

STS Instruments Ltd, Service & Maintenance Manual

SILOXANE MONITOR MANUAL STS INSTRUMENTS COPYRIGHT 2018

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2.0 MANUAL GUIDE

2.1 DOCUMENT VERSION

Issued by	Author	Issue Date	Revision Number
STS	Jim Ward	18/10/2016	1.0
STS	Jim Ward	20/10/2016	1.1 Final
STS	Jim Ward	06/02/2017	1.2 Amends P6.
STS	Jim Ward	26/05/2017	1.3 4-20mA error codes P14
STS	Jim Ward	16/08/2017	1.4 Added kiosk schematic and gas flow through kiosk P18

2.2 SYMBOLS USED

	Safety Warning	Identifies potential hazards to either the user or the installation.	Failure to follow this information may result in physical injury that in some cases could be fatal, cause irrevocable damage to the instrument or damage to the environment.
A	Electrical Hazard	Identifies specific electrical hazards to the user.	Failure to follow this information may result in physical injury that in some cases could be fatal or may cause irrevocable damage to the instrument.
	Notes	Identifies areas where clarification may be required.	

Should at any point you require additional help or information on the use or installation of the system please contact STS directly at: <u>sales@safetrainingsystems.com</u> or +44 (0) 1344 483563

3.0 SAFETY INFORMATION

The STS Siloxane Monitor operates from a 110V mains supply, the instrument case should not therefore be opened without having first isolated the power supply and disconnected the kettle lead form the rear of the instrument. The high voltage section of the instrument is protected by clear cover - this should not be removed unless necessary- having followed the above instructions. FAILURE TO ISOLATE THE SUPPLY MAY RESULT IN ELECTRIC SHOCK.

It is the responsibility of the owner of the instrument to complete a risk assessment on its installation, operation and servicing before being commissioned for use.

Inhalation of gases may be harmful to health, it is the responsibility of the operator to ensure they have adequate training in the safety aspects of handling biogas/landfill gas and that they follow appropriate procedures at all times. The vent/exhaust form the instrument must be piped to an area designated safe to discharge to atmosphere- a flame arrestor may be required to be fitted.

Installation and Maintenance of the unit should only be carried out by suitably trained personnel according to the applicable code of practice.

Maintenance should be carried out only using STS approved replacement parts and components - use of substitutes will invalidate the warranty and may be hazardous to both operator and instrument.

No alterations should be made to the instrument or its ancillary components.

Failure to comply with the instructions in this manual could result in injury to the user.

The instrument captures fuel gas any work associated with the instrument must be carried out by a class of person competent and certified to do so.

Should at any point you require additional help or information on the safe installation or use of the system please contact STS immediately at: <u>sales@safetrainingsystems.com</u> or +44 (0) 1344 483563

3.1 ENVIRONMENTAL PARAMETERS

- The Siloxane Monitor is not weatherproof and must be housed in a suitable kiosk or cabinet if sited outside of a building
- If siting inside a building consideration should be given to the local conditions as regards to dust, moisture and ventilation the Monitor is available supplied in a 19" rack case suitable for indoor use with inbuilt thermostatically controlled extraction fans.

- The monitor is suitable for use between 5C and 45C without additional cooling/heating required.
- Gas supply to the instrument should be at a minimum of 200mbar
- Adequate ventilation/air passage around the instrument should be provided.

3.2 INSTRUMENTATION SAFETY SYMBOLS



4.0 SERVICE SCHEDULE

External	
Area	Instructions
Nitrogen Cylinder and Piping	Make sure Nitrogen Cylinder is secured safely. Record cylinder size/type. Check for leaks at Regulator using Snoop, redo connection if leaks present. Record cylinder and regulator pressure. Make sure regulator is set to 1Bar. Piping to instrument should be fastened with no damage or degradation. If damage is present, replace the whole Nitrogen line.
Sample Line Piping	Check there are no leaks at sample supply, redo connection if a leak is present. Pipe work to the instrument should be fastened securely, insulated/weatherproofed with the heated line installed. Check the visible piping for damage or degradation. If damage is present, attempt to replace the damaged section.
Heated Line and Weatherproofing	Check whether the heated line has been installed correctly. Record the set temperature and measure the temperature inside the insulation using a temperate probe. Check the insulation for damage and degradation. If damage is present, attempt to repair that section.

Vent and Drain Piping	Check that the Vent and Drain Piping are fastened securely and have no damage or degradation. If damage is present, replace the whole line. Visibly check the vent/drain line for any blockages. If a blockage is suspected, confirm this by connection the Nitrogen to the vent/drain line and pressuring the line. These lines are open to atmosphere and should not retain any pressure. Confirm that the vent/drain line is venting into a suitable location. If the vent has a flame arrestor installed, remove the arrestor and purge it with Nitrogen at 1Bar.
Leak Check	Run a leak check on the Nitrogen lines. The leak check shall be performed with the nitrogen cylinders connected but closed. The service engineer shall verify no discernible pressure drop over 30 minutes. Any checks on the biogas system shall be performed in accordance with the Installation Manual.

