PowerDigger Lite
User Manual

Version 3.0
English

- when it has to be **right**

Leica Geosystems

Introduction

Purchase

Congratulations on your purchase of PowerDigger Lite machine control system. PowerDigger Lite System is an ideal tool for increasing productivity in all aspects of the construction earthmoving industry.

This manual contains important safety directions as well as instructions for setting up the system and operating it. Refer to the chapter "10 Safety Directions" for further information. Read carefully through the User Manual before you switch on the product.

To ensure safety when using the system, please also observe the directions and instructions contained in the User Manual and Safety Handbook issued by the:

- Machine manufacturer,
- Controller manufacturer and
- Sensor manufacturer.

Product identification

The type and serial number of your products are indicated on the label on the base of the unit.
Enter the model and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorised service workshop.

Type:	PowerDigger Lite Control Box	Serial No.:	_____
Type:	Boom 1 Sensor	Serial No.:	_____
Type:	Boom 2 Sensor	Serial No.:	_____
Type:	Stick/Laser Sensor	Serial No.:	_____
Type:	Bucket Sensor	Serial No.:	_____

Symbols

The symbols used in this manual have the following meanings:

Type	Description
 **Danger**	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 **Warning**	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
 **Caution**	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage.
	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

About This Manual

PowerDigger Lite

The PowerDigger Lite System is a basic machine control system that provides the operators with a visual reference of the bucket position. The PowerDigger Lite Control Box is designed to be easy to use and provides the operator with a range of information and setups to assist in all aspects of machine control.

Major components

The PowerDigger Lite System consists of several components depending on the type of machine and the customers needs to perform their earthmoving tasks.

The basic components of the systems are the PowerDigger Lite Control Box, angle sensors and cabeling.

Purpose of this manual

The purpose of this manual is to explain the features and operation of the PowerDigger Lite System. The specific uses of the systems are varied.
This manual is not intended to teach each specific use.

Table of Contents

In this manual

1 System Overview

1.1 General

General

The PowerDigger Lite System from Leica Geosystems consists of a PowerDigger Lite Control Box with a remote LED display and varying number of sensors depending on which system is installed on the excavator.

⚠ Warning

This product may be installed on building machinery only by an appropriately trained and qualified specialist.

⚠ Warning

Unauthorised modification of machines by mounting the product may alter the function and safety of the machine.
Precautions:
Follow the instructions of the machine manufacturer. If no appropriate instruction is available, ask machine manufacturer for instructions before mounting the product.

General principle of the PowerDigger Lite System

The sensors feed information to the PowerDigger Lite Control Box which makes the calculations.
You just establish a known reference point, for example Laser beam or stake, and then enter the required Offset and grade after which you are ready to start digging.

On the PowerDigger Lite Control Box you can overlook all guidance and status information on the LCD display. The bright LED signs and possibility for guidance by audio signals also make you able to determine if you are **HIGH**, **ON GRADE** or **LOW**.

Handling precautions

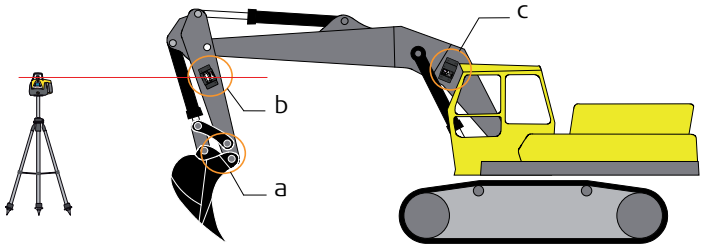
The PowerDigger Lite System is a precision system and should be treated with care. When using the system with a rotating laser, please make sure that the laser is calibrated and set up correctly.

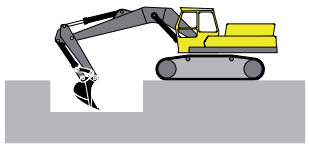
Safety information

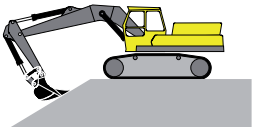
If using a rotating laser as reference, do not stare into the laser beam when the laser is working.
For more information, please see the documentation of your laser.

