

Portable Trace Hydrogen Sulfide Analyzer



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1.1 General Introduction

The Southland Sensing H2S-780 Portable Trace H2S Analyzer is a microprocessor based portable analyzer designed for continuous or intermittent measurements in a variety of applications and gas mixtures.

The analyzer was designed with the customer in mind, keeping the operations simple while still featuring a fast response and rugged design. Every effort has been made to use modern industrial components and materials which has resulted in an advanced design, excellent performance, and an overall low cost of ownership.

Southland Sensing Ltd. appreciates your business and recommends reading through the complete manual to get the full experience from your new H2S analyzer.

1.2 Principle of Operation - The H2S Sensor

The precision electrochemical H2S sensor used in the H2S-780 is designed and manufactured under a strict quality procedure.

To understand how the H2S analyzer functions, it is important to understand a little bit of the sensor characteristics.

The active components in the precision electrochemical H2S sensor are the anode, cathode, and aqueous electrolyte which are all housed in the cell body. The H2S molecules in the application pass through the front sensing membrane into the electrolyte, where a chemical reaction occurs, and a raw electrical current is generated.

These analyzers need to be calibrated under a known SPAN Calibration gas. It is important to calibrate the sensor to the same flow as your process - we recommend using 0.5 or 1.5 SCFH to calibrate the instrument as well as when running your process gas.

This electrical current is proportional to the amount of H2S in the application. The analyzer then processes this raw electronic signal, compensates for temperature and barometric pressure variations, and converts the data into a parts-per-million H2S measurement value.

The H2S concentration reading is then displayed on the local display and transmitted to the 0 - 1 VDC analog outputs featured on the analyzer which can be run to a PLC or other type of DCS system. This portable unit also allows the user to data log the output via a removable USB Flash Drive.

Portable PPM Hydrogen Sulfide Analyzer with Data Logging & Sample System



Designed for the Natural Gas Industry

Large Backlit Display w/ User Friendly Menu

Data Log via Removable USB Flash Drive

Integral Flow Control Valve & Flow Indicator

Continuous Analysis during Charging

Electrochemical Sensor Technology

The H2S-780 Hydrogen Sulfide Analyzer combines a rugged portable design with SSO2's precision H2S sensors. The result is a highly reliable and cost effective design with an easy-to-use interface.

The analyzer comes a removable USB flash drive for data logging via .CSV (Excel) file format. With an 8GB USB Flash Drive, you can data log at 1 minute intervals for about 50 years before running out of storage. The low full scale range and flexibility to easily access data makes this analyzer unmatched in the market.

The display of the analyzer is designed to be used in direct sunlight. No need to bring a shade or other method to see the screen.

Two H2S Sensors are available for the H2S-780. The H2S-1x is pre-loaded for 4 ranges: 0 - 10ppm, 0 - 50ppm, 0 - 100ppm, 0 - 200ppm. The H2S-2x is preloaded for 4 ranges: 0 - 100ppm, 0 - 500ppm, 0 - 1000ppm, 0 - 2000ppm.

The sensors are self-contained and minimal maintenance is required - no need to clean electrodes or add electrolyte.

Specifications

Accuracy:	< +/- 1% of Full Scale Range*
Analysis Range:	Multiple up to 2000 PPM
Battery Indicator:	Integrated into Large Display
Calibration:	Periodically
Data Logging:	Removable USB Flash Drive
Dimensions:	10.9 x 10.0 x 4.9 inch
Display:	Large with Backlight
Enclosure:	Brushed Stainless Steel
Flow Sensitivity:	0.25 - 5 SCFH
Gas Connections:	1/8" Compression Tube
Output (Analog):	0 - 1V DC
Power:	Rechargeable Battery 100 - 240 VAC AC Adapter
Pressure:	Inlet, 0 - 50 PSIG
Response Time:	T90 in 45 Seconds
Sample System:	Flow Control, Flow Indicator
Sensor:	Precision Electrochemical
Sensor Life:	12 - 36 months
Temperature:	0 - 50 deg C
Temperature Compensation:	Integral
Warranty:	12 months
Weight:	11.25 lbs

*Accuracy at constant conditions

Cross Sensitivity

Sensor response per 100 ppm of gas present:	
Methyl Mercaptan:	40 ppm
Carbon Monoxide:	4 ppm
Hydrogen:	1 ppm
Sulfur Dioxide:	18 ppm

Applications

- Natural Gas Extraction & Pipelines
- Natural Gas Processing
- Landfill Gas Monitoring
- Biogas before And After The H2S Scrubber
- And Many Other Industrial Applications

Sensor Options

H2S-1x	0 - 200 ppm H2S Sensor
H2S-2x	0 - 2000 ppm H2S Sensor

Optional Accessories

ENC-640	Carrying case with foam insert
PP-640	Integral sampling pump

2.1 Receiving your New H2S Analyzer

As soon as you receive your new portable Hydrogen Sulfide Analyzer, carefully unpack the unit and accessories and inspect the electronics module and sensor housing for damage and verify that the H2S sensor is present. The H2S sensor is usually shipped inside the sensor housing, so check there first.

