

2018

STS Instruments Ltd, Calibration Manual

SILOXANE MONITOR MANUAL
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1.0 MANUAL GUIDE

1.1 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

1.2 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.
	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: sales@safetrainingsystems.com or +44 (0) 1344 483563

2.0 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 from 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 from 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.

2.1 RECOMMENDED HANDLING PROCEEDURE

The siloxane instrument is a bulk item that weighs 12.0Kg that may exceed the manual lifting ability for a one man lift. Installers are required to perform a manual handling risk assessment before lifting the instrument. Lifting operations should be carried out in accordance with the Manual Handling Operations Regulations 1992.

Where the instrument is supplied complete with sampling apparatus and installed in a kiosk the combined item is considered too bulky for a safe one man lift, and mechanical means or team lift is considered necessary. The supervisor of the lift should perform a risk assessment prior to performing any lifting operation and take account of the legal requirements Manual Handling Operations Regulations 1992 and the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER).

The equipment is delicate electronic equipment and should as far as is practicable be protected from jolting or impacts during handling.

2.2 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.

2.3 INSTRUMENTATION SAFETY SYMBOLS

	Caution
	Electrical Hazard
	Earth Point
	Hot Surface

3.0 CALIBRATION OF THE MONITOR

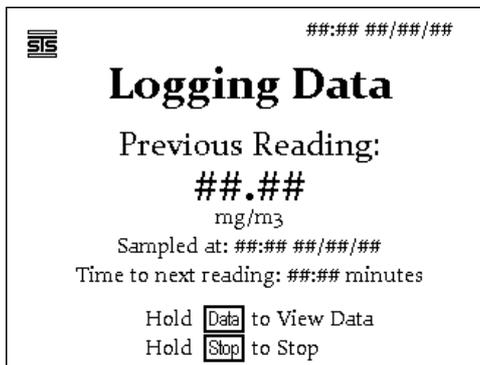
3.1 PRE-CALIBRATION PROCEDURES

To prepare the instrument for calibration, the following tasks must be achieved:

1. Stop Instrument sample cycle
2. Turn off Biogas supply at inlet valve and removing the top calibration blanking plug.
3. Run Cleaning Cycle
4. Prepare Standard

3.1.1 STOPPING THE INSTRUMENT

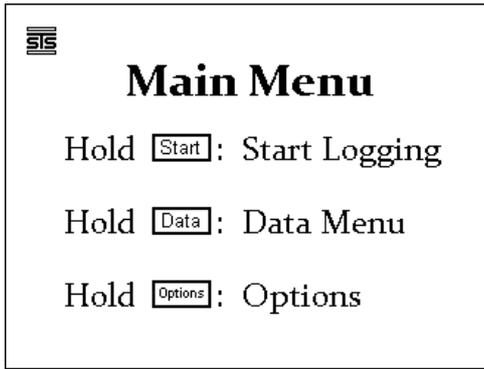
To stop the instrument during a measurement cycle. Hold **STOP**, this will bring up a confirmation screen:



Hold **START** to confirm:



This will then return the instrument to the main menu:



The instrument is now in a standby mode ready for the next stage.

3.1.2 INSTRUMENT PREPARATION

Please turn off the power to the instrument now, via the external isolation switch:

Remove the blanking plug from the top of the instrument:



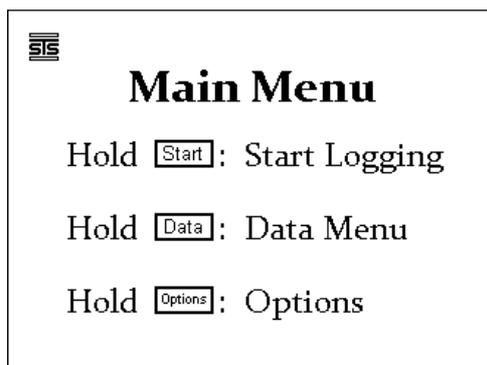
Close off the biogas supply to the instrument via the final ball valve before the connection to the instrument:

Once these modifications have been achieved, please turn on the instrument via the external isolation switch.