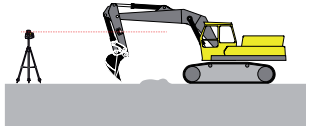
1.2 Single Slope System

Basic system



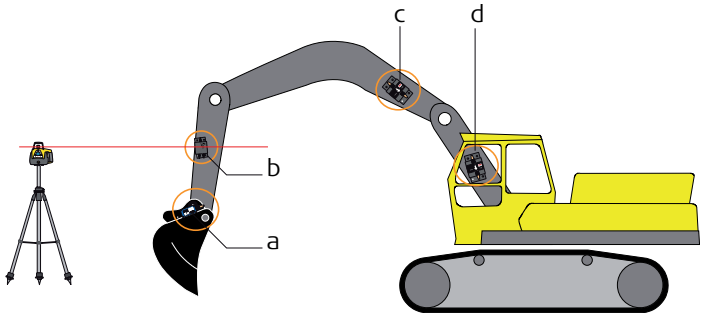


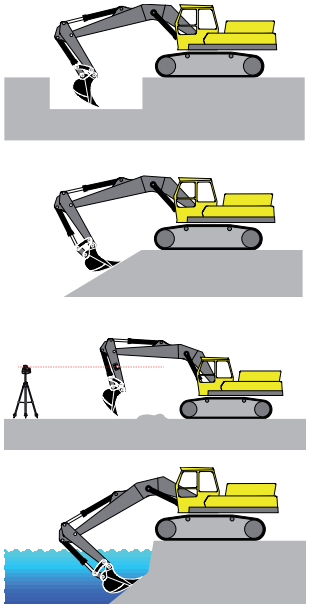




a) Bucket Sensor
b) Stick/Laser Sensor
c) Boom 1 Sensor

Basic system with Articulated Boom



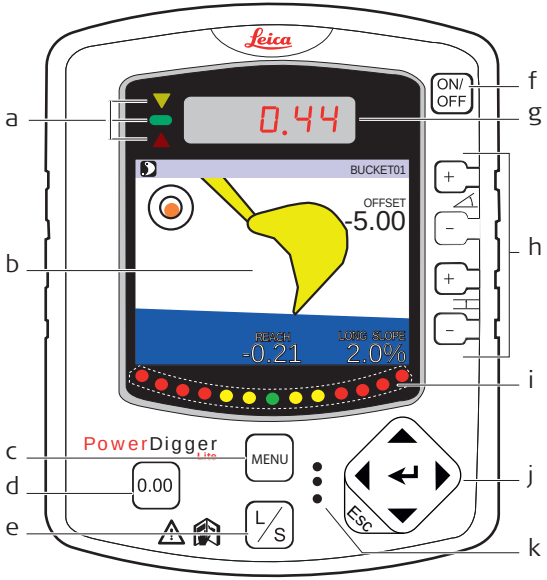


a) Bucket sensor
b) Stick/Laser Sensor
c) Boom 2 sensor
d) Boom 1 sensor

☞ On excavators with 2 booms, a sensor is mounted on each boom.

2 PowerDigger Lite Control Box

Overview



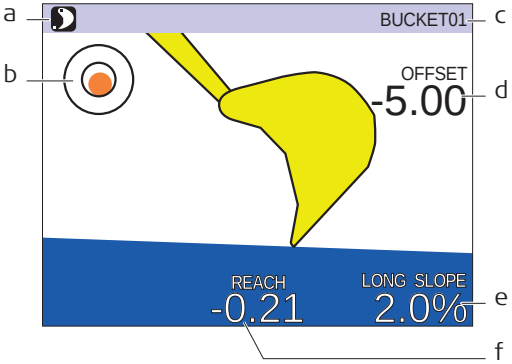
a) Shows whether the position of the bucket is **HIGH**, **ON GRADE** or **LOW**
b) Graphical display
c) Selection of bucket
d) Set On Grade position
Press for 2 sec to zero-set the Offset
e) Load and Store the position
f) Power ON / OFF
g) Remaining Offset to ON GRADE position
h) Setup buttons
i) Bucket Angle Indicator
j) Navigation buttons
k) Speaker

Description of buttons

Button	Description
	Increases the Slope of the excavation in the X-direction. Decreases the Slope of the excavation in the X-direction.

Button	Description
	Increases the Offset of the excavation. Decrases the Offset of the excavation.
	Navigation button. Allows you to navigate through the menus. Press left/right arrows to move between bucket items. **Naming convention within this manual:** • ↵: Enter button • ◆: Left / Right arrow buttons • ▲▼: Up / Down arrow buttons • Esc: Escape button

Display content



a) Reference method
b) Pitch / Roll indicator (optional equipment)
c) Selected bucket
d) Desired offset
e) Slope in X-direction
f) Reach measurement

Setting the desired offset

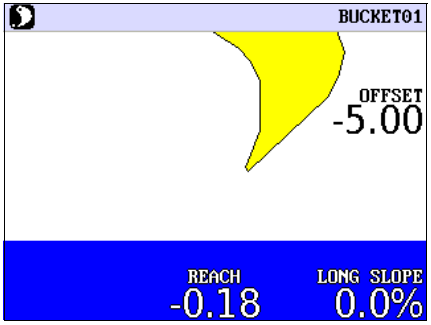
1. Make sure that **LASER MODE** is set to **OFF** (Bucket is selected as reference) in the menu option **SETUP HEIGHT -> LASER MODE**.
2. Press the Offset (+) or (−) button until the display shows the desired value.

Example:

If you want to enter a Offset of 5.0 m, press the Offset (+) or (−) button until the display shows the value -5.00.

The display to the right indicates:

1. The bucket tip is used as reference.
2. The bucket selected is No. 1.
3. The desired Offset is set to -5.00.
4. The X-slope is 0.0% (no slope).
5. Reach = -0.18 means that the bucket has been moved 18 cm closer to the machine since the 0.00 button was pressed.

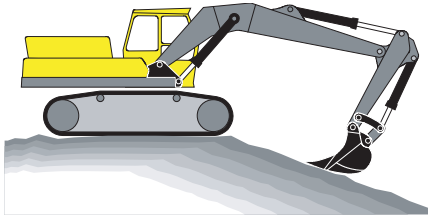


Digging with slope

Press the Slope (+) or (−) button until the display shows the slope desired.

Example:

If you want a slope where the excavation is getting shallower as the bucket comes nearer the excavator, press the Slope (+) or (−) button until the display shows the desired slope.

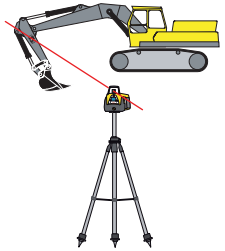


Positive slope

Moving the excavator

1. Make sure that **LASER MODE** is set to **OFF** (Bucket is selected as reference) in the menu option **SETUP HEIGHT -> LASER MODE**.
2. Put the bucket at a place that can be reached again after moving the excavator.
3. Press the L/S button to store the position.
   The red display will flash to indicate that the position is stored.
4. Move the excavator and put the bucket at **exactly** the same place where the position above was stored.
5. Press the L/S button again to load the position.

Basic operation instructions

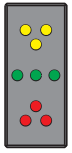


1. Make sure that **LASER MODE** is set to **Integrated** in the menu option **SETUP HEIGHT -> LASER MODE**.

   (= Reference method Laser)
2. Make sure that the rotation laser is activated.
3. Move the Laser Sensor, so that it can detect the laser beam. When the sensor detects the beam, the message

   NEW REF. @. 0.00
   PRESS L/S BUTTON

   is shown in the lower display, and the message LASEr is shown in the upper display.
   When the sensor approaches the beam, the diodes on the remote display will flash **slowly** in the direction in which the sensor is to be moved in order to detect the laser beam. When the green diodes flash **quickly**, the sensor is able to detect the beam.



4. Press the L/S button to set the reference point.
   When the upper display flashes the message **LASEr**, the reference point has been accepted. The values of actual Offset and alarm Offset depend on the actual position of stick and bucket.