If damage to any portion of the new analyzer is present, stop and report damage to the shipping company as well as the factory.

The analyzer is shipped with all materials needed to install and prepare the system for operation. In some instances, added sample system components are necessary to condition the gas sample before entering the sensor housing. Southland Sensing offers free application consultation, and we encourage you to take advantage of our engineers and their expertise.

2.2 Stainless Steel Enclosure Overview

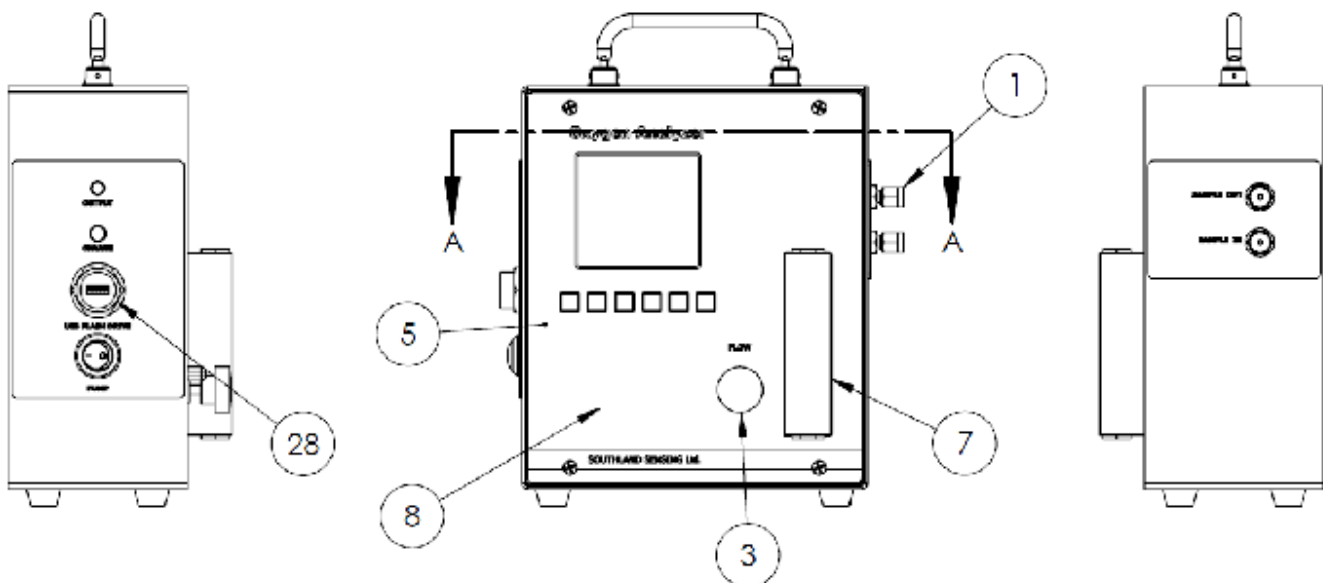
The display and all menu controls are accessible from the front side of the analyzer. The front panel has 6 push button membrane switches and a large backlit display which includes the H2S reading, battery life, time and date, and USB icon.

The left side of the analyzer houses the OUTPUT connector for the 0 - 1V DC analog output, a CHARGE connector for the 12VDC power needed to recharge the battery (the analyzer ships with international plug adapters for the 100 - 240VAC charger), the USB Flash Drive, and the optional integral sampling pump. On the right side of the analyzer is the inlet and outlet gas connections and labels.

The H2S-780 can be used as an online unit if necessary, the 12V DC charger can be left plugged in to the unit while it operates 24/7 continuously.

The H2S-780 is designed for indoor and outdoor installation using its NEMA4X, IP66 rated enclosure.

Refer to Part 3: Operation section of this instruction manual for more information on how to operate the controls and other functions of this advanced analyzer.



- (1) Inlet & outlet gas connections 1/8 inch tube fittings.
- (2) USB flash drive, removable 8 GB drive
- (3) Flow adjustment knob.
- (4) Flow indicator 0 - 2.0 SCFH.
- (5) Overlay with 6 button keypad and On/Off button.
- (6) Sensor Housing, with sensor mounted on the inside of the analyzer; access via back panel.
- (7) Flow indicator

2.3 Power / Charging Connections

The H2S-780 is powered by a rechargeable lead acid battery. The portable analyzer accepts a 12V DC wall charger power supply with a 0.5A current rating. Southland Sensing supplies a universal 100 - 240V AC wall charger that has optional plugs for almost all countries.

One of the unique features about the H2S-780 is its ability to charge while it is still functioning. This allows the user to plug in the H2S-780 and use it continuously 24/7 while measuring H2S or data logging via the USB flash drive.

In the left bottom corner of the display is a battery icon. This shows the user how much battery life is remaining. The icon will show full when it is near 100% charged. While charging the icon will have an AC Plug through the unit showing that the battery is indeed being charged.



