

<u>High level water vapour will reduce the life of converter!</u>

SO_2 Scrubber performance: Removes 99% of all SO_2 for 350 ppm – hours.

H_2S Analyser Ambient Air Converter option Part number: 98507550

This option may be used with the following models:

EC9850 A, EC9850B, EC9850H analysers.

3. INITIAL INSPECTION

The converter has been produced with the utmost care and attention and has been shipped to you in excellent condition. Upon receipt of the instrument be sure to check the packing slip to ensure all items have been delivered and to also inspect the converter for damage during transit. Notify both the shipping company and Ecotech immediately if damage has occurred. Retain the packaging materials as the container has been specially designed to protect the instrument during transit and will be needed should service be required in the future.

4. COMPONENT DESCRIPTION

4.1 Flow Path

Sample gas passes through an externally mounted 47mm diameter 5 micron Teflon filter before entering the H_2S-1100 converter. The gas passes through an internally mounted proprietary SO_2 removing scrubber. Sample gas containing H_2S then goes through the converter that converts H_2S to SO_2 prior to the Sulfur Dioxide Analyser. Conversion of H_2S to SO_2 has a 1:1 relationship therefore the measured concentration of SO_2 is directly proportional to the H_2S concentration.

Gas line connections should be made using ¼" Teflon tubes.

SO_2 Scrubber Part Number: A-ZMO-877510900-S

H_2S Converter (Molycon) Part Number: A-ZMO- 98415207

4.2 Front Panel

The front panel contains the temperature controller for setting and monitoring the converter temperature. The front panel also provides rack-mounting holes suitable for a 19" rack. The converter temperature should be set at 350°C, shown as SV. PV indicates the actual temperature of the converter. The controller does not require any adjustments.

4.3 Rear Panel

The rear panel has power inlet connection and ON/OFF switch, a fuse for the 12V internal supply, process gas connections (INLET and OUTLET) and an earth screw for grounding to a suitable earth point. A grille provides ventillation to the heated internal components. Ensure that the grille is not blocked or over-heating of the cabinet will occur.

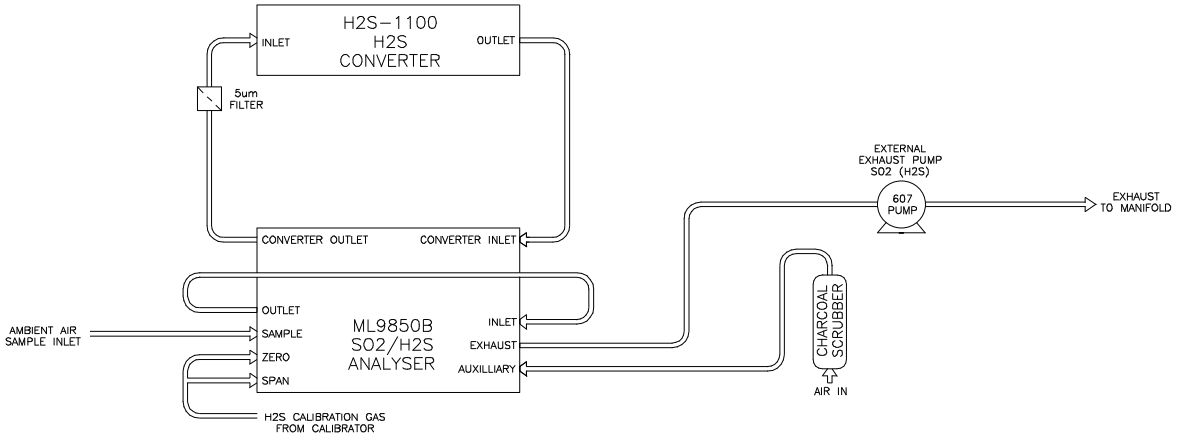
5. INSTALLATION AND OPERATION

5.1 General

Connection of the Ecotech Model H2S-1100 Hydrogen Sulfide Converter to the sample gas inlet is done by connecting the inlet line directly to the SO_2 scrubber and the Analyser is attached to outlet of the converter.

