

GEM-500

OPERATION MANUAL



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CES-LANDTEC Release Date: December 26, 2003

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Chapter 1 - Getting Started

Unpacking the GEM™500

The GEM™500 unit is normally shipped in a special protective shipping unit. An optional protective hard case with a foam interior offers additional protection, transportation convenience and component hardware storage. When properly sealed, the hard case is watertight. The hard case is equipped with a pressure relief valve (located under the handle on the case) that is normally kept closed. If there is a change in elevation, the hard case may not open until internal pressure is equalized by turning the pressure relief valve. When shipping a GEM™500 back to CES-LANDTEC for calibration or service, always ship it in the original packaging to protect unit from damage.

Carefully unpack the contents of the GEM™500, inspect and inventory them. The following items should be contained in your package:

- The GEM™500 unit
- GEM™500 Operation Manual
- Registration/Warranty Card and other instructional information
- Soft carrying case with replaceable protective window and carrying strap
- External (clear vinyl) sampling hose assembly (5 ft.) with external water trap filter assembly
- Blue ¼" vinyl pressure tubing sampling hose (5 ft.)
- Spare internal particulate filter element
- Polypropylene male connector (hose barb) connects to blue vinyl tubing
- Spare external water trap filter element
- 110-volt Nickel-Cadmium battery charger
- GEM™500 download software on DataField CS CD
- RS-232 serial cable for computer/printer data downloading
- Temperature probe (optional)
- Hard carrying case (optional)

Immediately notify shipper if the GEM™500 unit or accessories are damaged due to shipping. Contact CES-LANDTEC if any items are missing. If you have any questions, please contact CES-LANDTEC technical support at (800) 821-0496 or (800) LANDTEC. Complete the Registration/Warranty Card and return it to CES-LANDTEC. The model and serial numbers are located on the back of the GEM™500 unit.

Attaching the Hose Assembly

The GEM™500 hose assembly comes fully assembled but it needs to be connected to the GEM™500. Connect the clear tubing with the external filter/water trap assembly to the static pressure/ sampling port (top left corner) on the GEM™500 (See Figure 1.1). The shorter piece of tubing (from the water trap filter hosing) should be connected to the GEM™500. This allows you to see any liquid entering the hose and shut the unit off before the liquid reaches the GEM-500™. Always connect the hose in the same direction. Connect the blue tubing to the impact pressure port on the GEM™500 (See Figure 1.1). This port is located on the bottom left corner of the GEM™500. **DO NOT** block the exhaust port (See Figure 1.1).

Quick Connect Fittings

The quick connect fittings will simplify taking well field readings. They are easy to install on your landfill gas extraction system and on perimeter probes. Many different types are available. CES-LANDTEC maintains a stock of fittings used on its equipment for your convenience.

The GEM™500 comes with quick connect fittings for the Accu-Flo wellhead. Insert the hose barb end of the male connector into the end of the clear and blue tubing.

GEM™500 Keyboard and Port Descriptions

1. **Red On/Off Key**—Turns unit on or off.
2. **Blue Number/Letter Toggle Key**— Enables well ID code to be entered by toggling between number and letter mode and toggles contrast on the gas read screens.
3. **Receptacle Port**—Used for battery recharging, RS232 serial communications, temperature probe or gas pod.
4. **Backspace/Exit Key**—Acts as backspace key when pressed and held for one second, to correct entry of wrong number/letter, returns to previous procedure or steps back one layer of menus (similar to pressing the ESCAPE key in many computer programs).

