



gen^{ie} EC



Electrochemical Calibration Gas Generator Instruction Manual

Software Rev 1.2

Instruction Manual

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WARNING:

This instrument generates calibration gas for toxic gas detectors. The instruction manual should be read and understood prior to operation of the instrument. Failure to operate the instrument correctly can lead to improper calibrations.

This instrument conforms to the protection requirements of the EC DIRECTIVE 89/336/EEC on Electromagnetic Compatibility (EMC), in accordance with the provisions of Statutory Instrument 2372.

The following standards have been applied:

EN 50081-1 Emissions Standard (Residential Commercial and Light Industry)

EN 50082-1 Immunity Standard (Residential Commercial and Light Industry)

I. **General Description**

The GENie family of instruments consists of the GENie base unit (which provides a microprocessor based user interface and control system) and a source module (that determines the gas to be generated).



GENie Source Module & Base Unit (rear and front view).

GENie Base Unit

Battery powered microprocessor based user interface and control system.

Power Source

A set of four fully charged, **heavy duty alkaline** AA batteries provides approximately 6 hours of continuous operation at .5 LPM. **Note: Rechargeable or light duty batteries can be used, but they provide significantly less operating time.**

An optional battery extender is available that utilizes eight AA type batteries and provides extended hours of operation. Continuous operation power adaptors are also available for bench top operation (note: adaptors are also available for international customers).

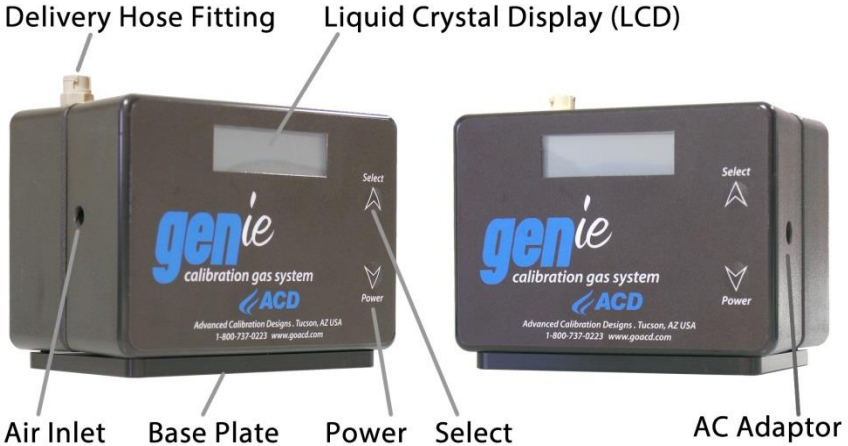
Microprocessor-Based Circuitry

The GENie base unit has microprocessor based circuitry that performs several different operations and offers the user many different features. The microprocessor tracks source and battery usage, monitors the air flow rate

and controls the source and pump to give the selected ppm and flow rate. In addition to English, every GENie EC is capable of providing menu displays in French, German, Spanish and Portuguese.

See section IV. Menu Options for instructions on how to change the menu language.

Digital Display



The GENie base unit has a liquid crystal display (LCD) located on the front of the instrument. This display is protected by a thin, clear plastic cover that is part of the front membrane panel and may be replaced if it becomes scratched or unclear.

POWER and SELECT

The POWER and SELECT switches are momentary push button type switches activated through the front membrane panel. They are physical switches mounted directly on the circuit board.

Delivery Hose

The instrument comes standard with a five (5) foot long, ¼ inch diameter Teflon lined hose for delivering the gas to the sensor or calibration adaptor. The hose has a male quick connect adaptor for easy attachment to the instrument.

Mass Flow Sensor

The GENie main module has a built-in mass flow sensor that measures the flow rate of the instrument. This information is used in two ways. With the pump engaged, it is used to control the pump to the desired flow rate over a range of 0.2 to 1.0 LPM. With the pump disabled, it is used to measure the air flow rate drawn through the GENie by an external pump (for use with EC module only). This information is used to determine the source generation rate to achieve the desired ppm. The flow meter should be calibrated against a primary mass flow standard every 12 months.

