Operating Instructions

SKC Deployable Cartridge Sampler (DCS) System

SKC Inc.
863 Valley View Road
Eighty Four, PA 15330

Form 38048 Rev 1812

DCS System Quick Guide

Sampling Head and Cartridge Installation

1. Disassemble sampling head: Unscrew inlet from cartridge holder section. Unscrew cartridge holder section from exhaust section. Clean parts and allow to dry.
2. Thread cartridge holder section onto exhaust section.
3. Insert media cartridge into cartridge holder (arrow pointing toward exhaust).
4. Reinstall inlet section onto cartridge holder section.

Setup and Calibration

1. Set up sample pump. (*See Leland Legacy® Quick Guide. For advanced programming, see Leland Legacy Operating Instructions.*)
2. Ensure media cartridge is installed in sampling head.
3. Thread calibration adapter into sampling head inlet.
4. Use tubing with quick-connect fitting to connect pump inlet to outlet of sampling head.
5. Use short tubing to connect inlet of calibration adapter to outlet of calibrator.
6. Calibrate pump flow rate to 10 L/min and record the pre-sample flow rate.
7. Disconnect calibrator and remove calibration adapter from sampling head.
8. Mount bracket at desired location.
9. Install sampling head on mounting bracket.
10. Install rain cover on sampling head.

Sampling

1. Turn on pump and record pertinent data. (*Leland Legacy pump may be started manually or automatically, see Leland Legacy Quick Guide.*)
2. After desired sampling period, record sample stop time. Remove rain cover. Reinstate calibration train to verify pump flow rate. Record post-sample flow rate.
3. Turn off pump. Record pertinent information.
4. Remove sampling head: Use quick-connect release to detach tubing from pump inlet. Remove tubing from sampling head. Remove sampling head from bracket. Move sampling head to a clean area.

Sample Removal

1. Disassemble sampling head: Unscrew inlet from cartridge holder section.
2. Lift media cartridge from cartridge holder section, wrap in aluminum foil, and place in supplied aluminum can. Transport to lab.

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Indicates a reminder or note

Indicates a warning or caution

INTRODUCTION

The SKC Deployable Cartridge Sampler (DCS) System *(Figure 1)* is a compact, portable, and battery-operated sampling system that ensures the ability to sample gaseous polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, and associated particulates. The system features the fully programmable constant flow Leland Legacy Sample Pump and an easy-to-use sampling head that houses a stainless steel media cartridge. *See Figure 2.* The media cartridges are provided preloaded with either PUF and 47-mm quartz filter or 47-mm quartz filter/PUF/XAD-2 sorbent/PUF. The easily deployed system is packaged in a portable heavy-duty Pelican® case from which the system operates.

Figure 1. DCS System

The SKC DCS System includes a Leland Legacy Sample Pump with connection case and cable, two external battery assemblies with adapters (packaged separately), charger (100-240 V), sampling head, calibration adapter, rain cover for sampling head, sample tubing with quick-connect fitting, calibration tubing, and mounting bracket in a heavy-duty lockable carry case. ***Media cartridges are available separately.***

PERFORMANCE PROFILE

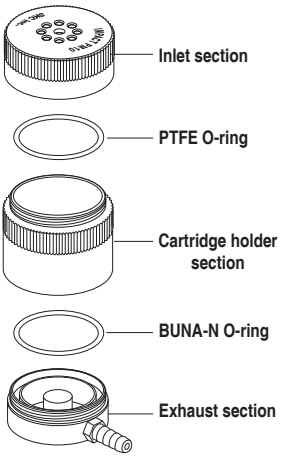
Flow Rate:	10 L/min
Run Time:	24 hrs on one battery charge
Power:	Rechargeable lithium-ion (Li-Ion) battery, 7.4 V, 12-Ah capacity†, 88.8 Wh
Battery Recharge Time:	15 hrs
Pre-filter: *(Not supplied with system)*	47-mm quartz, QM-A, 450-µm thickness
Sorbent: *(Not supplied with system)*	PUF (polyether type), 40-mm diameter, cleaned **or** PUF/XAD-2 sorbent/PUF
Analysis:	Gas chromatography/mass spectrometry (GC/MS) **or** high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS) dependent on method used
Tubing:	3/8-in ID reinforced flexible PVC (supplied)
Temperature:	*Charging:* 32 to 113 F (0 to 45 C) *Operating:* 32 to 104 F (0 to 40 C) *Storing:* -4 to 95 F (-20 to 35 C)
Altitude:	Do not use pump beyond 7500 ft.
RFI/EMI Shielding:	CE marked
Case Dimensions:	18.5 x 14.1 x 6.9 in (47 x 36 x 18 cm)
Complete System Weight:	12.20 lbs (5.5 kg)
Sampling Head Dimensions:	2.6 dia. x 3.6 H x 3.8 L in (7 x 9 x 10 cm)
Sampling Head Weight: *(without cartridge)*	0.60 lb (0.27 kg)
Cartridge Weight:	0.75 lb (0.34 kg)