Kiosk	
Area	Instructions
General Kiosk	Clear any debris, check weatherproofing. Fasten any loose cables and piping. Record the general state of kiosk and any damaged parts.
Flame Arrestor	Disconnect then purge the Flame arrestor with 1Bar Nitrogen, venting onto a sheet of white paper. Record any residue found. If excessive residue is found replace flame arrestor.
Coalescing Filter	Note any Discolouration and Moisture. Replace with New Filter.

Water Trap	Record any visible water or moisture inside the water trap. Record any visible corrosion to the fittings, if so replace Water Trap.
Fans	Record the previously set thermostat temperature. Thermostat should be set to 25degC. Clear any debris around the fans, filters and cowls. Check the kiosk fans operate when thermostat is triggered by changing the threshold temperature. If they don't, check the with a multi-meter to confirm the thermostat is powering the fan. If it is, replace the Fan, else replace the thermostat and repeat to confirm the fan is working.
Instrument Intake and Exhaust	Clear any debris. Record any damage to the join/seal to the instrument and to the kiosk.
Mains and Electrical	Visually inspect and record any damage and degradation. If any damage, disconnect the supply and speak to the manufacture.

Instrument	
Area	Instructions
General Instrument	Record the general condition of Instrument casing, bulkhead gas fittings and mains cable. Clear any internal debris.
Particle Filters	Remove two particle filters and blow through with 1Bar Nitrogen venting onto a sheet of white paper. Record any residue found. If excessive residue is found replace particle filter.
Fans	Check whether instrument intake and exhaust fans start up upon powering the instrument. If they do not, using a multi-meter, measure the voltage to the fans. If they aren't getting power, return instrument to the manufacturer.

PCB, LCD and keypad.	Check LCD and keypad are fully operational by navigating the menus of the instrument. Record any damage and degradation. Check LCD and keypad are fully operational.
Pipe work	Check the internal piping is fastened, and there is no damage or degradation. Replace any damaged sections.
Leak Check	Via View Stats in the Maintenance menu. Pressurise with N2 in Phase 0, close N2 supply, allow 10mins for stabilisation. Then start recoding the temperature and if after 5mins there has been a 20% drop, check all the connections and repeat. If there is still a leak, this line will need detailed inspection with the potential for some or all of the piping to need replacing. Then pressurise with N2 in Phase 6 with the vent closed, close N2 supply, likewise repeat the above step recording the pressure drop.
Pump and Relief Valve	Via View Stats in the Maintenance menu, set to phase 2 and record the pump pressure. If the pressure is less than approximate 15PSI, adjust relief valve and repeat. If the pressure does not change, check for leaks.
Nitrogen Regulator	Via View Stats in the Maintenance menu, set to phase 0. Record the nitrogen pressure. If the pressure is not approximately 10PSI, adjust the regulator. If the pressure doesn't change, check the cylinder is at 1Bar and check the internal piping for gas leaks. If the issue still is there, replace the regulator.
Heaters	Via View Stats in the Maintenance menu, set to phase 1. Record the Concentrator temperature. It should stabilise around 240degC. If it doesn't, return instrument to manufacturer. To check the Permeation heater, run a calibration cycle with a temperature probe in the permeation oven. This probe should stabilise around 80degC. If it doesn't return instrument to manufacture.

Flow Measurement	Via View Stats in the Maintenance menu, in phase 6, record the internal flow measurement and compare it with an external flow measurement on the vent line. If these differ by more than 20% return instrument to manufacture.
Temperature, Pressure and CH4 sensors	Via View Stats in the Maintenance menu, in phase 1, record the temperatures, pressures and CH4 values.
Solenoids	Via View Stats in the Maintenance menu. In Phase 0, if Solenoid 2 is operational the pump pressure should be approximately zero. In phase 3, if solenoid 4 is operational the pump pressure should be greater than 1PSI but less than 14PSI. To test Solenoid 1 and 3, run calibration cycle with a D5 sample and if the correct mass is present the solenoid is operational.
Calibration	Via Maintenance Menu, run a calibration cycle. Leave the first cycle blank, then use 20ul of 1mg/ml D5. Attach Calibration Report. Adjust the Calibration coefficient to achieve a reading of 20ug. Replace permeation oven seal once finished.

5.0 MAINTENANCE -WEEKLY

5.1 FITTINGS & CABLES

Visually check fittings and cables for any sign of wear or for loose connections.

5.2 AUTOMATED WATER TRAP

Check the automated trap is empty and the float is in its lower position, check the end of the drain line is clear and unblocked.