System Interface Bus

The center of the GENie system of products is the module expansion bus. This proprietary interface bus is what allows the GENie base unit to interface with an ever expanding family of product modules. Each source module provides the base unit with information pertaining to calibration, life of unit, gas type etc. It is important that these contacts remain clean and undamaged throughout the life of the instrument. If communication between the modules is ever corrupted, the unit will display the 'source not found' error and turn itself off.

II. GENie EC Module

Fast warm-up time allows the instrument to be turned off between remotely located sensors saving battery life and avoiding generation of unwanted gas. The GENie EC module uses the following components to produce the calibration gas/air mixture:

Internal Micro Pump

A small, rotary vane, micro air pump draws in ambient air to blend with the generated gas.

Nylon Carrying Case

The GENie EC comes with a convenient, durable, nylon carrying case. It can be worn around the neck or over the shoulder. The front of the carrying case is clear plastic, allowing the unit to be operated while within the case, and there are convenient side pockets for storage of additional sources, the delivery hose or a battery extender pack. The bottom of the case opens to store additional modules of the GENie system.



III. Operation

To start the instrument, press and hold the POWER switch, located in the lower right of the front of the instrument, until the display reads **GENie EC**, approximately five (5) seconds. Release the switch immediately thereafter.

The instrument will sequence through several screens as follows:

**GENie 1.20 EC
Copyright 2012**

Please Note: If you would like to change the language of the menus, see section IV. Menu Options: Foreign Language Option, for instructions.

The instrument will display the serial number and source number, followed by the manufactured date. The calibration date is the date the instrument (main module) was last calibrated.

**Serial# 0000001
Source# 000001**

**Manufactured
01 Jan 2012**

**Calibration Date
01 Jan 2012**

Initializing ...

**Stabilizing ...
Standby:60 sec**

The unit will then scroll through the flow rate, concentration and gas type, source life, and battery status.

**Flow 0.5 LPM
Select to change**

**1.00 PPM CL2
Select to change**

**Source Life
100 Hrs. 0 min**

**Battery Status
100**

Note that the gas type will be different depending on the source used as will the source life and concentration ranges.

At this point the unit will begin the stabilizing period. The unit will display the following sequence until either the SELECT button is pressed to change the flow or concentration, the POWER button is pressed and held to turn the unit off, or the Standby time elapses.

**Stabilizing ...
Standby:60 sec**

**Flow 0.5 LPM
Standby:60 sec**

**1.00 PPM CL2
Standby:60 sec**

When the Standby time elapses, the display will change to simply display the concentration as shown below. At this point the calibration

gas is stable and you may proceed with calibration. A timer will run on the bottom line indication the time the unit has been running.

**1.00 PPM CL2
@ 0.5 LPM**

At any time during operation, pressing the select switch will result in the following series of menus.

**Flow 0.5 LPM
Select to change**

**1.00 PPM CL2
Select to change**

**Source Life
100 Hrs. 0 min**

**Battery Status
100**

When the flow is displayed with the 'Select to change' indication, pressing the select button will result in the following display.

**0.2 to 1.0 LPM
Set... 0.4 LPM**

At this point pressing the up or down arrows will result in the flow rate changing accordingly. Pressing the down arrow will scroll the flow down from the current setting to 0.2 LPM.

Holding the down arrow will also allow the unit to be set to 0.0 LPM. When set to 0.0 LPM the unit will turn off the internal pump. This is done to provide a method for calibrating 'sample draw' instruments. In

this configuration the GENie EC operates similarly to a 'demand flow' type regulator. It should be noted that by setting both the flow and the concentration to zero the unit will operate as a real time mass flow meter. To learn more about this 'sample draw' operation, refer to the 'sample draw' section IV.

When the desired flow rate is displayed simply release the buttons. The unit will 'time out' and scroll to the next menu in the sequence. When the concentration is displayed with the 'Select to change' indication, pressing the select button will result in the following display. (note that the range may differ depending on the source being used and the flow rate.)

<p>0.5 to 50 PPM Set ... 1.0 PPM</p>
--

At this point pressing the up or down arrows will result in the output changing accordingly. Pressing the down arrow will scroll the output down from the current set point to 0.5 PPM. (note that the range may differ depending on the source being used.)