† *DCS Systems contain Li-Ion batteries and is subject to special shipping regulations.*

PRINCIPLE OF OPERATION

A sample pump draws air at a flow rate of 10 L/min through nozzles on top of the sampling head and into the media cartridge inside the cartridge holder section. The media cartridge contains a cleaned 47-mm quartz filter that collects particles and a cleaned PUF or PUF/XAD-2/PUF sorbent that adsorbs gases and vapors. *See Figure 2.* The aluminum foil-wrapped cartridge is supplied in an aluminum can with lid so that the sample is protected from light and contamination during transport. The filter and sorbent media are combined for extraction followed by GC/MS or HRGC/HRMS depending on the method used.

The two main components of the DCS System: DCS Sampling Head and Leland Legacy Sample Pump



Exploded view of the DCS Sampling Head

Figure 2. DCS Sampling Head and Leland Legacy Pump

SAMPLING HEAD PREPARATION

Cleaning the Sampling Head

All cleaning, loading, and unloading should be conducted in a controlled environment to minimize any chance of potential contamination. When new or when using the sampler at a different location, all sample contact areas need to be cleaned. Rinse with appropriate organic solvent. Allow the solvent to evaporate before loading a cartridge.

For deployed applications where method-specified solvents are unavailable, use isopropyl (rubbing) alcohol or a clean tissue wipe.

Do not place any mechanical object in the inlet nozzles.

O-ring Care for the Sampling Head

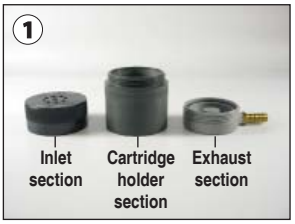
Visually inspect the condition of the BUNA-N exhaust O-ring. *See Figure 2*. Ensure the O-ring surface is smooth (i.e., without cracks, cuts, or other damage). Ensure the O-ring is fitted properly in its channel. Replace the exhaust O-ring if there is apparent damage, stretching, or thinning. It is recommended that the PTFE inlet O-ring be replaced by the manufacturer only.

Inserting a Media Cartridge into the Sampling Head

Wear disposable, clean, lint-free nylon or powder-free surgical gloves to handle the media cartridge.

1. Disassemble sampling head. *See Figure 2 for placement of parts*.
   a. Unscrew inlet section from cartridge holder section.
   b. Unscrew cartridge holder section from exhaust section.

   Clean and allow to dry. *See Cleaning the Sampling Head*.



Disassemble sampling head.

2. Thread cartridge holder section onto exhaust section.

Thread cartridge holder section onto exhaust section.

3. Remove media cartridge from aluminum foil and insert into cartridge holder section. **Ensure airflow arrow on media cartridge points to exhaust section.** The filter should be on the inlet side of the media cartridge.

Insert media cartridge into cartridge holder section.

4. Thread inlet section onto cartridge holder section until just tight. Further hand-tighten by 1/4 turn only.

Thread inlet section onto cartridge holder section.

SAMPLE PUMP OPERATION

The user may choose to:
- Operate the pump manually in the field (on/off)
- Program a schedule into the pump manually
- Program the pump for multiple schedules from a PC with optional DataTrac® for Leland Legacy Software (*see Ordering Information, Accessories*).

See the Leland Legacy Quick Guide to operate the SKC Leland Legacy Sample Pump. *For advanced programming, see the complete Leland Legacy Pump Operating Instructions.*

Charging the Battery

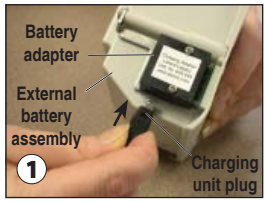
Completely charge a new battery pack using the SKC-approved charger (Cat. No. 223-241) before operating the pump. It may be necessary to charge the battery a few times before maximum battery capacity is achieved.