For the 9850 model SO_2 analyser, the analyser should have the (part number 98507550) option installed, so that the H2S-1100 is located between the KICKER and the FLUORESCENCE CELL. This special H_2S version of the 9850 SO_2 analyser has two extra port connections at the rear, labelled “Converter Outlet” and “Converter Inlet”. This configuration removes hydrocarbons prior to the H2S-1100. Refer to the figure below for details of the plumbing connections.

Connect the power lead to the instrument. The power lead must be a 3-pin (earthed) cable. Switch the converter on at the switch on the rear of the cabinet.



H2S-1100 H2S CONVERTER
WITH 9850B SO2 ANALYSER
PLUMBING CONNECTION DIAGRAM

Figure 1

5.2 Converter Temperature Adjustment

NOTE: The converter temperature has been factory set at 350°C and should not be changed. Increasing the temperature may cause premature heater failure and conversion of other sulfur compounds, while decreasing the temperature will reduce the efficiency of conversion.

If the set point temperature (SV) needs to be adjusted to 350°C, use Up/Down key to change the setting.

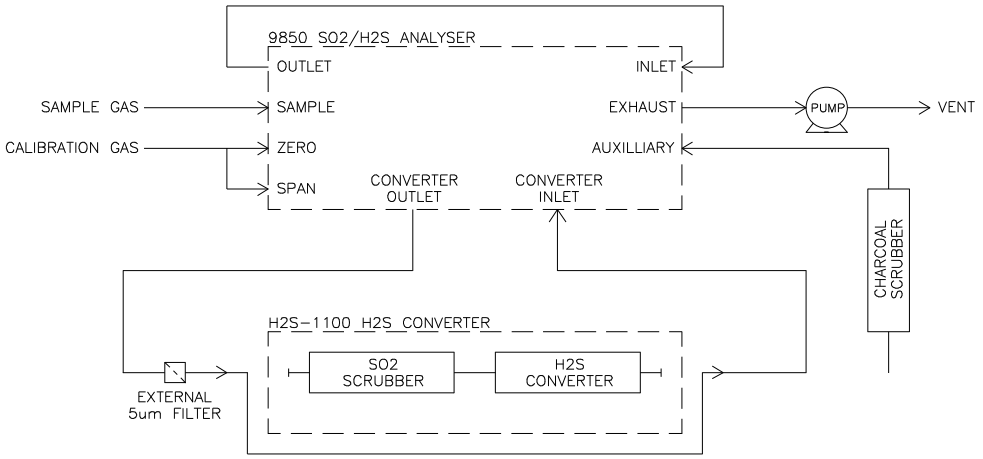
5.3 Converter Efficiency Check

The converter is a heated catalytic converter mounted in an insulated box inside the H2S-1100. Check the performance of the converter at 12 monthly intervals (at least.)

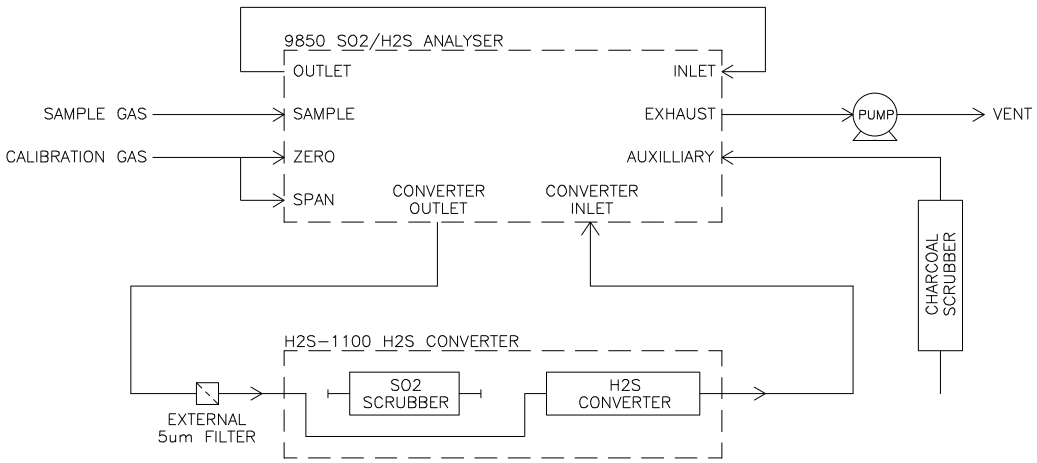
Note: Allow 40 minutes for absorption and desorption of H_2S in the sampling system.