Included: Power Supply with International Adapters

2.4 Gas Connections

The H2S-780 with its standard 1/8 inch tube fittings is designed for positive pressure samples and requires incoming sample lines. The user is responsible for added sample system components as well as sourcing a calibration gas. Southland Sensing Ltd. recommends stainless steel tubing or low permeable plastic tubing for optimal results.

* The H2S-780 does come with an optional pump should the user not have a positive pressure sample.

- Flow rate should be between 0.25 - 2.0 SCFH
- Inlet pressure should be between 5 - 50 PSIG
- Optional Pump available
- Analyzer should be vented to atmosphere, take precaution to make sure vent does not get blocked

**** Special note: For optimal accuracy, run the span calibration gas at the same flow as the sample gas. This will improve the performance of the analyzer.**

2.5 Installing the H2S Sensor

The H2S-780 can accept either an H2S-1x (0 - 200 ppm max) or H2S-2x (0 - 2000 ppm max) hydrogen sulfide sensor for trace H2S analysis. For help selecting a sensor, contact your local sales representative or the factory.

Prior to installing the sensor, it is important to ensure that the gas lines are hooked up and the unit is ready to purge. Connect the process gas line and set your flow between 0.5 - 1.5 SCFH. Ideally, both the span connection and sample connection will have the same flow. We recommend 0.5 to 1.5 SCFH. It is necessary to match the flow rate of the SPAN bottle and process gas to maximize accuracy.

To install the sensor:

- Open up the back of the enclosure which will give you access to the sensor housing.
- Remove the cell holder cap by unscrewing the stainless steel collar.
- Lift the stainless steel collar off and set it aside.
- Remove the sensor from its box and open up the packaging.
- Visually inspect the sensor for damage. If damaged, notify the factory immediately.
- Inspect the O-ring for cracks, replace if necessary. **Always lubricate your O-rings.**
- Place the sensor inside the housing with the white sensing element facing forward and the circuit board contacts facing back towards the sensor housing nut.
- Tighten collar. Hand tight is acceptable to create an air-tight seal.
- Install the flat ribbon cable to the back of the circuit board (see photo below)
- Make sure the contact pins on the ribbon cable align with the contact pins on the circuit board connector. The ribbon cable contact pins should be facing towards the center of the sensor.
- If the analyzer has not been calibrated, refer to section 4.1 for more information.
- The sensor / analyzer should be calibrated every 1 - 3 months with a certified bottle of SPAN gas.

H2S Sensor Front and Rear View

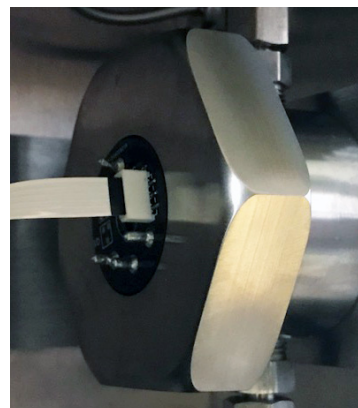


Front View
(Sensing Surface)



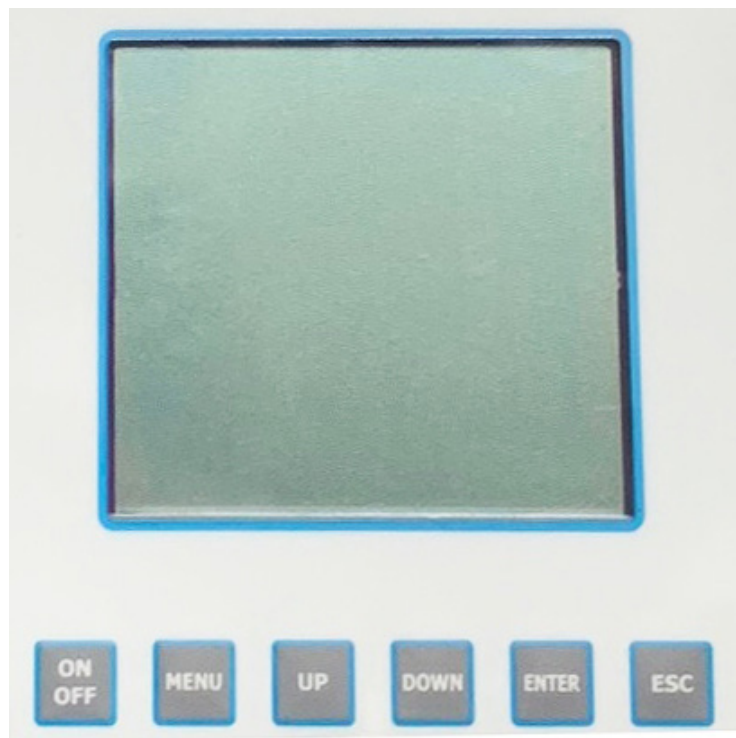
Rear View
(Circuit Board)