Cautions:

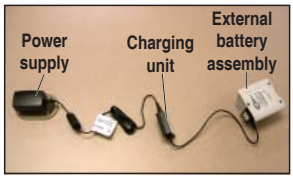
- **Do not charge or operate pump with or without charger in hazardous locations.**
- **Use only the SKC-approved charger for this pump. Use of an unapproved charger may damage the battery and pump and VOIDS ANY WARRANTY.**
- **Do not open, disassemble, short circuit, crush, incinerate, or expose the battery to fire or temperatures in excess of 212 F (100 C).**
- **Tampering with the battery pack VOIDS ANY WARRANTY.**
- **Ensure proper orientation of charging cable before plugging it into the charging jack. Improper orientation/contact will short-circuit the battery and VOIDS ANY WARRANTY.**
- **Short-circuiting the battery pack will render it immediately inoperative.**
- **Failure to follow warnings and cautions VOIDS ANY WARRANTY.**

The battery pack may be kept on the SKC-approved charger for an indefinite time.

1. Insert the plug from the charging unit into the charging port on the battery adapter (on top of the external battery assembly).
2. Insert plug from power supply into the jack on the charging unit.
3. Install the appropriate wall plug on the power supply and plug power supply into a wall outlet.

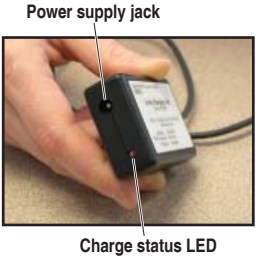


The battery will recharge in approximately 15 hours. For a complete charge, do not run the pump connected to the external battery assembly during charging. After charging is complete, disconnect battery from charger and connect pump to battery. *See Battery Setup.*



After charging the battery pack, it is good practice to run the pump for approximately 5 minutes before calibrating. This ensures the battery is in more steady-state conditions and improves the agreement in pre and post-sampling calibrations.

Reading the Charging Status LED



The Li-Ion Charging Unit indicates battery charge status via an LED on the unit that blinks in specific patterns. Observe the LED steadily for > 5 seconds to read charge status.

LED Action				Charge Status
ON ✸ steady				Charge in progress
ON ✸ 2 sec	OFF ○ .25 sec	ON ✸ 2 sec	(Repeats)	Approximately 80% charged
OFF ○ 2 sec	ON ✸ .25 sec	OFF ○ 2 sec	(Repeats)	Charge completed

For more information on SKC Lithium-ion pump batteries, go to http://www.skcinc.com/instructions/1918.pdf.

Battery Setup

1. Insert the plug on connecting cable from pump into the jack on the battery adapter (on top of the external battery assembly).

2. Insert external battery assembly into a foam compartment in the case. Ensure there is no tension on the connecting cable.

Battery Replacement

1. **Record all necessary data before unplugging pump from battery.**
2. Remove plug on connecting cable from jack on battery adapter (on top of the external battery assembly).
3. Insert plug on connecting cable into battery adapter jack on new, fully charged external battery assembly.
4. Insert external battery assembly into foam compartment in case. Ensure there is no tension on the connecting cable.

Leland Legacy Quick Guide

Terms »

Star button ✷

• Scrolls through run time data and Setup options

Up and down arrow buttons ▲▼

• Toggle between display choices and increase or decrease sampling parameters in Setup

Button sequence

▼ ✷= press buttons individually

[▲▼] = press simultaneously

✷▲▼✷ = security code, always press in sequence

Security code ✷▲▼✷

• Prevents unauthorized changes to the pump's sampling program

Programming Sequences »

• **To activate pump (e.g., to change pump from Sleep to Hold):**
Press any button.

• **To change pump from Hold to Run or Run to Hold:**
Press [▲▼].

• **To reset accumulated data:**
Press [▲▼], then ✷▲▼✷. Press ✷ until *CLr* displays then press [▲▼]; press ✷ until *End* displays then press [▲▼].

• **To set pump flow rate:**
Press [▲▼], then ✷▲▼✷. Flow rate and SET flash. Press ▲ or ▼ to change flow rate. Press ✷ until *End* appears then press [▲▼] to save setting and place pump in Hold.

• **To calibrate flow rate with standard calibrator:**
Press [▲▼], then ✷▲▼✷. Flow rate and SET flash. Press ▲ or ▼ to change flow rate. Press ✷ once. *ADJ* displays. Press ▲ or ▼ until desired flow rate is indicated on calibrator. When finished, press ✷ until *End* displays then press [▲▼] to save new setting and place pump in *Hold. For CalChek Calibration, see operating instructions.*

• **To change temperature scale from F to C or C to F:**
Press [▲▼], then ✷▲▼✷. Press ✷ until temperature displays. Press ▲ or ▼ to switch units; press ✷ until *End* displays then press [▲▼] to save new setting.