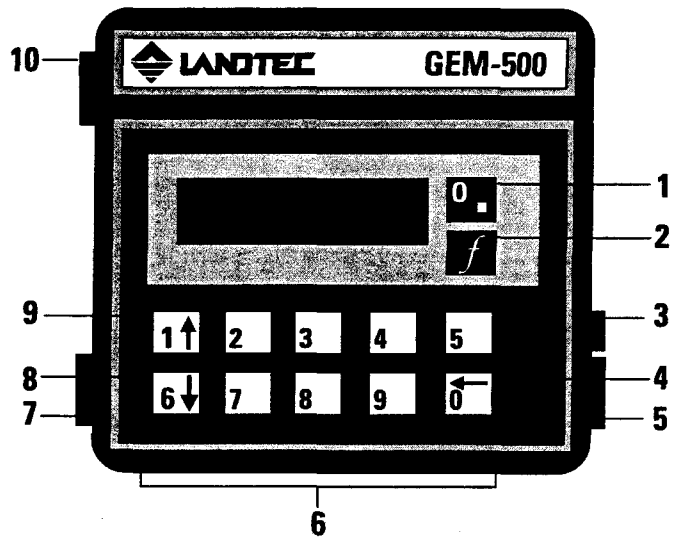


FIGURE 1.1

5. **Exhaust Port**—This port must be kept clear. If blocked while operating, over-pressurization may occur causing damage to internal components and case.
6. **Number Keys**—Enter numbers 0 through 9.
7. **Impact Pressure Port**—Measures impact pressure when connected to wellhead impact pressure port, pitot tube or orifice plate.
8. **Cursor-Down Key**—Enters number 6, scrolls down lines of information on display screens, and also scrolls down alphabetic character list.
9. **Cursor-Up Key**—Enters number 1, scrolls up lines of information on display screens, and also scrolls up alphabetic character list.
10. **Static Pressure/Sampling Port**—Measures static pressure and is inlet for gas sampling.

Must Do's Before Using the GEM™500

Read Chapter 2 – *Using Menu Screens*.

Proper operation of the GEM™500 requires the following functions to be completed before proceeding.

- Charge the unit with the battery charger
- Check the Time/Date
- Field Calibrate the unit

Calibration Gases

Calibration gases are required to field calibrate the GEM™500. Portable Calibration Gas Kits and 4-unit or 12-unit cylinder cases are available from CES-LANDTEC. (See Chapter 2 -- *Field Calibration*)

Special Key Functions

Entering an ID code with Letters and Numbers

Use the blue toggle key (*f*) to shift back and forth between number mode and letter mode. When in number mode, use number keys to enter numbers. When switched to letter mode, use the **1 KEY (UP ARROW)** or the **6 KEY (DOWN ARROW)** to scroll to desired letter, press **0 KEY** to enter the letter on the display. Repeat this process for all letters. After entry, the first four characters will remain as a default for ease in entering the next ID. If different characters are desired, replace the defaults by using the backspace function described below.

Backspace Function

To change or correct an entry, use the **0 KEY (BACK ARROW)** as a backspace key by holding it down for one second. In normal use, this key is quickly pressed and released.

Contrast Adjustment

Contrast can be adjusted when the unit is either first turned on or while taking a reading. While taking a reading, use the Blue *f* KEY to enter the contrast adjustment screen. To adjust, use **1 KEY (UP ARROW)** to darken the screen and the **6 KEY (DOWN ARROW)** to lighten screen.

Starting Up the GEM

This procedure is the same each time the GEM™500 is turned on by pressing the RED On/Off KEY. The following steps will allow you to proceed to the Main Menu Screen of the GEM™500 .

1. Turn unit on by pressing the RED On/Off KEY (see Figure 1.1)

Note: If the GEM is turned on and no additional keys are pressed within 15 minutes, the unit will automatically shut off.

2. The Warning screen appears for five seconds. This is a reminder that the GEM™500 is not to be used in areas such as vaults, excavations or other confined spaces. An explosion could result causing serious injury or death.

FIGURE 2.1

**Warning! --Do not use
in confined spaces.
Unit NOT certified
intrinsically safe.**

3. The Service Contract screen may appear for five seconds if activated by CES-LANDTEC. Otherwise, the Not Covered screen is displayed. The GEM™500 is a portable, scientific, field instrument that does require factory maintenance and calibration at recommended six-month intervals under normal landfill usage.