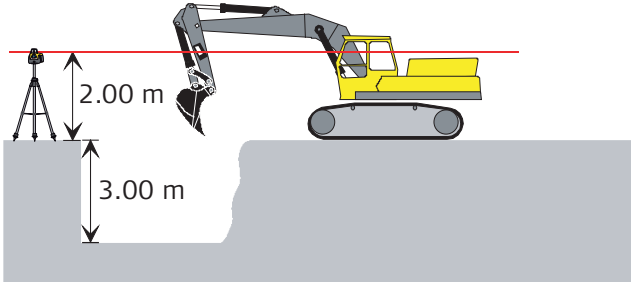
Setting the desired offset

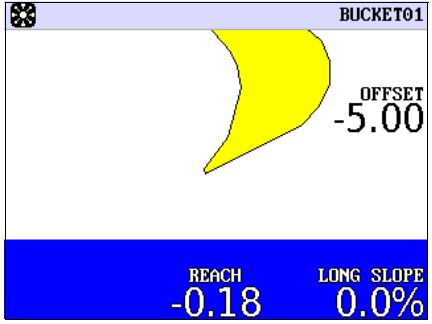
Press the Offset (+) or (−) button until the display shows the desired value.

☞ The reference point is the laser beam.

Example:

If you want to enter an Offset of 5.0 m below the laser beam, press the Offset (+) or (−) button until the display shows the value -5.00.

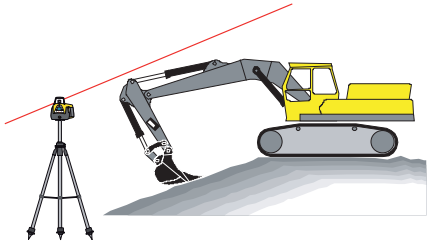




Digging with slope

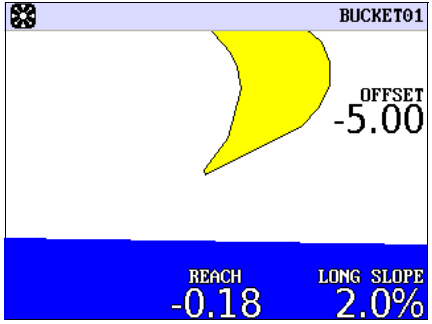
Press the Slope + or − button until the display shows the slope desired.

The slope you enter on the display must always be the same as the slope of the rotation laser.



Example:

If you want a slope of 2%, where the excavation is getting shallower as the bucket comes nearer the excavator, press the Slope + or − button until the display shows the value 2.0%.



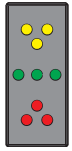
Moving the excavator

1. Make sure that **LASER MODE** is set to **Integrated** (Laser is selected as reference) in the menu option **SETUP HEIGHT -> LASER MODE**.

   (☀ = Reference method Laser)
2. Move the excavator to the desired location.
3. Move the Laser Sensor, so that it can detect the laser beam.
   When the sensor detects the beam, the message

   NEW REF. @. 0.00
   PRESS L/S BUTTON

   is shown in the lower display, and the message LASEr is shown in the upper display.
   When the sensor approaches the beam, the diodes on the remote display will flash **slowly** in the direction in which the sensor is to be moved in order to detect the laser beam. When the green diodes flash **quickly**, the sensor is able to detect the beam.



4. Press the L/S button to set the reference point.
   When the upper display flashes the message **LASEr**, the reference point has been accepted. The values of actual Offset and alarm Offset depend on the actual position of stick and bucket.

5 User Menu Tree

User Menu tree

- **SETUP SYSTEM**
  - UNITS LENGTH
  - UNITS ANGLE
  - BEEP VOLUME
  - LIGHT INTENSITY
  - ALARM HEIGHT
  - REVERSED VIEW
- **SETUP HEIGHT**
  - GREENBAND MODE
  - GREENBAND
  - YELLOWBAND
  - YELLOW BEEP
  - REFERENCE OFFSET
  - LASER MODE
- **SETUP BUCKET**
  - CALIBRATE BUCKET
    - ^v SELECT BUCKET
    - BUCKET LEFT/RIGHT
    - BUCKET LEN
    - BUCKET ANGLE
    - BUCKET FLAT ANGLE
    - DOG BONE L4
    - BUCKET NAME
  - BUCKET INDICATOR
  - BUCKET GREENBAND
- **MEASURE**

|—— **PROFILE**
|
|—— **CABLE DETECTION**
| |—— MODE
| |—— RANGE MIN
| |—— RANGE MAX
| |—— RESPONSE
| |—— ALARM
| |—— VOLUME
|
|—— **SERVICE MENU***

* Password protected menu for support personnel only.

6 User Menu

Enter the User Menu

To enter the User Menu, press the Enter button ↵.
Select a menu option by pressing the left/right arrows ◆.
Press the Enter button ↵ to enter the sub-menus.
Change a value by pressing the up/down arrows ◆.
To leave the User Menu, press the Escape button 

.

6.1 SETUP SYSTEM

UNITS LENGTH

This menu option is used to set in which unit the length is measured.
You can choose between meters, inches or feet.

UNITS ANGLE

This menu option is used to set in which unit the angle is measured.
You can choose between per cent, per thousand, gon, degrees or relative.

BEEP VOLUME

This menu option is used to set how loud the PowerDigger Lite Control Box is to beep.
You can choose between off, low, normal and loud.

LIGHT INTENSITY

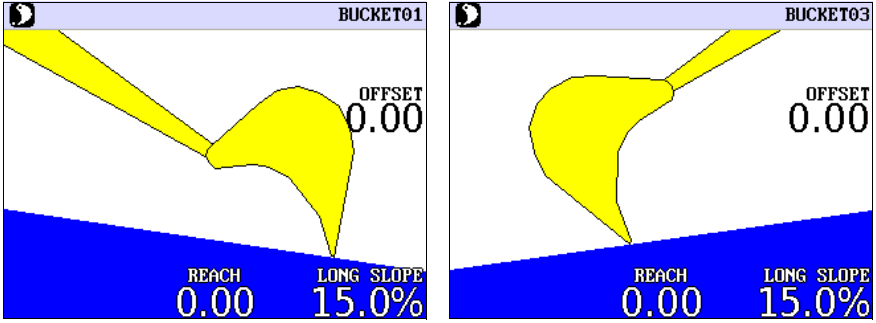
This menu option is used to set the light intensity in the display.
You can choose between the values from 0 to 15.