Ribbon Cable Connection

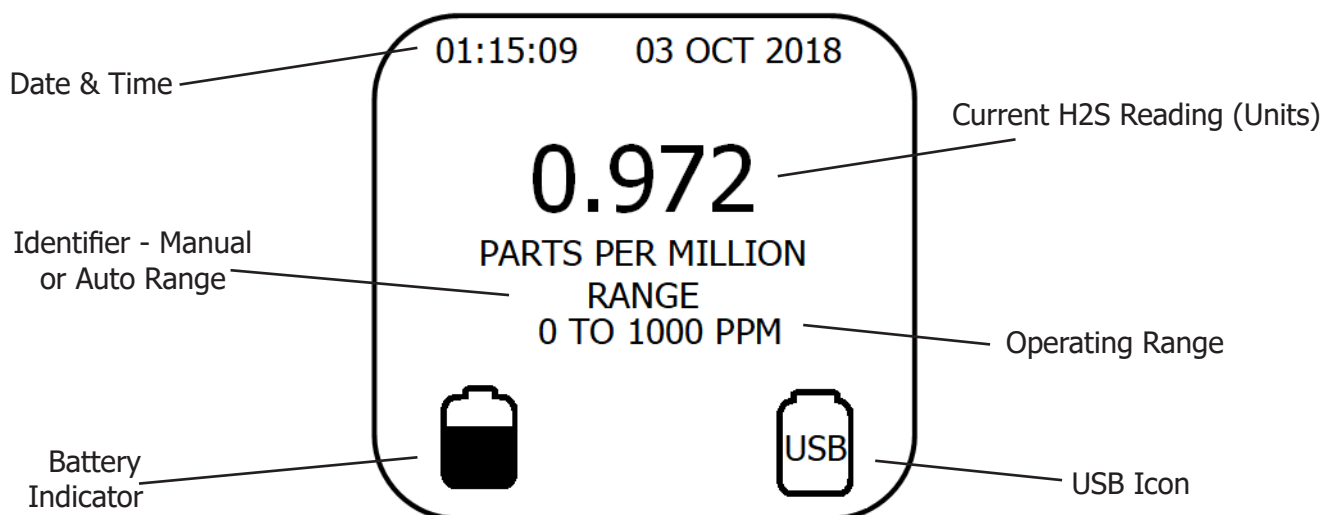


3.1 Understanding the Controls and their Operation

The H2S-780 H2S Analyzer is a feature packed unit with an easy-to-use menu interface. The key attributes within the menu are the ability to select a measurement range manually or using the auto-range mode, to calibrate the unit with a known gas, also referred to as a SPAN Calibration or SPAN CAL., to perform a zero calibration and to set the date and time so that you can datalog via the removable USB Flash Drive.



All features are programmable / selectable through the MENU button. The UP / DOWN buttons will allow you to select your setpoints and the ENTER button saves the data. If you want to cancel your selection or return to the previous screen the escape button ESC will allow you to do this. Once the unit starts up, the following home screen will appear:



3.2 Measurement Range Overview

The H2S-780 H2S Analyzer allows the user to select 4 available ranges - custom ranges are available upon request. These ranges can be selected in manual mode, meaning they are locked into that range by the user which locks in the analog output, or they can be set to auto-range so the analyzer will automatically adjust to give you the best full-scale resolution.

When using the Manual Range mode, selecting the Manual Range locks the analog output (0 - 1V DC) to a single range. The display will continue to operate in auto-range mode giving the user the full spectrum of analysis ranges.

To select Auto-Range or Manual-Range Mode, From the HOME screen, press the MENU key and the display will indicate:

Use the UP / DOWN buttons to move the cursor to select AUTO-RANGE, which will allow the unit to cycle through all five ranges, or MANUAL RANGE which will allow the user to select a specific range.

Decide which option will work best for your application. Move the cursor over the selection and press the ENTER button. If you have selected the AUTO RANGE option, it will blink for a second to confirm your selection. If you selected the MANUAL RANGE option, the following screen will be brought up:

MAIN MENU

AUTO RANGE
MANUAL RANGE
SPAN CAL
ZERO CAL
ALARM 1
ALARM 2

MANUAL RANGE

0 — 10 ppm
0 — 50 ppm
0 — 100 ppm
0 — 200 ppm

Standard Ranges: 0 - 10 ppm, 0 - 50 ppm, 0 - 100 ppm, 0 - 200 ppm

Optional Ranges: 0 - 100 ppm, 0 - 500 ppm, 0 - 1000 ppm, and 0 - 2000 ppm

Use the UP / DOWN buttons to select your desired range and press the ENTER key. The selected range will blink for a second indicating the range has been set.

Press the ESC button to move back to the previous screen.