3.1.3 CLEANING CYCLE

Before running a calibration, the instrument must be thoroughly cleaned to ensure there is no contamination present.

To do this the cleaning cycle should be run from the main menu:



Enter the Options menu:



Options Menu

Hold **Start**: Cleaning Cycle

Hold **Data**: Time/Date

Hold **Options**: Label

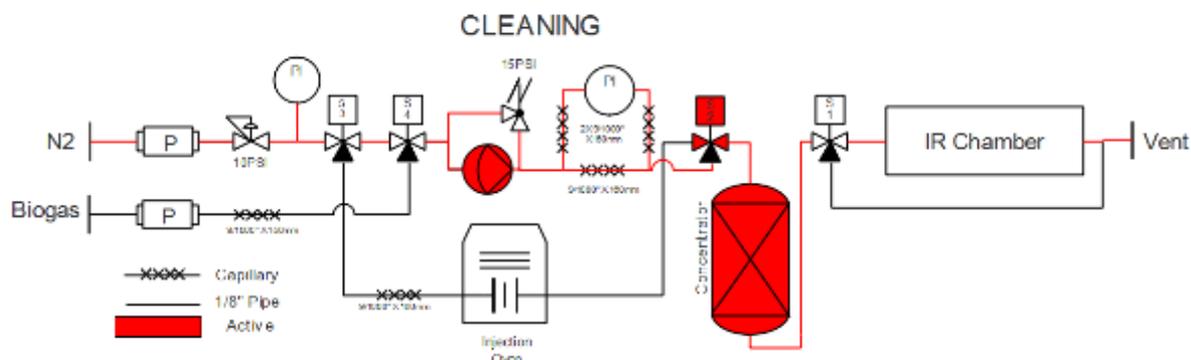
Hold **Stop**: Main Menu

Hold Start to commence the cleaning cycle. This cycle will continuously repeat until stopped. The instrument is clean, once it records a concentration reading of <0.5 mg/m³.

The instrument is now ready to start a calibration cycle.

3.1.3.1 CLEANING CYCLE FLOW DIAGRAM

For reference, here is the flow diagram for the cleaning cycle:



3.1.4 STANDARD PREPARATION

Before starting a calibration cycle, the liquid sample must be prepared.

A direct injection method is used for calibration. The calibration standard is made up using 0.1mg of D5 dissolved in 100ml of methanol, to give a standard which is 1ug/ml in D5 concentration. Suitable premade standards are available from STS, these are supplied in 25ml volumes.

The apparatus used to inject will be a 50ul syringe, such as this:

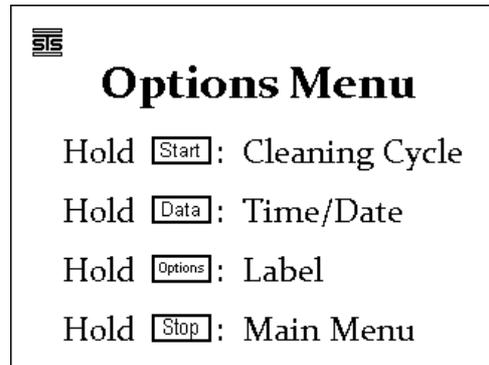
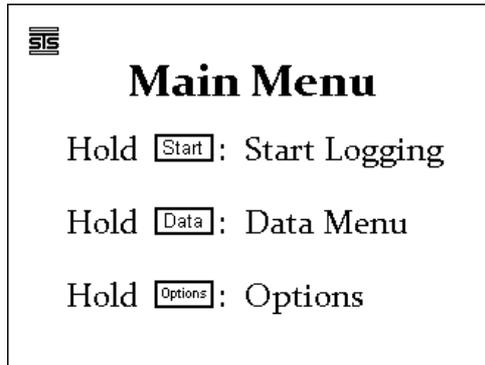


Injections of 10ul will be used during this calibration.