ALARM HEIGHT

This menu option is used to set how high up the pivot points are allowed to get. The value is the distance from the lowest pivot point.
You can save the value by moving the bucket to a desired alarm height and pressing the 0.00 button.

REVERSED VIEW

This menu option is used to reverse the view.
You can choose between **OFF** or **ON**.



6.2 SETUP HEIGHT

GREENBAND MODE	This menu option is used to set the position of the greenband **centred**, **above** or **below**, the **defined on grade level**. Greenband is the interval in which the green light flashes.
GREENBAND	This menu option is used to set when the green diode/diodes in the middle of the remote display and on the Control Box respectively start to light. The value is the distance from when the green diodes start to light until when the red arrow and diode start to light.
YELLOWBAND	This menu option is used to set when the yellow diodes on the remote display and on the Control Box respectively start to light. The value is the distance from when the yellow diodes start to light until when the green diodes start to light.
YELLOW BEEP	This menu option is used to enable or disable the audible indication of being in the yellow band.
REFERENCE OFFSET	This menu option is used to set a user defined Offset when the 0.00 button is pressed.
LASER MODE	This menu option is used to choose the reference method. You can choose between **OFF** and **INTEGRATED**. • For **OFF**, the method is as described in "3 Working without Laser". • For **INTEGRATED**, the method is as described in "4 Laser Mode".

6.3 SETUP BUCKET

CALIBRATE BUCKET

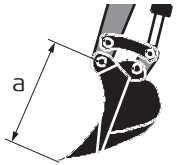
In order to calibrate the bucket sensor, you must input some information about the length and angles of the bucket to the PowerDigger Lite System.

Follow the instructions below to do so:

1. Press the Enter button ↵. You will now enter the User Menu.
2. Select the menu option **SETUP BUCKET**. You select a menu option by pressing the left/right arrows ◆▶.
3. Press the Enter button ↵ to enter the menu option **CALIBRATE BUCKET**.
4. Press the Enter button ↵ to enter the menu option **^v SELECT BUCKET**.
5. Select the bucket you want to calibrate ▲▼. It is possible to select between 30 buckets.
6. Press the Enter button ↵ to enter the menu option **BUCKET LEFT/RIGHT**.
7. Select whether the bucket sensor is placed left or right. ▲▼.
   When making your choice, you must look on the lid of the sensor. If the lid is turned against the left side, then you must choose LEFT and vice versa.

   ☞ If you choose the wrong side, the bucket and the graphics will work upside down.

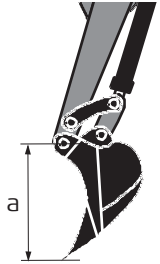
8. Press the right arrow ▶ until the display shows **BUCKET LEN**
9. Measure the distance between the pivot point of the bucket and the edge of the bucket.



a) BUCKET LEN

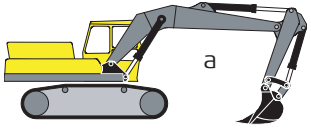
10. Press the up/down arrows ▲▼ until the display shows the distance between the pivot point and the edge of the bucket (BUCKET LEN) that you have measured in step 9.
11. Press the right arrow ▶ until the display shows **BUCKET ANGLE**.

12. Move the bucket of the excavator to a position where the line between the pivot point of the bucket and the edge of the bucket is in a straight vertical plane. To make sure that the line is in a straight vertical plane, we recommend that you use a spirit level. In calm weather, it is also possible to hold a plumb line to the pivot point and let it hang straight down. Then move the bucket until the leading edge touches the string.



a) BUCKET ANGLE

13. Press the 0.00 button when the bucket is in the position described before in step 12.
14. Press the right arrow ▶ until the display shows **BUCKET FLAT ANGLE**.
15. Move the bucket of the excavator to a position where the bucket can be used to level the surface evenly.

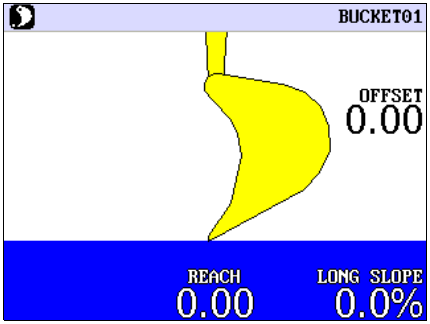


a) BUCKET FLAT ANGLE

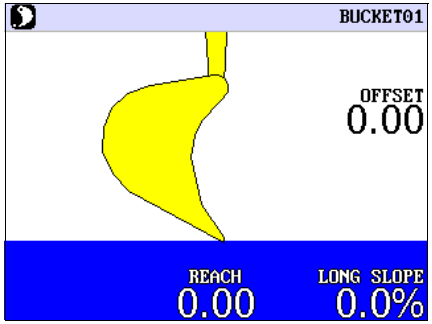
☞ This part of the calibration is used to set how the movements of the bucket are shown on the Control Box. The position you put the bucket into will correspond to the middle diode of the Bucket Angle Indicator on the Control Box.
See "2 PowerDigger Lite Control Box".

16. Press the 0.00 button when the bucket is in the position described before in step 15. The bucket sensor has now been calibrated.

You can mount a reversed Bucket.
Calibrate the reversed Bucket as usual and the graphic will reverse the Bucket on the screen.



"Standard" bucket view



"Reversed" bucket view

17. **DOG BONE L*4***
    This sub-menu is only used when bucket sensor is mounted on the dog bone.

18. **BUCKET NAME**
    This sub-menu is used to give the various buckets a name after they have been calibrated. If you state @ as the first letter in the name, the PowerDigger Lite will generate the names BUCKET 1, BUCKET 2 etc. according to the number of buckets you have calibrated to the system.
    By pressing the left/right arrows ◀▶, you can move the position of the cursor.
    By pressing the up/down arrows ▲▼, you can change the letter.
19. Press the Escape button 

three times to leave the User Menu.