3.3 Setting the Time and Date

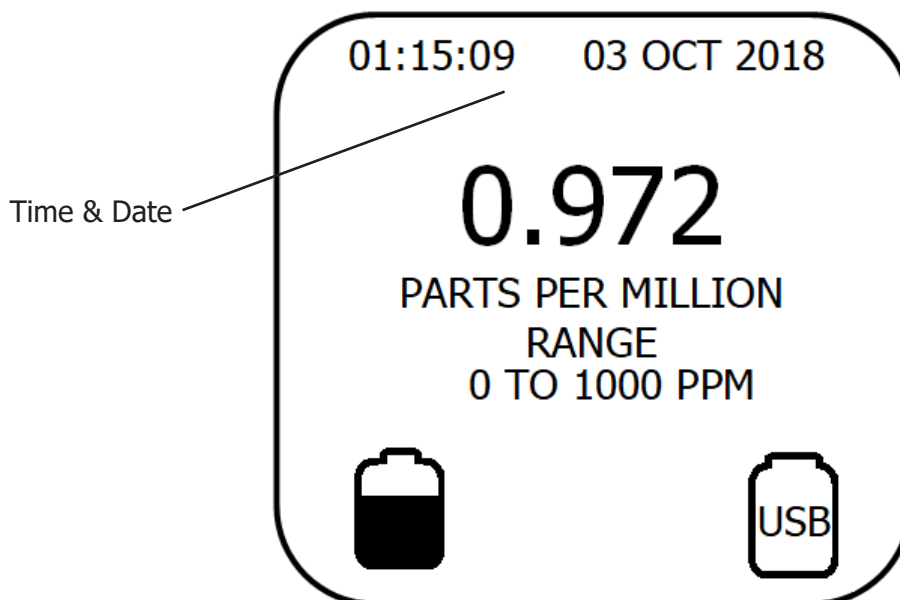
The H2S-780 Portable Trace H2S Analyzer is equipped with an onboard time and date stamp. This function is important to keep accurate if you are going to be taking advantage of the onboard USB Data logger.

Since most of our customers are located outside of the Pacific Standard Time zone, it is suggested to adjust the time and date to your local standard time.

To set the time, simply select the MENU key and select the SET TIME function. From here, it will allow you to adjust the seconds, minutes and hours. Once set, make sure to press ENTER to save the time.

To set the date, simply press the MENU key and select the SET DATE function. From here, it will allow you to adjust the day, month, and year. For the year adjustment, simply use the last two digits (for example, for 2018 select 18). Once set, make sure to press ENTER to save the date.

The correct time and date should now be showing on the bottom center of your screen.



3.4 Advanced USB Data logging

**** Caution: We have tested 100's of USB flash drives and 99% of them work just fine. Prior to data logging important data, make sure to test your USB thumb drive and verify it is logging.**

To install a USB flash drive, simply plug it into the right side of the display panel. This port will allow the electronics to talk to your USB flash drive and save the stored data in an .csv file (Excel compatible).

The data is stored in files by date and can be configured to save data at intervals from 1 minute up to 240 minutes.

To select your data logging interval, simply go into the MENU screen and select SET LOGGING INTERVAL. This will prompt you to a screen where you can set the value by minutes. Once selected, press ENTER and your interval will be saved.

** For data logging purposes, it is important to correctly set the date and time so that the time stamp will be saved along with the recorded H2S value. To set the time and date, refer to section 3.3.

*** Caution: Some USB flash drives have an LED that turns on, this LED draws additional power and will shorten the battery life of the instrument.

3.5 Analog Output 0 - 1V DC

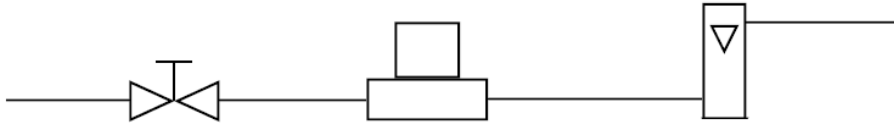
**** Caution: Analog output is internally powered and does not require external power. DO NOT supply any voltage across these terminals as the output will be damaged. It is also important to assure proper grounding of the external recording device.**

The Analog output can be connected via the left side panel of the analyzer with the connector marked "OUTPUT." The connector takes an audio phono jack which is supplied with the analyzer. The center pin is your positive and outer pin is negative.

The analog 0 - 1 VDC output is scaled to the analyzer range. If a specific output is needed such as 0 - 10 ppm or 0 - 200 ppm, select MANUAL RANGE in the menu and select the appropriate output.

3.6 Sample System Overview

The H2S-780 is supplied with a unique and easy to use sample system which enables the user to condition the gas and control the flow, resulting in a substantial increase in accuracy when used properly.



As shown in the graph above, the H2S-780 H2S Analyzer includes the following:

- 1/8" Compression tube fittings on the inlet and outlet connections.
- High quality flow control valve.
- Stainless steel sensor housing with easy access from the rear panel.
- Flow indicator with 0 - 2.0 SCFH range.
- Optional sampling pump to draw the sample through the analyzer.

3.7 Optional Integral Sampling Pump



The H2S-780 has an optional integral sampling pump. The pump is mounted on the outlet side of the sensor housing and pulls the gas across the sensor housing. When using the analyzer with a pump, make sure you open the flow knob all the way (turn to the left) so that it does not restrict flow and create a vacuum across the sensor.

The toggle switch to turn on the pump is mounted on the left hand side of the analyzer enclosure underneath the USB port. I is to turn the pump ON and O is to turn the pump off.