Efficiency of the converter can be determined as follows:

1. First zero the analyser with a reliable zero air supply.
2. Bypass the H2S-1100 temporarily with teflon tubing and appropriate ¼" fittings. Calibrate the SO_2 analyzer using a diluted SO_2 NATA accredited calibration gas (typically at 400ppb concentration).



3. Reconnect the H2S-1100 into the sample train. Open the H2S-1100 case and temporarily bypass the SO_2 scrubber with teflon tubing and appropriate ¼" fittings. Check the analyser calibration using the same concentration of SO_2 as in step 1. Check that the analyser reads close to the expected value (390-400ppb). Adjust the calibration of the SO_2 analyzer again to read 400ppb.



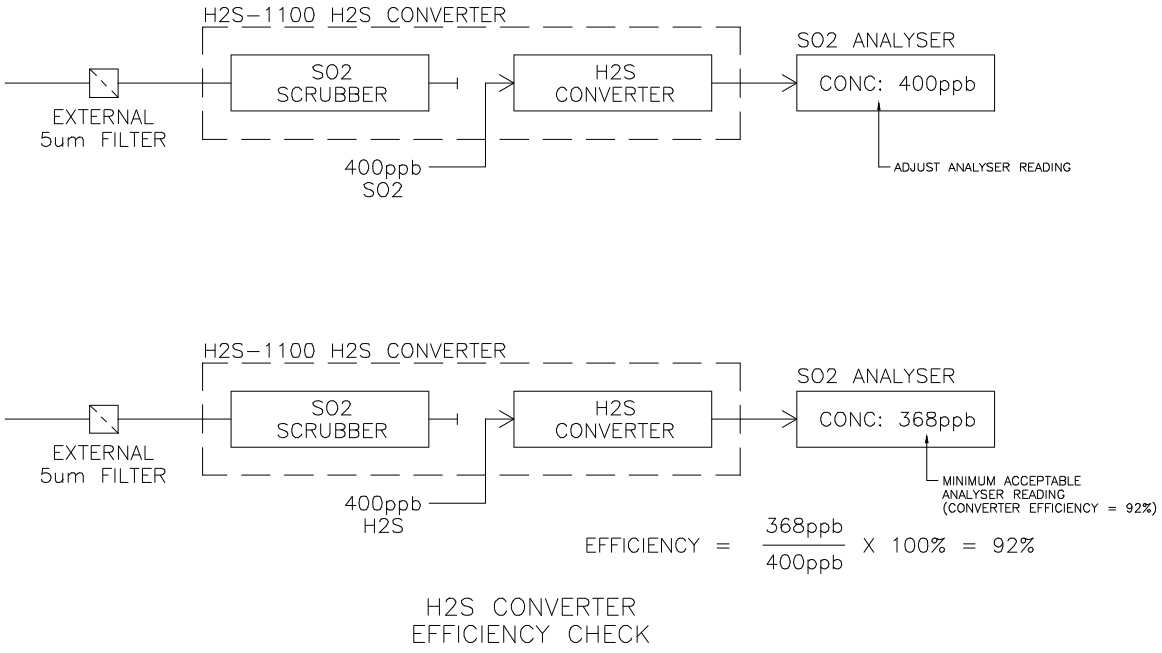
4. Now pass a diluted H_2S NATA accredited calibration gas (at the same concentration) through the converter (with the SO_2 scrubber still bypassed) and record the analyser reading. The efficiency is calculated as follows:

%Efficiency = (Analyser reading/ H_2S Input concentration) x 100

Note: The percent efficiency will be dependent on the accuracy of the calibration gases used. Take note of the ±value of each calibration gas used for determining the efficiency of the converter and also the % error of the dilution system. These errors are additive and the efficiency can vary considerably just because of the errors associated with the uncertainties of the calibration gases.