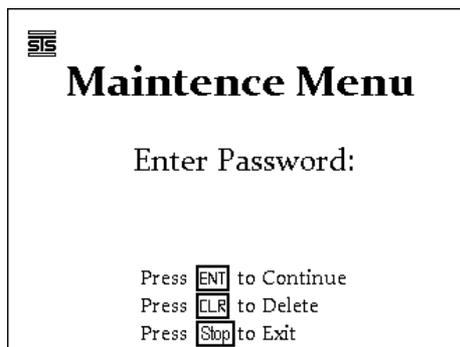
3.2 CALIBRATION OPERATION

3.2.1 STARTING A CALIBRATION CYCLE

Now that the instrument is prepared for calibration, start a calibration cycle, enter the Options menu from the main menu:

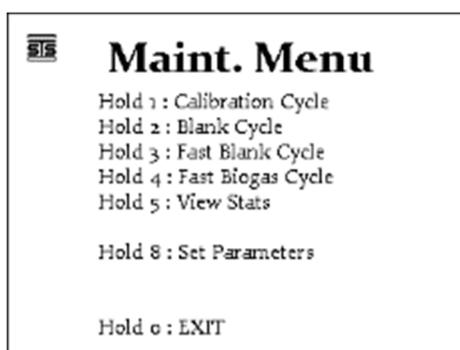


Hold **CLEAR** on the number pad for approximately 4 secs to enter the hidden Maintenance Menu password input screen:

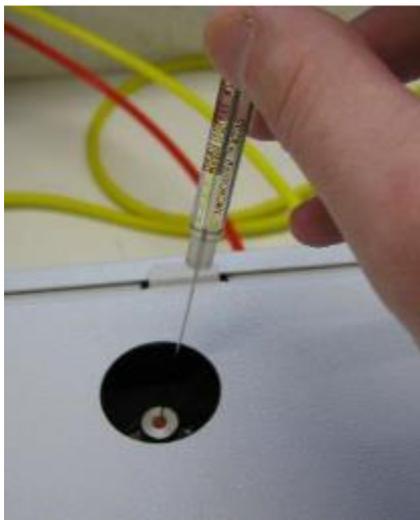


Enter the password “*SILOX*” and press **ENTER**, **START** to confirm.

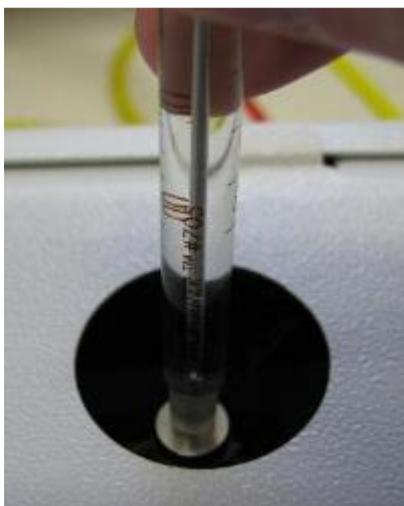
Hold **1** to start a calibration cycle.



The instrument will now start its cycle and pause when ready for the calibration injection. It'll take approximately 20mins from the start of the cycle to get to this stage:



Empty the contents of the syringe, and hold it in position for approximately 5 seconds. Then remove the syringe.



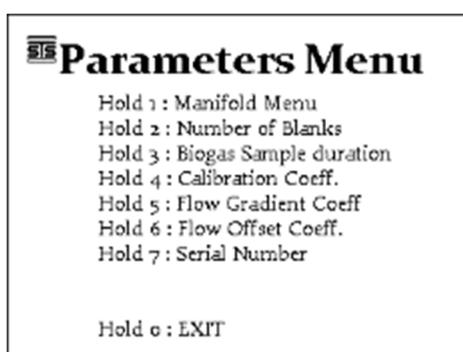
3.2.2 CHECKING RESULT OF CALIBRATION AND REPEAT

Take note of the reading output in μg (mass) and record for entry onto certificate. Repeat this calibration 3 times.