The pump is hard wired into the battery. When not in use, make sure the pump is in the off position to save battery life.

4.1 Span Calibration using Certified SPAN Gas

Calibration involves using a known span gas to match and adjust the H2S sensor / analyzer combo to a known value. For an H2S analyzer, a bottle of certified span gas from your local air separation company is your only option for calibration. When using a certified bottle of gas, it is recommended to get an H2S value of 25 - 50 ppm H2S / balance N2 on the 0 - 200 ppm range sensor (H2S-1x) and 50 - 100 ppm H2S / balance N2 on the 0 - 2000 ppm H2S sensor (H2S-2x). Contact your local gas supply company to see what values may be available.

Calibrate your analyzers with the same flow rate as your process gas, ideally between 1.0 and 1.5 SCFH. Calibrating at the same flow rate ensures accuracy.

Note: Breathing H2S at levels around 100 ppm can be fatal. Use extreme caution when dealing with high levels of H2S gas.

Calibration using Certified Span Gas:

It is recommended to read through all the calibration procedures prior to performing a SPAN calibration to ensure all instructions are understood. Consult the factory if any questions arise.

When installing a new sensor, after connecting the ribbon cable let it sit for a few minutes to make sure it reads <0.05 ppm before calibration (ideally let it sit outside of the sensor housing).

If unit is not reading 0.00 after a few minutes of air, perform a zero calibration to bring the reading to 0.00 ppm.

Connect the certified SPAN gas line to the SPAN inlet valve and set the pressure / flow per section 2.4 of the user's manual.

Once the gas is flowing, let the reading stabilize for about 3 - 5 minutes and then proceed (consider longer if sensor is still stabilizing).

SPAN CALIBRATION: To calibrate the analyzer press the MENU button, then use the UP/DOWN buttons to bring cursor beside the SPAN CAL option and press the ENTER button.

Use the UP / DOWN buttons until the reading on the display matches the value of your SPAN Gas. For example, if your SPAN gas is 27.5 ppm adjust the display UP or DOWN until it reads 27.5 ppm.

Once ENTER has been pressed, the display will show "PASSED" or "FAILED." If passed, you can promptly put the sensor into service measuring your sample gas.

If failed, repeat calibration steps or consult the factory.

MAIN MENU

AUTO RANGE
MANUAL RANGE
SPAN CAL
ZERO CAL
ALARM 1
ALARM 2

24.0 PPM

UP—INCREASE
DOWN—DECREASE
ENTER TO CAL
ESC TO EXIT

4.2 Procedure for Replacing the H2S Sensor

The characteristics of a precision electrochemical fuel cell are similar to those of a battery. They both provide an output that is nearly constant throughout their useful life and simply fall off sharply towards zero as they near full consumption. With the H2S sensor you should get about 1 - 3 years of life depending on your application.

Typically, with an H2S sensor, if you are measuring near zero periodic calibration is needed to verify the sensor is working properly. Failure to calibrate the sensor during the calibration process is the main indicator that it is time to replace the sensor. Calibrations should occur once every 1 - 3 months or as your application requires. Check section 4.1 for more instructions on calibration.

**** Note, make sure to read section 2.5 "Installing the H2S Sensor" before replacing the sensor.**

To replace the sensor, first remove the 4 screws located on the back panel and cautiously remove the panel from the analyzer. Note: the battery is mounted on the back panel so keep it close to the electronics and make sure the interconnection wires are not damaged. Locate the sensor housing and remove the ribbon cable, then unscrew (counter-clockwise) the sensor housing nut. Once free, remove the old H2S sensor by pulling on its tab and dispose of it like you would a lead-acid battery in accordance with your local regulations.

Remove the new sensor from its package. Check the O-ring on the front of the sensor to verify it is lubricated and has no cracks. Place the sensor sensing membrane side down in the sensor housing with the circuit board facing up. Proceed to re-engage the stainless steel collar making sure it is hand tight. No tools are required, hand tight with a good O-ring will create a leak-free seal. Once the collar is re-engaged insert the ribbon cable into the connector on the back of the sensor. Note that the metal contacts should be facing in towards the center of the sensor, making contact with the mating connector.

4.3 Troubleshooting

For troubleshooting and advanced maintenance techniques, please contact your factory representative for assistance.

Email: sales@sso2.com
Ph: 1-949-398-2879

4.4 Zero Calibration

In theory, the H2S sensor is linear over its measurement range and has no signal output when exposed to an H2S free environment (ambient air). However, in reality expect the analyzer to generate a small signal in an H2S free environment due to one tolerances of electronic components in the analyzer.

When is a ZERO Calibration Recommended:

A zero calibration is recommended for online and portable H2S analyzers in applications where a continuous and precise measurement of H2S is required below 5% of the lowest 2 ranges (i.e., when measuring 0.5ppm or below on the 0 - 10ppm range). A zero calibration is only recommended when these conditions are met and when the user is installing a new H2S sensor.

For most applications a ZERO calibration is not necessary, if you are unsure if a ZERO calibration is required for your installation, contact the factory and consult with our application specialists for a recommendation.