The converter is normally between 92 – 96% efficient. The converter should be replaced or reconditioned when the efficiency is less than 92%.

The basic principle can be seen in the following figure:

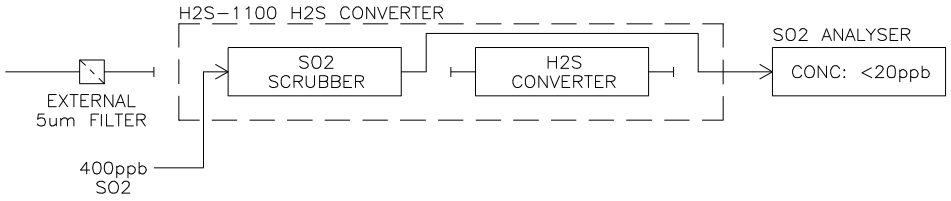


H2S CONVERTER
EFFICIENCY CHECK

Next proceed to check the SO_2 scrubber performance.

5.4 SO_2 Scrubber Performance Check

Check the performance of the scrubber at 12 monthly intervals (at least.) Pass 400ppb SO_2 NATA accredited calibration gas through the scrubber, bypassing the converter, then to the SO_2 analyser. The analyser should indicate less than 20ppb SO_2.

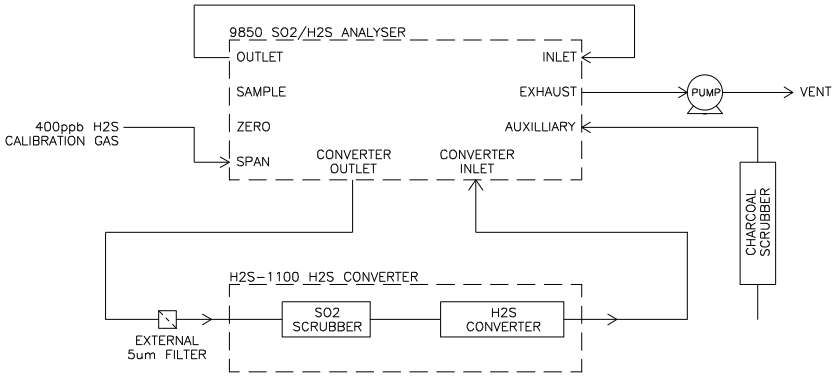


SO2 SCRUBBER
EFFICIENCY CHECK

Finally, reconnect all items of the sample train and recalibrate the analyser referring to section 6.0.

6. CALIBRATION

Calibration is carried out by using a traceable H_2S calibration gas, which is passed through the complete sampling train. The Sulfur Dioxide analyser is then adjusted to read the H_2S concentration. This calibration procedure takes into consideration the efficiency of the converter. Operation and calibration procedures for the Sulfur Dioxide analyser are according to the analyser's operating manual.