3.2.3 ADJUSTMENT IN SOFTWARE OF CALIBRATION COEFFICIENT

Using the three masses recorded during the calibration, take the average of these three results.

Enter the Maintenance menu as discussed previously and enter the Set Parameters Menu:



Hold 4 to view the enter the Calibration co-efficient input screen:



Record the Old calibration co-efficient on the calibration certificate, this will be needed to work out the new one.

Use the formula below to work out the new co-efficient:

$$\text{New Coeff} = \frac{(\text{Average calibration Mass})}{(\text{Mass injected})} * (\text{Old Coeff})$$

Eg: The Old Coeff was 2000, a mass of 10ug was injected and an average of 20ug was recorded. The New Coeff would be:

$$\text{New Coeff} = \frac{20}{10} * 2000$$

$$\text{New Coeff} = 4000$$

This new co-efficient should be within +/- 30% of the old. If this is not the case, it may be indicative of a fault with the liquid sample itself or the concentration medium/the IR bench within the instrument.

Enter the new co-efficient using the number pad, press ENTER, then START to confirm. This value will be stored within the systems memory.

3.3 RESTARTING SAMPLING

3.3.1 CHECK INSTRUMENT FOR RESTART

To ensure that the instrument is safe to restart, turn the instrument off at the external isolation switch.

Replace the injection port blanking plug.

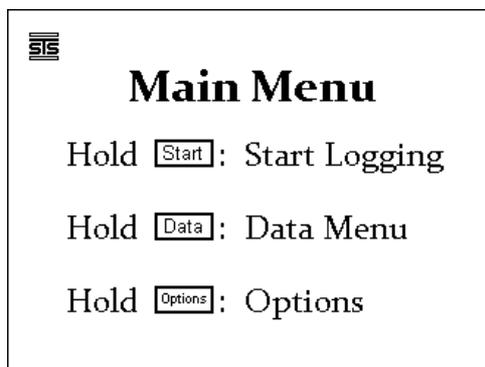
Turn biogas supply to on position.

Remove SD card and download all data. This data needs to be recorded along with the certificate. It is recommended to delete the SD card's data, at customer discretion.

Power the instrument.

3.3.2 START SAMPLING

To re-commence continuous Biogas sampling, press START on the main menu:



4.0 CALIBRATION CERTIFICATE

4.1 COMPLETION OF CALIBRATION CERTIFICATE & INSTRUMENT LOG/LABEL

A calibration certificate should be fully completed - this may be done off site and a copy supplied to customer and STS. The data from the instrument must also be supplied to STS.

4.2 EXAMPLE CALIBRATION CERTIFICATE

[Date]

Calibration Certificate

Serial Number
[Project Name]

Client Name
[Client Name]

Site Name
[Project Manager]

Prepared By
[Name]

Calibration Cycle test result

Calibration Sample	Ug D5	Reading
Blank Calibration	0	
D5 ug injected		a)
D5 ug injected		b)
D5 ug injected		c)
Average Mass a+b+c / 3		=

Use the formula below to work out the new co-efficient:

$$\text{New Coeff} = \frac{(\text{Average calibration Mass})}{(\text{Mass injected})} * (\text{Old Coeff})$$

Eg: The Old Coeff was 2000, a mass of 10ug was injected and an average of 20ug was recorded. The New Coeff would be:

$$\text{New Coeff} = \frac{20}{10} * 2000$$

$$\text{New Coeff} = 4000$$

Existing Coefficient Set

Final Coefficient Set

Calibration Pass/Fail

Status	Calibrated by:	Time/Date	Signature

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