BUCKET INDICATOR	Enables or disables the bucket angle indicator.
BUCKET GREENBAND	Sets the sensitivity of the bucket angle indicator.

6.4 MEASURE

Description

With this menu option you can let the PowerDigger Lite calculate slope, height, and length, in relation to two reference points.
You can choose which of the values is to be shown in the upper display.
Press the up/down arrows ▲▼ to select the value.
To let the PowerDigger Lite calculate slope, height and length, follow this procedure:

1. Place the tip of the bucket on the first reference point.
2. Press the [0.00] button to save the first reference point.
3. Place the tip of the bucket on the second reference point.

The upper blue box shows the slope, height or length according to which value you have selected.

If you want to work with the calculated slope, height and length, press the [L/S] button to save the second reference point.
After saving the second reference point, PowerDigger Lite automatically leaves the User Menu and returns to working mode.

☞ There is no timeout at this menu option.

6.5 PROFILE

General information

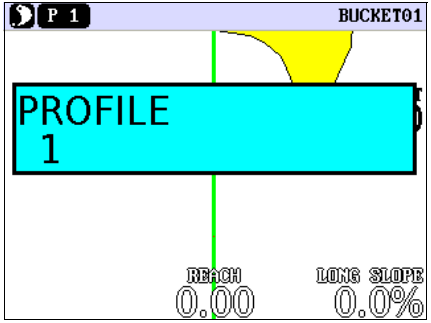
The basic idea of making profiles is either to **copy/save** a job that is already carried out or to pre-define various distances with a slope to match.
After defining the distances or copying a job you can then dig the job at a stretch.

When you work in profile mode, a laser as reference line cannot be used.

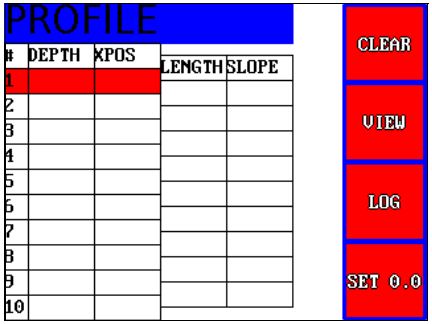
How to copy/save a job that already exists

1. Turn on the PowerDigger Lite Control Box.
2. Enter the User Menu by pressing the Enter button ↵.
3. Select the menu option **PROFILES** by pressing the left/right arrows ◆▶.
4. At the menu option **PROFILES** you can select a profile number by pressing the up/down arrows ▲▼.
   A small icon will indicate which profile is activated, for example **P 3**.
   Profile number 0 indicates that PowerDigger Lite is not running in profile mode.

   ☞ Profile number 11 is a Demo profile that cannot be changed.

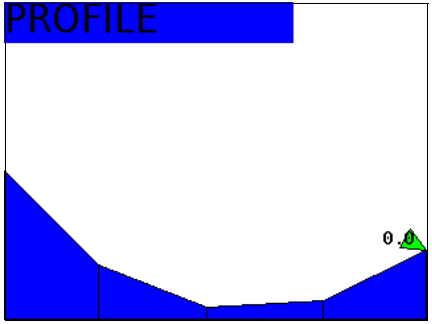


5. When you have selected a profile from 1 – 10, press the Enter button ↵ to activate the selected profile, and to enter the settings dialog for the selected profile.

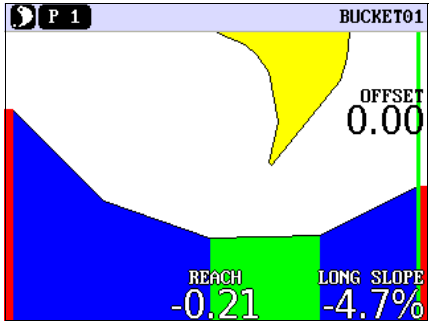


6. Place the bucket at the farthest point of the profile you want to copy/save.
7. Press the Offset button to LOG/Save this point as the first point of the profile.
8. Place the bucket at the second farthest point of the profile.
9. Press the Offset button to save this point as the second point. The slope and distance between the points is shown in the display.
10. Place the bucket at the third farthest point of the profile.
11. Press the Offset button to save this point as the third point. The slope and distance between the points is shown in the display.
12. Place the bucket at the fourth farthest point of the profile.
13. Press the Offset button to save this point as the fourth point. The slope and distance between the points is shown in the display. Continue this operation until you have saved all points in your profile. You can save up to 10 points in a profile.

You can get a graphic view of your profile by pressing the Slope button.



14. Press the Enter button ↵ two times to save and leave the setting of the profile.

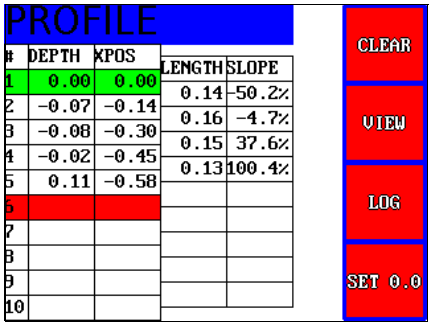


The green vertical line indicates your 0-point, the farthest point of the profile.

The 0-point can be moved the following way:

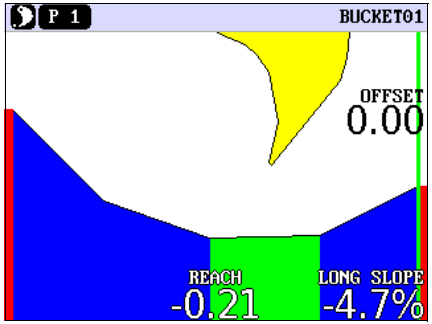
Enter the profile. Use the up/down arrows ▲▼ to move the red bar to the point that you want to be your new 0-point.

Press the Offset button (SET 0.0).