When the desired concentration is displayed simply release the buttons. The unit will 'time out' and return to normal operation displaying the source life and battery status. If either the flow rate, concentration or both, are changed the unit will display a short 20 second stabilizing screen as shown below.

**Stabilizing ...
Standby: 20 sec**

**Flow 0.5 LPM
Standby: 19 sec**

**1.00 PPM CL2
Standby: 18 sec**

When the stabilizing time is complete, the unit will return to the display the new concentration and flow rate. You are ready to calibrate.

**1.0 PPM CL2
@ 0.5 LPM**

When your calibration is complete simply press and hold the power button for approx. 5 seconds to turn the instrument off. The display will indicate "Hold for power" until the 5 seconds is complete then, change to 'Purging... '. The unit will display the following screen and count down until the unit will power off. Note: At any time while purging the unit will allow for changing flow and PPM. By changing these variables, the unit will return to normal running mode and the purge cycle will be aborted. The purge cycle is intended to allow the corrosive gases to be vented out of the instrument before storage. If the generating source is removed during the purge cycle, the unit will immediately power off. This allows for quick change out from one gas source to the next, for customers calibrating detection systems for multiple gases.

**Purging ...
Standby: 180 sec**

IV. Menu Options: Sample Draw Mode

When set to 0.0 LPM the unit will turn off the internal pump. This is done to provide a method for calibrating 'sample draw' instruments. In this configuration the GENie EC operates similar to a 'demand flow' type regulator.

The display will change to the following.

Stabilize flow ...
Flow 0.000 LPM

The unit can now be connected to a sample draw instrument. Do this by connecting the hose from the sample draw instrument to the output of the GENie EC. The GENie will display the flow being pulled through the instrument and wait a short period to ensure the flow is stable. The display will look something like this.

Stabilize flow ...
Flow 0.65 LPM

With the flow stabilized, the unit will scroll to allow for setting the concentration. Note that the concentration range will differ based on the flow rate that the sample draw instrument pulls. At this point the concentration can be set as described earlier.

0.5 to 50 PPM
Set ... 1.0 PPM

Stabilizing ...
Standby: 20 sec

Calibration gas will begin to flow immediately. The 20 second period is to allow for stabilization of the source and the sensor etc. It should be noted that the concentration will be 'remembered' by the instrument when the sample draw is removed. That is to say that several hand held instruments can be calibrated in this way without any user required interaction of the GENie EC instrument. (assuming all are being calibrated at the same concentration)

To achieve this, simply calibrate the first unit then remove it from the GENie EC. The unit will display the 0 flow and will wait patiently. When the next sample draw instrument is connected the unit will display its flow (they are often slightly different from unit to unit) and will immediately begin producing the concentration set earlier. In this way the GENie EC calibration source can be used to calibrate several sample draw instruments quickly and easily.

The operator can also configure the instrument as a real time mass flow meter by setting the concentration to zero. In this configuration, the GENie can be used to test sampling pumps. The flow source can be pushed through the input fitting (in place of the charcoal filter) or be drawn out through the output fitting. While the concentration is set to zero, the unit will simply display flow in real time. To exit this mode simply select to change either the flow or the concentration away from zero as required.

V. Menu Options: Foreign Language Option

The menu options can be adjusted to read in German, French, or Spanish. To change the language, start the unit as you normally would. When the GENie screen appears,

**GENie EC
Copyright 2012**

press the SELECT button. This will bring up the following screen (note: the Select button must be pressed quickly before the above screen transitions):

**English
Select to Change**

Press the SELECT button to choose the preferred language. Each time the select button is pressed the language will continue to scroll through the four possible options. When the language is displayed, press the POWER button to continue with the start-up sequence.

**Deutsch
Select f. ändern**

**Español
Sel para cambiar**

**Francais
Select p changer**

**Portuguese
Sel para mudar**

Optional Items

AC Adaptor

The GENie EC may also be operated from an AC adaptor. The AC adaptor converts the AC voltage supplied from the main power lines in lieu of the batteries. The adaptor plugs into the instrument from the side of the case directly into the power board and is independent of polarity. A specific adaptor for your country is included as specified when ordering. If needed, contact the factory for exact specifications of the AC adaptor.