FIGURE 2.2

**This analyzer has a
Service Contract
Next service due:-
dd/mm/yy**

FIGURE 2.3

**Unit not covered by
Service Contract
Next service due:-
dd/mm/yy**

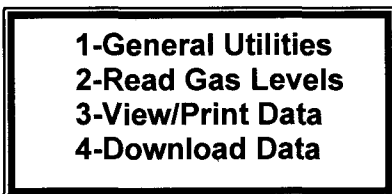
4. The CES-LANDTEC/Contrast screen allows the user to adjust the contrast of the characters on the liquid crystal display screen. Press and hold the 1 KEY (UP ARROW) to increase contrast. Press and hold the 6 KEY (DOWN ARROW) to decrease the contrast. Adjust the contrast as necessary (contrast levels are NOT saved when the unit is turned off). Press the 0 KEY to proceed to the Main Menu screen.

FIGURE 2.4

**CES-LANDTEC
GEM 500
(800) 821-0496
↑↓--Contrast 0-Cont**

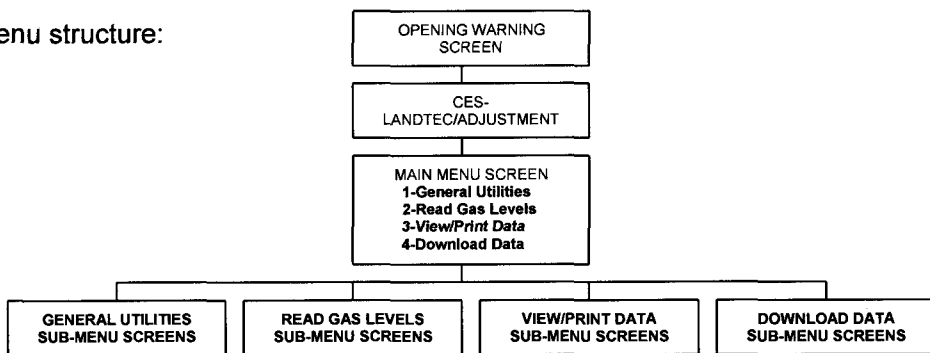
5. **The Main Menu Screen.** All the GEM™500 functions are accessed from the Main Menu Screen. All subsequent instructions about the GEM™500 functions will start from this screen.

FIGURE 2.5



GEM-500 Menu Tree

The overall menu structure:



Review of the Main Menu and Sub-Menu Screens

General Utilities

Refer to Chapter 4 for further information. The General Utilities function has sub-menu screens that allow housekeeping and other maintenance including:

1. CHECK TIME/DATE: Set or check time and date.
2. BATTERY STATUS: Graphic display of remaining power in batteries.
3. ZERO PRESSURES: Zero pressure transducers.
4. MEMORY: Check memory available or clear all data and ID information.
5. USA/METRIC UNITS: Select either USA standard or metric measurement units.
6. GAS CALIBRATION: Allow Methane, Carbon Dioxide and oxygen to be field calibrated by the user with calibration gas mixtures for increased accuracy (see Chapter 3).
7. GAS ALARM: Set gas alarm levels.
8. ID MAINTENANCE: View, enter, edit or delete ID information.

Read Gas Levels

Refer to Chapter 5 for further information. Read Gas Levels function allows gas, pressure, flow and BTU readings to be viewed and recorded. Sub-menu screens include:

1. Read GAS with Existing ID code.
2. Read GAS without ID code.

View/Print Data

For further information, refer to Chapter 6. The View/Print Data function allows previously stored data to be scanned on the GEM™500 display screen, individually displayed, or printed via the RS-232 cable to a serial printer.

Download Data

The Download Data function allows stored data to be downloaded via the RS-232 cable to a computer in a format that can be uploaded into DataField (CES-LANDTEC database management program) or onto spreadsheets. See Chapter 7 for further information.

Note: The 0 KEY (BACKSPACE) acts as an exit or ESCAPE key at the end of each sub-menu by returning to the Main Menu.