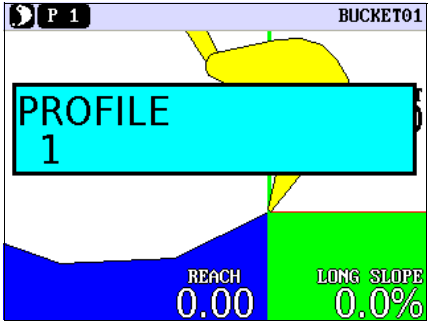
#	DEPTH	XPOS	LENGTH	SLOPE
1	0.00	0.00	0.14	-50.2%
2	-0.07	-0.14	0.16	-4.7%
3	-0.08	-0.30	0.15	37.6%
4	-0.02	-0.45	0.13	100.4%
5	0.11	-0.58		
6				
7				
8				
9				
10				

- The **green area** indicates that this area is included in the profile, and your bucket is working in this area right now.
- The **blue area** indicates that this area is included in the profile, but your bucket is not working in this area right now.
- The **red area** indicates that this area is NOT included in the profile.

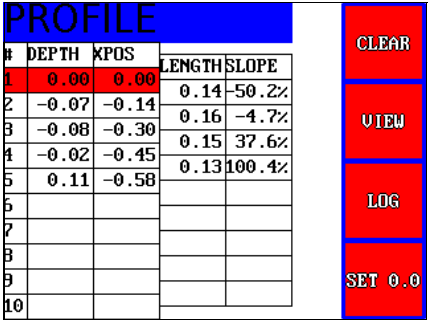


How to set up/change a profile by stating the length and slope

1. Turn on the PowerDigger Lite Control Box.
2. Enter the User Menu by pressing the Enter button ↵.
3. Select the menu option **PROFILES** by pressing the left/right arrows ◀▶.
4. At the menu option **PROFILES** you can select a profile number by pressing the up/down arrows ▲▼.
   Profile number 0 indicates that PowerDigger Lite is not running in profile mode. Profile number 11 is a Demo profile that cannot be changed.



5. When you have selected a profile from 1 – 10, press the Enter button ↵ to activate the selected profile, and to enter the settings dialog for the selected profile.

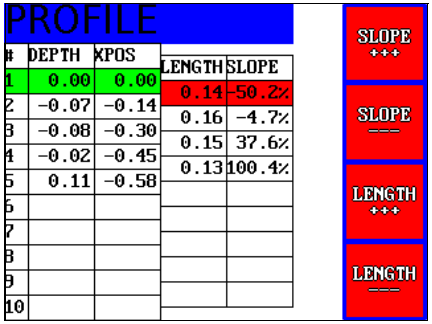


#	DEPTH	XPOS	LENGTH	SLOPE
1	0.00	0.00	0.14	-50.2%
2	-0.07	-0.14	0.16	-4.7%
3	-0.08	-0.30	0.15	37.6%
4	-0.02	-0.45	0.13	100.4%
5	0.11	-0.58		
6				
7				
8				
9				
10				

6. Press the right arrow ▶ to set up/change the selected profile.

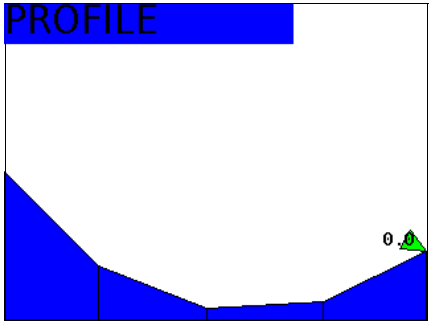
7. Press the Offset (+) or (−) button to state the length of the first stretch of the profile.

8. Press the Slope (+) or (−) button to state the slope of the first stretch of the profile.



9. Press the down arrow ▼ to get to the next stretch of the profile.
10. Press the Offset (+) or (−) button to state the length of the next stretch of the profile.
11. Press the Slope (+) or (−) button to state the slope of the next stretch of the profile.
    The length and slope between the points are shown in the display.
    Repeat the procedures 10. and 11. until you have stated all the stretches you want to include in the profile.
    You can state up to 10 stretches in the profile.

You can get a graphic view of your profile by pressing the left arrow ◀ and subsequently the Slope button



12. Press the Enter button ↵ two times to save and leave the setting of the profile.

6.6 CABLE DETECTION

Description

Please refer to the Cable Detection EZiDIG User Manual regarding the settings for CABLE DETECTION.

6.7 SERVICE MENU

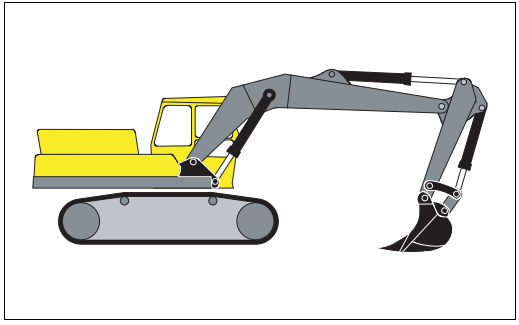
Description	Password protected menu for support personnel only.

7 Reversed Bucket

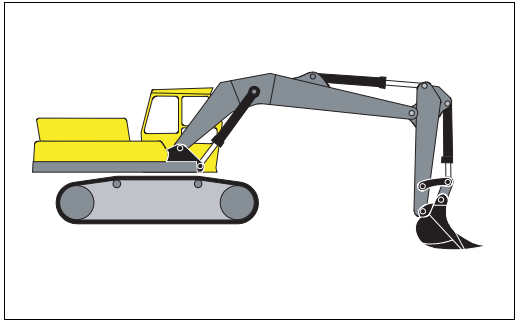
Description

You can mount a reversed bucket.

Calibrate the reversed bucket as a standard bucket and the graphic will reverse the bucket on the screen.



"Standard" bucket view



"Reversed" bucket view

8 Diagnosis Screen

Description

This is a diagnosis tool to view the status of sensors and error messages. If a cable breaks or a sensor is dead, it is easily possible to verify where the problem is.
To activate this screen, you must push the left/right arrows ◀▶ at the same time.

Example of a typical diagnosis screen

SENSOR	VALUE	VERSION	ENAB	STAT
ROLL	0.00		NO	OFF
PITCH	0.00		NO	OFF
BOOM1	28.88	XIS1 202	YES	ON
BOOM2	0.00		NO	OFF
STICK	-25.24	XIS1L203	YES	ON
BUCKET	19.14	IS2 3.01	YES	ON
TILT	0.00		NO	OFF
XIS1LASER	0x00			OFF
RS10 HEADING	0.00		NO	OFF
EXTENSION	0.00		NO	OFF
CABLE DET.	0		NO	OFF

XC12 v2.2.3

On the diagnosis screen you can see a detailed system status information.