• **To change atmospheric pressure scale (mm, mb, In):**
Press [▲▼], then ✷▲▼✷. Press ✷ until pressure displays then press ▲ or ▼ to switch units; press ✷ until *End* displays then press [▲▼] to save new setting.

• **To change time scale (12 Hr/24 Hr/Dela):**
Press [▲▼], then ✷▲▼✷. Press ✷ until 12 Hr, 24 Hr, or Dela displays then press ▲ or ▼ to switch units; press ✷ until *End* displays then press [▲▼] to save new setting. *To set delayed start (Dela), see operating instructions.*

• **To change clock:**
Press [▲▼], then ✷▲▼✷. Press ✷ until clock displays then press ▲ or ▼ to change flashing hour; press ✷ to move to minutes and ▲ or ▼ to change setting. Press ✷ until *End* displays then press [▲▼] to save new setting.

• **To change the sampling time function:**
Press [▲▼], then ✷▲▼✷. Press ✷ until *ST L/min* displays then press ▲ to change flashing digit; press ✷ until *End* displays then press [▲▼] to save new setting. To delete, follow above steps and press ▼ until 0 appears. Exit Setup.

Note: When in Setup, choosing Esc instead of End will exit Setup without saving new settings.

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CALIBRATION AND SAMPLING

Calibration

Calibrate pump flow rate with the sampling head loaded with a media cartridge in line. ***See pump and calibrator operating instructions.***

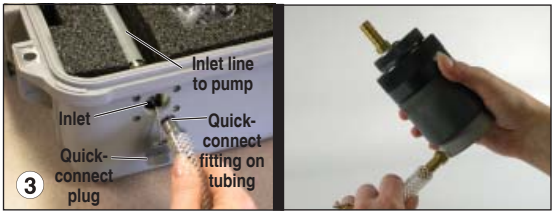
Allow the pump to equilibrate after moving it from one temperature extreme to another.

Wear disposable, clean, lint-free nylon or powder-free surgical gloves to handle the media cartridge.

Ensure pump has run for 5 minutes before calibrating. Ensure rain cover is removed from inlet and that sampling head is completely assembled with a media cartridge (see Inserting a Media Cartridge into the Sampling Head).

1

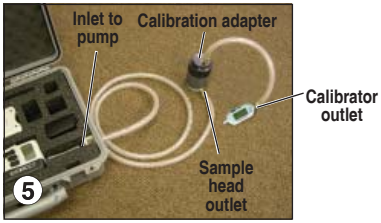
Thread calibration adapter into sampling head inlet.



Unscrew quick-connect plug on side of case. Use tubing with quick-connect fitting to attach case (pump) inlet to exhaust of sampling head.

Ensure O-ring is installed on the quick-connect fitting before inserting it into the inlet. Absence of the O-ring can affect measurements. See Replacement Parts.

Use provided short length of calibration tubing to connect inlet of calibration adapter to outlet of a calibrator to form a calibration train.



Set and calibrate pump flow rate to 10 L/min (see Leland Legacy Quick Guide). Record the pre-sample flow rate. See pump and calibrator operating instructions.

When calibration is completed, disconnect calibrator and tubing from calibration adapter. Remove calibration adapter from sampling head.

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Sampling

Locate system in an unobstructed area, at least 6 feet (2 meters) from any obstacle to airflow.

Allow pump to equilibrate after moving it from one temperature extreme to another.

1. Attach mounting bracket at the desired location and at breathing zone height (6 feet or 2 meters) using wire ties or other fasteners. Mount sampling head loaded with media cartridge on mounting bracket by threading clamp knob into bottom of sampling head.

2. Insert screw on rain cover into top of the sampling head inlet and rotate cover until tight.

3. Turn on pump and record sample start time, ambient temperature, ambient pressure, and other pertinent data.

Sample start time and duration can be programmed into the Leland Legacy Sample Pump in advance and sampling may be started manually or automatically.

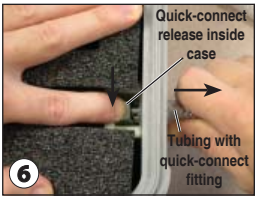
Record all necessary data before disconnecting pump from battery and reconnecting to new battery.

4. After desired sample time has elapsed, record sample stop time. Remove rain cover from sampling head and reinstate calibration adapter, tubing, and calibrator *(see Calibration)*. Record post-sample flow rate.

5. Turn off pump. Record total volume, ambient temperature, ambient pressure, and other pertinent data.

6. Reach inside case and press quick-connect release while pulling tubing from case (pump) inlet. Remove tubing from sampling head. Remove sampling head from bracket.