CAUTION: Prematurely zeroing the analyzer can cause erroneously low readings and extra caution should be taken to make sure a zero calibration is performed accurately.

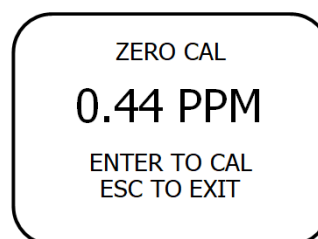
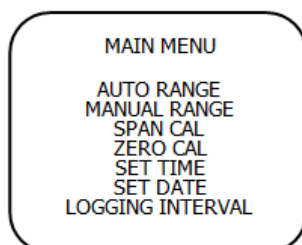
Determining the zero point is met: the user should allow the analyzer / sensor to sit in ambient air for 2 - 5 minutes outside of the sensor housing. There should be no downward trend of the reading. Allow reading to stabilize prior to zero calibration.

Zero Calibration Procedure:

Zero Calibration should precede the span calibration and once performed should not have to be repeated with subsequent span calibrations. The zero calibration should only be performed once, as well as when a new sensor is installed or if changes are made to the sample system connections.

The maximum zero calibration adjustment permitted is 45% of the lowest full scale range availability (roughly 0.45ppm). As such, the analyzer ZERO has not been performed at the factory prior to shipment as the factory gas connections and application conditions are different than the user's installation.

Allow the analyzer to be purged with a zero gas for 24 hours, then verify that the oxygen reading is not trending. Once confirmed, and the reading is below 0.45ppm, proceed to the menu to perform a zero calibration:



Once the ZERO Calibration procedure is complete, the display will show "PASSED" or "FAILED." If failed, your reading was most likely above the 0.45 ppm threshold or the sensor is still stabilizing. Contact the factory for additional troubleshooting techniques.

5.1 Spare Parts List

Spare Parts List - H2S-780

Replacement H2S Sensors:

H2S-1x	0 - 200 PPM max range H2S Sensor
H2S-2x	0 - 2000 PPM max range H2S Sensor

Replacement Parts:

PCB-780-Main	Circuit Board for H2S-780
DISP-780	Display for H2S-780
ORING-1004	Sensor Housing O-ring
BATT-780	Lead Acid Battery w/ Integral Circuit Board
CHRG-780	100 - 240VAC International Charging Adapter

For additional troubleshooting or replacement parts, please contact the factory:
sales@sso2.com; Ph: 1-949-398-2879

5.2 Warranty

H2S Analyzer / Sensor Warranty

The design and manufacture of our analyzers and precision electrochemical H2S sensors conform to established standards and incorporates state of the art materials and components for superior performance while still maintaining minimal cost of ownership. Prior to shipping, every analyzer / sensor is thoroughly tested by the manufacturer. When operated and maintained in accordance with the Owner's Manual, the units will provide many months of reliable service.

Coverage

Under normal operating conditions the analyzer / sensors are warranted to be free of defects in materials and workmanship for the period specified in accordance with the most recent published specifications. Said period begins with the date of shipment by the manufacturer. The manufacturer information and serial number of this analyzer / sensor are located visibly on the unit. Southland Sensing Ltd. reserves the right in its sole discretion to invalidate this warranty if the serial number does not appear.

Limitations

Southland Sensing Ltd. will not pay for: loss of time, inconvenience, loss of use, or property damage caused by the H2S analyzer / sensor or its failure to work.

Exclusions

This warranty does not cover installation, defects resulting from accidents, damage while in transit to our service location, damage resulting from alterations, misuse or abuse, lack of proper maintenance, unauthorized repair or modification of the analyzer, affixing of any label or attachment not provided with the analyzer, fire, or flood.

Service

Call Southland Sensing Ltd. at 1-949-398-2879 (or e-mail sales@sso2.com). Trained technicians will assist you in diagnosing the problem.

5.3 Material Safety Data Sheet (MSDS)**Product Identification**

Product Name	H2S Sensor Series – H2S-1x, H2S-2x series
Synonyms	Precision Electrochemical Sensor
Manufacturer	Southland Sensing Ltd, 4045 E. Guasti Rd. Suite 203 Ontario, CA 91761
Emergency Phone Number	1-949-398-2879
Preparation / Revision Date	April 23rd, 2016
Notes	H2S sensors are sealed, contain protective coverings and in normal conditions do not present a health hazard. Information applies to electrolyte unless otherwise noted.