The most important columns are the last two: ENAB and STAT.
They will show if there is a deviation.

- **ENAB** tells the setting for the sensor that has been made in the technical menu. When the sensor is activated, YES will be shown.
- **STAT** tells if the sensor is working.
  ON shows that the sensor is working, OFF shows a failure either in the sensor or in the cable connection from the previous sensor - this is meant from the cabin and out towards the bucket.

9 Care and Transport

9.1 General Notices

General information	Servicing the system only requires a minimum of time. All electronic components are enclosed in robust housings to safeguard them against mechanical damage.
Periodic checks	If any PowerDigger Lite components are subjected to severe impact, be sure to check for proper operation prior to performing any work with the system.

9.2 Transport

Transport in the field	When transporting the equipment in the field, always make sure that you carry the product in its original transport container.
Transport in a road vehicle	Never carry the product loose in a road vehicle. It can be affected by shock and vibration. Always carry the product in its transport container and secure it.
Shipping	When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.
Field adjustment	After transport inspect the field adjustment parameters given in this user manual before using the product.

9.3 Storage

Product	Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "11 Technical Data" for information about temperature limits.
Field adjustment	After long periods of storage inspect the field adjustment parameters given in this user manual before using the product.

9.4 Cleaning and Drying

Product	• Blow off dust. • Use a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol. Do not use other liquids; these may attack the polymer components.
Cables and Plugs	Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables.
Damp products	Dry the products at a temperature not greater than 40°C/108°F and clean them. Do not repack until everything is completely dry.

10 Safety Directions

10.1 General

Description

The following directions should enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

The person responsible for the product must ensure that all users understand these directions and adhere to them.

10.2 Intended Use

Permitted use

- Control of machine tool for generic working in height and slope, based on reference height, reference line, and machine configuration.
- Detection of machine configuration by machine-mounted slope sensors.
- Detection of a desired reference height and slope.
- Recording measurements.
- Computing by means of application software.
- Guidance of the operator.

Adverse use

- Use of the product without instruction.
- Use outside of the intended limits.
- Disabling safety systems.
- Removal of hazard notices.
- Opening the product using tools, for example screwdriver, unless this is specifically permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.

- Use of products with obviously recognizable damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at the work site, for example working on roads.
- Controlling of machines, moving objects or similar monitoring application without additional control- and safety installations.

Warning

Adverse use can lead to injury, malfunction and damage.
It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be operated until the user has been instructed how to work with it.

Warning

Unauthorised modification of machines by mounting the product may alter the function and safety of the machine.
Precautions:
Follow the instructions of the machine manufacturer. If no appropriate instruction is available, ask machine manufacturer for instructions before mounting the product.

10.3 Limits of Use

Environment

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.

Danger

Local safety authorities and safety experts must be contacted before working in hazardous areas, or in close proximity to electrical installations or similar situations by the person in charge of the product.

10.4 Responsibilities

Manufacturer of the product

Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a completely safe condition.

Manufacturers of non-Leica Geosystems accessories

The manufacturers of non-Leica Geosystems accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica Geosystems product.

Person in charge of the product

The person in charge of the product has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
- To be familiar with local regulations relating to safety and accident prevention.
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.

Warning

The person responsible for the product must ensure that it is used in accordance with the instructions. This person is also accountable for the training and the deployment of personnel who use the product and for the safety of the equipment in use.

Warning

This product may be installed on building machinery only by an appropriately trained and qualified specialist.

10.5 Hazards of Use

Warning

Only Leica Geosystems authorised service workshops are entitled to repair these products.

Caution

Installing near mechanically moving machine components may damage the product.
Precautions:
Deflect the mechanically moving machine components as far as possible and define a safe installation zone.

Warning

Beware of inadequate steering if machine is defective like after a crash or other damaging events or alterations to the machine.
Precautions:
Periodically perform control measurements and field adjustments on the machine as specified in the User Manual. While working, construction and grading should be checked by appropriate means, for example spirit level, tachymeter, before and after important measuring tasks.

Warning

While steering or navigating the machine accidents may occur due to a) the operator not paying attention to the surroundings (persons, ditches, traffic, etc.), or b) malfunctions (...of a system component, interference, etc).
Precautions:
The operator assures that the machine is operated, guided and monitored by a qualified user (e.g. driver). The user has to be able to take emergency measures, for example an emergency stop.

⚠ Warning

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far-reaching human, material, financial and environmental consequences.

Precautions:

All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.

⚠ Caution

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

Precautions:

Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important operations.

⚠ Danger

Because of the risk of electrocution, it is very dangerous to use poles and extensions in the vicinity of electrical installations such as power cables or electrical railways.

Precautions:

Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

⚠ Warning

If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning.

Precautions:

Do not use the product in a thunderstorm.

⚠ Warning

During dynamic applications, there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.

Precautions:

The person responsible for the product must make all users fully aware of the existing dangers.

⚠ Warning

Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.

Precautions:

Always ensure that the working site is adequately secured. Adhere to the regulations governing safety and accident prevention and road traffic.

⚠ Warning

If computers intended for use indoors are used in the field there is a danger of electric shock.

Precautions:

Adhere to the instructions given by the computer manufacturer with regard to field use in conjunction with Leica Geosystems products.

⚠ Caution

If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people may sustain injury.

Precautions:

When setting-up the product, make sure that the connecting cables, are correctly adapted, fitted, secured, and locked in position.

Avoid subjecting the product to mechanical stress.

⚠ Warning

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gas are produced which may impair health.

- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorised persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

Precautions:

The product must not be disposed with household waste.
Dispose of the product appropriately in accordance with the national regulations in force in your country.
Always prevent access to the product by unauthorised personnel.

Product specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http://www.leicageosystems.com/treatment or received from your Leica Geosystems dealer.

10.6 Electromagnetic Compatibility EMC

Description

The term Electromagnetic Compatability is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic distur-bances to other equip-ment.