CALIBRATION OF THE
H2S-1100
AND 9850 SO2 ANALYSER

7. MAINTENANCE

7.1 Particulate Filter

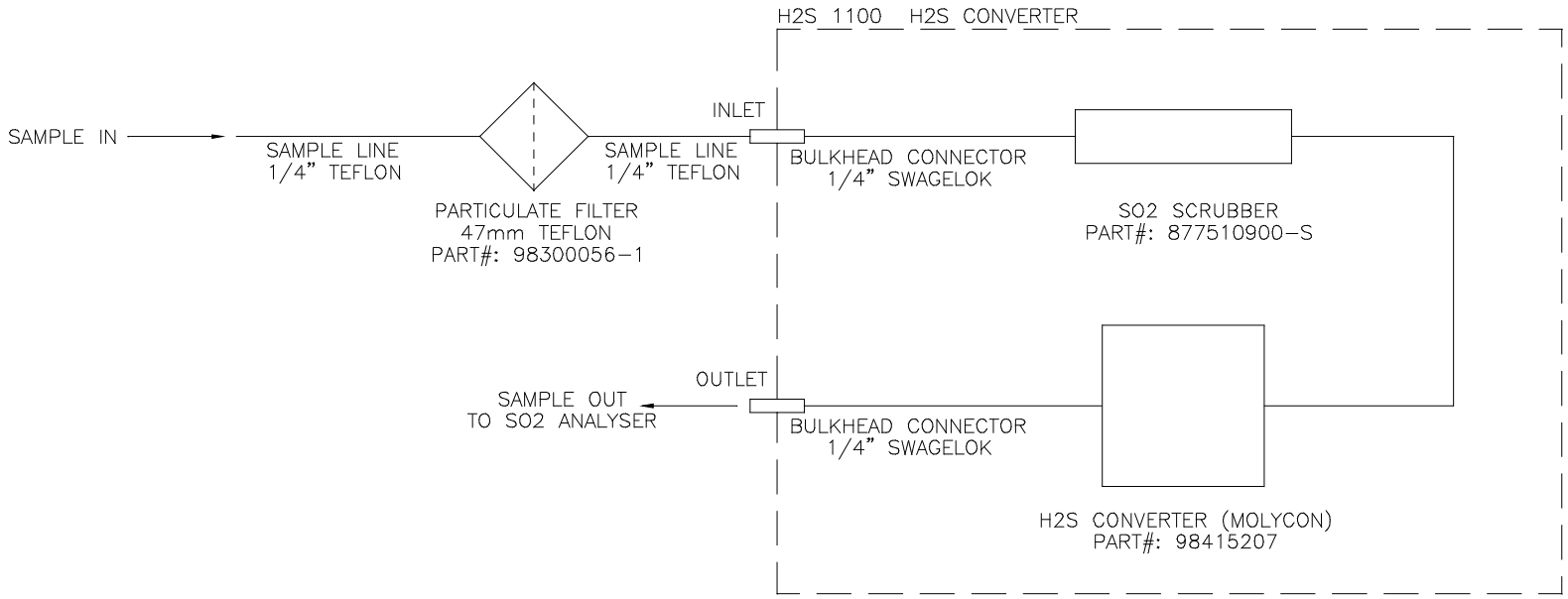
The 47mm Teflon filter element, housed inside the 47mm particulate filter holder, needs to be replaced on a regular basis. Changing of the filter should be carried out at routine intervals. The frequency of replacement is site specific and the filters should be inspected initially at least on a weekly basis to determine replacement schedules.

7.2 Converter

The converter has a greater than 96% efficiency of converting H_2S to SO_2 when the H_2S concentration in the sample gas is 2 ppm or less and the flow rates are less than 750cc/min. When the efficiency falls below 96% the converter should be replaced. The converter efficiency should be routinely checked, at least every 12 months.

7.3 SO_2 Scrubber

The SO_2 scrubber removes greater than 99% of all SO_2 for 350ppm-hours. By knowing the concentration of SO_2 in the sample, calculate the time when the 350ppm-hours level will be reached. Before this time is reached check that the removal of SO_2 is still 99% or greater. Refer to section 5.4 for details.



NOTES:

REVISIONS:

ECOTECH PTY LTD

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VICTORIA
Head Office
12 Apollo Court
Blackburn
Australia
Tel: (61 3) 9894 2399
Fax: (61 3) 9894 2445

NSW
Regional office
Unit 8 / 20-30 Stubbs St
Silverwater 2141
Australia
Tel: (61 2) 9748 7111
Fax: (61 2) 9748 7255

WA
Regional Office
Unit 3/30-34 Adams Drv
Welshpool 6106
Australia
Tel: (61 9) 361 7665
Fax: (61 9) 361 7667

E-mail address: ecotech@ecotech.com.au

web: http://ecotech.com.au