Specific Generic Ingredients

Carcinogens at levels > 0.1%	None
Others at levels > 1.0%	Potassium Hydroxide or Acetic Acid, Lead
CAS Number	Potassium Hydroxide = KOH 1310-58-3 or Acetic Acid = 64-19-7, Lead = Pb 7439-92-1

General Requirements

Use	Potassium Hydroxide or Acetic Acid - electrolyte, Lead - anode
Handling	Rubber or latex gloves, safety glasses
Storage	Indefinitely

Physical Properties

Boiling Point Range	KOH = 100 to 115 C or Acetic Acid = 100 to 117 C
Melting Point Range	KOH -10 to 0 C or Acetic Acid – NA, Lead 327 C
Freezing Point	KOH = -40 to -10 C or Acetic Acid = -40 to -10 C
Molecular Weight	KOH = 56 or Acetic Acid – NA, Lead = 207
Specific Gravity	KOH = 1.09 @ 20 C, Acetic Acid = 1.05 @ 20 C
Vapor Pressure	KOH = NA or Acetic Acid = 11.4 @ 20 C
Vapor Density	KOH – NA or Acetic Acid = 2.07
pH	KOH > 14 or Acetic Acid = 2-3
Solubility in H2O	Complete
% Volatiles by Volume	None
Evaporation Rate	Similar to water
Appearance and Odor	Aqueous solutions: KOH = Colorless, odorless or Acetic Acid = Colorless, vinegar-like odor

Fire and Explosion Data

Flash and Fire Points	Not applicable
Flammable Limits	Not flammable
Extinguishing Method	Not applicable
Special Fire Fighting Procedures	Not applicable
Unusual Fire and Explosion Hazards	Not applicable

5.3 Cont. Material Safety Data Sheet (MSDS)**Reactivity Data**

Stability	Stable
Conditions Contributing to Instability	None
Incompatibility	KOH = Avoid contact with strong acids or Acetic Acid = Avoid contact with strong bases
Hazardous Decomposition Products	KOH = None or Acetic Acid = Emits toxic fumes when heated
Conditions to Avoid	KOH = None or Acetic Acid = Heat

Spill or leak

Steps if material is released	Sensor is packaged in a sealed plastic bag, check the sensor inside for electrolyte leakage. If the sensor leaks inside the plastic bag or inside an analyzer sensor housing do not remove it without rubber or latex gloves and safety glasses and a source of water. Flush or wipe all surfaces repeatedly with water or a wet paper towel (fresh each time). Dispose in accordance with federal, state and local regulations.
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Health Hazard Information

Primary Route(s) of Entry	Ingestion, eye and skin contact
Exposure Limits	Potassium Hydroxide - ACGIH TLV 2 mg/cubic meter or Acetic Acid - ACGIH TLV / OSHA PEL 10 ppm (TWA), Lead - OSHA PEL .05 mg/cubic meter
Ingestion	Electrolyte could be harmful or fatal if swallowed. KOH = Oral LD50 (RAT) = 2433 mg/kg or Acetic Acid = Oral LD50 (RAT) = 6620 mg/kg
Eye	Electrolyte is corrosive and eye contact could result in permanent loss of vision.
Skin	Electrolyte is corrosive and skin contact could result in a chemical burn.
Inhalation	Liquid inhalation is unlikely.
Symptoms	Eye contact - burning sensation. Skin contact - soapy slick feeling.
Medical Conditions Aggravated	None
Carcinogenic Reference Data	KOH and Acetic Acid = NTP Annual Report on Carcinogens - not listed; LARC Monographs - not listed; OSHA - not listed
Other	Lead is listed as a chemical known to the State of California to cause birth defects or other reproductive harm.

Special Protection

Ventilation Requirements	None
Eye	Safety glasses
Hand	Rubber or latex gloves
Respirator Type	Not applicable
Other Special Protection	None

Special Precautions

Precautions	Do not remove the sensor's protective Teflon and PCB coverings. Do not probe the sensor with sharp objects. Wash hands thoroughly after handling. Avoid contact with eyes, skin and clothing. Empty sensor body may contain hazardous residue.
Transportation	Not applicable

5.4 Certificate of Conformance

Model Number: H2S-780 Portable Trace H2S Analyzer
 Serial Number: _____

Sensor Selection: () H2S-1x: 0 - 200 PPM max H2S Sensor
 () H2S-1x: 0 - 2000 PPM max H2S Sensor
 Serial Number: _____

Sample System Selection: Flow Through Sensor Housing with O’ring
 Integral Flow Control Knob
 Integral Flow Indicator

 () Integral Sampling Pump (Optional)

Configuration:
 Ranges: () 0 - 10 ppm, 0 - 50 ppm, 0 - 100 ppm, 0 - 200 ppm
 () 0 - 100 ppm, 0 -500 ppm, 0 - 1000 ppm, 0 - 2000 ppm

 Power: Rechargeable Battery
 Analog Output: 0 - 1V DC
 Data Loggin: USB Flash Drive
 Display: Graphical with Backlight
 Enclosures: Stainless Steel Enclosure

Accessories:
 () Wall Mount Power Adapter, 100 - 240VAC w/ International Plugs
 () Analog Output Audio Jack
 () 8 GB Removable Flash Drive

Gas Testing:
 () Calibration @ 50 PPM H2S / Balance N2; Date: _____

We certify that the parts shipped to you are manufactured in the USA and conform to all requirements of the Purchase Order. These parts have been manufactured and tested to the highest quality standards and in accordance with all required specifications, instructions, and technical drawings.

Date: _____ Signature: _____