5.3 COALESCING FILTER

This trap does not drain and should not have any visible water inside. If there is water present, the filter element should be changed immediately and the auto drain trap should also be checked to ensure its correct function.

5.4 INSTRUMENT AIR INTAKE FAN

Check that fan is running, check the external vent for any blockages and clear if required, check the pipe is secured to the vent plate and instrument securely.

5.5 INSTRUMENT EXHAUST FAN

Check that fan is running, check the external vent for any blockages and clear if required, check the pipe is secured to the vent plate and instrument securely.

5.6 KIOSK EXHAUST FAN

Check that fan is running, check the external vent for any blockages and clear if required.

6.0 MAINTENANCE - ANNUALLY

6.1 COALESCING FILTER

Change the filter in the coalescing trap once a year. After isolating the gas supply unscrew the bowl of the trap by hand in a anticlockwise direction. Remove the bowl and exchange the filter for a new one, the filter just pulls off the stem. Replace the bowl, tighten and turn the supply back on - leak check.

6.2 FLAME ARRESTOR

Disconnect and remove the flame arrestor, blow through with nitrogen at 1 bar observing any particulate matter that is discharged. Check the filter for obvious signs of clogging, should there be any which is not removed by the nitrogen the arrestor should be replaced and the unit returned to STS for overhaul.

6.3 BIOGAS REGULATOR PRESSURE SET

The gas stream into the instrument is regulated in the kiosk to a maximum of 35mbar. Annually the regulators should be checked to ensure the pressure is correctly set using a gauge.



6.4 HEATED LINE

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Check temperature set point of the heated line is correct using a temperature gauge, check the line for damage, and check the length for any failings in the insulation of fixings.

7.0 MAINTENANCE MENU

7.1 ACCESS TO MENU

The maintenance menu can be accessed from the main menu screen:

Select: OPTIONS

噩 Main Menu
Hold Start: Start Logging
Hold Data : Data Menu
Hold Options: Options

Hold **CLEAR** on the number pad for approximately 4 secs.

噩 Options Menu
Hold Start: Cleaning Cycle
Hold Data: Time/Date
Hold Options: Label
Hold Stop: Main Menu

The Maintenance menu screen is displayed

噩 Maintence Menu
Enter Password:
Press ENT to Continue Press ELR to Delete Press Sop to Exit

Enter the password "SILOX" and press ENTER, START to confirm.

Hold 5 to see the View Stats screen





Within this readout, pressing 1 to 8 on the keypad will change the instrument phase.

Phases:

- 1. Cleaning
- 2. Cooldown
- 3. Sample
- 4. Purge
- 5. Background preheat
- 6. Background
- 7. Measurement preheat
- 8. Measurement

The internal variables will be displayed on the readout and will change every second.

8.0 FAULT IDENTIFICATION

8.1 INSTRUMENT ERROR CODES

All Faults will cause instrument to enter a Safe Mode Configuration. In Safe Mode the instrument disables the heaters and the biogas input into the system but leaves the fans running in order to exhaust the case of any potential leak.

- Fault# 1: Communications Error. Board Faulty.
- Fault# 2: Low Nitrogen Error. Check supply pressure, if empty -Replace Supply. If there is still an error, internal Plumbing is Faulty.
- Fault# 4: High Nitrogen Error. Internal Plumbing is Faulty.
- Fault# 8: Sample Volume Low. Internal Pump Faulty.
- Fault# 10: Sample Volume High. Internal Pump Faulty, or Biogas Pressure too high.
- Fault# 20: Concentrator Oven Low Error. Oven Heater is Faulty or Board.
- Fault# 40: Concentrator Oven High Error. Oven Heater is Faulty or Board.
- Fault# 80: Calibration Oven Low Error. Oven Heater is Faulty or Board.
- Fault# 100: Calibration Oven High Error. Oven Heater is Faulty or Board.
- Fault# 200: Internal Temperature High Error. Internal temperature is >60degreesC. Installation error or Oven Heater error.
- Fault# 400: CH4 High Error. Instrument CH4 threshold has been exceeded. Installation error, or internal plumbing.
- Fault# Optical Signal: Instrument analytical system or board faulty.
- Fault# Fans Faulty: Instrument purging system or board faulty.
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Instrument will need resetting via the mains power upon a fault however an Internal Temperature error will automatically reset once the internal temperature has dropped below the threshold.

8.2 4-20MA REMOTE DATA ERROR CODES

Error line 4-20mA reading:

0: Standby

25: Communications Fault

50: Fan Fault

75: CH4 High Fault

100: N2 Fault

125: Internal Temp Fault

150: Biogas Volume Fault

175: Concentrator Temp Fault

200: Logging Normally

9.0 FLOW DIAGRAMS

Cooling and Blank Sample