7. Remove sampling head to a clean area.



Press quick-connect release to remove tubing.

Tips

- The supplied rain cover should be used for all outdoor sampling.
- Keep Leland Legacy Sample Pump inside the Pelican case and the case closed during sampling to protect sample pump from weather.

SAMPLE REMOVAL AND SHIPPING

Removing the Media Cartridge from the Sampling Head

Wear disposable, clean, lint-free nylon or powder-free surgical gloves to handle the media cartridge.

1. Unscrew inlet section from cartridge holder section.

   Ensure media cartridge remains vertical to avoid loss of sample from filter.

Remove inlet section from cartridge holder section.

2. Lift media cartridge from cartridge holder section.

Lift media cartridge from cartridge holder section.

3. Wrap media cartridge in supplied foil or clean aluminum foil and place in supplied aluminum can to protect sample from light and contamination.

Wrap media cartridge in foil and insert in aluminum can.

Storing and Transporting Samples

1. Store samples with ice packs (< 39.2 F [4 C]) in the field.

2. Package and transport samples and blanks with ice packs (< 39.2 F [4 C]) until receipt at the analytical laboratory.

ORDERING INFORMATION

Description	Cat. No.
DCS System†#* includes a Leland Legacy sample pump with connection case and cable, charger (100-240 V), 2 external battery assemblies with adapters (packaged separately), sampling head, calibration adapter, rain cover for sampling head, sample tubing with quick-connect fitting, calibration tubing, and mounting bracket in a heavy-duty lockable carry case. ***Cartridges, filters, and sorbent media available separately***	**100-3960**

† DCS Systems contain Li-Ion batteries and is subject to special shipping regulations.

 # Use in non-explosive environments only. Not UL Listed for intrinsic safety

** Provides data similar to Federal Reference Method samplers. The DCS System is not a U.S. EPA reference or equivalent method for compliance sampling.*

Media Cartridges, *required, select based on application* Stainless steel cartridges containing media as described below, stainless steel support screens, and gaskets. Each cartridge is wrapped in aluminum foil and shipped in an aluminum can with lid.	
Filter/PUF contains 41.3-mm length of PUF and a 47-mm quartz filter	**226-206**
Filter/PUF/XAD-2/PUF contains a 47-mm quartz filter and 2 grams of XAD-2 sorbent sandwiched between two 20.6-mm lengths of PUF	**226-207**

Accessories	
TSI 4146 Calibrator Kit, 0.01 to 20 L/min, includes calibrator, soft-sided case, mounting lugs, tubing (1/4-in ID), battery pack, 6 AA batteries, inlet filter, dampening module, NIST certificate, and manual	**740-4146**
DataTrac for Leland Legacy Software includes software on CD and adapter cable *(requires Windows 7 or higher and available USB port)*	**877-92**

Replacement Parts	Cat. No.
DCS Sampling Head	**225-620**
Quick-connect Fitting O-rings, pk/3	**P31996**
Rain Cover, gray	**225-398**
Mounting Bracket	**225-399**
Stainless Steel Support	**225-2647A**
Quick-connect Fitting, on 6.5-foot reinforced flexible PVC tubing	**P42741**
Reinforced Flexible PVC Tubing, 6.5 feet	**P30004**
Calibration Tubing, 1 foot, reinforced flexible PVC	**P300041**
Silicone Tubing, 0.4 foot, pk/2	**P30255A**
DCS Case, Pelican, with foam and hardware	**225-3901**
Calibration Adapter	**225-394**
Quick-connect Plug with retaining chain	**P42742**
External Battery Assembly with battery adapter	**223-247**
Battery Adapter	**223-248**
Connection Case with cable and plug	**223-249**
Support Screens for Media Cartridge, pk/2	**P26033**
Gaskets for Media Cartridge, pk/4	**P52413**

LI-ION BATTERY SHIPMENT

Rechargeable lithium-ion batteries for use with SKC sample pumps have been tested in accordance with the UN Manual and are proven to meet the requirements of each test in the *UN Manual of Tests and Criteria*, Part III, subsection 38.3. The batteries are rated below 100 watt-hours (Wh). Consult with your carrier for information on Lithium Battery Shipping Regulations UN 3480 and UN 3481 or visit SKC's website for more information at www.skcinc.com/catalog/pdf/instructions/1921.pdf.

SKC LIMITED WARRANTY AND RETURN POLICY

SKC products are subject to the SKC Limited Warranty and Return Policy, which provides SKC's sole liability and the buyer's exclusive remedy. To view the complete SKC Limited Warranty and Return Policy, go to http://www.skcinc.com/warranty.