DC Battery Extender

The GENie EC unit may also be operated from an external battery extender unit. Designed to fit into the pocket of the fanny pack, the battery extender utilizes eight AA batteries to provide approximately 14 hours of continuous operation.



Hard Body Instrument Case

A water resistant, padded instrument case is available for storage and shipping of the GENie EC. The case is made out of rugged, high impact resistant plastic and will help protect the instrument in harsh environments. The foam insert may be customized to hold additional items like spare batteries or sources.



Extension Hoses

Longer sample hoses may be purchased for use with the GENie EC in lengths up to 20 feet. Note: the internal pump may not be capable of overcoming flow restrictions associated with extreme hose lengths.

VI. Maintenance

If the instrument is returned on an annual basis to maintain NIST certification.

Generating Cell Removal and Replacement

Removal of the cell is accomplished by slightly pulling down on the base plate to release the latching mechanism and sliding the base plate in the direction of the arrows as shown below. Push the cell “Eject” button (see arrow) to disengage the cell. The cell can now be removed.



Install the new cell by aligning the cell contacts and pressing the cell in until it stops. Slide the base plate in the opposite direction of the arrows until it snaps in place.



Battery Replacement

To access the GENie battery compartment, the base module must be separated from the source module. This is accomplished by slightly pulling down on the base plate to release the latching mechanism and sliding the base plate in the direction of the arrows as shown below.

Note: The steps are shown using the GENie Ozone Module but is the same for all modules in the GENie family.



With the base plate out of the way it is now possible to disengage the source module. This is accomplished by sliding the source module downward (relative to the base unit) as shown.

The source module is now disengaged from the base module and can be pulled away revealing the battery compartment.



To reinstall the source module onto the base module, take the following steps: Align the air inlet fitting and the locking pins into the eyelet holes as shown. Press the two units together and slide the source module upwards (relative to the base module) to lock it in place. The two units should be flush and tightly secured at this point, then simply slide the base plate back into position until it latches.





VII. Troubleshooting

No Power to Instrument

Ensure that the POWER switch is pressed for five (5) seconds minimum.

The most common failure mode is that the batteries are dead. Try replacing the batteries with new alkaline batteries or try powering the unit from the AC power adaptor or battery extender (if available).

If the unit is being operated from the external battery extender, make sure that the power switch on the battery extender is in the 'ON' position.

'Flow too low' / 'Flow too high' accompanied by an audible beep.

Accurate air flow is critical to an accurate gas mixture. The microprocessor and built-in precision mass flow sensor continuously monitor the air flow. If, however, a flow problem develops (e.g. air blockage or kinked tubing) which cannot be corrected within ten seconds, the unit will display 'Flow too low.' If the problem cannot be cleared after an additional minute, the instrument will enter the purge mode and then power down.

'No Source Found!' accompanied by an audible beep.

If the source is not initially detected by the processor, the unit will display 'No Source Found' and immediately shut down. This failure can happen either because a generating cell is not inserted, a source is not connected to the main GENie module, the connection to the source or generating cell is not made, or due to a failure of the interface. Remove the generating cell, ensure that the electrical contacts are clean, then re-insert the generating cell.

'**CELL Used Up**' accompanied by an audible beep.

The generating cell has expired and the display will show '**CELL Used Up**'.

'**Battery is Low!**' accompanied by an audible beep.

Replace the batteries or switch to AC power.

VIII. Standard Warranty

ACD will warrant gas calibration equipment manufactured and sold by us to be free from defects in materials, workmanship and performance for a period of one year from date of shipment. Any parts found defective within that period will be repaired or replaced, at our option, free of charge, F.O.B. factory. This warranty does not apply to those items which by their nature are subject to deterioration or consumption in normal service, and which must be cleaned, repaired, or replaced on a routine basis.