Warning

Electromagnetic radiation can cause disturbances in other equipment.
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.

Caution

There is a risk that disturbances may be caused in other equipment if the product is used in conjunction with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.
Precautions:
Use only the equipment and accessories recommended by Leica Geosystems.
When combined with the product, they meet the strict requirements stipulated by the guide-lines and standards. When using computers and two-way radios, pay attention to the infor-mation about electromagnetic compatibility provided by the manufacturer.

Caution

Disturbances caused by electromagnetic radiation can result in erroneous measurements.
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by very intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.
Precautions:
Check the plausibility of results obtained under these conditions.

⚠ Warning

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.
Precautions:
While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

10.7 FCC Statement, Applicable in U.S.

Warning

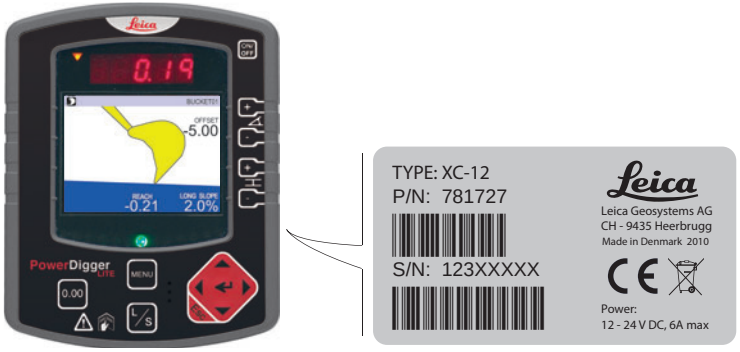
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.
These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication.
However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning

Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

Labelling PowerDigger Lite Control Box



Labelling Boom 1 Sensor

Labelling
Boom 2 Sensor

Labelling
Stick/Laser Sensor

Labelling
Bucket Sensor

11 Technical Data

11.1 Accuracy of the System

Digging system

Accuracy depends upon various factors including the calibration accuracy, the size of the machine, worn out joints, if the excavator is placed on stable ground.

The accuracy of the system is 0.2% of the reach of the machine, measured at the bucket point when the machine is positioned on a level surface.

11.2 General Technical Data

Protection class

Unit	Protection class
PowerDigger Lite Control Box	IP66
All Sensors	IP68

Temperature

Unit	Operating temperature [°C]	Storage temperature [°C]
All Units	-20 to +70	-40 to +80

PowerDigger Lite Control Box

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	1A @ 24VDC
Interfaces	2x CAN M12
Dimensions	4.7 x 6.3 x 2 inches (12 x 16 x 5 cm)
Weight	1.1 lbs (500g)

Stick/Laser Sensor

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	0,2A @ 24VDC
Interfaces	2x CAN M12
Range	19 cm to 150 m (depended on laser)

Parameter	Specification
Laser requirement	All Rotating Lasers (HeNe or Infrared Laser diodes visible and invisible)
Operating range	55 mm
Dimensions	3.2 x 4.7 x 1.2 inches (8 x 12 x 3 cm)
Weight	1.7 lbs (750g)

Bucket Sensor

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	0,2A @ 24VDC
Interfaces	1x CAN M12
Dimensions	1 x 1 x 2 inches (2.5 x 2.5 x 5 cm)
Weight	0.2 lbs (100g)

Boom1/Boom2 Sensor

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	0,2A @ 24VDC
Interfaces	2x CAN M12
Dimensions	3.2 x 4.7 x 1.2 inches (8 x 12 x 3 cm)
Weight	1.7 lbs (750g)

11.3 Conformity to National Regulations

Conformity to national regulations

CE Hereby, Leica Geosystems AG, declares that the PowerDigger Lite Control Box is in compliance with the essential requirements and other relevant provisions of the applicable European Directives. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.

12 International Limited Warranty, Software Licence Agreement

International Limited Warranty

This product is subject to the terms and conditions set out in the International Limited Warranty which you can download from the Leica Geosystems home page at http://www.leica-geosystems.com/internationalwarranty or collect from your Leica Geosystems distributor.

The foregoing warranty is exclusive and is in lieu of all other warranties, terms or conditions, express or implied, either in fact or by operation of law, statutory or otherwise, including warranties, terms or conditions of merchantability, fitness for a particular purpose, satisfactory quality and non-infringement, all of which are expressly disclaimed.

Software Licence Agreement

This product contains software that is preinstalled on the product, or that is supplied to you on a data carrier medium, or that can be downloaded by you online pursuant to prior authorisation from Leica Geosystems. Such software is protected by copyright and other laws and its use is defined and regulated by the Leica Geosystems Software License Agreement, which covers aspects such as, but not limited to, Scope of the License, Warranty, Intellectual Property Rights, Limitation of Liability, Exclusion of other Assurances, Governing Law and Place of Jurisdiction. Please make sure, that at any time you fully comply with the terms and conditions of the Leica Geosystems Software License Agreement.

Such agreement is provided together with all products and can also be referred to and downloaded at the Leica Geosystems home page at http://www.leica-geosystems.com/swlicense or collected from your Leica Geosystems distributor.

You must not install or use the software unless you have read and accepted the terms and conditions of the Leica Geosystems Software License Agreement. Installation or use of the software or any part thereof, is deemed to be an acceptance of all the terms and conditions

of such License Agreement. If you do not agree to all or some of the terms of such License Agreement, you may not download, install or use the software and you must return the unused software together with its accompanying documentation and the purchase receipt to the dealer from whom you purchased the product within ten (10) days of purchase to obtain a full refund of the purchase price.

Total Quality Management: Our commitment to total customer satisfaction.

Leica Geosystems AG, Heerbrugg, Switzerland, has been certified as being equipped with a quality system which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001) and Environmental Management Systems (ISO standard 14001).

Ask your local Leica Geosystems dealer for more information about our TQM program.

781979-3.0.0en
Original text

Leica Geosystems AG
Heinrich-Wild-Strasse
CH-9435 Heerbrugg
Switzerland
Phone +41 71 727 31 31
www.leica-geosystems.com

- when it has to be **right**

Leica Geosystems