Warranty is voided by abuse including rough handling, mechanical damage, alteration, or repair procedures not in accordance with the instruction manual. This warranty indicates the full extent of our liability, and ACD is not responsible for removal or replacement cost, local repair costs, transportation costs or contingent expenses incurred without our prior approval.

ACD, Inc.'s obligation under this warranty shall be limited to repairing or replacing, and returning any product which shall be returned to ACD, Inc. at its manufacturing facilities, with transportation charges prepaid, and which ACD, Inc.'s Material Review Board examination shall disclose to its satisfaction to have been defective.

This warranty is expressed in lieu of any and all other warranties and representations, expressed or implied, and all other obligations or liabilities on the part of ACD, Inc. including, but not limited to, the warranty of fitness for a particular purpose. In no event shall ACD, Inc. be liable for direct, incidental or consequential loss or damage of any kind connected with the use of its products or failure of its products to function or operate properly.

IX. Accessory Items / Parts List

The following items are available as accessories for the GENie EC instrument.

Accessories and Replacement Parts

Sources

Item Description	Capacity (Hrs.)	PPM Range Adjustable	Part Number
Cl2 (chlorine)	50 hr.	.5-50	510-0200-00
Cl2 (chlorine) micro	50 hr.	.05-5	510-0200-05
Cl2 (chlorine) double life	100 hr.	.5-50	510-0200-20
Cl2 (chlorine) double life micro	100 hr.	.05-5	510-0200-25
ClO2 (chlorine dioxide)	50 hr.	.5-5	510-0206-00
ClO2 (chlorine dioxide) double life	100 hr.	.5-5	510-0206-05
H2 (hydrogen)	50 hr.	.5-50	510-0209-00
H2 (hydrogen) double life	100 hr.	.5-50	510-0209-20
H2 (hydrogen) high output	100 hr.	50-500	510-0201-09
H2S (hydrogen sulfide)	50 hr.	.5-50	510-0205-00
H2S (hydrogen sulfide) micro	50 hr.	.05-5	510-0205-05
H2S (hydrogen sulfide) double life	100 hr.	.5-50	510-0205-20
H2S (hydrogen sulfide) double life micro	100 hr.	.05-5	510-0205-25
HCN (hydrogen cyanide)	50 hr.	.5-50	510-0207-00
HCN (hydrogen cyanide) micro	50 hr.	.05-5	510-0207-05
HCN (hydrogen cyanide) double life	100 hr.	.5-50	510-0207-20
HCN (hydrogen cyanide) double life micro	100 hr.	.05-5	510-0207-25

Accessories and Replacement Parts

Outlet fitting, body (1/8 NPT) quick connect	113-0400-00
Hose connector, insert (hose barb) quick connect	113-0402-00
External charcoal filter assembly, GENie series	150-0120-00
Tool, ACD magnetic tip screwdriver	243-0101-00
External battery extender	362-0010-00
Continuous operation adapter, (specify country) plug	362-0600-01
Hose, with quick connect, 5'	715-0405-0X
Nylon carrying case, GENie	730-0201-00
Hard body case	730-0615-00
O3 Module for GENie System	750-0202-02
QC-1 Module for GENie System	750-0202-03

X. Specifications

Hydrogen (H2) (ppm is variable with flow rate, output given at 0.5 LPM)	5.0 - 500.0 PPM
Chlorine (Cl2)	.05 - 50 PPM
Chlorine Dioxide (ClO2)	.5 - 5 PPM
Hydrogen Sulfide (H2S)	.05 - 50 PPM
Hydrogen Cyanide (HCN)	.05 - 50 PPM
Air Flow Rate (with internal pump)	0.2 to 1 LPM
Sample Draw Rate (with pump disabled)	0.1 to 5.0 LPM
Source Life	10, 50 or 100 hours
Warm-up time (to 90%)	Approx. 2 minutes
L x W x H	5'W x 3.88'H x 3.13'D
Weight	2 lb. (1360 g)
Operating Temperature	0° C to 50° C
Relative Humidity (intermittent use)	0 -100%
Accuracy	±10%
Repeatability	±5%
Battery Power	4 alkaline 'AA'
Battery Life	6 hours (at .5 LPM flow rate)

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